

FACULTY OF SCIENCE AND HUMANITIES

## ACADEMIC CURRICULA

UNDERGRADUATE DEGREE PROGRAMME

Bachelor of Science (Honors)

in

Computer Science

Four Years

National Education Policy

Learning Outcome-based Curricula Framework

National Credit Framework

Academic Year

2024 - 2025



SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

(Deemed to be University u/s 3 of UGC Act, 1956)

Kattankulathur, Chengalpattu District 603203, Tamil Nadu, India

| <b>1. Vision Statement</b> |                                                                                                                                                                                                                                  |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stmt - 1                   | To reach the goals of expansion and improvement of the department and rank among the top computer science departments in the world for teaching, learning, research, and community involvement                                   |
| Stmt - 2                   | Ensure that students have high-quality learning experiences by implementing efficient classroom procedures, using active learning techniques, and creating chances for students and faculty to engage in meaningful interactions |

| <b>2. Mission Statement</b> |                                                                                                                                                                                                                 |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stmt - 1                    | To create, disseminate, and apply knowledge in all areas of computer science, including interdisciplinary fields that broaden the field's application and advance humankind                                     |
| Stmt - 2                    | To equip to work both independently and in teams to solve challenging problems across domains and foster the development of communication skills as an integral part of the profession                          |
| Stmt - 3                    | To be successful, moral, ethically strong in the diverse society and encourage consistent and constant active learning throughout the life that will positively impact growth of the individual and the country |
| Stmt - 4                    | To spearhead the progress of computer science by globally acknowledged research and technology transfer                                                                                                         |
| Stmt - 5                    | To be an aspirational, idealized future state for a company, act as inspiration and a roadmap for organizing and making decisions.                                                                              |

“Stmt” stands for Statement

| <b>3. Program Education Objectives (PEO)</b> |                                                                                                                                                                                                                                                                                    |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PEO - 1                                      | The graduates will use their expertise to further their careers and/or pursue advanced degrees.                                                                                                                                                                                    |
| PEO - 2                                      | The graduates will be able to solve issues creatively, communicate clearly, and work well in inclusive, varied multidisciplinary teams.                                                                                                                                            |
| PEO - 3                                      | The graduates will effectively execute hardware and/or software-related engineering projects to achieve customer business objectives and/or engage in fruitful research, our graduates will employ computing principles and techniques that are rooted in mathematics and science. |
| PEO - 4                                      | The graduates may become entrepreneurs who can innovate and develop software/hardware solutions through the utilization of design thinking and create value for their products                                                                                                     |
| PEO - 5                                      | The graduates shall exploit the best practices of cognitive ability and demonstrate the psychological fitness to work across the globe                                                                                                                                             |

| <b>4. Consistency of Program Education Objectives with Mission</b> |                   |                   |                   |                   |                   |
|--------------------------------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|                                                                    | Mission Stmt. – 1 | Mission Stmt. – 2 | Mission Stmt. - 3 | Mission Stmt. - 4 | Mission Stmt. – 5 |
| PEO - 1                                                            | High              | High              | Medium            | Low               | Medium            |
| PEO - 2                                                            | Medium            | High              | Medium            | Low               | Medium            |
| PEO - 3                                                            | High              | High              | Medium            | High              | Medium            |
| PEO - 4                                                            | High              | Medium            | Medium            | High              | High              |
| PEO - 5                                                            | High              | High              | High              | High              | High              |

\*\* H – High Correlation, M – Medium Correlation, L – Low Correlation

\*\* H, M, and L have numerical equivalents of 3, 2, 1 correspondingly

| <b>5. Programme Learning Outcomes (PLO)</b> |                                                                                            |
|---------------------------------------------|--------------------------------------------------------------------------------------------|
|                                             | Graduate Learning Attributes                                                               |
| PLO - 1                                     | The capacity to apply mathematical and computer knowledge                                  |
| PLO - 2                                     | The capacity to interact and converse                                                      |
| PLO - 3                                     | An understanding towards the tradeoffs involved in design decisions computational systems. |
| PLO - 4                                     | Accept responsibility for personal behavior and actions                                    |

|         |                                                                                                                                                                                                                                                       |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PLO - 5 | A proficiency with the techniques, skill sets, and software/hardware tools                                                                                                                                                                            |
| PLO - 6 | A comprehension of the duties and obligations related to the computer profession in terms of professionalism, ethics, la                                                                                                                              |
| PLO - 7 | The capacity to evaluate the impact of computers and software/hardware products among common people, groups, and society                                                                                                                              |
| PLO - 8 | Development of science and society through entrepreneurship and innovative technologies for various needs and demands                                                                                                                                 |
| PSO - 1 | Make an effort to use and create simulation tools that can aid in the solution of simple to complicated problems requiring computation-based and computation-oriented solutions that are low-complexity, optimized, energy-efficient, and indigenous. |
| PSO - 2 | A zeal to engage with cutting-edge technologies in order to quickly find solutions for an ecosystem of intelligent applications.                                                                                                                      |

PSO – Programme Specific Outcome

| <b>6. Mapping of PLOs with PEOs</b> |         |         |         |         |         |         |         |         |         |         |
|-------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|                                     | PLO - 1 | PLO - 2 | PLO - 3 | PLO - 4 | PLO - 5 | PLO - 6 | PLO - 7 | PLO - 8 | PSO - 1 | PSO - 2 |
| PEO - 1                             | 2       | 2       | 3       | 2       | 2       | 1       | 1       | 3       | 2       | 2       |
| PEO - 2                             | 3       | 3       | 2       | 1       | 2       | 1       | 1       | 3       | 2       | 2       |
| PEO - 3                             | 3       | 3       | 2       | 3       | 3       | 2       | 3       | 2       | 1       | 2       |
| PEO - 4                             | 1       | 1       | 3       | 3       | 2       | 1       | 3       | 3       | 1       | 3       |
| PEO - 5                             | 3       | 3       | 3       | 3       | 2       | 3       | 3       | 3       | 1       | 3       |

## 7. Programme Structure

|                                       |                                                       |                |   |   |    |  |  |  |  |
|---------------------------------------|-------------------------------------------------------|----------------|---|---|----|--|--|--|--|
|                                       |                                                       |                |   |   |    |  |  |  |  |
|                                       |                                                       |                |   |   |    |  |  |  |  |
| Discipline Core Courses (C)           |                                                       |                |   |   |    |  |  |  |  |
| Course<br>Code                        | Course<br>Title                                       | Hours/<br>Week |   |   | C  |  |  |  |  |
|                                       |                                                       | L              | T | P |    |  |  |  |  |
| UCS24101J                             | Digital Electronics                                   | 3              | 0 | 3 | 4  |  |  |  |  |
| USA24102J                             | Programming for Problem Solving                       | 3              | 0 | 3 | 4  |  |  |  |  |
| UMS24101T                             | Discrete Mathematical Structures                      | 4              | 0 | 0 | 4  |  |  |  |  |
| USA24201J                             | Data Structures and Algorithms                        | 3              | 0 | 3 | 4  |  |  |  |  |
| UCS24202J                             | Object Oriented Programming using Java                | 3              | 0 | 3 | 4  |  |  |  |  |
| UMS24202T                             | Mathematical Foundation                               | 4              | 0 | 0 | 4  |  |  |  |  |
| UCS24301J                             | Operating System                                      | 3              | 0 | 3 | 4  |  |  |  |  |
| USA24302J                             | Database Management System                            | 3              | 0 | 3 | 4  |  |  |  |  |
| UMS24303T                             | Statistical Methods                                   | 4              | 0 | 0 | 4  |  |  |  |  |
| USA24401J                             | Python Programming                                    | 3              | 0 | 3 | 4  |  |  |  |  |
| Total Learning Credits                |                                                       |                |   |   | 40 |  |  |  |  |
|                                       |                                                       |                |   |   |    |  |  |  |  |
| Discipline Core/ Elective Courses (D) |                                                       |                |   |   |    |  |  |  |  |
| Course<br>Code                        | Course<br>Title                                       | Hours/<br>Week |   |   | C  |  |  |  |  |
|                                       |                                                       | L              | T | P |    |  |  |  |  |
| UMS24D01T                             | Resource Management Techniques                        | 4              | 0 | 0 | 4  |  |  |  |  |
| UMS24D02T                             | Numerical Methods                                     |                |   |   |    |  |  |  |  |
| UCS24D01J                             | Software Engineering                                  |                |   |   |    |  |  |  |  |
| UCS24D02J                             | Computer Networks and Data Communication              | 3              | 0 | 3 | 4  |  |  |  |  |
| UCS24D03J                             | Object Oriented Analysis and Design                   | 3              | 0 | 3 | 4  |  |  |  |  |
| UCS24D04J                             | Machine Learning                                      |                |   |   |    |  |  |  |  |
| UCS24D05J                             | Fundamentals of Business Application Development      | 3              | 0 | 3 | 4  |  |  |  |  |
| UCS24D06J                             | NLP and Language Models                               |                |   |   |    |  |  |  |  |
| USA24D07J                             | Cloud Computing                                       | 3              | 0 | 3 | 4  |  |  |  |  |
| UCS24D08J                             | Microprocessors and Embedded Systems                  |                |   |   |    |  |  |  |  |
| UCS24D09J                             | Mobile Application Development                        | 3              | 0 | 3 |    |  |  |  |  |
| USA24D10T                             | Wireless Communication and Mobile Computing           | 4              | 0 | 0 | 4  |  |  |  |  |
| UCS24D11J                             | Web Application Framework                             | 3              | 0 | 2 | 4  |  |  |  |  |
| UCS24D12J                             | Computer Vision                                       |                |   |   |    |  |  |  |  |
| UCS24D13J                             | Big Data Analytics                                    | 3              | 0 | 2 | 4  |  |  |  |  |
| UCS24D14J                             | Cryptography and Network Security                     |                |   |   |    |  |  |  |  |
| UCS24D15J                             | AI and Business Analytics                             | 3              | 0 | 2 | 4  |  |  |  |  |
| USA24D18J                             | Cyber Security                                        |                |   |   |    |  |  |  |  |
| USA24D20J                             | Blockchain Technology                                 | 3              | 0 | 2 | 4  |  |  |  |  |
| UCS24D18T                             | Introduction to Cyber Physical Systems                | 4              | 0 | 0 | 4  |  |  |  |  |
| Total Learning Credits                |                                                       |                |   |   | 40 |  |  |  |  |
|                                       |                                                       |                |   |   |    |  |  |  |  |
| Elective Courses (Minor) (E)          |                                                       |                |   |   |    |  |  |  |  |
| Course<br>Code                        | Course<br>Title                                       | Hours/<br>Week |   |   | C  |  |  |  |  |
|                                       |                                                       | L              | T | P |    |  |  |  |  |
| UDS24E01J                             | Data Science and Analytics                            | 3              | 0 | 3 | 4  |  |  |  |  |
| UDS24E02J                             | Data Analytics using Spreadsheet                      | 3              | 0 | 3 | 4  |  |  |  |  |
| UDS24E03J                             | Essentials of Machine Learning                        | 3              | 0 | 3 | 4  |  |  |  |  |
| UDS24E04J                             | Programming using R                                   | 3              | 0 | 3 | 4  |  |  |  |  |
| UDS24E05J                             | Programming using Python                              | 3              | 0 | 3 | 4  |  |  |  |  |
| UDS24E06J                             | Introduction to Deep Learning                         | 3              | 0 | 3 | 4  |  |  |  |  |
| UDS24E07J                             | Applications of Computer Vision                       | 3              | 0 | 3 | 4  |  |  |  |  |
| UDS24E08J                             | Data Visualization Tools                              | 3              | 0 | 3 | 4  |  |  |  |  |
| Total Learning Credits                |                                                       |                |   |   | 32 |  |  |  |  |
|                                       |                                                       |                |   |   |    |  |  |  |  |
| Multidisciplinary Courses (M)         |                                                       |                |   |   |    |  |  |  |  |
| Course<br>Code                        | Course<br>Title                                       | Hours/<br>Week |   |   | C  |  |  |  |  |
|                                       |                                                       | L              | T | P |    |  |  |  |  |
| UCS24M01J                             | Introduction to ICT Tools                             | 2              | 0 | 2 | 3  |  |  |  |  |
| UCS24M02J                             | Fundamentals of Digital Marketing                     | 3              | 0 | 1 | 3  |  |  |  |  |
| UCS24M03J                             | Basics of Web Application Development                 | 2              | 0 | 2 | 3  |  |  |  |  |
| Total Learning Credits                |                                                       |                |   |   | 9  |  |  |  |  |
|                                       |                                                       |                |   |   |    |  |  |  |  |
| Value Added Courses (V)               |                                                       |                |   |   |    |  |  |  |  |
| Course<br>Code                        | Course<br>Title                                       | Hours/<br>Week |   |   | C  |  |  |  |  |
|                                       |                                                       | L              | T | P |    |  |  |  |  |
| UCD24V01T                             | Essentials of Artificial Intelligence                 | 1              | 0 | 0 | 1  |  |  |  |  |
| UES24V01T                             | Environmental Studies                                 | 2              | 0 | 0 | 2  |  |  |  |  |
| UCD24V02T                             | Universal Human Values                                | 2              | 0 | 0 | 2  |  |  |  |  |
| Total Learning Credits                |                                                       |                |   |   | 5  |  |  |  |  |
|                                       |                                                       |                |   |   |    |  |  |  |  |
| Ability Enhancement Courses (A)       |                                                       |                |   |   |    |  |  |  |  |
| Course<br>Code                        | Course<br>Title                                       | Hours/<br>Week |   |   | C  |  |  |  |  |
|                                       |                                                       | L              | T | P |    |  |  |  |  |
| ULT24AE1J                             | Tamil - I                                             |                |   |   |    |  |  |  |  |
| ULH24AE1J                             | Hindi - I                                             | 2              | 0 | 2 | 3  |  |  |  |  |
| ULF24AE1J                             | French - I                                            |                |   |   |    |  |  |  |  |
| ULE24AE1J                             | English                                               | 2              | 0 | 2 | 3  |  |  |  |  |
| ULT24AE2J                             | Tamil - II                                            |                |   |   |    |  |  |  |  |
| ULH24AE2J                             | Hindi - II                                            | 2              | 0 | 2 | 3  |  |  |  |  |
| ULF24AE2J                             | French - II                                           |                |   |   |    |  |  |  |  |
| Total Learning Credits                |                                                       |                |   |   | 9  |  |  |  |  |
|                                       |                                                       |                |   |   |    |  |  |  |  |
| Skill Enhancement Courses (S)         |                                                       |                |   |   |    |  |  |  |  |
| Course<br>Code                        | Course<br>Title                                       | Hours/<br>Week |   |   | C  |  |  |  |  |
|                                       |                                                       | L              | T | P |    |  |  |  |  |
| UCD24S01J                             | Verbal Ability and Skill Development                  | 1              | 0 | 2 | 2  |  |  |  |  |
| UCD24S02L                             | Quantitative Aptitude and Logical Reasoning           | 0              | 0 | 2 | 1  |  |  |  |  |
| UCD24S03J                             | Industry Oriented Employability and Leadership Skills | 1              | 0 | 2 | 2  |  |  |  |  |
| UEN24S01L                             | Communication Skills                                  | 0              | 0 | 4 | 2  |  |  |  |  |
| UCD24S04J                             | Career Readiness and Professional Skills              | 1              | 0 | 2 | 2  |  |  |  |  |
| Total Learning Credits                |                                                       |                |   |   | 9  |  |  |  |  |

| Project Work / Internship (P) |                                   |            |   |    |  |    |
|-------------------------------|-----------------------------------|------------|---|----|--|----|
| Course Code                   | Course Title                      | Hours/Week |   |    |  |    |
|                               |                                   | L          | T | P  |  |    |
| UCS24P01L                     | Internship - I                    | -          | - | -  |  | 1  |
| UCS24P02L                     | Internship – II                   | -          | - | -  |  | 1  |
| UCS24P03L                     | Project Work                      | 0          | 0 | 4  |  | 2  |
| UCS24P04L                     | Research Project and Dissertation | 0          | 0 | 24 |  | 12 |
| UCS24P05L                     | Professional Internship           |            |   |    |  |    |
| Total Learning Credits        |                                   |            |   |    |  | 16 |

| Mandatory Courses (Y)  |                  |            |   |   |  |   |
|------------------------|------------------|------------|---|---|--|---|
| Course Code            | Course Title     | Hours/Week |   |   |  |   |
|                        |                  | L          | T | P |  |   |
| UNS24Y01L              | NSS              | 0          | 0 | 0 |  | 0 |
| UNC24Y01L              | NCC              |            |   |   |  |   |
| UNO24Y01L              | NSO              |            |   |   |  |   |
| UYG24Y01L              | YOGA             |            |   |   |  |   |
| UMI24Y01L              | My India Project | 0          | 0 | 0 |  | 0 |
| Total Learning Credits |                  |            |   |   |  | 0 |

Internship – I to be completed during Summer Vacation of the First year  
 Internship – II to be completed during Summer Vacation of the Second year

Students from other departments can enroll in Elective Courses (Minor) (E)  
 Students from all departments will be able to enroll in Multidisciplinary Courses (M).

**8. Course Allocation across Semesters**

| Semester – I     |                                      |                   |   |   |    |
|------------------|--------------------------------------|-------------------|---|---|----|
| Course Code      | Course Title                         | Sessions Per Week |   |   | C  |
|                  |                                      | L                 | T | P |    |
| ULT24AE1J        | Tamil – I                            | 2                 | 0 | 2 | 3  |
| ULH24AE1J        | Hindi – I                            |                   |   |   |    |
| ULF24AE1J        | French – I                           |                   |   |   |    |
| ULE24AE1J        | English                              | 2                 | 0 | 2 | 3  |
| UCS24101J        | Digital Electronics                  | 3                 | 0 | 3 | 4  |
| USA24102J        | Programming for Problem Solving      | 3                 | 0 | 3 | 4  |
| UMS24101T        | Discrete Mathematical Structures     | 4                 | 0 | 0 | 4  |
| UCD24S01J        | Verbal Ability and Skill Development | 1                 | 0 | 2 | 2  |
| Learning Credits |                                      |                   |   |   | 20 |

| Semester – II    |                                             |                   |   |   |    |
|------------------|---------------------------------------------|-------------------|---|---|----|
| Course Code      | Course Title                                | Sessions Per Week |   |   | C  |
|                  |                                             | L                 | T | P |    |
| ULT24AE2J        | Tamil – II                                  | 2                 | 0 | 2 | 3  |
| ULH24AE2J        | Hindi – II                                  |                   |   |   |    |
| ULF24AE2J        | French – II                                 |                   |   |   |    |
| USA24201J        | Data Structures and Algorithms              | 3                 | 0 | 3 | 4  |
| UCS24202J        | Object Oriented Programming using Java      | 3                 | 0 | 3 | 4  |
| UMS24202T        | Mathematical Foundation                     | 4                 | 0 | 0 | 4  |
| UCD24V01T        | Essentials of Artificial Intelligence       | 1                 | 0 | 0 | 1  |
|                  | Multidisciplinary Course – I                |                   |   |   | 3  |
| UCD24S02L        | Quantitative Aptitude and Logical Reasoning | 0                 | 0 | 2 | 1  |
| UNS24Y01L        | NSS                                         | 0                 | 0 | 0 | 0  |
| UNC24Y01L        | NCC                                         |                   |   |   |    |
| UNO24Y01L        | NSO                                         |                   |   |   |    |
| UYG24Y01L        | YOGA                                        |                   |   |   |    |
| Learning Credits |                                             |                   |   |   | 20 |

**Total Learning Credits of Courses of FIRST Year = 40**

| <b>Semester – III</b>         |                               |                          |          |          |           |
|-------------------------------|-------------------------------|--------------------------|----------|----------|-----------|
| <b>Course Code</b>            | <b>Course Title</b>           | <b>Sessions Per Week</b> |          |          | <b>C</b>  |
|                               |                               | <b>L</b>                 | <b>T</b> | <b>P</b> |           |
| UCS24301J                     | Operating System              | 3                        | 0        | 3        | 4         |
| USA24302J                     | Database Management System    | 3                        | 0        | 3        | 4         |
| UMS24303T                     | Statistical Methods           | 4                        | 0        | 0        | 4         |
|                               | Minor Elective – I            |                          |          |          | 4         |
| UCS24P01L                     | Internship – I                | 0                        | 0        | 0        | 1         |
|                               | Multidisciplinary Course – II |                          |          |          | 3         |
| <b>Total Learning Credits</b> |                               |                          |          |          | <b>20</b> |

| <b>Semester – IV</b>          |                                                       |                          |          |          |           |
|-------------------------------|-------------------------------------------------------|--------------------------|----------|----------|-----------|
| <b>Course Code</b>            | <b>Course Title</b>                                   | <b>Sessions Per Week</b> |          |          | <b>C</b>  |
|                               |                                                       | <b>L</b>                 | <b>T</b> | <b>P</b> |           |
| USA24401J                     | Python Programming                                    | 3                        | 0        | 3        | 4         |
| UMS24D01T                     | Resource Management Techniques                        | 4                        | 0        | 0        | 4         |
| UMS24D02T                     | Numerical Methods                                     |                          |          |          |           |
|                               | Minor Elective – II                                   |                          |          |          | 4         |
|                               | Minor Elective – III                                  |                          |          |          | 4         |
| UEN24S01L                     | Communication Skills                                  | 0                        | 0        | 4        | 2         |
| UCD24S03J                     | Industry Oriented Employability and Leadership Skills | 1                        | 0        | 2        | 2         |
| UMI24Y01L                     | My India Project                                      | 0                        | 0        | 0        | 0         |
| <b>Total Learning Credits</b> |                                                       |                          |          |          | <b>20</b> |

**Total Learning Credits of Courses of SECOND Year = 40**

| <b>Semester – V</b>           |                                          |                          |          |          |           |
|-------------------------------|------------------------------------------|--------------------------|----------|----------|-----------|
| <b>Course Code</b>            | <b>Course Title</b>                      | <b>Sessions Per Week</b> |          |          | <b>C</b>  |
|                               |                                          | <b>L</b>                 | <b>T</b> | <b>P</b> |           |
| UCS24D01J                     | Software Engineering                     | 3                        | 0        | 3        | 4         |
| UCS24D02J                     | Computer Networks and Data Communication |                          |          |          |           |
| UCS24D03J                     | Object Oriented Analysis and Design      | 3                        | 0        | 3        | 4         |
| UCS24D04J                     | Machine Learning                         |                          |          |          |           |
|                               | Minor Elective – IV                      |                          |          |          | 4         |
|                               | Multidisciplinary Course – III           |                          |          |          | 3         |
| UES24V01T                     | Environmental Studies                    | 2                        | 0        | 0        | 2         |
| UCD24S04J                     | Career Readiness and Professional Skills | 1                        | 0        | 2        | 2         |
| UCS24P02L                     | Internship – II                          | 0                        | 0        | 0        | 1         |
| <b>Total Learning Credits</b> |                                          |                          |          |          | <b>20</b> |

| <b>Semester – VI</b>          |                                                  |                          |          |          |           |
|-------------------------------|--------------------------------------------------|--------------------------|----------|----------|-----------|
| <b>Course Code</b>            | <b>Course Title</b>                              | <b>Sessions Per Week</b> |          |          | <b>C</b>  |
|                               |                                                  | <b>L</b>                 | <b>T</b> | <b>P</b> |           |
| UCS24D05J                     | Fundamentals of Business Application Development | 3                        | 0        | 3        | 4         |
| UCS24D06J                     | NLP and Language Models                          |                          |          |          |           |
| USA24D07J                     | Cloud Computing                                  | 3                        | 0        | 3        | 4         |
| UCS24D08J                     | Microprocessors and Embedded Systems             |                          |          |          |           |
|                               | Minor Elective – V                               |                          |          |          | 4         |
|                               | Minor Elective – VI                              |                          |          |          | 4         |
| UCS24P03L                     | Project Work                                     | 0                        | 0        | 4        | 2         |
| UCD24V02T                     | Universal Human Values                           | 2                        | 0        | 0        | 2         |
| <b>Total Learning Credits</b> |                                                  |                          |          |          | <b>20</b> |

**Total Learning Credits of Courses of THIRD Year = 40**

| <b>Semester – VII</b>   |                                             |                          |          |          |           |
|-------------------------|---------------------------------------------|--------------------------|----------|----------|-----------|
| <b>Course Code</b>      | <b>Course Title</b>                         | <b>Sessions Per Week</b> |          |          | <b>C</b>  |
|                         |                                             | <b>L</b>                 | <b>T</b> | <b>P</b> |           |
| UCS24D09J               | Mobile Application Development              | 3                        | 0        | 3        | 4         |
| USA24D10T               | Wireless Communication and Mobile Computing | 4                        | 0        | 0        |           |
| UCS24D11J               | Web Application Framework                   | 3                        | 0        | 2        | 4         |
| UCS24D12J               | Computer Vision                             |                          |          |          |           |
| UCS24D13J               | Big Data Analytics                          | 3                        | 0        | 2        | 4         |
| UCS24D14J               | Cryptography and Network Security           |                          |          |          |           |
|                         | Minor Elective – VII                        |                          |          |          | 4         |
|                         | Minor Elective – VIII                       |                          |          |          | 4         |
| <b>Learning Credits</b> |                                             |                          |          |          | <b>20</b> |

| Semester – VIII  |                                        |             |   |    |    |
|------------------|----------------------------------------|-------------|---|----|----|
| Course Code      | Course Title                           | Hours/ Week |   |    | C  |
|                  |                                        | L           | T | P  |    |
| UCS24D15J        | AI and Business Analytics              | 3           | 0 | 2  | 4  |
| USA24D18J        | Cyber Security                         |             |   |    |    |
| USA24D20J        | Blockchain Technology                  | 3           | 0 | 2  | 4  |
| UCS24D18T        | Introduction to Cyber Physical Systems | 4           | 0 | 0  |    |
| UCS24P04L        | Research Project and Dissertation      | 0           | 0 | 24 | 12 |
| UCS24P05L        | Professional Internship                |             |   |    |    |
| Learning Credits |                                        |             |   |    | 20 |

**Total Learning Credits of Courses of FOURTH Year = 40**

### 8.1 Elective Courses (MINOR) offered by the Department of Computer Science to other Departments (Excluding Department of Computer Science)

| Elective Courses (Minor) (E) |             |                                  |                   |   |   |    |
|------------------------------|-------------|----------------------------------|-------------------|---|---|----|
| Semester                     | Course Code | Course Title                     | Sessions Per Week |   |   | C  |
|                              |             |                                  | L                 | T | P |    |
| III                          | UDS24E01J   | Data Science and Analytics       | 3                 | 0 | 3 | 4  |
| IV                           | UDS24E02J   | Data Analytics using Spreadsheet | 3                 | 0 | 3 | 4  |
| IV                           | UDS24E03J   | Essentials of Machine Learning   | 3                 | 0 | 3 | 4  |
| V                            | UDS24E04J   | Programming using R              | 3                 | 0 | 3 | 4  |
| VI                           | UDS24E05J   | Programming using Python         | 3                 | 0 | 3 | 4  |
| VI                           | UDS24E06J   | Introduction to Deep Learning    | 3                 | 0 | 3 | 4  |
| VII                          | UDS24E07J   | Applications of Computer Vision  | 3                 | 0 | 3 | 4  |
| VII                          | UDS24E08J   | Data Visualization Tools         | 3                 | 0 | 3 | 4  |
| Total Learning Credits       |             |                                  |                   |   |   | 32 |

### 8.2 Multidisciplinary Courses offered by the Department of Computer Science to all departments (Including Department of Computer Science)

| Multidisciplinary Courses (M) |             |                                       |                   |   |   |   |
|-------------------------------|-------------|---------------------------------------|-------------------|---|---|---|
| Semester                      | Course Code | Course Title                          | Sessions Per Week |   |   | C |
|                               |             |                                       | L                 | T | P |   |
| II                            | UCS24M01J   | Introduction to ICT Tools             | 2                 | 0 | 2 | 3 |
| III                           | UCS24M02J   | Fundamentals of Digital Marketing     | 3                 | 0 | 1 | 3 |
| V                             | UCS24M03J   | Basics of Web Application Development | 2                 | 0 | 2 | 3 |
| Total Learning Credits        |             |                                       |                   |   |   | 9 |

| <b>9. Programme Articulation Matrix</b> |                                                       |                                  |          |          |          |          |          |          |          |              |              |  |
|-----------------------------------------|-------------------------------------------------------|----------------------------------|----------|----------|----------|----------|----------|----------|----------|--------------|--------------|--|
| <b>Course Code</b>                      | <b>Course Title</b>                                   | <b>Program Learning Outcomes</b> |          |          |          |          |          |          |          |              |              |  |
|                                         |                                                       | <b>1</b>                         | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> | <b>PSO 1</b> | <b>PSO 2</b> |  |
| ULT24AE1J                               | Tamil – I                                             | 3                                | 2        | 2        | 2        | 2        | 2        | -        | 2        | 2            | 2            |  |
| ULH24AE1J                               | Hindi – I                                             | 3                                | 2        | 2        | 2        | 2        | 2        | -        | 2        | 2            | 2            |  |
| ULF24AE1J                               | French – I                                            | 3                                | 2        | 2        | 2        | 2        | 3        | -        | 2        | 2            | 2            |  |
| ULE24AE1J                               | English                                               | 3                                | 2        | 2        | 2        | 2        | 3        | -        | 2        | 2            | 2            |  |
| UCS24101J                               | Digital Electronics                                   | 3                                | 2        | 2        | 2        | 2        | 3        | -        | 2        | -            | -            |  |
| USA24102J                               | Programming for Problem Solving                       | 3                                | 2        | 2        | 2        | 2        | 3        | -        | 2        | 2            | 2            |  |
| UMS24101T                               | Discrete Mathematical Structures                      | 3                                | 1        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| UCD24S01J                               | Verbal Ability and Skill Development                  | 3                                | 1        | 3        | -        | 2        | 2        | -        | -        | -            | -            |  |
| ULT24AE2J                               | Tamil – II                                            | 3                                | 2        | 2        | 2        | 2        | 2        | -        | 2        | 2            | 2            |  |
| ULH24AE2J                               | Hindi – II                                            | 3                                | 2        | 2        | 2        | 2        | 2        | -        | 2        | 2            | 2            |  |
| ULF24AE2J                               | French – II                                           | 3                                | 2        | 2        | 2        | 2        | 3        | -        | 2        | 2            | 2            |  |
| USA24201J                               | Data Structures and Algorithms                        | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| UCS24202J                               | Object Oriented Programming using Java                | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| UMS24202T                               | Mathematical Foundation                               | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| UCD24V01T                               | Essentials of Artificial Intelligence                 | 3                                | 3        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
|                                         | Multidisciplinary Course – I                          |                                  |          |          |          |          |          |          |          |              |              |  |
| UCD24S02L                               | Quantitative Aptitude and Logical Reasoning           | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| UNS24Y01L                               | NSS                                                   | -                                | 3        | -        | 3        | -        | -        | 3        | -        | -            | -            |  |
| UNC24Y01L                               | NCC                                                   | -                                | 3        | -        | 3        | -        | -        | 3        | -        | -            | -            |  |
| UNO24Y01L                               | NSO                                                   | -                                | 3        | -        | 3        | -        | -        | 3        | -        | -            | -            |  |
| UYG24Y01L                               | YOGA                                                  | -                                | 3        | -        | 3        | -        | -        | 3        | -        | -            | -            |  |
| UCS24301J                               | Operating System                                      | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| USA24302J                               | Database Management System                            | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| UMS24303T                               | Statistical Methods                                   | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
|                                         | Minor Elective – I                                    |                                  |          |          |          |          |          |          |          |              |              |  |
| UCS24P01L                               | Internship – I                                        | 3                                | 3        | 3        | 2        | 3        | 2        | 2        | 3        | 2            | 2            |  |
|                                         | Multidisciplinary Course – II                         |                                  |          |          |          |          |          |          |          |              |              |  |
| USA24401J                               | Python Programming                                    | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| UMS24D01T                               | Resource Management Techniques                        | 3                                | 2        | 3        | 2        | 2        | 3        | -        | 2        | 2            | -            |  |
| UMS24D02T                               | Numerical Methods                                     | 3                                | 2        | 3        | 2        | 2        | 3        | -        | 2        | 2            | -            |  |
|                                         | Minor Elective – II                                   |                                  |          |          |          |          |          |          |          |              |              |  |
|                                         | Minor Elective – III                                  |                                  |          |          |          |          |          |          |          |              |              |  |
| UEN24S01L                               | Communication Skills                                  | 3                                | 3        | 3        | 2        | 3        | 2        | 2        | 3        | 2            | 2            |  |
| UCD24S03J                               | Industry Oriented Employability and Leadership Skills | 3                                | 3        | 3        | 2        | 3        | 2        | 2        | 3        | 2            | 2            |  |
| UMI24Y01L                               | My India Project                                      | 3                                | 3        | 3        | 2        | 3        | 2        | 2        | 3        | 2            | 2            |  |
| UCS24D01J                               | Software Engineering                                  | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| UCS24D02J                               | Computer Networks and Data Communication              | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| UCS24D03J                               | Object Oriented Analysis and Design                   | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| UCS24D04J                               | Machine Learning                                      | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| UCS24E04J                               | Minor Elective – IV                                   |                                  |          |          |          |          |          |          |          |              |              |  |
|                                         | Multidisciplinary Course – III                        |                                  |          |          |          |          |          |          |          |              |              |  |
| UES24V01T                               | Environmental Studies                                 | -                                | 3        | -        | 3        | -        | -        | 3        | -        | -            | -            |  |
| UCD24S04J                               | Career Readiness and Professional Skills              | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| UCS24P02L                               | Internship – II                                       | 3                                | 3        | 3        | 2        | 3        | 2        | 2        | 3        | 2            | 2            |  |
| UCS24D05J                               | Fundamentals of Business Application Development      | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| UCS24D06J                               | NLP and Language Models                               | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| USA24D07J                               | Cloud Computing                                       | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| UCS24D08J                               | Microprocessors and Embedded Systems                  | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
|                                         | Minor Elective – V                                    |                                  |          |          |          |          |          |          |          |              |              |  |
|                                         | Minor Elective – VI                                   |                                  |          |          |          |          |          |          |          |              |              |  |
| UCS24P03L                               | Project Work                                          | 3                                | 3        | 3        | 2        | 3        | 2        | 2        | 3        | 2            | 2            |  |
| UCD24V02T                               | Universal Human Values                                | -                                | 3        | -        | 3        | -        | -        | 3        | -        | -            | -            |  |
| UCS24D09J                               | Mobile Application Development                        | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| USA24D10T                               | Wireless Communication and Mobile Computing           | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |
| UCS24D11J                               | Web Application Framework                             | 3                                | 2        | 2        | 2        | 3        | 3        | -        | 2        | 2            | 2            |  |

|                |                                        |   |   |   |   |   |   |   |   |   |   |
|----------------|----------------------------------------|---|---|---|---|---|---|---|---|---|---|
| UCS24D12J      | Computer Vision                        | 3 | 2 | 2 | 2 | 3 | 3 | - | 2 | 2 | 2 |
| UCS24D13J      | Big Data Analytics                     | 3 | 2 | 2 | 2 | 3 | 3 | - | 2 | 2 | 2 |
| UCS24D14J      | Cryptography and Network Security      | 3 | 2 | 2 | 2 | 3 | 3 | - | 2 | 2 | 2 |
|                | Minor Elective – VII                   |   |   |   |   |   |   |   |   |   |   |
|                | Minor Elective – VIII                  |   |   |   |   |   |   |   |   |   |   |
| UCS24D15J      | AI and Business Analytics              | 3 | 2 | 2 | 2 | 3 | 3 | - | 2 | 2 | 2 |
| USA24D18J      | Cyber Security                         | 3 | 2 | 2 | 2 | 3 | 3 | - | 2 | 2 | 2 |
| USA24D20J      | Blockchain Technology                  | 3 | 2 | 2 | 2 | 3 | 3 | - | 2 | 2 | 2 |
| UCS24D18T      | Introduction to Cyber Physical Systems | 3 | 2 | 2 | 2 | 3 | 3 | - | 2 | 2 | 2 |
| UCS24P04L      | Research Project and Dissertation      | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 2 |
| UCS24P05L      | Professional Internship                | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 2 |
| <b>Average</b> |                                        | 3 | 2 | 2 | 2 | 3 | 3 | 1 | 2 | 2 | 2 |

### Abbreviations

CLR – Course Learning Rationale  
 CLO – Course Learning Outcomes  
 PLO – Programme Learning Outcomes  
 SLO – Session Learning Outcomes  
 BLoT – Bloom’s Level of Thinking  
 CLA – Continuous Learning Assessment

## SEMESTER - I

| Course Code | ULT24AE1J | Course Title | Tamil - I |  |  |  | Category | A | Ability Enhancement Course | L | T | P | C |
|-------------|-----------|--------------|-----------|--|--|--|----------|---|----------------------------|---|---|---|---|
|             |           |              |           |  |  |  |          |   |                            | 2 | 0 | 2 | 3 |

| Course Offering Department | Tamil | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|-------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|-------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                | Depth    |        |           |         | Attainment                |    |    | Programme Learning Outcomes |   |   |   |   |   |   |   |   |    |
|-------|-------------------------------------------------------------------------------------------|----------|--------|-----------|---------|---------------------------|----|----|-----------------------------|---|---|---|---|---|---|---|---|----|
|       |                                                                                           | 1        | 2      | 3         | 4       | 1                         | 2  | 3  | 1                           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-1 | மரபிலிருந்துமாற்றம்பெற்றபுதுக்கவிதைமரபின்சிந்தனைகளைஅறியச்செய்தல்                          |          |        |           |         |                           |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-2 | நவீனகவிதையின்வழிமனிதவாழ்வியல்விழுமியங்களைத்தெரியச்செய்தல்                                 |          |        |           |         |                           |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-3 | சிறுநிலக்கியங்கள், காப்பியங்களுக்கற்பிக்கும்தமிழ்ச்சமூகத்தின்வாழ்வியலைஅறியச்செய்தல்       |          |        |           |         |                           |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-4 | நவீனதமிழ்இலக்கியவளர்ச்சிவரலாற்றைப்புரியச்செய்தல்                                          |          |        |           |         |                           |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-5 | மொழிப்பயிற்சிவழிமொழியின்பல்வேறுநுட்பங்களைத்தெரியச்செய்தல்                                 |          |        |           |         |                           |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLO   | At the end of this course, learners will be able to:                                      | Conceive | Design | Implement | Operate | Bloom's Level of Thinking |    |    | Programme Learning Outcomes |   |   |   |   |   |   |   |   |    |
| CLO-1 | புதுக்கவிதைஉருவாக்கித்தந்தபுதியசிந்தனைக்களங்களைஅறிந்துகொள்ளுதல்                           | ✓        | ✓      | -         | -       | 2                         | 75 | 60 | 3                           | - | 3 | - | - | - | 3 | - | - | -  |
| CLO-2 | நவீனகவிதைகள்வழிமாற்றம்பெற்றுவரும்மானுடவிழுமியங்களைத்தெரிந்துகொள்ளுதல்                     | ✓        | ✓      | ✓         | -       | 2                         | 80 | 70 | -                           | - | - | 2 | - | 3 | 3 | - | - | -  |
| CLO-3 | தமிழ்ச்சமூகத்தின்இடைக்காலவாழ்வியல்முறைகளைஉணர்ந்துகொள்ளுதல்                                | ✓        | ✓      | ✓         | ✓       | 2                         | 70 | 65 | 3                           | - | 3 | - | - | 3 | - | - | - | -  |
| CLO-4 | நவீனஇலக்கியவரலாறுவழிதமிழ்க்கல்விவரலாறு, சமூகவரலாறுபெற்றவளர்ச்சிநிலைகளைத்தெரிந்துகொள்ளுதல் | ✓        | ✓      | ✓         | ✓       | 2                         | 70 | 70 | -                           | 3 | - | - | 1 | 3 | - | - | - | -  |
| CLO-5 | மொழியின்றிநுட்பங்களைத்தெரிந்துமொழிஆளுமையோடுசெயல்படும்திறன்பெறுதல்                         | ✓        | ✓      | ✓         | ✓       | 3                         | 80 | 70 | 3                           | 3 | - | 3 | - | - | - | - | - | -  |

| Sessions | CLO - 1                                           | CLO - 2                    | CLO - 3                            | CLO - 4                       | CLO - 5                                   |
|----------|---------------------------------------------------|----------------------------|------------------------------------|-------------------------------|-------------------------------------------|
|          | 12                                                | 12                         | 12                                 | 12                            | 12                                        |
| SLO-1    | தமிழ்க்கவிதைமரபு                                  | நவீனகவிதைதோற்றம், வரலாறு   | தமிழரின்வீரமரபு - போர்விழுமியங்கள் | சிறுநிலக்கியத்தோற்றம் - வகைமை | தமிழ்உரைநடைமரபு - உ.வே.சா. விற்பங்களிப்பு |
| SLO-2    | புதுக்கவிதைஉருவாக்கம், புதுக்கவிதைவளர்ச்சிநெறிகள் | நவீனகவிதைகளில் செல்நெறிகள் | பரணியறிமுகம் பரணியிலக்கியங்கள்     | பிள்ளைத்தமிழ் - உலா - தூது    | உ.வே.சா. விராஜவைத்தியம்                   |

|        |                                                             |                                                          |                                                 |                                                       |                                                          |
|--------|-------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------|----------------------------------------------------------|
| SLO-3  | பாரதியார்பன்முகஆளுமைத்திறன்                                 | கவிதைமொழி - நவீனகவிஆளுமைகள்                              | தலைவனின்வீரம் - கலிங்கத்துப்பரணி 477,490        | புதுக்கவிதையின்தோற்றமும் மொழியும்                     | நாட்டுப்புறமரபில்சிறுதெய்வ வழிபாடு                       |
| SLO-4  | பாரததேசம் பாரததேசத்தின்வளம்                                 | கவிதையில்நாட்டுப்புறவடிவம்                               | தமிழ்இலக்கியமரபில் தூதுஇலக்கியங்கள்             | புதுக்கவிதையில்சமூகம் - புதுக்கவிதையும்இதழ்களும்      | கழனியூரனின்பொன்காத்தையனார்                               |
| SLO-5  | வெள்ளிப்பனிமலையின்மீதுலவுவோம்...                            | பெண்களின்கல்விநிலை - இளம்பிறை - அம்மா                    | தமிழின்பெருமை - தமிழ்விடுதூது (184 - 186)       | மணிக்கொடிஇதழ், எழுத்துஇதழ், வானம்பாடிஇதழ்             | பிழைநீக்கிஎழுதும்நூட்பங்கள்                              |
| SLO-6  | 20 ஆம்நூற்றாண்டுக்கவிதைமரபில் பாரதிதாசன்                    | ஆண்பெண்சமத்துவமும் ப.கல்பனா - கீறல்விழுந்தமாலைக்காலங்கள் | செய்யுள்மரபில் கலம்பகஇலக்கியங்கள்               | சிறுகதைதோற்றம் - சிறுகதைவளர்ச்சி                      | எழுத்துப்பிழை - ந - ண - ன ல - ள - ழ, ர - றவேறுபாடுஅறிதல் |
| SLO-7  | பாரதிதாசன் - அழகின்சிரிப்பு ஆல் - ஆயிரம்கிளைகள்கொண்டஅடிமரம் | விளிம்புநிலைவாழ்வியல்: திருநற்களும்சாதனைகளும்            | கையறுநிலை - நந்திக்கலம்பகம் - வானுறுமதியை (110) | சிறுகதைவரலாறு - சிறுகதைஆசிரியர்கள்                    | தொடர்பிழை ஒருமைபன்மைவேறுபாடு                             |
| SLO-8  | ஆல் - ஆயிரம்கிளைகள்கொண்டஅடிமரம்                             | திருநங்கைகுணவதி - சமூகப்பார்வை                           | தமிழ்இலக்கியமரபில் குறவஞ்சிஇலக்கியங்கள்         | இதழ்களும்சிறுகதையும்                                  | பிறமொழிச்சொற்களைநீக்கி எழுதுதல், ஷ, ஜ, ஸ, ஹமாற்றொலிகள்   |
| SLO-9  | வானம்பாடிக்கவிஞர்களும்மு.மேத்தாவும்                         | புலம்பெயர்வாழ்வியல் - வலியும்நம்பிக்கையும்               | குற்றாலக்குறவஞ்சி - ஆடுமரவீனுமணி (3)            | புதினம்தோற்றம் - புதினம்வளர்ச்சிவரலாறு                | தமிழில்சொல்வகைகள் சொல்லும்பயன்பாடும்                     |
| SLO-10 | மனிதநேயம் - மு.மேத்தாவின் மனிதனைத்தேடி                      | ஸர்மிளாஸெய்யித் - புராதனஊர்                              | காப்பியஇலக்கணம் - காப்பியவகைமைகள்               | புதினத்தின்வகைமை புதினஆசிரியர்கள்                     | பெயர்ச்சொற்கள் பெயர்ச்சொற்களும்வகைகளும்                  |
| SLO-11 | தமிழ்க்கவிதையில்சுற்றுச்சூழலியல்                            | காலந்தோறும்கவிதைவடிவில் மாற்றங்கள். ஹைக்கூ - மு.முருகேஷ் | சிலப்பதிகாரம் - அறிமுகம் கட்டுரைக்காதை          | தமிழ்இலக்கியத்தில்உரைநடைக்கூறுகள் - உரைநடையின்தோற்றம் | வினைச்சொற்கள்அறிதல்                                      |
| SLO-12 | இயற்கையும்சமத்துவமும் பழனிபாரதியின்காடு                     | லிமரைக்கூ - ஈரோடுதமிழன்பன் சென்ரியூ - மாமதயானை           | ஊழ்வினை - கோவலனின்முற்பிறப்பு வரலாறு            | தமிழில்உரைநடை வளர்த்தஅறிஞர்கள்                        | தமிழில்பெயரடை, வினையடை அறிதல்                            |

| Resources |                                                                                                                                                     |  |  |  |   |                                                                                         |  |  |  |  |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|---|-----------------------------------------------------------------------------------------|--|--|--|--|
| 1         | முல்லைக்காடு, தொகுப்பும்பதிப்பும் - தமிழ்த்துறைஆசிரியர்கள், எஸ்.ஆர்.எம். அறிவியல்மற்றும்தொழில்நுட்பக்கல்விநிறுவனம், காட்டாங்குளத்தூர், 603203, 2023 |  |  |  | 4 | வல்லிக்கண்ணன், புதுக்கவிதைதோற்றமும்வளர்ச்சியும், ஆழிபதிப்பகம், சென்னை, 2018             |  |  |  |  |
| 2         | கா. சிவத்தம்பி, தமிழில்சிறுகதைதோற்றமும்வளர்ச்சியும், என்.சி.பி.எச்., சென்னை, 2013                                                                   |  |  |  | 5 | மு.வரதராசன், தமிழிலக்கியவரலாறு, சாகித்தியஅக்காதெமி, 1972.                               |  |  |  |  |
| 3         | மதுரைதமிழிலக்கியமின்தொகுப்புத்திட்டம் - <a href="https://www.projectmadurai.org/">https://www.projectmadurai.org/</a>                               |  |  |  | 6 | தமிழ்இணையக்கல்விக்கழகம் - <a href="http://www.tamilvu.org/">http://www.tamilvu.org/</a> |  |  |  |  |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4*   |              |                                   |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        |
| 1                         | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                |
| 2                         | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                |
| 3                         | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                |
| 4                         | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                |
| 5                         | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                |
| 6                         | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               |

| Strategies                 |  |                      |                      |                         |                          |   |
|----------------------------|--|----------------------|----------------------|-------------------------|--------------------------|---|
| Technology                 |  | Pedagogy / Andragogy |                      | Sustainable Development |                          |   |
| Simulations                |  |                      | Clarification/Pauses | ✓                       | Good Health & Well Being | ✓ |
| Presentation Tools         |  | ✓                    | Group Discussion     | ✓                       | Quality Education        | ✓ |
| Learning Management System |  | ✓                    | Hands-on Practice    | ✓                       | Gender Equality          | ✓ |
|                            |  |                      | Debate               | ✓                       |                          |   |
|                            |  |                      | Interactive Lecture  | ✓                       |                          |   |
|                            |  |                      | Brainstorming        | ✓                       |                          |   |
|                            |  |                      |                      |                         |                          |   |
|                            |  |                      |                      |                         |                          |   |
|                            |  |                      |                      |                         |                          |   |

\* The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                                             |                            |                                                                                                                                          |                  |                                                                                                        |
|----------------------|-----------------------------------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------------------------------------------------------------------------------------|
| Professional Experts |                                                                             | Higher Institution Experts |                                                                                                                                          | Internal Experts |                                                                                                        |
| 1                    | Dr.P.R.Subramanian, Director, Mozhi Trust, Thiruvanniyur, Chennai – 600 041 | 1                          | Dr. V. Dhanalakshmi, Associate Professor, Subramania Bharathi School of Tamil Language & Literature, Pondicherry University, Pondicherry | 1                | Dr.B.Jaiganesh, Associate Professor and Head, Department of Tamil, FSH, SRMIST, Kattankulathur         |
|                      |                                                                             |                            |                                                                                                                                          | 2                | Dr. R. Ravi, Assistant Professor and Head, Department of Tamil, FSH, SRMIST, Vadapalani                |
|                      |                                                                             |                            |                                                                                                                                          | 3                | Mr. G. Ganesh, Assistant Professor, Department of Tamil, FSH, SRMIST, Ramapuram                        |
|                      |                                                                             |                            |                                                                                                                                          | 4                | Dr. T.R.Hezbibahbeulah Suganthi, Assistant Professor, Department of Tamil, FSH, SRMIST, Kattankulathur |
|                      |                                                                             |                            |                                                                                                                                          | 5                | Dr.S.Saraswathy, Assistant Professor, Department of Tamil, FSH, SRMIST, Kattankulathur                 |

| Course Code | ULH24AE1J | Course Title | Hindi – I | Category | A | Ability Enhancement Course | L | T | P | C |
|-------------|-----------|--------------|-----------|----------|---|----------------------------|---|---|---|---|
|             |           |              |           |          |   |                            | 2 | 0 | 2 | 3 |

| Course Offering Department | Hindi | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|-------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|-------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                             | Depth    |        |           |         | Attainment |          |                 | Programme Learning Outcomes |               |             |            |         |       |               |                 |       |        |
|-------|----------------------------------------------------------------------------------------|----------|--------|-----------|---------|------------|----------|-----------------|-----------------------------|---------------|-------------|------------|---------|-------|---------------|-----------------|-------|--------|
|       |                                                                                        | 1        | 2      | 3         | 4       | 1          | 2        | 3               | 1                           | 2             | 3           | 4          | 5       | 6     | 7             | 8               | 9     | 10     |
| CLR-1 | To Communicate in Hindi without any inhibition                                         |          |        |           |         |            |          |                 |                             |               |             |            |         |       |               |                 |       |        |
| CLR-2 | To appreciate the Hindi language in its various forms                                  |          |        |           |         |            |          |                 |                             |               |             |            |         |       |               |                 |       |        |
| CLR-3 | To analyze the different writing styles                                                |          |        |           |         |            |          |                 |                             |               |             |            |         |       |               |                 |       |        |
| CLR-4 | To display moral and social values in the field of social Responsibility and Integrity |          |        |           |         |            |          |                 |                             |               |             |            |         |       |               |                 |       |        |
| CLR-5 | To be willing listeners and Translators-where need be                                  |          |        |           |         |            |          |                 |                             |               |             |            |         |       |               |                 |       |        |
| CLO   | At the end of this course, learners will be able to:                                   | Conceive | Design | Implement | Operate | Level of   | Expected | Proficiency (%) | Problem                     | Communication | Independent | Leadership | Digital | Value | Environmental | Entrepreneurial | PLO-9 | PLO-10 |
| CLO-1 | To Understand the Philosophy of life and living through Stories                        | ✓        | ✓      | -         | -       | 2          | 85       | 75              | 3                           | 2             | 3           |            |         | 3     |               |                 |       |        |
| CLO-2 | To Examine Travelogue writing and Sketch                                               | ✓        | ✓      | ✓         | -       | 2          | 85       | 75              | 3                           |               | 2           |            | 3       |       | 3             |                 |       |        |
| CLO-3 | To Identify Irony and essay - based writing                                            | ✓        | ✓      | ✓         | ✓       | 3          | 85       | 75              |                             | 3             |             | 3          | 3       | 2     |               |                 |       |        |
| CLO-4 | Evaluate the various social issues depicted in the prose                               | ✓        | ✓      | ✓         | ✓       | 3          | 85       | 75              | 2                           |               | 2           | 3          |         |       | 2             |                 |       |        |
| CLO-5 | To Understand the fundamental principal of Translation                                 | ✓        | ✓      | ✓         | ✓       | 3          | 85       | 75              |                             | 3             |             | 3          | 3       | 2     |               |                 |       |        |

| Sessions | CLO – 1                      | CLO - 2                          | CLO – 3                              | CLO – 4               | CLO - 5                          |
|----------|------------------------------|----------------------------------|--------------------------------------|-----------------------|----------------------------------|
|          | 12                           | 12                               | 12                                   | 12                    | 12                               |
| SLO-1    | KAHANI KI AVDHARNA           | REKHACHITRA & YATRAVITRANT       | NIBANDH                              | NATAK                 | ANUVAD& PARIBHASHIK SHABDAVALI   |
| SLO-2    | SWARUP AUR PARIBHASHA        | AVDHARNA EVM SWAROOP             | NIBANDH KI AVDHARNA EVM SAWROOP      | AVDHARNA EVM SAWROOP  | ARTH EVM PARIBHASHA              |
| SLO-3    | KAHANI KE TATVA EVM MAHATWA  | MAHATVA AUR UDDESHYA             | MAHATVA EVM UDDESHYA                 | TATWA EVM PRAKAR      | SWARUP EVM PRAKAR                |
| SLO-4    | PARIKSHA- PREMCHAND          | GESHA REKHACHITRA                | KUTAJ- NIBANDH HAJARI PRASHAD DIVEDI | UDDESHYA              | MAHATVA                          |
| SLO-5    | VISLESHAN                    | PATH KA VISHLESHAN               | LEKHIK PARICHAY                      | NATAK KA MAHATVA      | UDDESHYA                         |
| SLO-6    | UDDESHYA                     | GURU SHISHYA KA SAMBANDH         | SHANGHARSHIL JEEVAN                  | RANGMANCH KA PARICHAY | ANUVAD KA PRAYOJAN EVM PRAYOG    |
| SLO-7    | MALBE KA MALIK- MOHAN RAKESH | THELE PAR HIMALAY (YATRAVITRANT) | PATH KA MAHATVA                      | LEKHAK PARICHAY       | SHROT EVM LAKSHYA BHASHA KA GYAN |

|               |                                |                           |                                                |                                       |                               |
|---------------|--------------------------------|---------------------------|------------------------------------------------|---------------------------------------|-------------------------------|
| <b>SLO-8</b>  | LEKHAK PARICHAY                | YATRAVITRANT KA MAHATVA   | BHOLARAM KA JEEV-(VYANGYA) HARISHANKAR PARSHAI | NATAK KA VISLESHAN                    | ANUVAD KA DAYITVA             |
| <b>SLO-9</b>  | BATWARE KA YATHARTH VARNAN     | YATRA KA YATHARTH CHITRAN | VYANGYA KI AVADHARNA                           | LALCH KA DUSHPARINAM                  | PARIBHASHIK SHABDAVALI        |
| <b>SLO-10</b> | TATKALIN PARISHTHITI KA VARNAN | PATH KA VISLESHAN         | PATH KA VIHLESHAN                              | GURU SHISHYA SAMBANDH                 | TAKANIKI SHABDAVALI KA MHATVA |
| <b>SLO-11</b> | KAHANI KA VISHLESHAN           | HIMALAY KA LOK JEEVAN     | SARKARI TANTRA KA KHOKHLA RUP                  | MAHATTAKANKSHI KA DUSHPARINAM         | VIVIDH PRAYOG                 |
| <b>SLO-12</b> | KAHANI KA UDDESHYA             | HIMALAY KA VARNANA        | SANVEDANSHIL BHAVANA                           | TATKALIN SAMAJIK VYAVASTHA KI CHARCHA | SHABDAVALI KI AVSHYAKTA       |

| Resources |                                                       |  |  |   |                                                     |
|-----------|-------------------------------------------------------|--|--|---|-----------------------------------------------------|
| 1         | Samanya Hindi, Srijonlok Publication, 2023, New Delhi |  |  | 4 | Bhakti Andolan Aur Surdas Ka Kavya – Manager Pandey |
| 2         | Kabir – Hazari Prasad Dwedi                           |  |  | 5 | Bihari – Vishvnath Prasad Mishr                     |
| 3         | Surdas – Ram Chandra Shukl                            |  |  | 6 | Aadhunik Vigyapan Aur Jansampark – Taresh Bhatia    |

| Assessment                      |            |                                                      |              |            |              |            |              |            |              |                                            | Strategies                 |   |                      |   |                          |   |
|---------------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|--------------------------------------------|----------------------------|---|----------------------|---|--------------------------|---|
| Bloom’s<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final<br>Assessment<br>(50 %<br>weightage) | Technology                 |   | Pedagogy / Andragogy |   | Sustainable Development  |   |
|                                 |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4*   |              |                                            | Simulations                |   | Clarification/Pauses | ✓ | Good Health & Well Being | ✓ |
|                                 |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                            | Presentation Tools         | ✓ | Group Discussion     | ✓ | Quality Education        | ✓ |
|                                 |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                                 | Learning Management System | ✓ | Hands-on Practice    | ✓ | Gender Equality          | ✓ |
| 1                               | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                         |                            |   | Debate               | ✓ |                          |   |
| 2                               | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                         |                            |   | Interactive Lecture  | ✓ |                          |   |
| 3                               | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                         |                            |   | Brainstorming        | ✓ |                          |   |
| 4                               | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                         |                            |   |                      |   |                          |   |
| 5                               | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                         |                            |   |                      |   |                          |   |
| 6                               | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                         |                            |   |                      |   |                          |   |
| Total (%)                       |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                                        |                            |   |                      |   |                          |   |

\* The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                          |                                                                                                 |                                                                                                                                                                 |
|----------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Professional Experts |                                                          | Higher Institution Experts                                                                      | Internal Experts                                                                                                                                                |
| 1                    | Ms. Reetha Govindan, Senior Manager (Rajbhasha)          | 1<br>Dr. S.Padmapriya, Professor and Head, Pondichery University,<br>Kalapet, Puducherry-605014 | 1 Dr. S Preeti. Associate Professor, SRMIST                                                                                                                     |
| 2                    | Mr. Vipin Kumar Jha, Senior Translation Officer (ALUMNI) |                                                                                                 | 2 Dr. Md.Shwahidul Islam, Assistant Professor, SRMIST<br>3 Dr. S. Razia Begum, Assistant Professor, SRMIST<br>4 Dr.Nisha Murlidharan Assistant Professor,SRMIST |

| Course Code | ULF24AE1J | Course Title | French – I |  |  |  | Category | A | Ability Enhancement Course | L | T | P | C |
|-------------|-----------|--------------|------------|--|--|--|----------|---|----------------------------|---|---|---|---|
|             |           |              |            |  |  |  |          |   |                            | 2 | 0 | 2 | 3 |

| Course Offering Department | French | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|--------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|--------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                               | Depth |   |   |   | Attainment |   |   | Programme learning Outcomes |   |   |   |   |   |   |   |   |    |
|-------|--------------------------------------------------------------------------------------------------------------------------|-------|---|---|---|------------|---|---|-----------------------------|---|---|---|---|---|---|---|---|----|
| CLR-1 | Extend and expand their savoir-faire through the acquisition of current scenario                                         | 1     | 2 | 3 | 4 | 1          | 2 | 3 | 1                           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-2 | Enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-3 | Make them learn the basic rules of French Grammar.                                                                       |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-4 | Develop strategies of comprehension of texts of different origin                                                         |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-5 | Strengthen the language of the students both in oral and written                                                         |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |

| CLO   | At the end of this course, learners will be able to:                                     | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity Solving | Communication Skills | Collaborative Skills | Independent Thinking, Analytical Reasoning, Learning to Learn | Leadership Qualities | Professionalism, Integrity | Digital Technology Skills | Value Education, Multicultural Inclusivity | Environmental Action, Community Engagement | Entrepreneurial Risk Taking | PLO-9 | PLO-10 |
|-------|------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|--------------------------------------------------------|----------------------|----------------------|---------------------------------------------------------------|----------------------|----------------------------|---------------------------|--------------------------------------------|--------------------------------------------|-----------------------------|-------|--------|
| CLO-1 | To acquire knowledge about French language                                               | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3                                                      | 2                    | 3                    |                                                               |                      |                            |                           | 2                                          |                                            |                             |       |        |
| CLO-2 | To strengthen the knowledge on concept, culture, civilization, and translation of French | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3                                                      |                      | 2                    |                                                               |                      | 3                          |                           | 3                                          |                                            |                             |       |        |
| CLO-3 | To develop content using the features in French language                                 | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                                                        | 3                    |                      | 3                                                             | 3                    | 2                          |                           |                                            |                                            |                             |       |        |
| CLO-4 | To interpret the French language into other language                                     | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 2                                                      |                      | 2                    | 3                                                             |                      |                            |                           | 2                                          |                                            |                             |       |        |
| CLO-5 | To improve the communication, intercultural elements in French language                  | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                                                        | 3                    |                      | 3                                                             | 3                    | 2                          |                           |                                            |                                            |                             |       |        |

| Sessions | CLO – 1                                      | CLO - 2                      | CLO – 3                     | CLO - 4                      | CLO – 5                         |
|----------|----------------------------------------------|------------------------------|-----------------------------|------------------------------|---------------------------------|
|          | 12                                           | 12                           | 12                          | 12                           | 12                              |
| SLO-1    | Contacts, Emma la championne                 | Les verbes du premier groupe | Qu'est-cequ'ils font?       | Portraits                    | Les verbes du deuxième groupe – |
| SLO-2    | Les nombres à partir de 31                   | La liaison                   | Oùestmon sac                | Un casting                   | Les pronoms personnels toniques |
| SLO-3    | Les pays, les nationalités                   | Entreren contact             | Quelquesobjets              | Le Petit Spirou              | Les verbes faire et lire        |
| SLO-4    | Les jours de la semaine, Les jours           | Présenter et se presenter    | Les professions             | L'aspect physique            | Les Sons                        |
| SLO-5    | Les mois de l'année, Les animaux domestiques | Demander et dire la date     | La formation du féminin (2) | Le caractère                 | Décrire l'aspect physique       |
| SLO-6    | La famille (1)                               | Une rencontre.               | Qu'est-ce que c'est?        | les états d'âme              | Demander et dire l'heure        |
| SLO-7    | La formation du féminin (1)                  | Contacts                     | C'est / Il est (1)          | Les prépositions de lieu (1) | Elle est comment?               |

|               |                          |                          |                           |                             |                     |
|---------------|--------------------------|--------------------------|---------------------------|-----------------------------|---------------------|
| <b>SLO-8</b>  | Les adjectifs possessifs | Emma la Championne       | La phrase négative (1)    | La famille (2)              | Portraits           |
| <b>SLO-9</b>  | La phrase interrogative  | Mots et expressions      | Les verbes aller et venir | La formation du féminin     | Mots et Expressions |
| <b>SLO-10</b> | Les nombres              | Grammaire                | Les formules de politesse | La formation du pluriel (2) | Grammaire.          |
| <b>SLO-11</b> | Intonation et est-ce que | Communication            | C'est qui?                | Il y a                      | Communication       |
| <b>SLO-12</b> | Les exemples             | Les verbes du ER –groupe | Mots et Expressions       | Les articles contractés     | Les concepts        |

| Resources |                                                                                                                                            |  |  |   |                                                                                                                                                           |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------|--|--|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1         | “La Nouvelle Génération-AI” Méthode de français, Marie-Noëlle COCTON, P. DAUDA, L. GIACHINO, C. BARACCO, Les éditions Didier, Paris, 2018. |  |  | 4 | <a href="https://www.elearningfrench.com/learn-french-grammar-online-free.html">https://www.elearningfrench.com/learn-french-grammar-online-free.html</a> |
| 2         | Cahier d'activités avec deux discs compacts.                                                                                               |  |  | 5 | <a href="https://www.lawlessfrench.com/grammar">https://www.lawlessfrench.com/grammar</a>                                                                 |
| 3         | <a href="https://www.fluentu.com/blog/french/french-grammar">https://www.fluentu.com/blog/french/french-grammar</a>                        |  |  | 6 | <a href="https://blog.gymglish.com/2022/12/15/basic-french-grammar">https://blog.gymglish.com/2022/12/15/basic-french-grammar</a>                         |

| Assessment                      |            |                                                      |              |            |              |            |              |            |              |                                            | Strategies                 |   |                      |   |                          |   |
|---------------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|--------------------------------------------|----------------------------|---|----------------------|---|--------------------------|---|
| Bloom’s<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final<br>Assessment<br>(50 %<br>weightage) | Technology                 |   | Pedagogy / Andragogy |   | Sustainable Development  |   |
|                                 |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4*   |              |                                            | Simulations                |   | Clarification/Pauses | ✓ | Good Health & Well Being | ✓ |
|                                 |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                            | Presentation Tools         | ✓ | Group Discussion     | ✓ | Quality Education        | ✓ |
|                                 |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                                 | Learning Management System | ✓ | Hands-on Practice    | ✓ | Gender Equality          | ✓ |
| 1                               | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                         |                            |   | Debate               | ✓ |                          |   |
| 2                               | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                         |                            |   | Interactive Lecture  | ✓ |                          |   |
| 3                               | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                         |                            |   | Brainstorming        | ✓ |                          |   |
| 4                               | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                         |                            |   |                      |   |                          |   |
| 5                               | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                         |                            |   |                      |   |                          |   |
| 6                               | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                         |                            |   |                      |   |                          |   |
| Total (%)                       |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                                        |                            |   |                      |   |                          |   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                                                                         |                            |                                                                                |                                                         |
|----------------------|---------------------------------------------------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------|
| Professional Experts |                                                                                                         | Higher Institution Experts |                                                                                | Internal Experts                                        |
| 1                    | Mr. Kavaskar Danasegarane, Language Specialist, Process Expert<br>Maersk Global Service Center Pvt. Ltd | 1                          | Dr. C Thirumurugan, Professor, Department of French,<br>Pondicherry University | 1 Mr. Kumaravel K. Assistant Professor and Head, SRMIST |
| 2                    | Mr. Shrivathsan S, Journalist, Senior Sports Reporter/Sub-Editor,<br>Times of India, Chennai            |                            |                                                                                | 2 Ms. Abigail A, Assistant Professor, SRMIST            |
|                      |                                                                                                         |                            |                                                                                | 3 Mrs. Mahalakshmi, Assistant Professor, SRMIST         |

| Course Code | ULE24AE1J | Course Title | English | Category | A | Ability Enhancement Course | L | T | P | C |
|-------------|-----------|--------------|---------|----------|---|----------------------------|---|---|---|---|
|             |           |              |         |          |   |                            | 2 | 0 | 2 | 3 |

| Course Offering Department | English | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|---------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|---------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                     | Depth    |        |           |         | Attainment        |                          |                         | Programme learning Outcomes                            |                                                                                        |                                                                            |                                                                                          |                             |       |        |   |   |   |
|-------|----------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|--------------------------------------------------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------|-------|--------|---|---|---|
| CLR-1 | Develop an understanding and sensibility of human consciousness through gender inclusive curriculum            | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity Solving | Communication Skills, Collaborating Skills, Independent Thinking, Analytical Reasoning | Leadership Qualities, Professionalism, Autonomy, Digital Technology Skills | Value Incultation, Multicultural Inclusivity, Environmental Action, Community Engagement | Entrepreneurial Risk Taking | PLO-9 | PLO-10 |   |   |   |
| CLR-2 | Enhance the abilities of deeper understanding to stay with integrity with the fellow human beings              |          |        |           |         |                   |                          |                         |                                                        |                                                                                        |                                                                            |                                                                                          |                             |       |        |   |   |   |
| CLR-3 | Develop the overall language competency of the learner                                                         |          |        |           |         |                   |                          |                         |                                                        |                                                                                        |                                                                            |                                                                                          |                             |       |        |   |   |   |
| CLR-4 | Develop proficient language skills                                                                             |          |        |           |         |                   |                          |                         |                                                        |                                                                                        |                                                                            |                                                                                          |                             |       |        |   |   |   |
| CLR-5 | Learn to express the thoughts clearly, develop logical arguments and enhance the overall communication skills. |          |        |           |         |                   |                          |                         |                                                        |                                                                                        |                                                                            |                                                                                          |                             |       |        |   |   |   |
| CLO   | At the end of this course, learners will be able to:                                                           |          |        |           |         |                   |                          |                         |                                                        |                                                                                        |                                                                            |                                                                                          |                             |       |        |   |   |   |
| CLO-1 | Analyze different literary texts to identify the representation of issues related to gender, and class         | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3                                                      | 3                                                                                      | 3                                                                          | 3                                                                                        | -                           | 3     | 3      | 2 | 3 | 3 |
| CLO-2 | Apply critical thinking skills to analyze and respond to academic texts.                                       | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3                                                      | 2                                                                                      | 3                                                                          | 2                                                                                        | -                           | 3     | 1      | - | 3 | 2 |
| CLO-3 | Critically evaluate and discuss contemporary issues through online articles.                                   | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                      | 3                                                                                      | 3                                                                          | 3                                                                                        | 3                           | 3     | 2      | 1 | 3 | 3 |
| CLO-4 | Refine their general writing skills                                                                            | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 1                                                      | 2                                                                                      | 2                                                                          | 1                                                                                        | 3                           | 3     | 2      | 2 | 3 | 1 |
| CLO-5 | Improve their language application skills                                                                      | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                      | 3                                                                                      | 2                                                                          | 3                                                                                        | 1                           | 1     | 1      | 3 | 3 | 1 |

| Sessions | CLO-1  | CLO-2         | CLO-3                  | CLO-4                   | CLO-5                               |
|----------|--------|---------------|------------------------|-------------------------|-------------------------------------|
|          | POETRY | SHORT STORIES | LEARNING ABOUT WRITING | LEARNING ABOUT SPEAKING | REFLECTION OF THE LANGUAGE LEARNING |
|          | 12     | 12            | 12                     | 12                      | 12                                  |

|              |                                                                                                                                                              |                                                                                                                                                                                              |                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                       |                                                                                                                                                         |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SLO-1</b> | Introduction to the poet- Sukirtharani-<br>Reading and recitation of the poem –<br>Debt<br>Analysis and Critical interpretation of the poem.                 | Introduction to the short story writer Katherine Mansfield.<br>Reading the story- The Doll's House<br>Explaining the story through depiction of characters and representation of injustices. | Introduction to Creative Writing. Explaining the elements of creative writing.<br><br>Grouping the Students belonging to States other than Tamilnadu                                                                              | Building the discourse- The significance of conversation and the key elements of discourse-<br>Art of conversation in digital and verbal discourse- Lee Mockobe's A Powerful Poem of what it means to be a Transgender.<br>TEDX TALK- POEM RECITATION | Reflecting the learning. -<br>Review writing<br>Explaining the process of reviewing and the method of reviewing.<br>Choosing the subject for reviewing. |
| <b>SLO-2</b> | Introduction to the poet Kalki Subramaniam.<br>Reading and recitation of the poem Phallus I cut.<br>Analysis and Critical interpretation of the poem. Part-1 | Analysis and critical interpretation of the short story Doll's House.                                                                                                                        | Stand-up comedy show - translate the audio content in English. (any regional language)<br>Practice the writing activity - creative ways of engaging in translation.                                                               | Reflecting on the style and the tone of the poem.<br>Practicing conversation                                                                                                                                                                          | Choosing and planning the topic for students- group 1 and group 2                                                                                       |
| <b>SLO-3</b> | Analysis and Critical interpretation of the poem. Phallus I cut- Part-2                                                                                      | Class room activity- reviewing characters<br>Group Discussion- social consciousness                                                                                                          | Correction of errors- attempting to translate.<br>Identifying equivalent terms to certain regional words - learn the art of translation.                                                                                          | Classroom- Speaking activity- reflection about the issues regarding gender expression and gender identity.<br>Reviewing activity- group discussion- communicating effectively- importance                                                             | Choosing and planning the topic for students- group 3 and group 4                                                                                       |
| <b>SLO-4</b> | Introduction to the poet -Imtiaz Dharker.<br>Reading and reciting the poem Purdah 1.<br>Analysis and Critical interpretation of the poem- Purdah 1- part 1   | Speaking activity- society and its portrayal in the short story- Magnifying and analyzing the characters from contemporary perspective                                                       | Introducing famous art works and the contexts of creation.<br>Salvador Dali- The Face of War<br>Pablo Picasso- Guernica<br>Edward Munch- The Scream<br>Pieter Bruegel- The Tower of Babel.<br>Understanding the art works- Part 1 | Introducing Content writing in Social Media- the importance of content writing.                                                                                                                                                                       | Introducing the students to the review of the various works.<br>Understand the review process how effectively a review of any work can be done.         |
| <b>SLO-5</b> | Analysis and Critical interpretation of the poem- Purdah 1- part 2                                                                                           | Introduction to the writer Haruki Murakami.<br>Reading the Confessions of a Shinawaga monkey.<br>Discussion and analysis of the Confessions of a Shinawaga monkey.                           | Understanding the art works- Part 2<br>creative and/ or thoughtful writing - contemporary themes of modern day                                                                                                                    | BLOG WRITING - Subtleties Of Workplace Inclusion: Mental Health And Queer Community- Salik Ansari.<br>Reading the text- content in the blog by the students- Reading Activity                                                                         | Reviewing -record -post in the social media pages of SRMIST                                                                                             |

|              |                                                                                                                                                                                  |                                                                                                                                                                     |                                                                                                                                                              |                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                   |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SLO-6</b> | Reading and reciting the poem Purdah 2<br>Analysis and Critical interpretation of the poem- Purdah 2- part 1                                                                     | Group discussion activity reflecting the understanding of the character Shinagwa monkey<br>Speaking activity- review on life and existentialism and identity crisis | Course instructor guidance-<br>Classroom activity for creative writing- discussion on generation of ideas<br>discussion on working and reflection of ideas   | Analysing the text- content in the blog by the students- Discussion Activity<br>writer's conversation with the readers - the blog in other blog articles..<br>Practice blog writing                                                                           | Thoughtful conversation with your team member post the same in the official social media page of SRMIST.<br>Choosing the team based on the abilities that are comfortable to match the peer members                                                                                                               |
| <b>SLO-7</b> | Analysis and Critical interpretation of the poem- Purdah 2- part 2                                                                                                               | Introduction to Crystal Wilkinson<br>Reading Endangered Species: Case 47401.                                                                                        | Elements of writing<br>Incorporate the elements of story in story writing                                                                                    | Apprehending Life by reading the texts of influence- Chimamanda Ngozi Adiche's Notes on Grief- A BRIEF NOTE, We should all be Feminists- An Essay.                                                                                                            | Choosing the topics for a thoughtful conversation<br>Planning and preparation for the script of conversation with a team member                                                                                                                                                                                   |
| <b>SLO-8</b> | Introduction to the poet Arundathi Subramanian.<br>Reading and reciting the poem- Home<br>Student activity- recitation<br>Analysis and Critical interpretation of the poem- Home | Discussion and analysis of Endangered Species: Case 47401.                                                                                                          | Students -writing abilities-<br>building stories- a visual treat of variety of pictures.                                                                     | Class discussion- essay by the author -subjective depiction of life. Understand -subjective opinions - perspectives-<br>Practising the task multiple times with all the students in the classroom.                                                            | Drafting , editing and revising the script of conversation and enacting the conversation with the team members<br>Enactment -proper rehearsal - final performance -conversation- whole performance should be recorded.<br>The recording should be posted in the official media page and social handles of SRMIST. |
| <b>SLO-9</b> | Recollection of study of the writing styles and intentions of the poets prescribed in the syllabus.                                                                              | Introduction to C.S Lakshmi also known as Ambai.<br>Reading the short story- In a Forest, A Deer.                                                                   | Practice -write stories - pictures given or shown .<br>Classroom activity- evaluation of writings and reflections for suggesting, correction and improvement | Interposing opinions in famous interviews- FII Interviews: Tasveer Co-Founder And Filmmaker Rita Meher On The Seattle Legislation, Minority Rights And The Fight Against Oppression- INTERVIEW- Analysing the text and discussing the aspects of an interview | work for this social post - reflect on their experience of learning communicative English course and the testimonial has to be recorded and posted in the social media pages of SRMIST..                                                                                                                          |
| <b>S-10</b>  | Group Discussion activity for students to reflect up on gender consciousness                                                                                                     | Discussion and Analysis of In a Forest, A Deer.                                                                                                                     | A writing task to write a script is introduced in the classroom.                                                                                             | Students -enact as interviewer and interviewee and practice building the discourse.                                                                                                                                                                           | Involving the students for the project work. Introducing what is project work and inculcating the interest -Giving instructions to do the project works -                                                                                                                                                         |

|        |                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                              |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SLO-11 | Revision of the poems Debt and Phallus I cut, Purdah 1 and Purdah 2                                                                                 | Classroom activity- speaking about identity, power of women and contemporary issues and perspectives up on women like Thangam Atthai                                                                                                                                                                                                                                                                   | creative scripts inspiring from the dialogues of their favourite films by changing the scenario to their own wish according to their own whims and fancies.<br>Creative writing -writing news reports. recreated with new characters, places, scenes, incidents. | Certain role plays like celebrity personalities, political personalities -conduct the interview and be the interviewer and interviewee.<br><br>The art of conversation and the ability to build a discourse<br>Reflecting on the points- Student reviewing activity- art of conversation in the text | Discussion of ideas and generation of creative ideas- Preparation for next semester. Assignment on any piece of creative writing (OR) Presentation- Mastering the art of Public Speaking. (OR) Project on compiling the real life influential events on gender inclusive issues and a presentation of the same. Interview Scripting /Blog writing.- Guidance |
|        | Revision of the poem Home.<br><br>Creative activity for the students to reflect up on gender consciousness, influence of religion on women freedom. | Retrospecting the writing styles of the authors- Katherine Mansfield, Haruki Murakami, Crystal Wilkinson and Ambai.<br><br>Overall Revision- The Doll's House, Confessions of a Shinawaga Monkey, Endangered Species: Case 47401<br>Classroom activity- speaking about racism in contemporary society- an attempt to understand the issues prevailing in the society from the perspectives of students | Watch debate shows - summarising the arguments Enhance -descriptive writing skill.<br><br>Repetitive practice and continuous assessment - writing skiills-master the writing skill.                                                                              | Reflecting on the points- Student reviewing activity- art of conversation in the text<br><br>The evaluation and assesment of the conversation -constructive feedbacks to the students.                                                                                                               | Reflection, Evaluation and Assessment of ideas- Students can opt any of the project from the given choice.<br><br>Ready for the next semester- reflection of the learning through assignments practiced                                                                                                                                                      |

| Resources |                                                                                                                                     |   |                                                                                               |  |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------------------|--|
| 1         | Horizon- English Text Book – Compiled and Edited by the Faculty of English Departement, FSH, SRMIST, 2023                           | 5 | The Art of Public Speaking by Stephen E. Lucas- 2019                                          |  |
| 2         | The Creative Writing Coursebook: Forty Authors Share Advice and Exercises for Fiction and Poetry by Julia Bell and Paul Magrs- 2001 | 6 | Talk Like TED: The 9 Public-Speaking Secrets of the World's Top Minds by Carmine Gallo – 2014 |  |
| 3         | On Writing: A Memoir of the Craft by Stephen King 2000                                                                              | 7 | The Anatomy of a Book Review: A Guide for College Students by Ronald J. Weber 1994            |  |
| 4         | The Writing Life: Writers on How They Think and Work edited by Marie Arana -2003                                                    | 8 | How to Write a Simple Book Review: It's easier than you think! by Allyson R. Abbott 2013      |  |

| Assessment                      |            |                                                      |              |            |              |            |              |            |              |                                            | Strategies                 |   |                      |   |                          |   |
|---------------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|--------------------------------------------|----------------------------|---|----------------------|---|--------------------------|---|
| Bloom’s<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final<br>Assessment<br>(50 %<br>weightage) | Technology                 |   | Pedagogy / Andragogy |   | Sustainable Development  |   |
|                                 |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4*   |              |                                            | Simulations                |   | Clarification/Pauses | ✓ | Good Health & Well Being | ✓ |
|                                 |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                            | Presentation Tools         | ✓ | Group Discussion     | ✓ | Quality Education        | ✓ |
|                                 |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                                 | Learning Management System | ✓ | Hands-on Practice    | ✓ | Gender Equality          | ✓ |
| 1                               | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                         |                            |   | Debate               | ✓ |                          |   |
| 2                               | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                         |                            |   | Interactive Lecture  | ✓ |                          |   |
| 3                               | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                         |                            |   | Brainstorming        | ✓ |                          |   |
| 4                               | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                         |                            |   |                      |   |                          |   |
| 5                               | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                         |                            |   |                      |   |                          |   |
| 6                               | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                         |                            |   |                      |   |                          |   |
| Total (%)                       |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                                        |                            |   |                      |   |                          |   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                      |                            |                                                                                                                 |                                                                                          |
|----------------------|--------------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Professional Experts |                                      | Higher Institution Experts |                                                                                                                 | Internal Experts                                                                         |
| 1                    | Krishna Raj, Sutherland Technologies | 1                          | Dr. J Mangayarkarasi<br>Associate Professor and Head, Department of English, Ethiraj College for Women, Chennai | 1 Dr. Pushpanjali Sampathkumar, Assistant Professor, Department of English, FSH, SRMIST  |
|                      |                                      | 2                          | Dr. K S Antonysamy<br>Associate Professor and Head, Department of English, Loyola College, Chennai              | 2 Dr. Dr. Shanthichitra, Associate Professor, & Head, Department of English, FSH, SRMIST |
|                      |                                      |                            |                                                                                                                 | 3 Dr Anchal Sharma, Professor and Head, Department of EFL SRMIST                         |
|                      |                                      |                            |                                                                                                                 | 4 Dr T Sridevi, Assistant Professor, FSH, SRMIST                                         |
|                      |                                      |                            |                                                                                                                 | 5 Dr Shanmuga Priya, Assistant Professor SRMIST                                          |

| Course Code | UCS24101J | Course Title | Digital Electronics | Category | C | Core | L | T | P | C |
|-------------|-----------|--------------|---------------------|----------|---|------|---|---|---|---|
|             |           |              |                     |          |   |      | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                    | Depth |   |   |   | Attainment |   |   | Programme Learning Outcomes |   |   |   |   |   |   |   |   |    |
|-------|---------------------------------------------------------------|-------|---|---|---|------------|---|---|-----------------------------|---|---|---|---|---|---|---|---|----|
| CLR-1 | To learn the concepts of basics of Digital Logics             | 1     | 2 | 3 | 4 | 1          | 2 | 3 | 1                           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-2 | To impart in-depth knowledge of Logic Gates                   |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-3 | Understand the principles of Boolean Algebra                  |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-4 | Basic knowledge of Combinational Circuits and it Applications |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-5 | Basic knowledge of sequential Circuits and it Applications    |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |

| CLO   | At the end of this course, learners will be able to:                                   | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity | Communication Skills, Collaborating | Independent Thinking, Analytical Reasoning, Learning to Learn, Research | Leadership Qualities, Professionalism, Autonomy, Accountability | Digital Technology Skills | Value Inculcation, Multicultural Inclusivity | Environmental Action, Community Engagement | Entrepreneurial Risk Taking | PSO-1 | PSO-2 |
|-------|----------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|------------------------------------------------|-------------------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------|----------------------------------------------|--------------------------------------------|-----------------------------|-------|-------|
| CLO-1 | Have a thorough Understanding of the Fundamentals of Digital Logic and it Fundamentals | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3                                              | -                                   | -                                                                       | 1                                                               | -                         | 3                                            | -                                          | 2                           | 2     | 1     |
| CLO-2 | Understand the concepts of logic gates and its uses                                    | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3                                              | 2                                   | 1                                                                       | 2                                                               | 2                         | 3                                            | -                                          | 1                           | 2     | 1     |
| CLO-3 | Real time applications of Boolean Algebra                                              | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                              | 1                                   | 3                                                                       | 1                                                               | 3                         | 3                                            | -                                          | 1                           | 1     | 2     |
| CLO-4 | Design and implementation knowledge of Combinational Circuits                          | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                              | 3                                   | 2                                                                       | 3                                                               | 3                         | 3                                            | -                                          | 2                           | 3     | 3     |
| CLO-5 | Design and implementation knowledge of Sequential Circuits                             | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                              | 3                                   | 2                                                                       | 3                                                               | 3                         | 3                                            | -                                          | 3                           | 3     | 3     |

| Sessions | CLO - 1                                                 | CLO - 2                                                                             | CLO - 3                                                                       | CLO - 4                                      | CLO - 5                                             |
|----------|---------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------|
|          | 18                                                      | 18                                                                                  | 18                                                                            | 18                                           | 18                                                  |
| SLO-1    | Number System and its types<br>Base conversions         | Minterms and Maxterms<br>Sum of Products                                            | Combinational Logic - Introduction<br>Designing of a Logic Circuit Diagram    | Sequential Circuit - Introduction<br>Latches | Counters - Introduction<br>A Basic Design Counter   |
| SLO-2    | Binary codes and its types<br>Code conversions          | Product of Sums methods<br>Conversions of SOP to POS                                | Adders : Quarter, Half and Full Adders<br>Subtractors: Half, Full Subtractors | Flip Flops - Introduction<br>RS Flip Flop    | Classification of Counters<br>Asynchronous Counters |
| SLO-3    | Basics of Logic Gates and Derived Gates<br>Truth Tables | Simplifying Boolean Expressions using theorems<br>Derivation of a Boolean Functions | Design of Adder Circuits<br>Design of Subtractor Circuits                     | JK Flip Flop<br>D Flip Flop                  | Synchronous Counters<br>Syn Vs Asyn Counters        |
| SLO 4-6  | Lab1 : Verification of Basic Gates and Derived Gates    | Lab 4: Verifications of Distributive Law                                            | Lab 7: Half Adder and Full Adder                                              | Lab 10: Implementation of DeMultiplexer      | Lab 13: Ring Counters                               |

|           |                                                                                               |                                                                    |                                                                           |                                                                            |                                                |
|-----------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------|------------------------------------------------|
| SLO-7     | Universality of NAND Gate<br>Universality of NOR Gate                                         | Karnaugh Map - Introduction and its uses<br>Types of K-Map         | Multiplexer<br>Implementation of a Boolean expression using a Multiplexer | T - Flip Flop<br>Edge Triggered                                            | Ripple Counters<br>MOD Counters                |
| SLO-8     | Duality of Logic Gate Representation<br>Boolean Algebra - Introduction                        | Rules for constructing K-Map<br>Two and Three Variable K-Map       | De Multiplexer<br>Encoder                                                 | Master Slave Flip Flop<br>Registers Architecture                           | UP DOWN Counters<br>Ring Counter               |
| SLO-9     | Logical Operations AND OR NOT<br>Hierarchy of Logic Circuits                                  | Four Variable K-Map<br>Simplifying Boolean Expressions using K-Map | Decoder<br>Decimal -to- BCD encoder                                       | Shift Registers<br>Register with parallel load                             | Shift Counters<br>Decade                       |
| SLO 10-12 | <b>Lab2:NAND as Universal Gate<br/>NOR as Universal Gate</b>                                  | <b>Lab 5-Simplifying Boolean Expressions using theorems</b>        | <b>Lab 8:Half Subtractor and Full Subtractor</b>                          | <b>Lab 11: Implementation of Shift Registers and Serial Transfer</b>       | <b>Lab 14: Implementation of DOWN Counter</b>  |
| SLO-13    | Evaluating Logic Circuits<br>Implementing Circuits from Boolean Expressions                   | Don't Care conditions<br>Determination Prime Implicant Method      | Parity Generator<br>Parity Checker                                        | Four-bit Serial in Serial Out Shift register<br>Shift Registers Operations | Memory - Introduction<br>Basic terms and ideas |
| SLO-14    | Boolean Functions<br>Duality Principle, Complements                                           | Boolean Arithmetic - Introduction<br>Binary Addition               | Checksum<br>Code Conversions                                              | Serial-to-Parallel Shift Register<br>Design of Serial to Parallel          | Magnetic Memories<br>Memory Addressing         |
| SLO-15    | Laws and Theorems<br>Laws of Intersection, Union, Absorption, Involution, DeMorgan's Theorems | Binary Subtractions<br>Various Representation of Binary Numbers    | Programmable Array Logic<br>Programmable Logic Array                      | Parallel-to-Serial Shift Register<br>Design of Parallel to serial          | Types of ROM<br>Types of RAM                   |
| SLO 16-18 | <b>Lab 3:Laws of Boolean Expressions</b>                                                      | <b>Lab 6: Implementation of Binary Addition and Subtraction</b>    | <b>Lab 9: Implementation of Multiplexer</b>                               | <b>Lab 12: Four Bit Binary Shift Counters</b>                              | <b>Lab 15: Implementation of DOWN Counter</b>  |

| Resources |                                                                                               |   |                                                                       |  |  |
|-----------|-----------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------------|--|--|
| 1         | AnanthiSheshasaayee,J.G. Sheshasaayee, Digital Logic Fundamentals, Margham Publications, 2005 | 3 | Leach D.P, Malvino A.P, Digital Principles and Applications, TM, 2002 |  |  |
| 2         | Vijayendran.V, Digital Fundamentals, S.V. Publishers, 2003                                    | 4 | Moris ManoM, Digital Logic and Computer Design, Pearson, 2001         |  |  |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              | Strategies         |                      |                      |                          |                         |   |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|--------------------|----------------------|----------------------|--------------------------|-------------------------|---|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              | Technology         |                      | Pedagogy / Andragogy |                          | Sustainable Development |   |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              | Simulations        | Clarification/Pauses | ✓                    | Good Health & Well Being | ✓                       |   |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              |                    |                      |                      |                          |                         |   |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) | Presentation Tools | ✓                    | Group Discussion     | ✓                        | Quality Education       | ✓ |
| 1                         | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                    |                      |                      |                          |                         |   |
| 2                         | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                    | Interactive Lecture  | ✓                    |                          |                         |   |
| 3                         | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                    | Brainstorming        | ✓                    |                          |                         |   |
| 4                         | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                    |                      |                      |                          |                         |   |
| 5                         | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                    |                      |                      |                          |                         |   |
| 6                         | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                    |                      |                      |                          |                         |   |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |                    |                      |                      |                          |                         |   |
|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                    |                      |                      |                          |                         |   |
|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                    |                      |                      |                          |                         |   |
|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                    |                      |                      |                          |                         |   |
|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                    |                      |                      |                          |                         |   |
|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                    |                      |                      |                          |                         |   |
|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                    |                      |                      |                          |                         |   |
|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                    |                      |                      |                          |                         |   |
|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                    |                      |                      |                          |                         |   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |  |  |  |                            |                                               |  |  |  |  |
|----------------------|---------------------------------------------------------|--|--|--|--|----------------------------|-----------------------------------------------|--|--|--|--|
| Professional Experts |                                                         |  |  |  |  | Higher Institution Experts |                                               |  |  |  |  |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  |  |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT Chennai |  |  |  |  |
|                      |                                                         |  |  |  |  |                            |                                               |  |  |  |  |

| Course Code | USA24102J | Course Title | Programming for Problem Solving | Category | C | Core | L | T | P | C |
|-------------|-----------|--------------|---------------------------------|----------|---|------|---|---|---|---|
|             |           |              |                                 |          |   |      | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Applications | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|-----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|-----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                        | Depth   | Attainment | Programme Learning Outcomes |
|-------|-----------------------------------------------------------------------------------|---------|------------|-----------------------------|
| CLR-1 | Introduction to programming language.                                             | 1 2 3 4 | 1 2 3      | 1 2 3 4 5 6 7 8 9 10        |
| CLR-2 | Understanding basic element of programming language.                              |         |            |                             |
| CLR-3 | Use and implement data structures like arrays and structures to obtain solutions. |         |            |                             |
| CLR-4 | Customizing functions and procedures to encourage reusability                     |         |            |                             |
| CLR-5 | Establish interaction between stored files and the application code               |         |            |                             |

  

| CLO   | At the end of this course, learners will be able to:                                                       | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | PSO-1 | PSO-2 |
|-------|------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|-------|-------|
| CLO-1 | Evaluation of programming language                                                                         | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3     | 1     |
| CLO-2 | Choose operators, control structures to solve the problem optimally                                        | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3     | 2     |
| CLO-3 | Analyze the problem thoroughly and choose the prebuilt functions/ customize functions to solve the problem | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3     | 1     |
| CLO-4 | Able to use dynamic memory allocation concepts for problems that demand                                    | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3     | 3     |
| CLO-5 | Defend the need for files storage and the access privilege modes                                           | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3     | 3     |

| Sessions | CLO - 1                                                                   | CLO - 2                                                                                                                                                                                              | CLO - 3                                                                          | CLO - 4                                                     | CLO - 5                                                                                                              |
|----------|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
|          | 18                                                                        | 18                                                                                                                                                                                                   | 18                                                                               | 18                                                          | 18                                                                                                                   |
| SLO-1    | Evolution of Programming Languages<br>Problem solving through programming | Arithmetic operators, Assignment operator, Increment and decrement operator, Comma, Arrow and Bitwise and sizeof operator<br>Relational and logical Operators<br>Character and Numbers: Manipulation | Understanding contiguous memory allocation<br>Array : Advantages and Limitations | Formal and Actual Parameters<br>Functions: Returning values | File Types: text and binary, File operations: basics<br>File permissions and access privileges, Changing permissions |

|                    |                                                                                                           |                                                                                                                                                                                                                                  |                                                                                                                                                                                                                            |                                                                                                                                                          |                                                                                                              |
|--------------------|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| <b>SLO-2</b>       | Writing algorithms/pseudo codes<br>Drawing flowcharts                                                     | Expressions with pre / post increment operator<br>Expression with conditional and assignment operators                                                                                                                           | String Basics<br>String Declaration and Initialization                                                                                                                                                                     | Advantages of using Functions<br>Passing Array to Function                                                                                               | Writing contents to file , Reading file contents, Appending an existing file<br>Difference: Append and write |
| <b>SLO-3</b>       | Evolution of C language<br>Program structure                                                              | Ternary operator<br>L value and Rvalue in expression                                                                                                                                                                             | Understanding String Functions:<br>gets(), puts(), getchar(), putchar(), printf()<br>String Functions: atoi, strlen, strcat, strcmp                                                                                        | Call by Value<br>Call by Reference (An introduction on pointers shall be effective)                                                                      | Writing contents to file, Reading file contents<br>fscanf(), fprintf()                                       |
| <b>SLO 4-6</b>     | <b>Lab 1: Basic Program</b>                                                                               | <b>Lab 4: Operators and Expressions</b>                                                                                                                                                                                          | <b>Lab 7: Arrays : Multi dimensional</b>                                                                                                                                                                                   | <b>Lab 10: Functions</b>                                                                                                                                 | <b>Lab 13: File: reading and writing</b>                                                                     |
| <b>SLO-7</b>       | Need for file header files<br>Need for linkers and loaders                                                | Operator precedence<br>Type conversion                                                                                                                                                                                           | String Functions: sprintf, sscanf, strev, strcpy, strstr, strtok<br>Need for tokenization                                                                                                                                  | Nested functions<br>Functions: advantages and limitations                                                                                                | fscanf(), fprintf(), fseek(), ftell(), fputc(),                                                              |
| <b>SLO-8</b>       | Input and output statements: scanf, printf<br>Identifiers, Variables and Scope and lifetime of variables, | Control Statements : Sequential, Branching, looping and Jump<br>If, if ..else, else if ladder                                                                                                                                    | Need for user-defined data types<br>Structures                                                                                                                                                                             | Pointers and address operator<br>sizeof Pointer Variable and Pointer Operator                                                                            | fgetc(), fputc(), fgets()<br>fputw(), fgetw(),                                                               |
| <b>SLO-9</b>       | Keywords, Literals                                                                                        | Nested if, switch case<br>for loop                                                                                                                                                                                               | Unions<br>Accessing members of the structure                                                                                                                                                                               | Pointer Declaration and dereferencing<br>pointers<br>void Pointers and sizeof void Pointers                                                              | feof(), remove(), ferror()<br>End_of_file in file handling                                                   |
| <b>SLO 10-12</b>   | <b>Lab 2: Program using Input and Output Statements</b>                                                   | <b>Lab 5: Control Statements</b>                                                                                                                                                                                                 | <b>Lab 8: Strings, structures and union</b>                                                                                                                                                                                | <b>Lab 11: Pointers</b>                                                                                                                                  | <b>Lab 14: File Handling<br/>fputw(), fgetw(),<br/>remove();</b>                                             |
| <b>SLO-13</b>      | Expressions<br>Single line and multiline comments                                                         | while loop<br>do while                                                                                                                                                                                                           | Accessing members of the structure<br>Structure and arrays                                                                                                                                                                 | Function and call by reference<br>Functions and Returning array(use of pointers)                                                                         | Processor Directives<br>Predefined macros and macros                                                         |
| <b>SLO-14</b>      | Data types classification:<br>Basic, data type,<br>Derived data type, and<br>User-defined data type       | goto, break, continue, exit: Jump statements<br>Understanding jump statements with branch and iterative statements                                                                                                               | Structure and arrays<br>Nested structures                                                                                                                                                                                  | Structures and pointers :dynamic creation of data structures(list)<br>Incrementing Pointers, Constant Pointers                                           | conditional compilation<br><br>Processor Directives                                                          |
| <b>SLO-15</b>      | Constants and its types                                                                                   | Array Basic ,<br>Array Declaration, Initialization, manipulating one dimensional arrays with indices, Methods: sort, append, reverse, traverse, Manipulating two dimensional arrays with indices, Problems: matrix manipulations | Functions declaration and definition, Function prototypes, Defining and calling functions<br>Prebuilt and user defined functions, Multiple functions, Recursion , recursive Functions, Scope of variables across functions | Pointers and strings, Function Pointers, Array of Function Pointers<br>Null Pointers, Using sizeof(), malloc, calloc()<br>File Handling, Open(), close() | #pragma<br>, Creating include and macros                                                                     |
| <b>SLO 16 - 18</b> | <b>Lab 3: Program using Operators</b>                                                                     | <b>Lab 6: Arrays – One Dimensional</b>                                                                                                                                                                                           | <b>Lab 9: Functions</b>                                                                                                                                                                                                    | <b>Lab 12: Pointers</b>                                                                                                                                  | <b>Lab 15: Creating Macros</b>                                                                               |

| Resources |                                                                                    |  |  |  |  |  |  |  |   |                                                                                               |  |
|-----------|------------------------------------------------------------------------------------|--|--|--|--|--|--|--|---|-----------------------------------------------------------------------------------------------|--|
| 1         | R. G. Dromey, “How to solve it by Computer”, Pearson Education, ISBN 0-13-433995-9 |  |  |  |  |  |  |  | 3 | Reema Thareja, “Python Programming: Using Problem Solving Approach”, Oxford University Press; |  |
| 2         | The ‘C’ programming language by Kernighan and Ritchie, Prentice Hall               |  |  |  |  |  |  |  | 4 | Stephen G. Krantz, “Problem Solving Techniques”, Universities Pres                            |  |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) |
| 1                         | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |
| 2                         | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |
| 3                         | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |
| 4                         | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |
| 5                         | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |
| 6                         | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |

| Strategies                 |  |                      |                   |                         |                          |                   |   |
|----------------------------|--|----------------------|-------------------|-------------------------|--------------------------|-------------------|---|
| Technology                 |  | Pedagogy / Andragogy |                   | Sustainable Development |                          |                   |   |
| Simulations                |  | Clarification/Pauses |                   | ✓                       | Good Health & Well Being | ✓                 |   |
| Presentation Tools         |  | ✓                    | Group Discussion  |                         | ✓                        | Quality Education | ✓ |
| Learning Management System |  | ✓                    | Hands-on Practice |                         | ✓                        | Gender Equality   | ✓ |
|                            |  | Debate               |                   | ✓                       |                          |                   |   |
|                            |  | Interactive Lecture  |                   | ✓                       |                          |                   |   |
|                            |  | Brainstorming        |                   | ✓                       |                          |                   |   |
|                            |  |                      |                   |                         |                          |                   |   |
|                            |  |                      |                   |                         |                          |                   |   |
|                            |  |                      |                   |                         |                          |                   |   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |  |  |  |                            |                                               |  |  |                  |                                        |
|----------------------|---------------------------------------------------------|--|--|--|--|----------------------------|-----------------------------------------------|--|--|------------------|----------------------------------------|
| Professional Experts |                                                         |  |  |  |  | Higher Institution Experts |                                               |  |  | Internal Experts |                                        |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  |  |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT Chennai |  |  | 1                | Dr. G. Kalpana, Professor, FSH, SRMIST |

| Course Code | UMS24101T | Course Title | Discrete Mathematical Structures | Category | C | Core | L | T | P | C |
|-------------|-----------|--------------|----------------------------------|----------|---|------|---|---|---|---|
|             |           |              |                                  |          |   |      | 4 | 0 | 0 | 4 |

| Course Offering Department | Mathematics and Statistics | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|----------------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|----------------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                                  | Depth                             | Attainment                                                         | Programme Learning Outcome                                                                                                                                                                                                                                                                                                                                                  |
|-------|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CLR-1 | To provide a strong foundations in discrete mathematics                                                                     | 1 2 3 4                           | 1 2 3                                                              | 1 2 3 4 5 6 7 8 9 10                                                                                                                                                                                                                                                                                                                                                        |
| CLR-2 | To apply mathematical techniques for solving real life problems                                                             |                                   |                                                                    |                                                                                                                                                                                                                                                                                                                                                                             |
| CLR-3 | Apply Boolean algebra, truth table, logic gates, in computer science and communication.                                     |                                   |                                                                    |                                                                                                                                                                                                                                                                                                                                                                             |
| CLR-4 | To enable the use of logical, graphical and algebraic techniques wherever relevant.                                         |                                   |                                                                    |                                                                                                                                                                                                                                                                                                                                                                             |
| CLR-5 | Understanding of computer science through the applications of Discrete Mathematics                                          |                                   |                                                                    |                                                                                                                                                                                                                                                                                                                                                                             |
| CLO   | At the end of this course, learners will be able to:                                                                        | Conceive Design Implement Operate | Level of Thinking Expected Proficiency (%) Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity, Communication Skills, Collaborative Skills, Independent Thinking, Analytical Reasoning, Learning to Learn, Leadership Qualities, Professionalism, Autonomy, Digital Technology Skills, Value Incubation, Multicultural Understanding, Environmental Action, Community Engagement, Entrepreneurial Risk Taking, PSO-1, PSO-2 |
| CLO-1 | Problem solving in sets and relations. Gaining knowledge, solving the simple problems using elementary concepts.            | ✓ ✓ - -                           | 2 85 75                                                            | 3 - - 1 - 3 - 2 2 1                                                                                                                                                                                                                                                                                                                                                         |
| CLO-2 | Understand the concepts of Graphs terminology Sub graphs, Acyclic, Euler path, Hamiltonian Path                             | ✓ ✓ ✓ -                           | 2 85 75                                                            | 3 2 1 2 2 3 - 1 2 1                                                                                                                                                                                                                                                                                                                                                         |
| CLO-3 | Logical knowledge through the Statements, connectives, arguments, validity of arguments and Normal forms using truth tables | ✓ ✓ ✓ ✓                           | 3 85 75                                                            | 3 1 3 1 3 3 - 1 1 2                                                                                                                                                                                                                                                                                                                                                         |
| CLO-4 | Gain the knowledge about Trees , Labeled Trees, Binary trees ,Rooted Trees , Spanning Trees Minimal Spanning Trees          | ✓ ✓ ✓ ✓                           | 3 85 75                                                            | 3 3 2 3 3 3 - 2 3 3                                                                                                                                                                                                                                                                                                                                                         |
| CLO-5 | Apply the concepts of Boolean Algebra in real world problems related to Computer Science                                    | ✓ ✓ ✓ ✓                           | 3 85 75                                                            | 3 3 2 3 3 3 - 3 3 3                                                                                                                                                                                                                                                                                                                                                         |

| Sessions | CLO – 1                                    | CLO - 2                                              | CLO – 3                                                          | CLO - 4                           | CLO - 5                                                                         |
|----------|--------------------------------------------|------------------------------------------------------|------------------------------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------|
|          | 12                                         | 12                                                   | 12                                                               | 12                                | 12                                                                              |
| SLO-1    | Introduction to Sets – simple examples.    | Logic – Basic explanations                           | Graphs and Their Representation-Basic Terminology                | Trees – Basic properties of tress | Partition of a set - Relation concepts                                          |
| SLO-2    | Properties of sets, Types of sets          | Statements- simple compound                          | Drawings of Graphs – Special families of graph – Simple problems | Labeled trees                     | Matrix representation of relation – Hasse Diagrams - Lattices as posets         |
| SLO-3    | Venn diagram – Problems using Venn Diagram | Symbolic representation and Connectives explanations | Incidence graphs -Adjacency matrices –Vertex degree matrices     | Undirected Trees – Binary trees   | Definition of Lattices- Properties of Lattices - Problems on Lattices as posets |
| SLO-4    | Tutorial                                   | Tutorial                                             | Tutorial                                                         | Tutorial                          | Tutorial                                                                        |

|        |                                                                      |                                                                 |                                                                        |                                         |                                                                                        |
|--------|----------------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------|
| SLO-5  | Relation definitions – Types of Relations                            | Problems using Truth Tables – logical equivalence               | Isomorphism of Graphs – Sub graph                                      | Rooted Trees and Branches –             | Introduction to Boolean Algebra- basic definitions.                                    |
| SLO-5  | Problems on Relations                                                | Tautological implications                                       | Acyclic graph –Digraph – Simple problems                               | problems based on concepts              | Problems using the postulates of Boolean Algebra                                       |
| SLO-7  | Reflexive-Symmetric-Transitive – basic Explanations                  | Arguments- validity of arguments and normal forms               | Euler path and circuits                                                | Spanning Trees - Minimal Spanning Trees | Expression of a Boolean function By Truth table method – Properties of Boolean Algebra |
| SLO-8  | Tutorial                                                             | Tutorial                                                        | Tutorial                                                               | Tutorial                                | Tutorial                                                                               |
| SLO-9  | Functions-Types of functions – Comparison of Relations and Functions | Minterms and maxterms with examples                             | Eulerian cycles                                                        | Kruskal's Algorithm - Rooted Tree       | Boolean function in canonical form by Truth table method.                              |
| SLO-10 | Composite of two functions                                           | Principal disjunctive normal form                               | Hamiltonian Path and Circuits.                                         | binary Tree and Simple Problems         | DNF by Truth table method                                                              |
| SLO-11 | Composite of three functions – Simple problems                       | Principal conjunctive normal form - Problems using Truth Tables | Hamiltonian Path and Circuits – problems using graph – simple problems | Expression of Trees and Simple Problems | CNF by Truth table method – Simple problems                                            |
| SLO-12 | Composite of three functions – Simple problems                       | Principal conjunctive normal form - Problems using Truth Tables | simple problems                                                        | Expression of Trees and Simple Problems | CNF by Truth table method – Simple problems                                            |

| Resources |                                                                                                                        |  |  |   |                                                                                             |
|-----------|------------------------------------------------------------------------------------------------------------------------|--|--|---|---------------------------------------------------------------------------------------------|
| 1         | Discrete Mathematics with Graph Theory and Combinatorics by T.Veerajan, McGraw Hill Education(India) Pvt Limited, 2007 |  |  | 2 | .Dr. A. Singaravelu, Allied Mathematics, 7 <sup>th</sup> edition, A. R. Publications, 2015. |

| Assessment                      |            |                                                      |            |            |            |                                         | Strategies         |                               |                      |                             |                            |                 |
|---------------------------------|------------|------------------------------------------------------|------------|------------|------------|-----------------------------------------|--------------------|-------------------------------|----------------------|-----------------------------|----------------------------|-----------------|
| Bloom’s<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |            |            |            | Final<br>Assessment<br>(50 % weightage) | Technology         |                               | Pedagogy / Andragogy |                             | Sustainable<br>Development |                 |
|                                 |            | CLA – 1                                              | CLA – 2    | CLA – 3    | CLA – 4    |                                         | Simulations        | Clarification/Pauses          | ✓                    | Good Health & Well<br>Being | ✓                          |                 |
|                                 |            | (10 %)                                               | (10 %)     | (20 %)     | (10%)      |                                         | Presentation Tools | ✓                             | Group Discussion     | ✓                           | Quality Education          | ✓               |
|                                 |            | Theory (%)                                           | Theory (%) | Theory (%) | Theory (%) |                                         | Theory (%)         | Learning<br>Management System | ✓                    | Hands-on Practice           | ✓                          | Gender Equality |
| 1                               | Remember   | 15                                                   | 15         | 10         | 10         | 15                                      |                    | Debate                        | ✓                    |                             |                            |                 |
| 2                               | Understand | 15                                                   | 15         | 10         | 10         | 15                                      |                    | Interactive Lecture           | ✓                    |                             |                            |                 |
| 3                               | Apply      | 20                                                   | 25         | 25         | 25         | 25                                      |                    | Brainstorming                 | ✓                    |                             |                            |                 |
| 4                               | Analyze    | 20                                                   | 25         | 25         | 25         | 25                                      |                    |                               |                      |                             |                            |                 |
| 5                               | Evaluate   | 15                                                   | 10         | 15         | 15         | 10                                      |                    |                               |                      |                             |                            |                 |
| 6                               | Create     | 15                                                   | 10         | 15         | 15         | 10                                      |                    |                               |                      |                             |                            |                 |
| Total (%)                       |            | 100                                                  | 100        | 100        | 100        | 100                                     |                    |                               |                      |                             |                            |                 |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                 |                            |                                                   |                                |
|----------------------|-------------------------------------------------|----------------------------|---------------------------------------------------|--------------------------------|
| Professional Experts |                                                 | Higher Institution Experts |                                                   | Internal Experts               |
| 1                    | Dr. D. Arivudai nambi, Anna University, Chennai | 1                          | Dr. N.Viswanathan, , Presidency college , Chennai | 1 1.Dr.L.Sivakami, SRMIST      |
|                      |                                                 |                            |                                                   | 2 2.Dr.S.Lakshmi priya, SRMIST |

| CourseCode | UCD24S01J | Course Title | Verbal Ability and Skill Development | Category | S | Skill Enhancement Course | L | T | P | C |
|------------|-----------|--------------|--------------------------------------|----------|---|--------------------------|---|---|---|---|
|            |           |              |                                      |          |   |                          | 1 | 0 | 2 | 2 |

| Course Offering Department | Career Guidance | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|-----------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|-----------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                             | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcomes                            |                                            |                                                                               |                                                                 |                           |                                              |                                            |                             |       |        |
|-------|------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|--------------------------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------|----------------------------------------------|--------------------------------------------|-----------------------------|-------|--------|
| CLR-1 | Expose students to right attitudinal and behavioral aspects and to build the same through activities                   | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity Solving | Communication Skills, Collaborating Skills | Independent Thinking, Analytical Reasoning, Learning to Learn Research Skills | Leadership Qualities, Professionalism, Autonomy, Accountability | Digital Technology Skills | Value Incultation, Multicultural Inclusivity | Environmental Action, Community Engagement | Entrepreneurial Risk Taking | PLO-9 | PLO-10 |
|       |                                                                                                                        |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                               |                                                                 |                           |                                              |                                            |                             |       |        |
|       |                                                                                                                        |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                               |                                                                 |                           |                                              |                                            |                             |       |        |
|       |                                                                                                                        |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                               |                                                                 |                           |                                              |                                            |                             |       |        |
|       |                                                                                                                        |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                               |                                                                 |                           |                                              |                                            |                             |       |        |
| CLR-2 | Develop and nurture interpersonal skills of the students through individual and group activities.                      |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                               |                                                                 |                           |                                              |                                            |                             |       |        |
| CLR-3 | Increase efficiency and leadership skills to improve team results.                                                     |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                               |                                                                 |                           |                                              |                                            |                             |       |        |
| CLR-4 | Use the basic mechanics of Grammar.                                                                                    |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                               |                                                                 |                           |                                              |                                            |                             |       |        |
| CLR-5 | Instill confidence in students and develop skills necessary to face the challenges of competitive exams and placements |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                               |                                                                 |                           |                                              |                                            |                             |       |        |
| CLO   | At the end of this course, learners will be able to:                                                                   |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                               |                                                                 |                           |                                              |                                            |                             |       |        |
| CLO-1 | Re-engineer their attitude and understand its influence on behavior                                                    | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 2                                                      | 3                                          | 2                                                                             | 2                                                               | -                         | 1                                            | 2                                          | 3                           | -     | -      |
| CLO-2 | Acquire inter-personal skills and be an effective goal-oriented team player                                            | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3                                                      | 3                                          | 2                                                                             | 3                                                               | -                         | 1                                            | 2                                          | 1                           | -     | -      |
| CLO-3 | Learn the importance of inner management and creativity                                                                | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                      | 2                                          | 2                                                                             | 3                                                               | -                         | 1                                            | 2                                          | 2                           | -     | -      |
| CLO-4 | Understand the correct usage of grammar                                                                                | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                      | -                                          | 3                                                                             | -                                                               | 3                         | 1                                            | 1                                          | -                           | -     | -      |
| CLO-5 | Help the students succeed in competitive exams and placements                                                          | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                      | -                                          | 3                                                                             | -                                                               | 3                         | 1                                            | 1                                          | -                           | -     | -      |

| Sessions | CLO - 1                                                                                    | CLO - 2                                                                                                                        | CLO - 3                                                                                                                                                                 | CLO - 4                                           | CLO - 5                                           |
|----------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|---------------------------------------------------|
|          | 9                                                                                          | 9                                                                                                                              | 9                                                                                                                                                                       | 9                                                 | 9                                                 |
| SLO-1    | Introduction to IKIGAI, IKIGAI – Key concepts                                              | Networking skills – relationship building, value exchange, active listening, friendliness and positivity, clear communication  | Time management skills - Value of Time, Pomodoro technique.                                                                                                             | Basics of Grammar                                 | Sentence Correction                               |
| SLO-2    | Attitude, Attitude formation and Factors influencing Attitude                              | <b>Negotiation skills – building rapport and problem-solving</b>                                                               | Weekly Planner, To do list, Prioritizing work, Time management activity                                                                                                 | Spotting Errors                                   | Sentence completion (Grammar based)               |
| SLO-3    | SWOT Analysis, individual SWOT Analysis -SWOT Analysis activity                            | Entrepreneurial Skills, Entrepreneurial knowledge, Focus, Investment, Risk tolerance, Resilience, Ethics                       | Creative thinking skills – divergent thinking, Synthesis and collaboration, out-of -the -box thinking                                                                   | Error spotting based on Parts of Speech           | Sentence completion (Vocabulary based)            |
| SLO-4    | Presentation skills, Types of presentation, Structure of presentation, Delivery techniques | Creating brands – activity (posters, flyers, business cards)                                                                   | Creative thinking skills Activity session                                                                                                                               | Errors how to avoid in Nouns & Pronouns           | Cause and Effect - Introduction                   |
| SLO-5    | Extempore Practice Session I                                                               | Stress Management - Causes of Stress and Its Impact                                                                            | Brainstorming, use of groups and individual brainstorming techniques to promote idea generation                                                                         | Common Errors: Subject - verb Agreement           | Cause and Effect – Practise Session               |
| SLO-6    | Extempore Practice Session II                                                              | How to Manage Stress and distress, Understanding the circle of control, stress busters                                         | Intercultural communication – beliefs, customs and attitudes of people in different countries (US, UK, Japan, West Asia, China, Russia), Social and cultural etiquettes | Vocabulary - Synonyms - Antonyms - Phrasal verbs- | Theme detection – Introduction - Practice session |
| SLO-7    | Interpersonal Skills, Emotional Intelligence                                               | Conflict Management - Conflict in human relations – reasons, Approaches to conflict resolution                                 | Communication etiquettes, Telephone etiquettes                                                                                                                          | One Word Substitution - Homophones - Homonyms     | Critical Reasoning and Verbal deduction           |
| SLO-8    | Importance of Team Work, Team Building activity                                            | Conflict resolutions – Case studies                                                                                            | Ice breaking, Designing ice breaker games                                                                                                                               | Words often confused                              | Types of Critical Reasoning- Tips and Tricks      |
| SLO-9    | Leadership skills, Leadership skills - based activity                                      | Importance of decision making, Process of decision making, Practical ways of decision making, weighing positives and negatives | Resume writing skills                                                                                                                                                   | Idioms and Idiomatic Expressions – Introduction   | Word Analogy - Types of Word analogy              |

| Resources |                                                                              |  |  |  |   |                                                                                              |  |  |  |
|-----------|------------------------------------------------------------------------------|--|--|--|---|----------------------------------------------------------------------------------------------|--|--|--|
| 1         | JeffButterfield,SoftSkillsforEveryone, CENGAGE,India,2015                    |  |  |  | 5 | ThomasAHarris,Iamok,youareok,Arrow,London,2012                                               |  |  |  |
| 2         | Dr.K.Alex,SoftSkills,S. ChandPublishing&Company,India,2014                   |  |  |  | 6 | DanielColeman, EmotionalIntelligence,Bloomsbury,India,2016                                   |  |  |  |
| 3         | CoveySean,Sevenhabits ofhighlyeffectiveteens,Simon&Schuster,NewYork,2014     |  |  |  | 7 | Norman Lewis, Word Power Made Easy New Revised and Expanded Edition, Goyal publication, 2011 |  |  |  |
| 4         | CarnegieDale,Howtowinfriendsandinfluencepeople,SimonandSchuster,NewYork,2016 |  |  |  | 8 | Bhatnagar R P, English for Competitive Examinations, Trinity Press, 2016.                    |  |  |  |

| Assessment                |            |                                                       |              |            |              |            |              |            |              |
|---------------------------|------------|-------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|
| Bloom's Level of Thinking |            | Continuous Learning Assessment (CLA) (100% weightage) |              |            |              |            |              |            |              |
|                           |            | CLA – 1                                               |              | CLA – 2    |              | CLA – 3    |              | CLA – 4 *  |              |
|                           |            | (20 %)                                                |              | (20 %)     |              | (30 %)     |              | (30%)      |              |
|                           |            | Theory (%)                                            | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) |
| 1                         | Remember   | 20                                                    | 20           | 15         | 15           | 20         | 20           | 20         | 20           |
| 2                         | Understand | 20                                                    | 20           | 15         | 15           | 20         | 20           | 20         | 20           |
| 3                         | Apply      | 15                                                    | 15           | 15         | 15           | 15         | 15           | 20         | 20           |
| 4                         | Analyze    | 15                                                    | 15           | 15         | 15           | 15         | 15           | 20         | 20           |
| 5                         | Evaluate   | 15                                                    | 15           | 20         | 20           | 15         | 15           | 10         | 10           |
| 6                         | Create     | 15                                                    | 15           | 20         | 20           | 15         | 15           | 10         | 10           |
| Total (%)                 |            | 100                                                   | 100          | 100        | 100          | 100        | 100          | 100        | 100          |

| Strategies                 |   |                      |   |                          |   |
|----------------------------|---|----------------------|---|--------------------------|---|
| Technology                 |   | Pedagogy / Andragogy |   | Sustainable Development  |   |
| Simulations                |   | Clarification/Pauses | ✓ | Good Health & Well Being | ✓ |
| Presentation Tools         | ✓ | Group Discussion     | ✓ | Quality Education        | ✓ |
| Learning Management System | ✓ | Hands-on Practice    | ✓ | Gender Equality          | ✓ |
|                            |   | Debate               | ✓ |                          |   |
|                            |   | Interactive Lecture  | ✓ |                          |   |
|                            |   | Brainstorming        | ✓ |                          |   |
|                            |   |                      |   |                          |   |
|                            |   |                      |   |                          |   |
|                            |   |                      |   |                          |   |

\* The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                                                                                                                                |                            |                                                                                                                                                  |                  |                                                                                                                  |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------------------------------------------------------------------------------------------------|
| Professional Experts |                                                                                                                                                                | Higher Institution Experts |                                                                                                                                                  | Internal Experts |                                                                                                                  |
| 1                    | Mr. P. Chockalingam, Senior Lead Software Engineer, Virtusa Consulting Services Private Ltd, DLF IT Park SEZ, Chennai – 600089<br>p.chockalingam1986@gmail.com | 1                          | Dr. G. Saravana Prabu, Asst. Professor, Department of English, Amrita Vishwa Vidhyapeetham, Coimbatore - 641112<br>g_saravanaprabu@cb.amrita.edu | 1                | Dr.SathishK,HOD,DepartmentofCareerGuidanceCell,FSH,SRMIST<br>hod.dcgk.ktr@srmist.edu.in                          |
|                      | -                                                                                                                                                              |                            | -                                                                                                                                                | 2                | Mrs.Deepalakshmi S, Assistant Professor, Department of Career Guidance Cell, FSH, SRMIST, deepalas@srmist.edu.in |
|                      |                                                                                                                                                                |                            |                                                                                                                                                  | 3                | Dr. Sam Israel S, Assistant Professor, Department of Career Guidance Cell, FSH, SRMIST, samisras@srmist.edu.in   |

## Semester - II

| Course Code | ULT24AE2J | Course Title | Tamil – II |  |  |  | Category | A | Ability Enhancement Course | L | T | P | C |
|-------------|-----------|--------------|------------|--|--|--|----------|---|----------------------------|---|---|---|---|
|             |           |              |            |  |  |  |          |   |                            | 2 | 0 | 2 | 3 |

| Course Offering Department | Tamil | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|-------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|-------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                       | Depth    |        |           |         | Attainment        |                          |                         | Programme learning Outcomes |                       |                       |                       |                    |                    |                       |                      |       |       |
|-------|--------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|-----------------------------|-----------------------|-----------------------|-----------------------|--------------------|--------------------|-----------------------|----------------------|-------|-------|
| CLR-1 | சங்கஇலக்கியங்கள்வழிதொன்மைஅக, புறவாழ்வியலைஅறியச்செய்தல்                                           | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 1                           | 2                     | 3                     | 4                     | 5                  | 6                  | 7                     | 8                    | 9     | 10    |
| CLR-2 | தமிழ்ச்சமூகத்தின்அறவியல்குறித்துதெரியச்செய்தல்                                                   |          |        |           |         |                   |                          |                         |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLR-3 | பக்திஇலக்கியங்கள்போதித்தமனிதமாண்புகளைஉணர்ச்செய்தல்                                               |          |        |           |         |                   |                          |                         |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLR-4 | பண்டைத்தமிழ்ச்சமூகத்தின்தொல்இலக்கியங்கள்வளர்ச்சிபெற்றவரலாற்றைப்புரியச்செய்தல்                    |          |        |           |         |                   |                          |                         |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLR-5 | சிறுகதைகள்சொல்லும்வாழ்வியல்நெறி, மொழியின்நுட்பங்கள்ஆகியவற்றைத்தெரியச்செய்தல்                     |          |        |           |         |                   |                          |                         |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
|       |                                                                                                  | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving,            | Communication Skills, | Independent Thinking, | Leadership Qualities, | Digital Technology | Value Incultation, | Environmental Action, | Entrepreneurial Risk | PSO-1 | PSO-2 |
| CLO   | At the end of this course, learners will be able to:                                             |          |        |           |         |                   |                          |                         |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLO-1 | பண்டைத்தமிழ்ச்சமூகத்தின்அக, புறவாழ்வியல்இன்றையசமூகமேம்பாட்டிற்குவழிகாட்டிநிற்பதைஅறிந்துகொள்ளுதல் | ✓        | ✓      | -         | -       | 2                 | 75                       | 60                      | 3                           | 3                     |                       |                       |                    | 2                  |                       |                      |       |       |
| CLO-2 | தமிழ்ச்சமூகம்அறத்தைவலியுறுத்தியசமூகம்என்பதன்வழிமானுடஅறத்தைத்தெரிந்துகொள்ளுதல்                    | ✓        | ✓      | ✓         | -       | 2                 | 80                       | 70                      | 2                           |                       | 3                     |                       | 3                  |                    |                       |                      |       |       |
| CLO-3 | பக்திஇலக்கியம்மூலம்இறைத்தந்துவங்களைஅறிந்துமானுடஒற்றுமைமேம்பாட்டைஅறிந்துகொள்ளுதல்                 | ✓        | ✓      | ✓         | ✓       | 2                 | 70                       | 65                      |                             | 3                     |                       | 3                     |                    | 1                  |                       |                      |       |       |
| CLO-4 | தொல்தமிழ்ச்சமூகம்இலக்கியம், அரசியல், அறம், பக்திஆகியவற்றில்தழைத்தோங்கியதைத்தெரிந்துகொள்ளுதல்     | ✓        | ✓      | ✓         | ✓       | 2                 | 70                       | 70                      | 3                           |                       | 3                     |                       |                    | 3                  |                       |                      |       |       |
| CLO-5 | வாழ்வியலின்நெறிகளைச்சொல்லும்கதைகளைப்படைக்கும்திறனோடுமொழிஆளுமையையும்அறிந்துகொள்ளுதல்              | ✓        | ✓      | ✓         | ✓       | 3                 | 80                       | 70                      | 3                           |                       |                       | 2                     |                    |                    |                       | 3                    |       |       |

| Sessions | CLO – 1                                   | CLO - 2                              | CLO – 3                                    | CLO - 4                                      | CLO - 5                                           |
|----------|-------------------------------------------|--------------------------------------|--------------------------------------------|----------------------------------------------|---------------------------------------------------|
|          | 12                                        | 12                                   | 12                                         | 12                                           | 12                                                |
| SLO -1   | காலந்தோறும்தமிழ்அகத்திணைமரபு - உள்ளடக்கம் | சங்கமருவியகாலம் அறமும்வாழ்வியலும்    | பல்லவர்காலஇலக்கியங்கள்                     | பண்டைக்காலத்தமிழகம் சங்ககாலமக்களின்வாழ்வியல் | தமிழ்ச்சிறுகதையும்தமிழ்ச்சமூக வாழ்வியலும்         |
| SLO -2   | எட்டுத்தொகைநூல்களும்பகுப்புமுறையும்       | உலகப்பொதுமறை - திருக்குறள்கட்டமைப்பு | பக்தியும்தமிழும் - பக்திஇலக்கியத்தோற்றநிலை | முச்சங்கஅறிமுகமும் வரலாறும்                  | புதுமைப்பித்தன் - சங்குத்தேவனின்தர்மம்            |
| SLO -3   | ஐங்குறுநூறு – 375, 391                    | திருக்குறள்வான்சிறப்பு (2)           | சைவசமயஇலக்கியங்கள் - சைவக்குரவர்நால்வர்    | சங்கஇலக்கியப்பாடுபொருளும்வடிவமும்            | நபிச்சமூர்த்தி - வேப்பமரம் - மரபும்நம்பிக்கைகளும் |

|         |                                        |                                         |                                                                |                                                 |                                                 |
|---------|----------------------------------------|-----------------------------------------|----------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| SLO -4  | குறுந்தொகை - 02, 03                    | திருக்குறள் -<br>புலவிநுணுக்கம் (132) - | தேவாரம் -<br>திருஞானசம்பந்தர் - 2834<br>திருநாவுக்கரசர் - 4262 | எட்டுத்தொகைநூல்களின்வரலாறு<br>ம்கட்டமைப்பும்    | தமிழருவிமணியன் -<br>ஒற்றைச்சிறகு - உறவின்மேன்மை |
| SLO -5  | அகநானூறுநூல்கட்டமைப்பு                 | தமிழ்இலக்கியமரபில்நீதிஇ<br>லக்கியங்கள்  | திருவாசகம்-<br>மாணிக்கவாசகர்ஆனந்த<br>பரவசம் - பாடல் 10         | பத்துப்பாட்டுநூல்களின்வரலாறும்<br>வாழ்வியலும்   | ஆர். சூடாமணி - மூடநம்பிக்கை.                    |
| SLO -6  | அகநானூறு -238                          | நாலடியார்<br>வைகலும் - பாடல்எண் 39      | வைணவசமயவளர்ச்சி<br>ப்போக்கு                                    | பதினெண்கீழ்க்கணக்கும்தமிழர்அ<br>றமரபும்         | கிருஷ்ணாடாவின்ஸி -<br>காலாஅருகேவாடா             |
| SLO -7  | கலித்தொகை -11                          | நீதிஇலக்கியத்தில்திருநா<br>ல்கள்        | நாலாயிரத்திவ்யப்பிரப<br>ந்தம்<br>குலசேகராழ்வார்பாடல்<br>- 678  | பதினோருநீதிஇலக்கியங்கள்                         | மொழிப்பயிற்சி<br>சொற்களைஉருவாக்குதல்            |
| SLO -8  | தமிழ்புறமரபு- புறநானூறு-<br>107        | சிறுபஞ்சமூலம் -64                       | ஆண்டாள்பாடல் - 574.<br>திருமழிசைஆழ்வார்பா<br>டல்               | காப்பியஇலக்கணம் -<br>காப்பியங்களின்வகைமை        | எழுத்துகளில்இருந்துசொற்களைக்<br>கண்டுபிடித்தல்  |
| SLO -9  | புறநானூறு -110, 112                    | பழமொழிநானூறுஅறிமுகம்-<br>தனித்தன்மைகள்  | தமிழில்இஸ்லாமிய<br>இலக்கியங்கள்                                | ஐம்பெருங்காப்பியங்கள்                           | படம்பார்த்துக்கதைஎழுதுதல்                       |
| SLO -10 | பத்துப்பாட்டும்ஆற்றுப்படை<br>நூல்களும் | பழமொழிநானூறு - 184                      | சீறாப்புராணம் -<br>விடமீட்டப்படலம் -<br>10பாடல்கள்             | தமிழ்ச்சமூகமும்சமயத்தத்துவங்க<br>ளும்           | படம்பார்த்துக்கவிதைஎழுதுதல்                     |
| SLO -11 | சிறுபாணாற்றுப்படை: 84-115              | பண்டைக்காலப்போரும்வா<br>ழ்வும் - புறம்  | தமிழில்கிறித்தவ<br>இலக்கியங்கள்                                | பன்னிருதிருமுறை - அறிமுகம்.<br>வரலாறு           | கற்பனையும்தொகுப்பு -<br>தமிழில்வாசகம்           |
| SLO -12 | பட்டினப்பாலை: 40-50                    | களவழிநாற்பது - 40                       | கிறித்துவின்அருள்வேட்<br>டல் - திரு.வி.க.<br>அலகிலொளி- 5பாடல்  | நாலாயிரத்திவ்யப்பிரபந்தம் -<br>அறிமுகம், வரலாறு | விளம்பரத்திற்குவாசகம்எழுதுதல்                   |

#### Resources

|   |                                                                                                                                                                  |   |                                                                                                |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------------------|
| 1 | கொன்றை, தொகுப்பும்பதிப்பும் - தமிழ்த்துறைஆசிரியர்கள், தமிழ்த்துறை,<br>எஸ்.ஆர்.எம். அறிவியல்மற்றும்தொழில்நுட்பக்கல்விநிறுவனம், காட்டாங்குளத்தூர்,<br>603203, 2023 | 2 | தமிழண்ணல், புதியநோக்கில்தமிழ்இலக்கியவரலாறு,<br>மீனாட்சிபுத்தகநிலையம், மதுரை, 2017              |
| 3 | மு. அருணாசலம், தமிழ்இலக்கியவரலாறு, நூற்றாண்டுமுறை ( 9ஆம்நூ. முதல் 16<br>வரை), திபார்க்கர், சென்னை, 2005                                                          | 4 | தமிழ்இலக்கியத்தொடரடைவு - <a href="http://tamilconcordance.in/">http://tamilconcordance.in/</a> |
| 5 | மதுரைதமிழ்இலக்கியமின்தொகுப்புத்திட்டம் - <a href="https://www.projectmadurai.org/">https://www.projectmadurai.org/</a>                                           | 6 | தமிழ்இணையக்கல்விக்கழகம் - <a href="http://www.tamilvu.org/">http://www.tamilvu.org/</a>        |

| Assessment                      |            |                                                      |                 |               |                 |               |                 |               |                 |                                            | Strategies                    |                      |                      |                             |                         |   |
|---------------------------------|------------|------------------------------------------------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|-----------------|--------------------------------------------|-------------------------------|----------------------|----------------------|-----------------------------|-------------------------|---|
| Bloom’s<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |                 |               |                 |               |                 |               |                 | Final<br>Assessment<br>(50 %<br>weightage) | Technology                    |                      | Pedagogy / Andragogy |                             | Sustainable Development |   |
|                                 |            | CLA – 1                                              |                 | CLA – 2       |                 | CLA – 3       |                 | CLA – 4 *     |                 |                                            | Simulations                   | Clarification/Pauses | ✓                    | Good Health & Well<br>Being | ✓                       |   |
|                                 |            | (10 %)                                               |                 | (10 %)        |                 | (20 %)        |                 | (10%)         |                 |                                            | Presentation Tools            | ✓                    | Group Discussion     | ✓                           | Quality Education       | ✓ |
|                                 |            | Theory<br>(%)                                        | Practice<br>(%) | Theory<br>(%) | Practice<br>(%) | Theory<br>(%) | Practice<br>(%) | Theory<br>(%) | Practice<br>(%) | Theory (%)                                 | Learning Management<br>System | ✓                    | Hands-on Practice    | ✓                           | Gender Equality         | ✓ |
| 1                               | Remember   | 15                                                   | 15              | 15            | 15              | 10            | 10              | 10            | 10              | 15                                         |                               |                      | Debate               | ✓                           |                         |   |
| 2                               | Understand | 15                                                   | 15              | 15            | 15              | 10            | 10              | 10            | 10              | 15                                         |                               |                      | Interactive Lecture  | ✓                           |                         |   |
| 3                               | Apply      | 20                                                   | 25              | 25            | 20              | 25            | 25              | 25            | 25              | 25                                         |                               |                      | Brainstorming        | ✓                           |                         |   |
| 4                               | Analyze    | 20                                                   | 25              | 25            | 20              | 25            | 25              | 25            | 25              | 25                                         |                               |                      |                      |                             |                         |   |
| 5                               | Evaluate   | 15                                                   | 10              | 10            | 15              | 15            | 15              | 15            | 15              | 10                                         |                               |                      |                      |                             |                         |   |
| 6                               | Create     | 15                                                   | 10              | 10            | 15              | 15            | 15              | 15            | 15              | 10                                         |                               |                      |                      |                             |                         |   |
| Total (%)                       |            | 100                                                  | 100             | 100           | 100             | 100           | 100             | 100           | 100             | 100                                        |                               |                      |                      |                             |                         |   |

\* The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                                                |                            |                                                                                                                                          |                  |                                                                                          |
|----------------------|--------------------------------------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------------------------------------------------------------------------|
| Professional Experts |                                                                                | Higher Institution Experts |                                                                                                                                          | Internal Experts |                                                                                          |
| 1                    | Dr. P.R.Subramanian, Director, Mozhi Trust, Thiruvannmiyur, Chennai – 600 041. | 1                          | Dr. V. Dhanalakshmi, Associate Professor, Subramania Bharathi School of Tamil Language & Literature, Pondicherry University, Pondicherry | 1                | Dr. B.Jaiganesh, Associate Professor & Head, Dept. of Tamil, FSH, SRMIST, KTR.           |
|                      |                                                                                |                            |                                                                                                                                          | 2                | Dr. R. Ravi, Assistant Professor and Head, Dept. of Tamil, FSH, SRMIST, VDP.             |
|                      |                                                                                |                            |                                                                                                                                          | 3                | Mr. G. Ganesh, Assistant Professor, Dept. of Tamil, FSH, SRMIST, RMP.                    |
|                      |                                                                                |                            |                                                                                                                                          | 4                | Dr. T.R.Hezbibah beulah Suganthi, Assistant Professor, Dept. of Tamil, FSH, SRMIST, KTR. |
|                      |                                                                                |                            |                                                                                                                                          | 5                | Dr. S.Saraswathy, Assistant Professor, Dept. of Tamil, FSH, SRMIST, KTR.                 |

| Course Code | ULH24AE2J | Course Title | Hindi – II |  |  |  | Category | A | Ability Enhancement Course | L | T | P | C |
|-------------|-----------|--------------|------------|--|--|--|----------|---|----------------------------|---|---|---|---|
|             |           |              |            |  |  |  |          |   |                            | 2 | 0 | 2 | 3 |

| Course Offering Department | Hindi | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|-------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|-------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                      | Depth |   |   |   | Attainment |   |   | Programme learning Outcomes |   |   |   |   |   |   |   |   |    |
|-------|-------------------------------------------------------------------------------------------------|-------|---|---|---|------------|---|---|-----------------------------|---|---|---|---|---|---|---|---|----|
| CLR-1 | They get to learn Ancient ,Medieval,and Modern poetry                                           | 1     | 2 | 3 | 4 | 1          | 2 | 3 | 1                           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-2 | To understand the Significance of poems of great poets like Kabir,Tulsidas,Bihari and Dhananand |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-3 | To Enhance and Enrich their knoeledge through poetry                                            |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-4 | Media based understanding for employability                                                     |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-5 | Job Oriented writing skills                                                                     |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |

| CLO   | At the end of this course, learners will be able to:                                                                                | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving | Critical Thinking | Creativity | Communication Skills | Collaborative Skills | Independent Thinking | Analytical Reasoning | Leadership Qualities | Entrepreneurial Attitude | Digital Technology Skills | Value Incultication | Multicultural Inclusivity | Environmental Action | Community Engagement | Entrepreneurial Risk Taking | PSO-1 | PSO-2 |
|-------|-------------------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|-----------------|-------------------|------------|----------------------|----------------------|----------------------|----------------------|----------------------|--------------------------|---------------------------|---------------------|---------------------------|----------------------|----------------------|-----------------------------|-------|-------|
| CLO-1 | To provide a brief Introduction of Hindi poetry(Bhaktikal,Reetikal and Aadhunikkal)                                                 | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3               | 2                 | 3          |                      |                      |                      |                      | 2                    |                          |                           |                     |                           |                      |                      |                             |       |       |
| CLO-2 | To Discuss the origin and development of various forms of poetry in Hindi                                                           | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3               |                   | 2          |                      |                      |                      | 3                    |                      |                          |                           |                     | 3                         |                      |                      |                             |       |       |
| CLO-3 | Focus on Evaluating the social changes through poetry                                                                               | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                 | 3                 |            |                      | 3                    | 3                    | 2                    |                      |                          |                           |                     |                           |                      |                      |                             |       |       |
| CLO-4 | To Examine Transcreation in advertisement                                                                                           | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 2               |                   | 2          | 3                    |                      |                      |                      |                      |                          |                           | 2                   |                           |                      |                      |                             |       |       |
| CLO-5 | To guide the students in the learning of the technical aspect of the Hindi Languge,this would help them in the field administration | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                 | 3                 |            |                      | 3                    | 3                    | 2                    |                      |                          |                           |                     |                           |                      |                      |                             |       |       |

| Sessions | CLO - 1                          | CLO - 2                  | CLO - 3                                              | CLO - 4                       | CLO - 5                             |
|----------|----------------------------------|--------------------------|------------------------------------------------------|-------------------------------|-------------------------------------|
|          | 12                               | 12                       | 12                                                   | 12                            | 12                                  |
| SLO-1    | BHAKTI KALIN KAVITA              | RITI KALIN KAVITA        | ADHUNIK KAVITA                                       | VIGYAPAN                      | PATRA LEKHAN&PARIBHASHIK SHABDAVALI |
| SLO-2    | BHAKTIU KALIN KAITA KI AVADHARNA | AVADHARNA EVM SAWROOP    | AVADHARNA EVM SAWROOP                                | AWADHARNA EVM SAROOP          | AVADHARNA EVM SAROOP                |
| SLO-3    | SWARUP EVM MAHATWA               | RITI KAL VIBHAJAN        | MAHATVA EVM UDDESHYA                                 | ARTH EVM PARIBHASHA           | ARTH EVM PARIBHASHA                 |
| SLO-4    | BHAKTIKAL KI PRASANGIKTA         | MAHATVA EVM UDDESHYA     | MATHLI SHARAN GUPT- NAR HO NA NIRASH KARO MAN KO     | VIGYAPAN KE PRAKAR            | PRAYOJAN EVM PRYOG                  |
| SLO-5    | DOHE- KABIRDAS                   | DOHE- BIHARI             | KAVI PARICHAYA EVM KAVITA KA VISHLESHAN              | VIGYAPAN KI VISHESHTAYEN      | PRAKAR EVM MAHATVA                  |
| SLO-6    | SANT PARICHAY                    | KAVI PARICHAYA           | SURYAKANT TRIPATHI NIRALA- VAR DE VEENAVADINI VAR DE | VIGYAPAN KA MAHATVA           | VYAKTIGAT PATRA                     |
| SLO-7    | DOHE KA VISLESHAN                | DOHE KA VISLESHAN        | KAVI PARICHAYA EVM VISHLESHAN                        | VIGYAPAN KI BHASHA            | AUPCHARIK PATRA                     |
| SLO-8    | GURU KA MAHATVA                  | DOHE- GHANANAND          | NAGARJUN-- AKAL AUR USKE BAD                         | VIGYAPAN AUR ROZGAR           | PARIBHASHIK SHABDAVALI              |
| SLO-9    | DOHE- TULSHIDAS                  | SNEH KI SARLTA KA VARNAN | AKAL KA VASHTAVIK CHITRAN                            | PRINT EVM ELECTRONIC VIGYAPAN | SHABDAVALI KI AVSHYAKTA             |

|               |                   |                                      |                                |                        |                                             |
|---------------|-------------------|--------------------------------------|--------------------------------|------------------------|---------------------------------------------|
| <b>SLO-10</b> | DOHE KA VISLESHAN | PREM KA MAHATVA                      | KATTIS- BADRINARAYAN           | VIGYAPAN KI VYAPAKTA   | KARYALYIN SHABDAVALI                        |
| <b>SLO-11</b> | DAYA KA MAHATVA   | GHANANAND KI KAVYA SHAILI KA MAHATVA | SAMBAND VICCHED KI PARICHARCHA | VIGYAPANLEKHAN KI KALA | EK DIN EK SHABD                             |
| <b>SLO-12</b> | RAM KI MAHIMA     | DHOHA PARICHARCHA                    | KAVYA PARICHARCHA              | UDDESHYA               | HINDI SE ANGREJI AUR ANGREJI SE HINDI SHABD |

| Resources |                                                          |  |  |   |                                                     |
|-----------|----------------------------------------------------------|--|--|---|-----------------------------------------------------|
| 1         | “Samanya Hindi”, Srijonlok Publication, 2023, New Delhi. |  |  | 4 | Bhakti Andolan Aur Surdas Ka Kavya – Manager Pandey |
| 2         | Kabir – Hazari Prasad Dwedi                              |  |  | 5 | Bihari – Vishvnath Prasad Mishr                     |
| 3         | Surdas – Ram Chandra Shukl                               |  |  | 6 | Aadhunik Vigyapan Aur Jansampark – Tareh Bhatia     |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   | Strategies   |                      |                      |                          |                         |  |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|----------------------|----------------------|--------------------------|-------------------------|--|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) | Technology   |                      | Pedagogy / Andragogy |                          | Sustainable Development |  |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA - 4    |              |                                   | Simulations  | Clarification/Pauses | ✓                    | Good Health & Well Being | ✓                       |  |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              |                      |                      |                          |                         |  |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) | Theory (%)           |                      |                          |                         |  |
| 1                         | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                |              |                      |                      |                          |                         |  |
| 2                         | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                |              |                      |                      |                          |                         |  |
| 3                         | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                |              |                      |                      |                          |                         |  |
| 4                         | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                |              |                      |                      |                          |                         |  |
| 5                         | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                |              |                      |                      |                          |                         |  |
| 6                         | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                |              |                      |                      |                          |                         |  |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               |              |                      |                      |                          |                         |  |
|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                      |                      |                          |                         |  |
|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                      |                      |                          |                         |  |
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|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                      |                      |                          |                         |  |

\* The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                                                   |                                                                                                                          |                                                                                                                                                                                                                                                                             |
|----------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Professional Experts |                                                                                   | Higher Institution Experts                                                                                               | Internal Experts                                                                                                                                                                                                                                                            |
| 1                    | MS.REETHA GOVINDAN,Senior Manager (Rajbhasha)<br>ritushivani@yahoo.com            | 1<br>Dr. S. PADMAPRIYA, PROF& HEAD, PONDICHERRY<br>University, kalapet, puducherry-605014<br>padmapriya.srirka@gmail.com | 1<br>Dr.S Preeti. Associate Professor & Head, SRMIST-<br>hod.hindi.ktr@srmist.edu.in                                                                                                                                                                                        |
| 4                    | ALUMINI - VIPIN KUMAR JHA, Senior Translation Officer<br>anju.bipin.jha@gmail.com |                                                                                                                          | 2<br>. Dr. Md.Shwahidul Islam Assistant Professor,<br>SRMISTshwahidj@srmist.edu.in<br>3<br>Dr. S. Razia Begum, Assistant Professor, SRM IST<br>raziabes@srmist.edu.in<br>4<br>Dr.Nisha Murlidharan Assistant Professor, VDP,SRM IST<br>Murulidharan- nishamup@srmist.edu.in |

| Course Code | ULF24AE2J | Course Title | French – II |  |  |  | Category | A | Ability Enhancement Course | L | T | P | C |
|-------------|-----------|--------------|-------------|--|--|--|----------|---|----------------------------|---|---|---|---|
|             |           |              |             |  |  |  |          |   |                            | 2 | 0 | 2 | 3 |

| Course Offering Department | French | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|--------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
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| CLR   | The purpose of learning this course is to:                                                                               | Depth |   |   |   | Attainment |   |   | Programme learning Outcomes |   |   |   |   |   |   |   |   |    |
|-------|--------------------------------------------------------------------------------------------------------------------------|-------|---|---|---|------------|---|---|-----------------------------|---|---|---|---|---|---|---|---|----|
| CLR-1 | Strengthen the language of the students both in oral and written                                                         | 1     | 2 | 3 | 4 | 1          | 2 | 3 | 1                           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-2 | Express their sentiments, emotions, and opinions, reacting to information, situations                                    |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-3 | Make them learn the basic rules of French Grammar.                                                                       |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-4 | Develop strategies of comprehension of texts of different origin                                                         |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-5 | Enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |

| CLO   | At the end of this course, learners will be able to:                                     | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity | Communication Skills, Collaborative Skills | Independent Thinking, Analytical Reasoning, Learning to Learn | Leadership Qualities, Entrepreneurship, Autonomy | Digital Technology Skills | Value Education, Multicultural Inclusivity | Environmental Action, Community Engagement | Entrepreneurial Risk Taking | PSO-1 | PSO-2 |
|-------|------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|------------------------------------------------|--------------------------------------------|---------------------------------------------------------------|--------------------------------------------------|---------------------------|--------------------------------------------|--------------------------------------------|-----------------------------|-------|-------|
| CLO-1 | To acquire knowledge about French language                                               | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3                                              | 2                                          | 3                                                             |                                                  |                           | 2                                          |                                            |                             |       |       |
| CLO-2 | To strengthen the knowledge on concept, culture, civilization, and translation of French | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3                                              |                                            | 2                                                             |                                                  | 3                         |                                            | 3                                          |                             |       |       |
| CLO-3 | To develop content using the features in French language                                 | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                                                | 3                                          |                                                               | 3                                                | 3                         | 2                                          |                                            |                             |       |       |
| CLO-4 | To interpret the French language into other language                                     | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 2                                              |                                            | 2                                                             | 3                                                |                           |                                            | 2                                          |                             |       |       |
| CLO-5 | To improve the communication, intercultural elements in French language                  | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                                                | 3                                          |                                                               | 3                                                | 3                         | 2                                          |                                            |                             |       |       |

| Sessions | CLO - 1                                      | CLO - 2                                      | CLO - 3                | CLO - 4                  | CLO - 5                     |
|----------|----------------------------------------------|----------------------------------------------|------------------------|--------------------------|-----------------------------|
|          | 12                                           | 12                                           | 12                     | 12                       | 12                          |
| SLO-1    | Temps libre                                  | Le pronom indéfini on                        | Vendre                 | Il faut                  | Les gallicismes             |
| SLO-2    | Les loisirs                                  | Les adjectifs interrogatifs                  | Acheter                | Le verbe devoir          | Les pronoms personnels COI  |
| SLO-3    | Les moments de la journée                    | Les prépositions avec les noms géographiques | Les aliments           | Le verbe pouvoir         | Le pronom Y                 |
| SLO-4    | Les matières scolaires                       | Les verbes prendre et sortir                 | Les emballages         | Le verbe vouloir         | Des pronoms compléments     |
| SLO-5    | Les activités quotidiennes, Les quotidiennes | Les sons                                     | Les quantités          | Demander et dire le prix | Les nombres ordinaux        |
| SLO-6    | Le temps, L'heure                            | Parler de ses goûts                          | Les commerces          | Faire des achats         | Les verbes écrire et voir   |
| SLO-7    | La fréquence                                 | Parler de ses préférences                    | Les commerçants        | Les activités            | Le E caduc ou instable      |
| SLO-8    | Les sons [u], Les sons [y]                   | Parler de sa routine                         | L'impératif            | Les activités            | Présenter ses vœux          |
| SLO-9    | L'heure, Quelle heure est-il ?               | A la recherche d'un cadeau                   | Les articles partitifs | Mots et expressions      | Présenter ses félicitations |
| SLO-10   | Les pronoms personnels COD                   | Temps libre                                  | Très ou beaucoup (de)  | Communication            | Répondre à une invitation   |

|               |                                                       |                          |                            |             |                          |
|---------------|-------------------------------------------------------|--------------------------|----------------------------|-------------|--------------------------|
| <b>SLO-11</b> | Les pronominaux, Se promener, se coucher etc....,     | Mots et expressions      | Le pronom en (la quantité) | Les sorties | Écrire un message amical |
| <b>SLO-12</b> | Les verbes du premier groupe, Parler, Demander, Poser | Grammaire– Communication | La phrase négative (2)     | Les fêtes   | Parler au téléphone      |

| Resources |                                                                                                                                            |  |  |   |                                                                                                                                                           |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------|--|--|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1         | “La Nouvelle Génération-AI” Méthode de français, Marie-Noëlle COCTON, P. DAUDA, L. GIACHINO, C. BARACCO, Les éditions Didier, Paris, 2018. |  |  | 4 | <a href="https://www.elearningfrench.com/learn-french-grammar-online-free.html">https://www.elearningfrench.com/learn-french-grammar-online-free.html</a> |
| 2         | Cahier d’activités avec deux discs compacts.                                                                                               |  |  | 5 | <a href="https://www.lawlessfrench.com/grammar">https://www.lawlessfrench.com/grammar</a>                                                                 |
| 3         | <a href="https://www.fluentu.com/blog/french/french-grammar">https://www.fluentu.com/blog/french/french-grammar</a>                        |  |  | 6 | <a href="https://blog.gymglish.com/2022/12/15/basic-french-grammar">https://blog.gymglish.com/2022/12/15/basic-french-grammar</a>                         |

| Assessment                      |            |                                                      |                 |               |                 |               |                 |               |                 |                                            | Strategies  |                      |                      |                             |                         |  |
|---------------------------------|------------|------------------------------------------------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|-----------------|--------------------------------------------|-------------|----------------------|----------------------|-----------------------------|-------------------------|--|
| Bloom’s<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |                 |               |                 |               |                 |               |                 | Final<br>Assessment<br>(50 %<br>weightage) | Technology  |                      | Pedagogy / Andragogy |                             | Sustainable Development |  |
|                                 |            | CLA – 1                                              |                 | CLA – 2       |                 | CLA – 3       |                 | CLA - 4       |                 |                                            | Simulations | Clarification/Pauses | ✓                    | Good Health & Well<br>Being | ✓                       |  |
|                                 |            | (10 %)                                               |                 | (10 %)        |                 | (20 %)        |                 | (10%)         |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            | Theory<br>(%)                                        | Practice<br>(%) | Theory<br>(%) | Practice<br>(%) | Theory<br>(%) | Practice<br>(%) | Theory<br>(%) | Practice<br>(%) | Theory (%)                                 |             |                      |                      |                             |                         |  |
| 1                               | Remember   | 15                                                   | 15              | 15            | 15              | 10            | 10              | 10            | 10              | 15                                         |             |                      |                      |                             |                         |  |
| 2                               | Understand | 15                                                   | 15              | 15            | 15              | 10            | 10              | 10            | 10              | 15                                         |             |                      |                      |                             |                         |  |
| 3                               | Apply      | 20                                                   | 25              | 25            | 20              | 25            | 25              | 25            | 25              | 25                                         |             |                      |                      |                             |                         |  |
| 4                               | Analyze    | 20                                                   | 25              | 25            | 20              | 25            | 25              | 25            | 25              | 25                                         |             |                      |                      |                             |                         |  |
| 5                               | Evaluate   | 15                                                   | 10              | 10            | 15              | 15            | 15              | 15            | 15              | 10                                         |             |                      |                      |                             |                         |  |
| 6                               | Create     | 15                                                   | 10              | 10            | 15              | 15            | 15              | 15            | 15              | 10                                         |             |                      |                      |                             |                         |  |
| Total (%)                       |            | 100                                                  | 100             | 100           | 100             | 100           | 100             | 100           | 100             | 100                                        |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
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|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |             |                      |                      |                             |                         |  |

\* The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                                                                                               |                                                                                                            |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Professional Experts |                                                                                                                               | Higher Institution Experts                                                                                 |
| 1                    | Mr. Kavaskar Danasegarane, Language Specialist, Process Expert<br>Maersk Global Service Center Pvt. Ltd Mailkavas18@gmail.com | 1 Dr. C.Thirumurugan ,Professor, Department of French,<br>Pondicherry University drcthirusurugan@gmail.com |
| 2                    | Mr. Shrivathsan S, Journalist, Senior Sports Reporter/Sub-Editor,<br>Times of India, Chennai shrivathsangilramhanga@gmail.com |                                                                                                            |
|                      |                                                                                                                               | 1 Mr. Kumaravel K. Assistant Professor & Head, SRMIST,KTR.,<br>hod.french.ktr@srmist.edu.in                |
|                      |                                                                                                                               | 2 Miss. Abigail A, Assistant Professor , SRMIST,,VDP<br>abigaila@srmist.edu.in                             |
|                      |                                                                                                                               | 3 Mrs.M.Mahalakshmi, Assistant Professor , SRMIST,,RMP<br>mahalakm2@srmist.edu.in                          |

| Course Code | USA24201J | Course Title | Data Structures and Algorithms | Category | C | Core | L | T | P | C |
|-------------|-----------|--------------|--------------------------------|----------|---|------|---|---|---|---|
|             |           |              |                                |          |   |      | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Applications | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|-----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|-----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                           | Depth    |   |   |   | Attainment |    |    | Programme Learning Outcomes |   |   |   |   |   |   |   |   |    |
|-------|------------------------------------------------------------------------------------------------------|----------|---|---|---|------------|----|----|-----------------------------|---|---|---|---|---|---|---|---|----|
|       |                                                                                                      | 1        | 2 | 3 | 4 | 1          | 2  | 3  | 1                           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-1 | Utilize the different data types; Utilize searching and sorting algorithms                           |          |   |   |   |            |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-2 | Utilize linked list in developing applications                                                       |          |   |   |   |            |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-3 | Utilize stack and queues in processing data for real-time applications                               |          |   |   |   |            |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-4 | Utilize tree data storage structure for real-time applications                                       |          |   |   |   |            |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-5 | Utilize algorithms to find shortest data search in graphs for real-time application development      |          |   |   |   |            |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLO   | At the end of this course, learners will be able to:                                                 | Conceive |   |   |   | Attainment |    |    | Programme Learning Outcomes |   |   |   |   |   |   |   |   |    |
|       |                                                                                                      | ✓        | ✓ | - | - | 2          | 85 | 75 | 3                           | - | - | 1 | - | 3 | - | 2 | 2 | 1  |
| CLO-1 | Identify linear and non-linear data structures. Create algorithms for searching and sorting          | ✓        | ✓ | - | - | 2          | 85 | 75 | 3                           | 2 | 1 | 2 | 2 | 3 | - | 1 | 2 | 1  |
| CLO-2 | Create the different types of linked lists and evaluate its operations                               | ✓        | ✓ | ✓ | - | 2          | 85 | 75 | 3                           | 1 | 3 | 1 | 3 | 3 | - | 1 | 1 | 2  |
| CLO-3 | Construct stack and queue data structures and evaluate its operations                                | ✓        | ✓ | ✓ | ✓ | 3          | 85 | 75 | 3                           | 3 | 2 | 3 | 3 | 3 | - | 2 | 3 | 3  |
| CLO-4 | Create tree data structures and evaluate its types and operations                                    | ✓        | ✓ | ✓ | ✓ | 3          | 85 | 75 | 3                           | 3 | 2 | 3 | 3 | 3 | - | 2 | 3 | 3  |
| CLO-5 | Create graph data structure, evaluate its operations, implement algorithms to identify shortest path | ✓        | ✓ | ✓ | ✓ | 3          | 85 | 75 | 3                           | 3 | 2 | 3 | 3 | 3 | - | 3 | 3 | 3  |

| Sessions | CLO-1                                                            | CLO-2                                                              | CLO-3                                                                | CLO-4                                                 | CLO-5                                                          |
|----------|------------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------|----------------------------------------------------------------|
|          | 18                                                               | 18                                                                 | 18                                                                   | 18                                                    | 18                                                             |
| SLO-1    | Introduction to theory of data structures<br>Data representation | Introduction to stack<br>Representation of stack through array     | Tree Traversals – In order, preorder<br>Tree Traversals - Post order | Introduction to sorting<br>Different types of sorting | Graph Terminology<br>Representation of graph – Arrays          |
| SLO-2    | Abstract Data type<br>Classification of data types               | Representation of stack through linked list<br>Operations on stack | Binary Search Tree<br>Threaded Binary Search Tree                    | Bubble sort<br>Example                                | Representation of graph – Linked list<br>Graph Traversal – BFS |

|           |                                                                                         |                                                                                                                                  |                                                                               |                                                                  |                                                                            |
|-----------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------------------------|
| SLO-3     | Asymptotic Notation<br>Algorithm Analysis, Recursion                                    | Disadvantages of Stack, Polish notations<br>Applications – Evaluation of Expression, Tower of Hanoi, Infix to Postfix expression | Binary Search Tree :Construction<br>Binary Search Tree : Insertion, Searching | Insertion Sort<br>Quick sort<br>Example                          | Example<br>Graph Traversal – DFS, Topological Sorting                      |
| SLO 4-6   | <b>Lab1:Recursion</b>                                                                   | <b>Lab4:Implementation ofstackanditsapplications</b>                                                                             | <b>Lab7: Implement all the three type of TreeTraversals</b>                   | <b>Lab10:ImplementationofBubbleandInsertionsort</b>              | <b>Lab13:ImplementationofGraphusingArray</b>                               |
| SLO-7     | Introduction to Data structures<br>Data Structures and its uses                         | Queue, Representation of Queue using Arrays and Linked list                                                                      | Applications of trees<br>Applications of BST                                  | Selection sort<br>Example                                        | Shortest Path Algorithm- Introduction<br>Shortest Path Algorithm: Dijkstra |
| SLO-8     | Linear and Non Linear Data Structures,<br>Operations on data structure                  | Operations on Queue, Circular Queue                                                                                              | Expression trees, Example                                                     | Merge sort, Example                                              | Applications of Graph,                                                     |
| SLO-9     | Array types<br>Array operations,<br>Applications of arrays<br>Dynamic memory allocation | Double ended Queue<br>Priority Queue, Reversing a Queue using another queue, Applications of Queue                               | AVL Tree<br>AVL Tree Rotations,<br>Applications of AVL tree                   | Radix sort<br>Heap Sort<br>Example, Comparison of sorts          | Minimum spanning tree – Prims<br><br>Minimum Spanning Tree – Kruskals      |
| SLO 10-12 | <b>Lab2:Arrays</b>                                                                      | <b>Lab 5:Queue implementation usingarrayandpointers</b>                                                                          | <b>Lab8:ImplementationofBST HeapDataStructure</b>                             | <b>Lab11:ImplementationofQuicksortandmergesort</b>               | <b>Lab14:Implementationofshortestpathalgorithm</b>                         |
| SLO-13    | Introduction to lists<br>Linked list operations                                         | Introduction to nonlinear data structures<br>Tree ADT and Terminologies                                                          | Minimum Heap Construction<br>Example                                          | Introduction to searching ,<br>Linear search<br>Binary search    | Algorithm Design And Analysis<br>Greedy Algorithms                         |
| SLO-14    | Types of Linked Lists<br>Linked list vs. Arrays                                         | Tree Terminologies<br>Tree Representation                                                                                        | Minimum Heap Deletion<br>Construction<br>Example                              | Comparison of different search<br>Define Hashing, Hash functions | Backtracking<br>Example                                                    |

|             |                                                                                                                                             |                                                                                    |                                                                                                           |                                                                                                         |                                                       |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| SLO-15      | Application of linked list, Performance Analysis and Measurement of algorithm Efficiency of algorithm, Time complexity and space complexity | Tree Types and Operations<br>Binary Tree Representation, Properties of binary tree | Maximum Heap Construction<br>Maximum Heap Deletion<br>Construction<br>Applications of Heaps and AVL trees | Hashing : Collision avoidance<br>Hashing : Separate chaining,<br>Open addressing, Advantages of Hashing | Divide And Conquer<br>Example                         |
| SLO 16 - 18 | <b>Lab3: Implementation of LinkedList</b>                                                                                                   | <b>Lab6: Implementation of binary tree using Arrays</b>                            | <b>Lab9: Implementation of Min and Max Heap</b>                                                           | <b>Lab12: Linear search and Binary search</b>                                                           | <b>Lab15: Implementation of minimum spanning tree</b> |

| Resources |                                                                                                    |   |                                                                                                                |  |  |
|-----------|----------------------------------------------------------------------------------------------------|---|----------------------------------------------------------------------------------------------------------------|--|--|
| 1         | Seymour Lipschutz, (2014), "Data Structures with C", McGraw Hill Education, Special Indian Edition | 4 | SRD Group, (2013), "Data structures using C", McGraw Hill, 2nd Edition,                                        |  |  |
| 2         | R.F. Gilberg, B.A. Forouzan, (2005), "Data Structures", Thomson India, 2nd Edition,                | 5 | A.V. Aho, J.E. Hopcroft, J.D. Ullman, (2003), "Data structures and Algorithms", 1st Edition, Pearson Education |  |  |
| 3         | Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education    | 6 | Reema Thareja, (2011), "Data Structures Using C", 1st Edition, Oxford 3er Education                            |  |  |

| Assessment                      |            |                                                      |              |            |              |            |              |            |              |                                         |              |
|---------------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------------|--------------|
| Bloom’s<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final<br>Assessment<br>(50 % weightage) |              |
|                                 |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                         |              |
|                                 |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                         |              |
|                                 |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                              | Practice (%) |
| 1                               | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                      | 15           |
| 2                               | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                      | 15           |
| 3                               | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                      | 25           |
| 4                               | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                      | 25           |
| 5                               | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                      | 10           |
| 6                               | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                      | 10           |
| Total (%)                       |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                                     | 100          |

| Strategies                 |  |                      |                     |                            |
|----------------------------|--|----------------------|---------------------|----------------------------|
| Technology                 |  | Pedagogy / Andragogy |                     | Sustainable Development    |
| Simulations                |  | Clarification/Pauses |                     | ✓ Good Health & Well Being |
| Presentation Tools         |  | ✓                    | Group Discussion    | ✓ Quality Education        |
| Learning Management System |  | ✓                    | Hands-on Practice   | ✓ Gender Equality          |
|                            |  |                      | Debate              | ✓                          |
|                            |  |                      | Interactive Lecture | ✓                          |
|                            |  |                      | Brainstorming       | ✓                          |
|                            |  |                      |                     |                            |
|                            |  |                      |                     |                            |
|                            |  |                      |                     |                            |
|                            |  |                      |                     |                            |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                                    |  |  |  |  |                            |                                                      |  |  |  |  |                  |                                                   |  |  |  |  |
|----------------------|--------------------------------------------------------------------|--|--|--|--|----------------------------|------------------------------------------------------|--|--|--|--|------------------|---------------------------------------------------|--|--|--|--|
| Professional Experts |                                                                    |  |  |  |  | Higher Institution Experts |                                                      |  |  |  |  | Internal Experts |                                                   |  |  |  |  |
| 1                    | Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai |  |  |  |  | 1                          | Dr.S.Gopinathan,Professor,UniversityofMadras,Chennai |  |  |  |  | 1                | Dr.R.Aruna Rani, Assistant Professor, FSH, SRMIST |  |  |  |  |

| Course Code | UCS24202J | Course Title | Object Oriented Programming using Java |  |  |  | Category | C | Core |  |  |  | L | T | P | C |
|-------------|-----------|--------------|----------------------------------------|--|--|--|----------|---|------|--|--|--|---|---|---|---|
|             |           |              |                                        |  |  |  |          |   |      |  |  |  | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                           | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcomes                                                                                                                                                                              |   |   |   |   |   |   |   |   |    |
|-------|----------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|----|
| CLR-1 | To learn the fundamentals of object-oriented programming                                                             | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 1                                                                                                                                                                                                        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-2 | Learning to write object-oriented programs in Java                                                                   |          |        |           |         |                   |                          |                         |                                                                                                                                                                                                          |   |   |   |   |   |   |   |   |    |
| CLR-3 | Developing skills in creating graphical and database applications through Java                                       |          |        |           |         |                   |                          |                         |                                                                                                                                                                                                          |   |   |   |   |   |   |   |   |    |
| CLR-4 | Build Resilient code using Exception Handling mechanism                                                              |          |        |           |         |                   |                          |                         |                                                                                                                                                                                                          |   |   |   |   |   |   |   |   |    |
| CLR-5 | Be able to apply object oriented or non-object-oriented techniques to solve bigger real world computing problems     |          |        |           |         |                   |                          |                         |                                                                                                                                                                                                          |   |   |   |   |   |   |   |   |    |
| CLO   | At the end of this course, learners will be able to:                                                                 | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Communication Skills, Problem Solving, Communication Skills, Independent Thinking, Leadership Qualities, Digital Technology, Value Incultation, Environmental Action, Entrepreneurial Risk, PSO-1, PSO-2 |   |   |   |   |   |   |   |   |    |
| CLO-1 | Remember and understand Java program and application structure and understand Java program and application structure | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3                                                                                                                                                                                                        | - | - | 1 | - | 3 | - | 2 | - | -  |
| CLO-2 | Apply the principles of OOPs and develop simple Java program or application                                          | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3                                                                                                                                                                                                        | 2 | 1 | 2 | 2 | 3 | - | 1 | - | -  |
| CLO-3 | Analyze the problem specific requirements and develop java programs                                                  | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                                                                                                                                                                        | 1 | 3 | 1 | 3 | 3 | - | 1 | - | -  |
| CLO-4 | Evaluate the program using extended functionalities                                                                  | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                                                                                                                                                                        | 3 | 2 | 3 | 3 | 3 | - | 2 | - | -  |
| CLO-5 | Create and Design an interactive application using swing and event handling                                          | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                                                                                                                                                                        | 3 | 2 | 3 | 3 | 3 | - | 3 | - | -  |

| Sessions | CLO-1                                                                                                             | CLO-2                                               | CLO-3                                                            | CLO-4                                                  | CLO-5                                             |
|----------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------|
|          | 18                                                                                                                | 18                                                  | 18                                                               | 18                                                     | 18                                                |
| SLO-1    | Overview of Java Programming: History and Evolution, Features of Java, JVM                                        | Introduction: Classes, Objects                      | Understanding Exceptions: Types of Exception Exception Hierarchy | Understanding Thread: Creating a thread Running Thread | Understanding Java Swing                          |
| SLO-2    | Structure of Java Program: Main Method, Statements and Expressions Declaring Variables and Initializing variables | Functions Inheritance and its types                 | Try-Catch Blocks: Handling Exception Throwing Exception          | Thread Life Cycle Extending thread class               | Adding components: Layouts, Buttons and Textareas |
| SLO-3    | Primary Data types: int, float, char, Boolean                                                                     | Polymorphism, Encapsulation, Abstraction            | : Multiple catch clauses                                         | Creating multiple thread                               | Custom components: Simple Toolbars                |
| SLO 4-6  | <b>Practice: Work with IDE and writing simple programs</b>                                                        | <b>Practice: Programs using Classes and objects</b> | <b>Practice: Program using Exception Handling</b>                | <b>Practice: Program to create multi thread</b>        | <b>Practice: Creating Basic Swing Application</b> |

|           |                                                                                                               |                                                                 |                                                                    |                                                        |                                                     |
|-----------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------|
| SLO-7     | Scope and Lifetime of variable                                                                                | Constructors & Destructors, Default & Parameterized constructor | Working with finally, throw and throws                             | Synchronization and Coordination                       | Communication between components, Listeners, Events |
| SLO-8     | Operators: Arithmetic, Relational and Logical Operators                                                       | Garbage Collection<br>Passing Arguments, object as arguments    | User defined exception                                             | Thread safety and deadlock                             | Component settings: size, setting borders           |
| SLO-9     | Operator precedence                                                                                           | Overloading: Method, Constructor<br>Overriding: Method          | Understanding Packages                                             | Inter-Thread Communication                             | Custom events, Form submissions                     |
| SLO 10-12 | <b>Practice: Program using various operators</b>                                                              | <b>Practice: Program using Constructors and Destructors</b>     | <b>Practice: Program using simple packages</b>                     | <b>Practice: Program to Inter Thread Communication</b> | <b>Practice: Creating applications using events</b> |
| SLO-13    | Flow Control Statements:<br>Conditional Statements:<br>if, else if, else statements<br>Switch-case statements | Recursion, Understanding Static variables, methods              | Importing Packages                                                 | File Handling: Reading and Writing to files            | Menus, Tables                                       |
| SLO-14    | Looping Statements<br>for or while, do-while loops<br>Enhanced for loop                                       | Introduction: String Class<br>String functions                  | Built-in Packages<br>User Defined Packages                         | Working with Input and Output Stream                   | File Choosers, Color Choosers, Dialog boxes         |
| SLO-15    | Working with break, continue and return statements                                                            | Command Line Arguments                                          | Sample Packages                                                    | StringbufferInput stream                               | MVC Architecture                                    |
| SLO 16-18 | <b>Practice: Programs using control statements</b>                                                            | <b>Practice: Program using string class and functions</b>       | <b>Practice: Program using built-in and user defined packages.</b> | <b>Practice: Program to read and write on files</b>    | <b>Practice: Program to implement MVC in swing.</b> |

| Resources |                                                                  |  |  |   |                                                                                      |
|-----------|------------------------------------------------------------------|--|--|---|--------------------------------------------------------------------------------------|
| 1         | Java : The Complete Reference, Twelfth Edition, Herbert Schildt, |  |  | 4 | Head First Java, A Brain Friendly Guide, Kathy Sierra,                               |
| 2         | Core Java Fundamentals, Volume 1                                 |  |  | 5 | Introduction to Java Programming and Data Structures, Comprehensive Version Y :Liang |
| 3         | Java All in One for Dummies, Dong Lowe                           |  |  |   |                                                                                      |

| Assessment                      |            |                                                      |                 |               |                 |               |                 |               |                 |                                         |              | Strategies                    |   |                      |   |                             |   |
|---------------------------------|------------|------------------------------------------------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|-----------------|-----------------------------------------|--------------|-------------------------------|---|----------------------|---|-----------------------------|---|
| Bloom’s<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |                 |               |                 |               |                 |               |                 | Final<br>Assessment<br>(50 % weightage) |              | Technology                    |   | Pedagogy / Andragogy |   | Sustainable<br>Development  |   |
|                                 |            | CLA – 1                                              |                 | CLA – 2       |                 | CLA – 3       |                 | CLA – 4       |                 |                                         |              | Simulations                   |   | Clarification/Pauses | ✓ | Good Health & Well<br>Being | ✓ |
|                                 |            | (10 %)                                               |                 | (10 %)        |                 | (20 %)        |                 | (10%)         |                 |                                         |              | Presentation Tools            | ✓ | Group Discussion     | ✓ | Quality Education           | ✓ |
|                                 |            | Theory<br>(%)                                        | Practice<br>(%) | Theory<br>(%) | Practice<br>(%) | Theory<br>(%) | Practice<br>(%) | Theory<br>(%) | Practice<br>(%) | Theory (%)                              | Practice (%) | Learning<br>Management System | ✓ | Hands-on Practice    | ✓ | Gender Equality             | ✓ |
| 1                               | Remember   | 15                                                   | 15              | 15            | 15              | 10            | 10              | 10            | 10              | 15                                      | 15           |                               |   | Debate               | ✓ |                             |   |
| 2                               | Understand | 15                                                   | 15              | 15            | 15              | 10            | 10              | 10            | 10              | 15                                      | 15           |                               |   | Interactive Lecture  | ✓ |                             |   |
| 3                               | Apply      | 20                                                   | 25              | 25            | 20              | 25            | 25              | 25            | 25              | 25                                      | 25           |                               |   | Brainstorming        | ✓ |                             |   |
| 4                               | Analyze    | 20                                                   | 25              | 25            | 20              | 25            | 25              | 25            | 25              | 25                                      | 25           |                               |   |                      |   |                             |   |
| 5                               | Evaluate   | 15                                                   | 10              | 10            | 15              | 15            | 15              | 15            | 15              | 10                                      | 10           |                               |   |                      |   |                             |   |
| 6                               | Create     | 15                                                   | 10              | 10            | 15              | 15            | 15              | 15            | 15              | 10                                      | 10           |                               |   |                      |   |                             |   |
| Total (%)                       |            | 100                                                  | 100             | 100           | 100             | 100           | 100             | 100           | 100             | 100                                     | 100          |                               |   |                      |   |                             |   |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                         |              |                               |   |                      |   |                             |   |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                         |              |                               |   |                      |   |                             |   |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                         |              |                               |   |                      |   |                             |   |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                         |              |                               |   |                      |   |                             |   |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                         |              |                               |   |                      |   |                             |   |
|                                 |            |                                                      |                 |               |                 |               |                 |               |                 |                                         |              |                               |   |                      |   |                             |   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |  |  |  |                            |                                               |  |  |  |  |                  |                                                 |  |  |
|----------------------|---------------------------------------------------------|--|--|--|--|----------------------------|-----------------------------------------------|--|--|--|--|------------------|-------------------------------------------------|--|--|
| Professional Experts |                                                         |  |  |  |  | Higher Institution Experts |                                               |  |  |  |  | Internal Experts |                                                 |  |  |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  |  |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT chennai |  |  |  |  | 1                | Dr. M. Ramesh, Assistant Professor, FSH, SRMIST |  |  |

| Course Code | UMS24202T | Course Title | Mathematical Foundation |  |  |  | Category | C | Core | L | T | P | C |
|-------------|-----------|--------------|-------------------------|--|--|--|----------|---|------|---|---|---|---|
|             |           |              |                         |  |  |  |          |   |      | 4 | 0 | 0 | 4 |

| Course Offering Department | Mathematics and Statistics | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|----------------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|----------------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                                                      | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcome                                                 |                           |                       |                      |                             |       |       |   |   |    |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|----------------------------------------------------------------------------|---------------------------|-----------------------|----------------------|-----------------------------|-------|-------|---|---|----|
|       |                                                                                                                                                 | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 1                                                                          | 2                         | 3                     | 4                    | 5                           | 6     | 7     | 8 | 9 | 10 |
| CLR-1 | To apply the basic concepts and theorems of matrices                                                                                            |          |        |           |         |                   |                          |                         | Problem Solving, Critical Thinking, Creativity                             |                           |                       |                      |                             |       |       |   |   |    |
| CLR-2 | To learn the concepts of polynomial equations, reciprocal equations and approximation of roots.                                                 |          |        |           |         |                   |                          |                         | Communication Skills,                                                      |                           |                       |                      |                             |       |       |   |   |    |
| CLR-3 | To learn the basic concepts of differentiation, successive differentiation and partial differentiation                                          |          |        |           |         |                   |                          |                         | Collaborating Skills                                                       |                           |                       |                      |                             |       |       |   |   |    |
| CLR-4 | To learn the basic concepts of integration and to apply Bernoulli's formula and reduction formula.                                              |          |        |           |         |                   |                          |                         | Independent Thinking, Reasoning, Analytical                                |                           |                       |                      |                             |       |       |   |   |    |
| CLR-5 | To understand how a function is transformed by Laplace and inverse Laplace methods and how they are related.                                    |          |        |           |         |                   |                          |                         | Leadership Qualities, Professionalism, Autonomy, Digital Technology Skills |                           |                       |                      |                             |       |       |   |   |    |
| CLO   | At the end of this course, learners will be able to:                                                                                            | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Value                                                                      | Multicultural inclusivity | Environmental Action, | Community Engagement | Entrepreneurial Risk Taking | PSO-1 | PSO-2 |   |   |    |
| CLO-1 | Gaining knowledge in basic concepts of matrix method.                                                                                           | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3                                                                          | -                         | -                     | 1                    | -                           | 3     | -     | 2 | 2 | 1  |
| CLO-2 | Gaining knowledge in the concepts of polynomial equations and reciprocal equations and applying Horner's and Newton's methods for finding roots | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3                                                                          | 2                         | 1                     | 2                    | 2                           | 3     | -     | 1 | 2 | 1  |
| CLO-3 | Understanding the concepts of differentiation and to solve the problems of Radius of curvature and Euler's theorem                              | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                                          | 1                         | 3                     | 1                    | 3                           | 3     | -     | 1 | 1 | 2  |
| CLO-4 | Understanding the concepts of integration and to evaluate reduction formula.                                                                    | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                                          | 3                         | 2                     | 3                    | 3                           | 3     | -     | 2 | 3 | 3  |
| CLO-5 | Getting the knowledge of Laplace and Inverse Laplace transformation and their application.                                                      | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                                          | 3                         | 2                     | 3                    | 3                           | 3     | -     | 3 | 3 | 3  |

| Sessions | CLO-1                                                        | CLO-2                                               | CLO-3                                          | CLO-4                                                                    | CLO-5                                               |
|----------|--------------------------------------------------------------|-----------------------------------------------------|------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------|
|          | 12                                                           | 12                                                  | 12                                             | 12                                                                       | 12                                                  |
| SLO-1    | Definition and types of matrix - Examples of types of Matrix | Introduction to algebraic equations                 | Introduction to Differentiation                | Introduction to integration - Basic problems on integration              | Introduction to Laplace Transforms-Basic Properties |
| SLO-2    | Symmetric matrix - Skew- symmetric matrix                    | <b>Types of algebraic equations</b>                 | Solving basic problems – more examples         | Integration of polynomial functions and Irrational Functions             | Problems on Laplace Transforms                      |
| SLO-3    | Hermitian matrix - Skew-Hermitian matrix                     | Relation between roots and coefficients of equation | Maxima- Minima of functions of single variable | Integration by the method of partial fractions Type I, Type II, Type III | Problems based on Shifting property                 |
| SLO-4    | Tutorial                                                     | Tutorial                                            | Tutorial                                       | Tutorial                                                                 | Tutorial                                            |

|        |                                            |                                                                                                                               |                                                                  |                                                            |                                                                                                          |
|--------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| SLO-5  | Orthogonal matrix                          | Problems on irrational roots                                                                                                  | Problems based on Maxima- Minima of functions of single variable | Bernoulli's formula                                        | Solving problems of type $L[e^{at} f(t)]$                                                                |
| SLO-6  | Unitary matrix                             | Complex roots                                                                                                                 | Introduction to curvature                                        | Simple Problems                                            | Problems based on derivative method                                                                      |
| SLO-7  | Eigen values of a matrix                   | <b>Reciprocal equations-Definition</b>                                                                                        | Radius of Curvature                                              | Reduction formula for $\int \sin^n x dx$                   | Solving problems of type $L[tf(t)]$                                                                      |
| SLO-8  | Tutorial                                   | Tutorial                                                                                                                      | Tutorial                                                         | Tutorial                                                   | Tutorial                                                                                                 |
| SLO-9  | Eigen values and eigen vectors of a matrix | Solving Reciprocal equation of degree four with like and unlike signs for its coefficients-Type I, Type II, Type III, Type IV | Problems based on radius of curvature                            | Reduction formula for $\int \cos^n x dx$                   | Solving problems of type $L[t^n f(t)]$ and type $L[e^{at} tf(t)]$                                        |
| SLO-10 | Cayley Hamilton theorem - Problems         | Newton-Raphson method – Problems                                                                                              | Partial differentiation-Introduction                             | Reduction formula for $\int_0^{\frac{\pi}{2}} \sin^n x dx$ | Solving problems of type $L\left[\frac{f(t)}{t}\right]$                                                  |
| SLO-11 | Cramer's rule                              | Horner's Methods                                                                                                              | Euler's theorem                                                  | Reduction formula for $\int_0^{\frac{\pi}{2}} \cos^n x dx$ | Basic problems on Inverse Laplace Transforms                                                             |
| SLO-12 | Problems based on Cramer's rule            | Problems based on Horner's Methods                                                                                            | Problems based on Euler's Theorem                                | Simple problems                                            | Finding inverse Laplace transforms by the method of partial fractions – problems based on that concepts. |

### Resources

|   |                                                                                         |   |                                                        |
|---|-----------------------------------------------------------------------------------------|---|--------------------------------------------------------|
| 1 | Dr.A.Singaravelu, Allied Mathematics, 7 <sup>th</sup> edition, A.R.S.Publications, 2015 | 2 | P.R.Vittal, Margham Publications, Latest edition, 2002 |
|---|-----------------------------------------------------------------------------------------|---|--------------------------------------------------------|

| Assessment                |                                                      |            |            |            |                                   | Strategies                 |                      |                     |                          |
|---------------------------|------------------------------------------------------|------------|------------|------------|-----------------------------------|----------------------------|----------------------|---------------------|--------------------------|
| Bloom's Level of Thinking | Continuous Learning Assessment (CLA) (50% weightage) |            |            |            | Final Assessment (50 % weightage) | Technology                 | Pedagogy / Andragogy |                     | Sustainable Development  |
|                           | CLA – 1                                              | CLA – 2    | CLA – 3    | CLA – 4    |                                   | Simulations                | Clarification/Pauses | ✓                   | Good Health & Well Being |
|                           | (10 %)                                               | (10 %)     | (20 %)     | (10%)      |                                   | Presentation Tools         | ✓                    | Group Discussion    | ✓                        |
|                           | Theory (%)                                           | Theory (%) | Theory (%) | Theory (%) |                                   | Learning Management System | ✓                    | Hands-on Practice   | ✓                        |
| 7                         | Remember                                             | 15         | 15         | 10         | 10                                | 15                         |                      | Debate              | ✓                        |
| 8                         | Understand                                           | 15         | 15         | 10         | 10                                | 15                         |                      | Interactive Lecture | ✓                        |
| 9                         | Apply                                                | 20         | 25         | 25         | 25                                | 25                         |                      | Brainstorming       | ✓                        |
| 10                        | Analyze                                              | 20         | 25         | 25         | 25                                | 25                         |                      |                     |                          |
| 11                        | Evaluate                                             | 15         | 10         | 15         | 15                                | 10                         |                      |                     |                          |
| 12                        | Create                                               | 15         | 10         | 15         | 15                                | 10                         |                      |                     |                          |
| Total (%)                 |                                                      | 100        | 100        | 100        | 100                               | 100                        |                      |                     |                          |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                 |                                                             |
|----------------------|-------------------------------------------------|-------------------------------------------------------------|
| Professional Experts |                                                 | Higher Institution Experts                                  |
| 1                    | Dr. D. Arivudai nambi, Anna University, Chennai | 2 Dr. N.Viswanathan, , Presidency college , Chennai         |
|                      |                                                 | 1 Dr.S.Poongodisathiya,SRM IST, KTR, poongods@srmist.edu.in |
|                      |                                                 | 2 Dr.S.Saravanakumar,SRM IST, KTR, saravans14@srmist.edu.in |

| Course Code | UCD24V01T | Course Title | Essentials of Artificial Intelligence |  |  |  | Category | V | Value Added Course | L | T | P | C |
|-------------|-----------|--------------|---------------------------------------|--|--|--|----------|---|--------------------|---|---|---|---|
|             |           |              |                                       |  |  |  |          |   |                    | 1 | 0 | 0 | 1 |

| Course Offering Department | Computer Applications | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|-----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|-----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                                            | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcomes                                                   |   |   |   |   |   |   |   |   |    |
|-------|---------------------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|-------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|----|
|       |                                                                                                                                       | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 1                                                                             | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-1 | Study the basics of designing intelligent agents that can solve general purpose problems'                                             |          |        |           |         |                   |                          |                         | Problem Solving, Critical Thinking, Creativity                                |   |   |   |   |   |   |   |   |    |
| CLR-2 | Discover appropriate AI methods to solve a given problem                                                                              |          |        |           |         |                   |                          |                         | Communication Skills, Collaborating Skills                                    |   |   |   |   |   |   |   |   |    |
| CLR-3 | Perform intellectual task as decision making, problem solving, perception, understanding                                              |          |        |           |         |                   |                          |                         | Independent Thinking, Analytical Reasoning, Learning to Learn Research Skills |   |   |   |   |   |   |   |   |    |
| CLR-4 | Formalize a given problem using different AI methods                                                                                  |          |        |           |         |                   |                          |                         | Leadership Qualities, Professionalism, Autonomy, Accountability               |   |   |   |   |   |   |   |   |    |
| CLR-5 | Provides adaptive learning                                                                                                            |          |        |           |         |                   |                          |                         | Digital Technology Skills                                                     |   |   |   |   |   |   |   |   |    |
|       |                                                                                                                                       |          |        |           |         |                   |                          |                         | Value Inculturation, Multicultural Inclusivity                                |   |   |   |   |   |   |   |   |    |
|       |                                                                                                                                       |          |        |           |         |                   |                          |                         | Environmental Engagement                                                      |   |   |   |   |   |   |   |   |    |
|       |                                                                                                                                       |          |        |           |         |                   |                          |                         | Entrepreneurial Risk Taking                                                   |   |   |   |   |   |   |   |   |    |
|       |                                                                                                                                       |          |        |           |         |                   |                          |                         | PSO-1                                                                         |   |   |   |   |   |   |   |   |    |
|       |                                                                                                                                       |          |        |           |         |                   |                          |                         | PSO-2                                                                         |   |   |   |   |   |   |   |   |    |
| CLO   | At the end of this course, learners will be able to:                                                                                  | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) |                                                                               |   |   |   |   |   |   |   |   |    |
| CLO-1 | Demonstrate fundamental understanding of the history of artificial intelligence and its foundations                                   | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3                                                                             | - | - | 1 | 2 | 1 | - | - | - | 1  |
| CLO-2 | Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 2                                                                             | - | 1 | - | 2 | 2 | - | 1 | - | 1  |
| CLO-3 | Identify systems with Artificial Intelligence. evaluation of different algorithms on a problem formalization                          | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 2                                                                             | 3 | 2 | - | 2 | 1 | - | 1 | - | 2  |
| CLO-4 | Use classical Artificial Intelligence techniques, such as search algorithms,                                                          | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                                             | - | 2 | - | 2 | 2 | - | 2 | - | -  |
| CLO-5 | Ability to apply Artificial Intelligence techniques for problem solving.                                                              | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 2                                                                             | 2 | - | - | 2 | - | - | - | - | -  |

| Session | CLO-1                                                                                  | CLO-2                                                                                                   | CLO-3                                                                    | CLO-4                                                        | CLO-5                                                                            |
|---------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------|
|         | Introduction to Artificial Intelligence                                                | Logical Reasoning and First order logic                                                                 | Unification and State Space Search                                       | Planning Graphs                                              | Probability Theory and Temporal Models                                           |
|         | 3                                                                                      | 3                                                                                                       | 3                                                                        | 3                                                            | 3                                                                                |
| SLO-1   | Introduction to Artificial Intelligence, History of Artificial Intelligence- AI models | Logical Reasoning-Introduction- Knowledge Representation                                                | Unification and Conditions, Unification algorithm                        | Partial-order planning, planning graphs                      | Probability Theory, Uncertain Knowledge, Axioms of probability.                  |
| SLO-2   | Problem Solving with Artificial Intelligence- ProblemSolving Process                   | Logical Agents, Knowledge basedAgents, Syntax of First order logic, Basic elements of First order logic | Planning: designing programs to search for data or solutions to problem. | Uses of planning graph, Planning and acting in the realworld | Bayes Theorem, Bayes' Rules & uses, Bayesian networks, Types of Bayesian Network |

|              |                                                                                               |                                                             |                                                                                                               |                                                     |                                                       |
|--------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------|
| <b>SLO-3</b> | Problem Types, Characteristics and Representation-Agents- Examples of Agents, Types of agents | Forward chaining and Backward Chaining- Properties Examples | State-space search, Problems to solve: Water Jug Problem, State representation: Initial, operator, goal state | Forward march, Backward march and Limited resources | Temporal models, Hidden Markov models, HMM components |
|--------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------|

| Resources |                                                                                                               |  |  |   |                                                                                                           |
|-----------|---------------------------------------------------------------------------------------------------------------|--|--|---|-----------------------------------------------------------------------------------------------------------|
| 1         | Russel.SandNorvig.P, (2003), “Artificial Intelligence – A Modern Approach”, Second Edition, Pearson Education |  |  | 2 | S. Russel and P. Norvig, “Artificial Intelligence – A Modern Approach”, Second Edition, Pearson Education |

| Assessment                |            |                                                       |            |            |            | Strategies                 |   |                      |   |                          |   |
|---------------------------|------------|-------------------------------------------------------|------------|------------|------------|----------------------------|---|----------------------|---|--------------------------|---|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (100% weightage) |            |            |            | Technology                 |   | Pedagogy / Andragogy |   | Sustainable Development  |   |
|                           |            | CLA – 1                                               | CLA – 2    | CLA – 3    | CLA – 4    | Simulations                | ✓ | Clarification/Pauses | ✓ | Good Health & Well Being |   |
|                           |            | (20 %)                                                | (20 %)     | (40 %)     | (20%)      | Presentation Tools         | ✓ | Group Discussion     |   | Quality Education        | ✓ |
|                           |            | Theory (%)                                            | Theory (%) | Theory (%) | Theory (%) | Learning Management System | ✓ | Hands-on Practice    | ✓ | Gender Equality          |   |
| 1                         | Remember   | 15                                                    | 15         | 10         | 10         |                            |   | Debate               |   |                          |   |
| 2                         | Understand | 15                                                    | 15         | 10         | 10         |                            |   | Interactive Lecture  | ✓ |                          |   |
| 3                         | Apply      | 20                                                    | 25         | 25         | 25         |                            |   | Brainstorming        | ✓ |                          |   |
| 4                         | Analyze    | 20                                                    | 25         | 25         | 25         |                            |   |                      |   |                          |   |
| 5                         | Evaluate   | 15                                                    | 10         | 15         | 15         |                            |   |                      |   |                          |   |
| 6                         | Create     | 15                                                    | 10         | 15         | 15         |                            |   |                      |   |                          |   |
| Total (%)                 |            | 100                                                   | 100        | 100        | 100        |                            |   |                      |   |                          |   |

\* The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                                                                                              |  |                            |                                                                                                                          |                                                  |
|----------------------|------------------------------------------------------------------------------------------------------------------------------|--|----------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Professional Experts |                                                                                                                              |  | Higher Institution Experts |                                                                                                                          | Internal Experts                                 |
| 1                    | Mr.Jothi Periaswamy, Founder/Chief Data Scientist, DeepSphere AI, 2 Venture Drive, #13-26 Vision Exchange, Singapore, 608526 |  | 1                          | Dr.S.Gopinathan, Professor and Head, Department of Computer Science, University of Madras, Guindy Campus,,Chennai-600025 | 1<br>Dr.S.Belina V J Sara, SRMIST Kattankulathur |

| Course Code                | UCD24S02L                                                                                                                                             | Course Title          | Quantitative Aptitude and Logical Reasoning |                      |     |                     | Category | S                           | Skill Enhancement Course | L       | T                 | P                        | C                       |                                                        |                                            |                                                                                |                                                                 |                           |                                                |                                            |                             |       |        |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------------------------|----------------------|-----|---------------------|----------|-----------------------------|--------------------------|---------|-------------------|--------------------------|-------------------------|--------------------------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------|------------------------------------------------|--------------------------------------------|-----------------------------|-------|--------|
|                            |                                                                                                                                                       |                       |                                             |                      |     |                     |          |                             |                          | 0       | 0                 | 2                        | 1                       |                                                        |                                            |                                                                                |                                                                 |                           |                                                |                                            |                             |       |        |
| Course Offering Department | Career Guidance                                                                                                                                       | Pre-requisite Courses | Nil                                         | Co-requisite Courses | Nil | Progressive Courses | Nil      | Data Book / Codes/Standards | Nil                      |         |                   |                          |                         |                                                        |                                            |                                                                                |                                                                 |                           |                                                |                                            |                             |       |        |
| CLR                        | The purpose of learning this course is to:                                                                                                            |                       |                                             |                      |     |                     | Depth    |                             |                          |         | Attainment        |                          |                         | Programme Learning Outcomes                            |                                            |                                                                                |                                                                 |                           |                                                |                                            |                             |       |        |
|                            |                                                                                                                                                       |                       |                                             |                      |     |                     | 1        | 2                           | 3                        | 4       | 1                 | 2                        | 3                       | 1                                                      | 2                                          | 3                                                                              | 4                                                               | 5                         | 6                                              | 7                                          | 8                           | 9     | 10     |
| CLR-1                      | Illustrate the application of different principles in solving mathematical problems                                                                   |                       |                                             |                      |     |                     | Conceive | Design                      | Implement                | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity Solving | Communication Skills, Collaborating Skills | Independent Thinking, Analytical Reasoning, Learning to Learn, Research Skills | Leadership Qualities, Professionalism, Autonomy, Accountability | Digital Technology Skills | Value Incultication, Multicultural Inclusivity | Environmental Action, Community Engagement | Entrepreneurial Risk Taking | PLO-9 | PLO-10 |
| CLR-2                      | Foster students' curiosity and understanding of concepts related to profit/loss, interest computation, and averages                                   |                       |                                             |                      |     |                     |          |                             |                          |         |                   |                          |                         |                                                        |                                            |                                                                                |                                                                 |                           |                                                |                                            |                             |       |        |
| CLR-3                      | Analyze fundamental mathematical concepts concerning permutation and combination, as well as time and work, with a critical perspective               |                       |                                             |                      |     |                     |          |                             |                          |         |                   |                          |                         |                                                        |                                            |                                                                                |                                                                 |                           |                                                |                                            |                             |       |        |
| CLR-4                      | Equip students with the abilities essential for generating and comprehending data, focusing on topics such as cubes, dices and blood relations        |                       |                                             |                      |     |                     |          |                             |                          |         |                   |                          |                         |                                                        |                                            |                                                                                |                                                                 |                           |                                                |                                            |                             |       |        |
| CLR-5                      | Empower students to grasp the fundamentals of reasoning                                                                                               |                       |                                             |                      |     |                     |          |                             |                          |         |                   |                          |                         |                                                        |                                            |                                                                                |                                                                 |                           |                                                |                                            |                             |       |        |
| CLO                        | At the end of this course, learners will be able to:                                                                                                  |                       |                                             |                      |     |                     |          |                             |                          |         |                   |                          |                         |                                                        |                                            |                                                                                |                                                                 |                           |                                                |                                            |                             |       |        |
| CLO-1                      | Grasp, evaluate, and tackle problems involving numbers and percentages                                                                                |                       |                                             |                      |     |                     | ✓        | ✓                           | -                        | -       | 2                 | 85                       | 75                      | 3                                                      | 1                                          | 3                                                                              | -                                                               | 2                         | 2                                              | -                                          | -                           | -     | -      |
| CLO-2                      | Develop, solve, interpret, and apply fundamental mathematical models relevant to everyday situations                                                  |                       |                                             |                      |     |                     | ✓        | ✓                           | ✓                        | -       | 2                 | 85                       | 75                      | 3                                                      | 1                                          | 3                                                                              | -                                                               | 2                         | 2                                              | -                                          | -                           | -     | -      |
| CLO-3                      | Realize the principles of permutation and combination, probability, time and work, and adopt simplified and innovative approaches to problem- solving |                       |                                             |                      |     |                     | ✓        | ✓                           | ✓                        | ✓       | 3                 | 85                       | 75                      | 3                                                      | 1                                          | 3                                                                              | -                                                               | 2                         | 2                                              | -                                          | -                           | -     | -      |
| CLO-4                      | Comprehend the concepts of data interpretation, data sufficiency, coding and decoding                                                                 |                       |                                             |                      |     |                     | ✓        | ✓                           | ✓                        | ✓       | 3                 | 85                       | 75                      | 3                                                      | 1                                          | 3                                                                              | -                                                               | 2                         | 2                                              | -                                          | -                           | -     | -      |
| CLO-5                      | Solve logical puzzles and reasoning challenges                                                                                                        |                       |                                             |                      |     |                     | ✓        | ✓                           | ✓                        | ✓       | 3                 | 85                       | 75                      | 3                                                      | 1                                          | 3                                                                              | -                                                               | 2                         | 2                                              | -                                          | -                           | -     | -      |

| Sessions | CLO - 1                                            | CLO -2                                             | CLO - 3                                       | CLO - 4                                    | Unit V / CLO – 5                                                  |
|----------|----------------------------------------------------|----------------------------------------------------|-----------------------------------------------|--------------------------------------------|-------------------------------------------------------------------|
|          | 6                                                  | 6                                                  | 6                                             | 6                                          | 6                                                                 |
| SLO-1    | Classification of numbers and Test of divisibility | Profit and Loss                                    | Permutation and Combination                   | Cubes and Dice                             | Direction Sense                                                   |
| SLO-2    | Unit digit and Trailed zeroes                      | Ratio and Proportions                              | Problems on Probability                       | Data Interpretation                        | Number Series and Word Series                                     |
| SLO-3    | Problems on HCFand LCM                             | Simple Interest and Compound Interest              | Time and work - Men and Work                  | Data sufficiency                           | Odd man out<br>Missing Number and Wrong Number                    |
| SLO-4    | Problems on Partnership                            | Word problems on Linear and Simultaneous Equations | Time and Work - Pipes and Cisterns            | Seating Arrangements – Linear and Circular | Puzzles - Concepts & Problems<br>Syllogisms - Concepts & Problems |
| SLO-5    | Problems on Percentage                             | Problems on Averages                               | Time, Speed and Distance - Problems on Trains | Problems on Blood Relations                | Problems on Clocks                                                |
| SLO-6    | Percentage - Increasing & Decreasing functions     | Mixtures and Alligations                           | Time, Speed and Distance - Boats & Streams    | Coding – Decoding                          | Problems on Calendars                                             |

| Resources |                                                                                                               |  |  |   |                                                                                                                   |
|-----------|---------------------------------------------------------------------------------------------------------------|--|--|---|-------------------------------------------------------------------------------------------------------------------|
| 1         | Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Tata McGraw Hill, 5th Edition               |  |  | 4 | Dr. Agarwal. R. S, Quantitative Aptitude for Competitive Examinations, S. Chand and Company Limited, 2018 Edition |
| 2         | Archana Ram, Place Mentor: Tests of Aptitude for Placement Readiness, Oxford University Press, Oxford, 2018   |  |  | 5 | Edgar Thrope, Test of Reasoning for Competitive Examinations, Tata McGraw Hill, 6th Edition                       |
| 3         | Dinesh Khattar, The Pearson Guide to Quantitative Aptitude for competitive examinations, Pearson, 3rd Edition |  |  | 6 | PAA nand, Quantitative Aptitude for competitive examinations, Wiley publications, ebook, 2019                     |

| Assessment                |            |                                                       |              |              |              | Strategies                 |   |                      |   |                          |   |
|---------------------------|------------|-------------------------------------------------------|--------------|--------------|--------------|----------------------------|---|----------------------|---|--------------------------|---|
| Bloom's Level of Thinking |            | Continuous Learning Assessment (CLA) (100% weightage) |              |              |              | Technology                 |   | Pedagogy / Andragogy |   | Sustainable Development  |   |
|                           |            | CLA – 1                                               | CLA – 2      | CLA – 3      | CLA – 4      | Simulations                | ✓ | Clarification/Pauses | ✓ | Good Health & Well Being |   |
|                           |            | (20 %)                                                | (20 %)       | (30 %)       | (30%)        | Presentation Tools         | ✓ | Group Discussion     |   | Quality Education        | ✓ |
|                           |            | Practice (%)                                          | Practice (%) | Practice (%) | Practice (%) | Learning Management System | ✓ | Hands-on Practice    | ✓ | Gender Equality          |   |
| 1                         | Remember   | 20                                                    | 10           | 20           | 10           |                            |   | Debate               |   |                          |   |
| 2                         | Understand | 20                                                    | 10           | 20           | 10           |                            |   | Interactive Lecture  | ✓ |                          |   |
| 3                         | Apply      | 20                                                    | 20           | 20           | 20           |                            |   | Brainstorming        | ✓ |                          |   |
| 4                         | Analyze    | 20                                                    | 20           | 20           | 20           |                            |   |                      |   |                          |   |
| 5                         | Evaluate   | 10                                                    | 20           | 10           | 20           |                            |   |                      |   |                          |   |
| 6                         | Create     | 10                                                    | 20           | 10           | 20           |                            |   |                      |   |                          |   |
| Total (%)                 |            | 100                                                   | 100          | 100          | 100          |                            |   |                      |   |                          |   |

\* The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                                                                                                                                |                            |                                                                                                                                                                                                  |                  |                                                                                                  |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------------------------------------------------------------------------------|
| Professional Experts |                                                                                                                                                                | Higher Institution Experts |                                                                                                                                                                                                  | Internal Experts |                                                                                                  |
| 1                    | Mr. P. Chockalingam, Senior Lead Software Engineer, Virtusa Consulting Services Private Ltd, DLF IT Park SEZ, Chennai – 600089<br>p.chockalingam1986@gmail.com | 1                          | Dr. G. Saravana Prabu, Asst. Professor, Department of English, Amrita Vishwa Vidhyapeetham, Coimbatore - 641112 <a href="mailto:g_saravanaprabu@cb.amrita.edu">g_saravanaprabu@cb.amrita.edu</a> | 1                | Dr.SathishK,HOD,DepartmentofCareerGuidanceCell,FSH,SRMIST<br>hod.dcgk.ktr@srmist.edu.in          |
|                      |                                                                                                                                                                |                            |                                                                                                                                                                                                  | 2                | Dr.AarthiS,AssistantProfessor,DepartmentofCareerGuidanceCell,FSH,SRMIST<br>aarthi4@srmist.edu.in |

| Course Code | UNS24Y01L/UNC24Y01L/UNO24Y01L/UYG24Y01L | Course Title | NSS/NCC/NSO/YOGA | Category | Y | Mandatory Course | L | T | P | C |
|-------------|-----------------------------------------|--------------|------------------|----------|---|------------------|---|---|---|---|
|             |                                         |              |                  |          |   |                  | 0 | 0 | 0 | 0 |

| Course Offering Department | NSS | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|-----|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|-----|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                 | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcomes                            |                                            |                                                                                                                                 |                                           |                                                                    |       |       |   |   |    |
|-------|--------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|--------------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------|-------|-------|---|---|----|
| CLR-1 | Understand themselves in relation to their community                                       | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 1                                                      | 2                                          | 3                                                                                                                               | 4                                         | 5                                                                  | 6     | 7     | 8 | 9 | 10 |
| CLR-2 | Develop among themselves a sense of social and civic responsibility                        | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity Solving | Communication Skills, Collaborating Skills | Independent Thinking, Analytical Reasoning, Learning Leadership Qualities, Professionalism, Autonomy, Digital Technology Skills | Value Incultation, Multicultural Industry | Environmental Action, Community Engagement, Entrepreneurial Taking | PSO 1 | PSO 2 |   |   |    |
| CLR-3 | Utilize their knowledge in finding practical solution to individual and community problems |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                                                                                 |                                           |                                                                    |       |       |   |   |    |
| CLR-4 | Develop competence required for group-living and sharing of responsibilities               |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                                                                                 |                                           |                                                                    |       |       |   |   |    |
| CLR-5 | Acquire leadership qualities and democratic attitude                                       |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                                                                                 |                                           |                                                                    |       |       |   |   |    |
|       |                                                                                            |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                                                                                 |                                           |                                                                    |       |       |   |   |    |
|       |                                                                                            |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                                                                                 |                                           |                                                                    |       |       |   |   |    |
| CLO   | At the end of this course, learners will be able to:                                       |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                                                                                 |                                           |                                                                    |       |       |   |   |    |
| CLO-1 | realize themselves in relation to their community                                          | ✓        | ✓      | -         |         | 2                 | 85                       | 75                      | 3                                                      | -                                          | -                                                                                                                               | 1                                         |                                                                    | 3     | 3     | 2 |   |    |
| CLO-2 | Develop among themselves a sense of social and civic responsibility                        | ✓        | ✓      | ✓         |         | 2                 | 85                       | 75                      | 3                                                      | 2                                          | 1                                                                                                                               | 2                                         |                                                                    | 3     | 3     | 1 |   |    |
| CLO-3 | find practical solution to individual and community problems                               | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                      | 1                                          | 3                                                                                                                               | 1                                         |                                                                    | 3     | 3     | 1 |   |    |
| CLO-4 | Develop competence required for group-living and sharing of responsibilities               | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                      | 3                                          | 2                                                                                                                               | 3                                         |                                                                    | 3     | 3     | 2 |   |    |
| CLO-5 | develop leadership qualities and democratic attitude                                       | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                                                        | 3                                          | 3                                                                                                                               | 2                                         | 3                                                                  |       | 3     | 3 | 3 |    |

#### Assessment is Fully Internal

| Assessment                                            |            |              |              |              |              |
|-------------------------------------------------------|------------|--------------|--------------|--------------|--------------|
| Continuous Learning Assessment (CLA) (100% weightage) |            |              |              |              |              |
| Bloom's Level of Thinking                             |            | CLA – 1 *    | CLA– 2 *     | CLA– 3 *     | CLA – 4 *    |
|                                                       |            | (20%)        | (30%)        | (30%)        | (20 %)       |
|                                                       |            | Practice (%) | Practice (%) | Practice (%) | Practice (%) |
| 1                                                     | Remember   | 20           | 20           | 20           | 20           |
| 2                                                     | Understand | 20           | 20           | 20           | 20           |
| 3                                                     | Apply      | 40           | 40           | 40           | 40           |
| 4                                                     | Analyze    | 20           | 20           | 20           | 20           |
| 5                                                     | Evaluate   |              |              |              |              |
| 6                                                     | Create     |              |              |              |              |
| Total (%)                                             |            | 100          | 100          | 100          | 100          |

| Strategies                 |  |                      |   |                          |   |
|----------------------------|--|----------------------|---|--------------------------|---|
| Technology                 |  | Pedagogy / Andragogy |   | Sustainable Development  |   |
| Simulations                |  | Clarification/Pauses |   | Good Health & Well Being | ✓ |
| Presentation Tools         |  | Group Discussion     | ✓ | Quality Education        |   |
| Learning Management System |  | Hands-on Practice    | ✓ | Gender Equality          | ✓ |
|                            |  | Debate               | ✓ |                          |   |
|                            |  | Interactive Lecture  | ✓ |                          |   |
|                            |  | Brainstorming        |   |                          |   |
|                            |  |                      |   |                          |   |
|                            |  |                      |   |                          |   |
|                            |  |                      |   |                          |   |
|                            |  |                      |   |                          |   |

**\*CLAs are evaluated based on (i) participation in awareness programmes, (ii) participation in outreach programme, (iii) Community Services (iv) Camps (National, State, Regional)**

| Resources |                                           |
|-----------|-------------------------------------------|
| 1.        | NSS Manual (Revised), Government of India |

| Designers            |                                                                        |                                           |                                                                                                                    |
|----------------------|------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Professional Experts |                                                                        | Higher Institution Experts                | Internal Experts                                                                                                   |
| 1                    | Dr Samuel Chellaiya C<br>Regional Director, NSS<br>Government of India | 1<br>State Officer, NSS<br>Tamil Nadu NSS | 1<br>Dr Prakash V, NSS Coordinator, SRMIST,<br>AP, department of Economics, FSH, SRMIST<br>Prakashv2@srmist.edu.in |
|                      |                                                                        |                                           | 2<br>Dr Yogalakshmi, NSS Programme Officer, FSH, SRMIST.                                                           |

## SEMESTER - III

| Course Code | UCS24301J | Course Title | Operating System | Category | C | Core | L | T | P | C |
|-------------|-----------|--------------|------------------|----------|---|------|---|---|---|---|
|             |           |              |                  |          |   |      | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                          | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcomes                    |                                     |                                                                         |                                                                 |                           |                                               |                                            |                             |       |       |
|-------|-----------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|------------------------------------------------|-------------------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------|-----------------------------------------------|--------------------------------------------|-----------------------------|-------|-------|
| CLR-1 | Utilize operating systems based on its features and utility                                         | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 1                                              | 2                                   | 3                                                                       | 4                                                               | 5                         | 6                                             | 7                                          | 8                           | 9     | 10    |
| CLR-2 | Utilize the Process Management functions of an Operating system                                     |          |        |           |         |                   |                          |                         |                                                |                                     |                                                                         |                                                                 |                           |                                               |                                            |                             |       |       |
| CLR-3 | Utilize the features of Memory Management concepts of an Operating system                           |          |        |           |         |                   |                          |                         |                                                |                                     |                                                                         |                                                                 |                           |                                               |                                            |                             |       |       |
| CLR-4 | Analyze how Device Management part of an Operating system functions                                 |          |        |           |         |                   |                          |                         |                                                |                                     |                                                                         |                                                                 |                           |                                               |                                            |                             |       |       |
| CLR-5 | Utilize the File Management functions of an Operating system                                        |          |        |           |         |                   |                          |                         |                                                |                                     |                                                                         |                                                                 |                           |                                               |                                            |                             |       |       |
| CLO   | At the end of this course, learners will be able to:                                                | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity | Communication Skills, Collaborating | Independent Thinking, Analytical Reasoning, Learning to Learn, Research | Leadership Qualities, Professionalism, Autonomy, Accountability | Digital Technology Skills | Value Incubation, Multicultural Understanding | Environmental Action, Community Engagement | Entrepreneurial Risk Taking | PSO-1 | PSO-2 |
| CLO-1 | Identify functions of an operating system, analyze the process management functions                 | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3                                              | -                                   | -                                                                       | -                                                               | -                         | -                                             | -                                          | -                           | -     | -     |
| CLO-2 | Analyze CPU scheduling and synchronization process of an operating system                           | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3                                              | -                                   | -                                                                       | -                                                               | -                         | -                                             | -                                          | -                           | -     | -     |
| CLO-3 | Analyze the need of Memory management functions of an operating system                              | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                              | -                                   | -                                                                       | -                                                               | 3                         | -                                             | -                                          | -                           | -     | -     |
| CLO-4 | Identify the significance of device management and file management's role of an operating system    | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                              | 3                                   | -                                                                       | -                                                               | -                         | -                                             | -                                          | -                           | 3     | 3     |
| CLO-5 | Identify the essentials of inter process communication in an operating system, evaluate hypervisors | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                              | 3                                   | -                                                                       | -                                                               | 3                         | -                                             | -                                          | 3                           | 3     | 3     |

| Sessions  | CLO - 1                                                                                                                        | CLO - 2                                                                                                 | CLO - 3                                                                                         | CLO - 4                                                                              | CLO - 5                                                                                  |
|-----------|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
|           | 18                                                                                                                             | 18                                                                                                      | 18                                                                                              | 18                                                                                   | 18                                                                                       |
| SLO-1     | <b>Introduction Operating Systems (OS):<br/>Operating System overview<br/>.Operating system as a resource management</b>       | <b>Process concept : Introduction,</b><br>Process states : Process creation and process termination     | Process Synchronization – Background,<br>The Critical section problem                           | Deadlocks - System model                                                             | <b>Memory management: Introduction</b>                                                   |
| SLO-2     | Operations, Assembler, Compiler, loader, linker, <b>Evolution of Operating Systems ,serial processing and batch processing</b> | Process state transition diagram,<br>Operation on process                                               | Two process Solutions ,Multi process Solutions                                                  | Deadlock characterization, Necessary conditions                                      | Logical, physical address space, Comparison of Logical, physical Address                 |
| SLO-3     | Batch: Simple, Multiprogramming, Multiprocessor, Time Sharing, parallel systems                                                | Symmetric multiprocessing                                                                               | Synchronization hardware solution                                                               | Resource Allocation Graph, Methods for handling deadlocks                            | Swapping, Organization : physical and logical organization                               |
| SLO 4&5   | <b>Lab 1: Comparison between various Operating Systems</b>                                                                     | <b>Lab 4: Simulation of FCFS CPU scheduling algorithm Usage</b>                                         | <b>Lab 7: Write a procedure for timer interrupt handler</b>                                     | <b>Lab 10: Program to implement Bankers Algorithm</b>                                | <b>Lab 13: multiple partition (dynamic Memory allocation method)</b>                     |
| SLO-6     | Distributed (client-server, peer-to-peer), Real-Time (hard, soft Clustering (symmetric, asymmetric, parallel)) , Network,)     | Concurrent process, Usage                                                                               | Semaphores – Usage                                                                              | Deadlock Prevention, Mutual exclusion, Hold and Wait<br>No Preemption, Circular Wait | Memory allocation method, Single partition allocation                                    |
| SLO-7     | Microkernel: Architecture, Kernel mode, user mode, Monolithic, differences, System Call Types                                  | <b>CPU Scheduling: Process Scheduler (long, short, medium term),</b><br>Scheduling criteria             | Semaphores –Implementation, Binary semaphores                                                   | Deadlock Avoidance – Safe state, Resource Allocation Graph Algorithm                 | Multiple partition memory management, contiguous (fixed, dynamic)                        |
| SLO-8     | process control: fork(), exit(), wait(),file manipulation: open(), close()                                                     | CPU utilization, throughput, time: (a) turnaround (b) waiting (c) response, Scheduling Types: FCFS, SJF | Classic Problems of Synchronization - The Bounded Buffer problem, The Readers - Writers Problem | Banker's Algorithm - Safety Algorithm                                                | Contiguous Types: memory protection, allocation, fragmentation , partitioned, Compaction |
| SLO 9&10  | <b>Lab 2: Booting process in GNU/Linux OS</b>                                                                                  | <b>Lab 5: Priority CPU scheduling algorithm</b>                                                         | <b>Lab 8: classical inter process communication problem (Producer consumer)</b>                 | <b>Lab 11: Program to implement memory allocation with pages</b>                     | <b>Lab 14 : Simulation of FIFO page replacement algorithm Paging</b>                     |
| SLO-11    | File operations , read(), write()                                                                                              | Priority , Round Robin Scheduling                                                                       | The Dinning philosophers problem , Examples                                                     | Resource request algorithm , Examples                                                | Paging,Segmentation                                                                      |
| SLO-12    | Operating System services, System Programs:                                                                                    | Other Scheduling Types, Real Time Scheduling                                                            | Critical Regions: Race condition and process synchronization                                    | Deadlock Detection - introduction                                                    | Page Replacement Algorithms, Types of Replacement algorithms, , Examples                 |
| SLO-13    | file management, status information                                                                                            | multilevel queue, multilevel feedback queue                                                             | Implementation of Critical region, Mutual Exclusion Algorithm: Peterson , Monitors              | Single instance of each resource type, Several instances of a Resource type          | , Demand paging                                                                          |
| SLO 14-15 | <b>Lab 3: Multi-thread Programming</b>                                                                                         | <b>Lab 6: Simulation of Round Robin CPU scheduling algorithm</b>                                        | <b>Lab 9: Write a procedure to make message passing in inter process communication</b>          | <b>Lab 12: Simulation of FIFO page replacement algorithm</b>                         | <b>Lab 15: Simulation of optimal page replacement algorithm</b>                          |

| Resources |                                                                                                                      |  |  |  |  |  |   |                                                                                                |  |  |  |
|-----------|----------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|---|------------------------------------------------------------------------------------------------|--|--|--|
| 5         | Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating systems, 9 <sup>th</sup> ed., John Wiley & Sons, 2013 |  |  |  |  |  | 3 | Andrew S. Tanenbaum, Herbert Bos, Modern Operating systems, 4 <sup>th</sup> ed., Pearson, 2015 |  |  |  |
| 2         | William Stallings, Operating Systems-Internals and Design Principles, 7 <sup>th</sup> ed., Prentice Hall, 2012       |  |  |  |  |  | 4 | Bryant O'Hallaxn, Computer systems- A Programmer's Perspective, Pearson, 2015                  |  |  |  |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) |
| 7                         | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |
| 8                         | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |
| 9                         | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |
| 10                        | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |
| 11                        | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |
| 12                        | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |

| Strategies                 |  |                      |                   |                         |                          |
|----------------------------|--|----------------------|-------------------|-------------------------|--------------------------|
| Technology                 |  | Pedagogy / Andragogy |                   | Sustainable Development |                          |
| Simulations                |  | Clarification/Pauses |                   | ✓                       | Good Health & Well Being |
| Presentation Tools         |  | ✓                    | Group Discussion  | ✓                       | Quality Education        |
| Learning Management System |  | ✓                    | Hands-on Practice | ✓                       | Gender Equality          |
|                            |  | Debate               |                   | ✓                       |                          |
|                            |  | Interactive Lecture  |                   | ✓                       |                          |
|                            |  | Brainstorming        |                   | ✓                       |                          |
|                            |  |                      |                   |                         |                          |
|                            |  |                      |                   |                         |                          |
|                            |  |                      |                   |                         |                          |
|                            |  |                      |                   |                         |                          |

| Strategies                 |   |                      |   |                          |   |
|----------------------------|---|----------------------|---|--------------------------|---|
| Technology                 |   | Pedagogy / Andragogy |   | Sustainable Development  |   |
| Simulations                |   | Clarification/Pauses | ✓ | Good Health & Well Being | ✓ |
| Presentation Tools         | ✓ | Group Discussion     | ✓ | Quality Education        | ✓ |
| Learning Management System | ✓ | Hands-on Practice    | ✓ | Gender Equality          | ✓ |
|                            |   | Debate               | ✓ |                          |   |
|                            |   | Interactive Lecture  | ✓ |                          |   |
|                            |   | Brainstorming        | ✓ |                          |   |
|                            |   |                      |   |                          |   |
|                            |   |                      |   |                          |   |
|                            |   |                      |   |                          |   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |  |  |  |                            |                                               |  |  |                  |                                        |
|----------------------|---------------------------------------------------------|--|--|--|--|----------------------------|-----------------------------------------------|--|--|------------------|----------------------------------------|
| Professional Experts |                                                         |  |  |  |  | Higher Institution Experts |                                               |  |  | Internal Experts |                                        |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  |  |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT Chennai |  |  | 1                | Dr. Arul Lena Rose P J, Professor, FSH |

| Course Code | USA24302J | Course Title | Database Management System | Category | C | Core | L | T | P | C |
|-------------|-----------|--------------|----------------------------|----------|---|------|---|---|---|---|
|             |           |              |                            |          |   |      | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                     | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcomes |   |   |   |   |   |   |   |   |    |
|-------|----------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|-----------------------------|---|---|---|---|---|---|---|---|----|
| CLR-1 | Understand the fundamentals of Database Management Systems and Its architecture                                | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 1                           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-2 | To impart in-depth knowledge of database design process through ER Model and Relational Model                  |          |        |           |         |                   |                          |                         |                             |   |   |   |   |   |   |   |   |    |
| CLR-3 | Understand the using Structure Query Language (SQL) and PL/SQL                                                 |          |        |           |         |                   |                          |                         |                             |   |   |   |   |   |   |   |   |    |
| CLR-4 | Basic knowledge of Improvement of the database design using normalization criteria and optimize queries        |          |        |           |         |                   |                          |                         |                             |   |   |   |   |   |   |   |   |    |
| CLR-5 | Basic knowledge of the practical problems of concurrency control and gain knowledge about failures and recover |          |        |           |         |                   |                          |                         |                             |   |   |   |   |   |   |   |   |    |
| CLO   | At the end of this course, learners will be able to:                                                           | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) |                             |   |   |   |   |   |   |   |   |    |
| CLO-1 | Have a thorough Understanding of the Database Systems                                                          | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3                           | - | - | - | - | - | - | - | - | -  |
| CLO-2 | Realize the concepts of ER Model and Relational Model                                                          | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3                           | - | - | - | - | - | - | - | - | -  |
| CLO-3 | Create real time applications of SQL and PL/SQL                                                                | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                           | - | - | - | 3 | - | - | - | - | -  |
| CLO-4 | Design and implementation knowledge of a Normalized Database                                                   | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                           | 3 | - | - | - | - | - | - | 3 | 3  |
| CLO-5 | Design and implementation knowledge of Concurrency Control                                                     | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                           | 3 | - | - | 3 | - | - | 3 | 3 | 3  |

| Sessions | CLO - 1                             | CLO - 2                                           | CLO - 3                                        | CLO - 4                       | CLO - 5                                                    |
|----------|-------------------------------------|---------------------------------------------------|------------------------------------------------|-------------------------------|------------------------------------------------------------|
|          | 18                                  | 18                                                | 18                                             | 18                            | 18                                                         |
| SLO-1    | What is a DBMS                      | Introduction to Entity Relationship               | Defining Constraints through SQL               | CODD Rules                    | Recoverability in Transaction                              |
| SLO-2    | Advantage of DBMS over File Systems | E-R Model Construction                            | SQL Aggregate Functions Introduction           | Normalization: 1Nf, 2Nf, 3Nf  | Concurrent Execution                                       |
| SLO-3    | Applications of DBMS                | Case Study                                        | Built Functions : In Numeric, Date             | BCNF 4Nf and 5Nf              | Concurrency Control – Lock Based, Two-Phase Control Commit |
| SLO 4-6  | <b>Lab1 : Creating a Simple DB</b>  | <b>Lab 4: Working with Built In SQL Functions</b> | <b>Lab 7: Working with Aggregate Functions</b> | <b>Lab 10: Normalize a DB</b> | <b>Lab 13: Working with Transactions</b>                   |
| SLO-7    | DBMS Architecture                   | Issues in E-R Model                               | Built Functions: String, Set                   | Referential Integrity         | DB Stored Procedures : PL/SQL                              |

|           |                                |                                                      |                                                              |                                                      |                                                                          |
|-----------|--------------------------------|------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------|--------------------------------------------------------------------------|
| SLO-8     | Over View of SQL               | Keys, Attributes, Constraints                        | SQL Joins                                                    | Indexing: Primary, Secondary, Multilevel             | Multilevel Granularity                                                   |
| SLO-9     | SQL : Data Definition- DDL     | Mapping Cardinality                                  | Creating Sub Queries                                         | ISAM, B-Trees                                        | <b>Deadlock Prevention</b>                                               |
| SLO 10-12 | <b>Lab2: Working with DDL</b>  | <b>Lab 5- Working with Primary and Secondary Key</b> | <b>Lab 8: Working With Sub Queries</b>                       | <b>Lab 11: PL/SQL work with Iterative Statements</b> | <b>Lab 14: Creating DB Stored Procedures</b>                             |
| SLO-13    | SQL : Data Manipulation -DML   | Extended ER - Aggregation                            | Transaction Control Commands : Commit, Roll Back, Save Point | PL/SQL Variables and Control Structures              | PL/SQ: Exception Handling, Triggers                                      |
| SLO-14    | Evolution of Data Models       | Extended ER – Generalization, Specialization         | Relational Algebra : Fundamental Operations                  | Cursors and Functions in PL/SQL                      | Need For DB Security                                                     |
| SLO-15    | Comparison of Data Models      | Conversion of ER to Relational Table                 | Functional Dependency : Trivial, Non Trivial                 | Transactions : ACID Property                         | Mandatory Access control and SLO-2 Multilevel Security                   |
| SLO 16-18 | <b>Lab 3: Working with DML</b> | <b>Lab 6: Working with Nested Queries</b>            | <b>Lab 9: Correlated Sub Queries</b>                         | <b>Lab 12: PL/SQL Working with Cursors</b>           | <b>Lab 15: Implementation of Payroll Processing, Student Mark Report</b> |

| Resources |                                                                                               |   |                                                                       |  |  |
|-----------|-----------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------------|--|--|
| 1         | AnanthiSheshasaayee,J.G. Sheshasaayee, Digital Logic Fundamentals, Margham Publications, 2005 | 3 | Leach D.P, Malvino A.P, Digital Principles and Applications, TM, 2002 |  |  |
| 2         | Vijayendran.V, Digital Fundamentals, S.V. Publishers, 2003                                    | 4 | Moris ManoM, Digital Logic and Computer Design, Pearson, 2001         |  |  |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) |
| 1                         | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |
| 2                         | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |
| 3                         | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |
| 4                         | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |
| 5                         | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |
| 6                         | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |

| Strategies                 |  |                      |                   |                         |                          |                   |
|----------------------------|--|----------------------|-------------------|-------------------------|--------------------------|-------------------|
| Technology                 |  | Pedagogy / Andragogy |                   | Sustainable Development |                          |                   |
| Simulations                |  | Clarification/Pauses |                   | ✓                       | Good Health & Well Being |                   |
| Presentation Tools         |  | ✓                    | Group Discussion  |                         | ✓                        | Quality Education |
| Learning Management System |  | ✓                    | Hands-on Practice |                         | ✓                        | Gender Equality   |
|                            |  | Debate               |                   | ✓                       |                          |                   |
|                            |  | Interactive Lecture  |                   | ✓                       |                          |                   |
|                            |  | Brainstorming        |                   | ✓                       |                          |                   |
|                            |  |                      |                   |                         |                          |                   |
|                            |  |                      |                   |                         |                          |                   |
|                            |  |                      |                   |                         |                          |                   |
|                            |  |                      |                   |                         |                          |                   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |                            |                                                    |                  |
|----------------------|---------------------------------------------------------|--|----------------------------|----------------------------------------------------|------------------|
| Professional Experts |                                                         |  | Higher Institution Experts |                                                    | Internal Experts |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  | 1                          | Dr. Neela Narayanan V, Professor, VIT Chennai      |                  |
| 1                    |                                                         |  | 1                          | Dr. E. Sweety Bakyarani, Assistant Professor, FSH, |                  |

| Course Code | UMS24303T | Course Title | Statistical Methods | Category | D | Discipline Core/<br>Elective Course | L | T | P | C |
|-------------|-----------|--------------|---------------------|----------|---|-------------------------------------|---|---|---|---|
|             |           |              |                     |          |   |                                     | 4 | 0 | 0 | 4 |

| Course Offering Department | Mathematics and Statistics | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|----------------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|----------------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                       | Depth |   |   |   | Attainment |   |   | Programme Learning Outcomes |   |   |   |   |   |   |   |   |    |
|-------|--------------------------------------------------------------------------------------------------|-------|---|---|---|------------|---|---|-----------------------------|---|---|---|---|---|---|---|---|----|
| CLR-1 | To provide foundations in Bio Statistics                                                         | 1     | 2 | 3 | 4 | 1          | 2 | 3 | 1                           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-2 | To provide a strong foundations of organizing the data, diagrammatic and graphical presentation. |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-3 | To apply Statistical techniques for biological problems.                                         |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-4 | To understand the characteristics of biological problems.                                        |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-5 | To provide the application of correlation and regression in biological sciences.                 |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |

  

| CLO   | At the end of this course, learners will be able to:                                                                                                                     | Conceive | Design | Implement | Operate | Level of Thinking | Expected | Proficiency | Expected | Attainment (%) | Problem Solving, Critical | Communication Skills | Independent Thinking | Leadership Qualities | Digital Technology | Value Incultation | Environmental Action | Entrepreneurial Risk | PSO-1 | PSO-2 |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|----------|-------------|----------|----------------|---------------------------|----------------------|----------------------|----------------------|--------------------|-------------------|----------------------|----------------------|-------|-------|
| CLO-1 | To understand the statistical modeling and its limitations, and have skill in description, interpretation and exploratory analysis of data by graphical and other means; | ✓        | ✓      | -         | -       | 2                 | 85       | 75          | 3        | -              | -                         | -                    | -                    | -                    | -                  | -                 | -                    | -                    | -     | -     |
| CLO-2 | To calculate and apply measures of central tendency - grouped and ungrouped data cases.                                                                                  | ✓        | ✓      | ✓         | -       | 2                 | 85       | 75          | 3        | -              | -                         | -                    | -                    | -                    | -                  | -                 | -                    | -                    | -     | -     |
| CLO-3 | To understand and apply measures of dispersion - grouped and ungrouped data cases.                                                                                       | ✓        | ✓      | ✓         | ✓       | 3                 | 85       | 75          | 3        | -              | -                         | -                    | 3                    | -                    | -                  | -                 | -                    | -                    | -     | -     |
| CLO-4 | Find the relationship between two or more variables using correlation and regression.                                                                                    | ✓        | ✓      | ✓         | ✓       | 3                 | 85       | 75          | 3        | 3              | -                         | -                    | -                    | -                    | -                  | -                 | -                    | 3                    | 3     | 3     |
| CLO-5 | Perform Test of Hypothesis for small sample. Learn non-parametric test such as the Chi-Square test for Independence and Goodness of Fit.                                 | ✓        | ✓      | ✓         | ✓       | 3                 | 85       | 75          | 3        | 3              | -                         | -                    | 3                    | -                    | -                  | 3                 | 3                    | 3                    | 3     | 3     |

| Title & Content | Introduction to Operations Research                                                                                                                      | Linear Programming                                                               | Transportation & Assignment Problems                                               | Sequencing Problems                                                                | Game Theory                                                            |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| Duration (hour) | 12                                                                                                                                                       | 12                                                                               | 12                                                                                 | 12                                                                                 | 12                                                                     |
| SLO-1           | Nature and scope of statistical methods<br>Definition of statistics<br>Nature and scope of Statistical methods- Definition of Statistics- Numerical Data | Measures of Central tendency – Definitions-functions- characteristics of average | Measures of Dispersion - Range – Individual, Discrete series and Continuous series | Correlation Analysis: Correlation - Definition and uses<br>Types of correlation    | Testing of Hypotheses<br><br>-Testing Procedures                       |
| SLO-2           | Nature of statistics                                                                                                                                     | Arithmetic mean<br>Individual series                                             | Quartile Deviation - Individual and Discrete series                                | Methods for Finding Correlation Coefficient, Properties of correlation coefficient | Definition of test statistic t and its uses- t-test-Small Sample tests |

|            |                                                                                                                              |                                                                                        |                                                                                   |                                                                                                                                             |                                                                                                                                         |
|------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| SLO-3      | Importance of Statistics – Function of Statistics                                                                            | Arithmetic mean<br>Discrete series                                                     | Quartile Deviation - Continuous series                                            | Karl Pearson’s Correlation Co-efficient - <b>Spearman’s Rank Correlation Coefficientwith non-repeated Ranks</b>                             | <b>t-test</b><br>- <b>Test for Single Mean</b>                                                                                          |
| SLO-4      | Limitations - <b>Distrust of Statistics</b>                                                                                  | Arithmetic mean<br>Continuous series                                                   | Mean Deviation about Mean – Individual Series- Discrete series- Continuous series | <b>Spearman’s Rank Correlation Coefficientwith repeated Ranks</b>                                                                           | <b>t-test</b><br>- <b>Test for two sample Means</b>                                                                                     |
| SLO-5      | Classification-Types of classification and its good Characteristics                                                          | Arithmetic mean<br>Cumulative series                                                   | Standard Deviation – Individual and Discrete Series                               | Spearman’s Rank Correlation Co-efficient                                                                                                    | <b>t-test</b><br>- <b>t Test Statistic, when sample standard deviations are not known, but Population Standard Deviations are known</b> |
| SLO-6      | Tabulation-Types of Tabulation – Parts of Tabulation - <b>Components of Good Table - Rules of construction of the table.</b> | Arithmetic mean<br>Meritsand Demerits                                                  | Standard Deviation-Continuous Series                                              | <b>Problems on finding the best pair of judgments</b>                                                                                       | Chi-Square distribution<br>- <b>Definition and its Uses-Testing procedure</b>                                                           |
| SLO-7      | <b>Components of Good Table Rules of construction of the table.-Difference between classification and tabulation.</b>        | Median<br>Individual series -- Discrete series- Continuous series                      | Standard Deviation-Continuous Series                                              | <b>Bivariate Distribution</b>                                                                                                               | <b>Test based on Goodness of fit- Testing the Independence of Attributes using Chi-Square</b>                                           |
| SLO-8      | Diagrammatic representation of various types of statistical data : <b>Bar Diagram</b>                                        | Median<br>Merits and Demerits                                                          | Coefficient of Variation                                                          | <b>Regression Analysis: Regression - Definition and Uses - Regression Coefficients- Regression Equations- Types of Regression Equations</b> | <b>F-test</b><br>- <b>Test Statistic of F-test-</b>                                                                                     |
| SLO-9      | <b>Types of Bar diagram - One dimensional Diagrams</b>                                                                       | Mode<br>Individual series -- Discrete series- Continuous series<br>Merits and Demerits | Graphical solution of Dispersion<br>Lorenz curve                                  | <b>Regression Equation of X on Y and Regression Equation of Y on X</b>                                                                      | <b>Uses and testing Procedures</b>                                                                                                      |
| SLO-10     | <b>Two dimensional Diagrams- Histogram-pie chart</b>                                                                         | <b>Empirical Relation</b>                                                              | Graphical solution of Dispersion<br>Lorenz                                        | <b>Relationship between Correlation and Regression Coefficients</b>                                                                         | Testing the equality of variance using F distribution                                                                                   |
| SLO-11     | Frequency Polygon - <b>Frequency Curve-</b> Less than O gives-more than O gives                                              | Graphical solution of Median                                                           | Skewness- Bowley’s coefficient of Skewness                                        | - <b>Problems on the Relationship between the Coefficients</b>                                                                              | <b>Analysis of Variance – Definition and Uses</b>                                                                                       |
| SLO-12     | <b>Lorenz Curve</b>                                                                                                          | Graphical solution of Mode                                                             | Concept of Kurtosis                                                               | - <b>Finding the corrected Correlation Coefficient values by correcting the wrongly entered inputs</b>                                      | <b>ANOVA - One Way Classification</b>                                                                                                   |
| Assessment | Continuous Learning Assessment 1                                                                                             |                                                                                        | Continuous Learning Assessment - 2                                                |                                                                                                                                             |                                                                                                                                         |
|            | Continuous Learning Assessment - 3                                                                                           |                                                                                        |                                                                                   |                                                                                                                                             |                                                                                                                                         |

| Resources |                                                                                                                        |  |  |  |  |  |  |   |                                                                                                                           |  |  |
|-----------|------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|---|---------------------------------------------------------------------------------------------------------------------------|--|--|
| 1         | Pillai, R.S.N, Bagavathi, V. (2009), Statistics, Theory and Practice, 7 <sup>th</sup> Edition, S.Chand Ltd, New Delhi. |  |  |  |  |  |  | 3 | Gupta, S.P. (2012), Statistical Methods, 4 <sup>th</sup> Edition, Sultan Chand & Sons, New Delhi.                         |  |  |
| 2         | Khan and Khanum, (2008), Fundamentals of Bio Statistics, 3 <sup>rd</sup> Edition, Ukaaz Publications, Hyderabad.       |  |  |  |  |  |  | 4 | Ken Black, (2013), Business Statistics for Contemporary Decision Making, 7 <sup>th</sup> Edition, John Wiley Publications |  |  |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) |
| 1                         | Remember   | 15                                                   | -            | 15         | -            | 10         | -            | 10         | -            | 15                                | -            |
| 2                         | Understand | 15                                                   | -            | 15         | -            | 10         | -            | 10         | -            | 15                                | -            |
| 3                         | Apply      | 20                                                   | -            | 25         | -            | 25         | -            | 25         | -            | 25                                | -            |
| 4                         | Analyze    | 20                                                   | -            | 25         | -            | 25         | -            | 25         | -            | 25                                | -            |
| 5                         | Evaluate   | 15                                                   | -            | 10         | -            | 15         | -            | 15         | -            | 10                                | -            |
| 6                         | Create     | 15                                                   | -            | 10         | -            | 15         | -            | 15         | -            | 10                                | -            |
| Total (%)                 |            | 100                                                  |              | 100        |              | 100        |              | 100        |              | 100                               |              |

| Strategies                 |  |                      |                   |                         |                          |                   |   |
|----------------------------|--|----------------------|-------------------|-------------------------|--------------------------|-------------------|---|
| Technology                 |  | Pedagogy / Andragogy |                   | Sustainable Development |                          |                   |   |
| Simulations                |  | Clarification/Pauses |                   | ✓                       | Good Health & Well Being | ✓                 |   |
| Presentation Tools         |  | ✓                    | Group Discussion  |                         | ✓                        | Quality Education | ✓ |
| Learning Management System |  | ✓                    | Hands-on Practice |                         | ✓                        | Gender Equality   | ✓ |
|                            |  | Debate               |                   | ✓                       |                          |                   |   |
|                            |  | Interactive Lecture  |                   | ✓                       |                          |                   |   |
|                            |  | Brainstorming        |                   | ✓                       |                          |                   |   |
|                            |  |                      |                   |                         |                          |                   |   |
|                            |  |                      |                   |                         |                          |                   |   |
|                            |  |                      |                   |                         |                          |                   |   |
|                            |  |                      |                   |                         |                          |                   |   |

| Designers            |                                                 |  |  |                            |                                                 |  |  |                  |                            |  |  |
|----------------------|-------------------------------------------------|--|--|----------------------------|-------------------------------------------------|--|--|------------------|----------------------------|--|--|
| Professional Experts |                                                 |  |  | Higher Institution Experts |                                                 |  |  | Internal Experts |                            |  |  |
| 1                    | Dr. D. Arivudai nambi, Anna University, Chennai |  |  | 1                          | Dr.N.Viswanathan , Presidency college , Chennai |  |  | 1                | Dr.S.Lakshmi Priya, SRMIST |  |  |
|                      |                                                 |  |  |                            |                                                 |  |  | 2                | Dr.J.Madhumitha,SRMIST     |  |  |

| Course Code | UCS24P01L | Course Title | Internship - 1 |  |  |  | Category | P | Project Work/Internship | L | T | P | C |
|-------------|-----------|--------------|----------------|--|--|--|----------|---|-------------------------|---|---|---|---|
|             |           |              |                |  |  |  |          |   |                         | 0 | 0 | 0 | 1 |

| Course Offering Department | Computer Applications | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|-----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|-----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| Course Rationale (CLR)         |                                                                               | The purpose of learning this course is to:           | Depth                                      |   |   |   | Attainment        |                          |                         | Program Learning Outcomes                                                                                                                                                                                                                             |       |        |   |   |   |   |   |   |    |
|--------------------------------|-------------------------------------------------------------------------------|------------------------------------------------------|--------------------------------------------|---|---|---|-------------------|--------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|---|---|---|---|---|---|----|
|                                |                                                                               |                                                      | 1                                          | 2 | 3 | 4 | 1                 | 2                        | 3                       | 1                                                                                                                                                                                                                                                     | 2     | 3      | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-1                          | Demonstrate skills learnt in the real time environment.                       |                                                      | Conceive<br>Design<br>Implement<br>Operate |   |   |   | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Communication Skills, Collaborating Independent Thinking, Analytical Leadership Qualities, Digital Technology Skills Value Incultation, Multicultural Environmental Action, Community Entrepreneurial Risk Taking | PLO-9 | PLO-10 |   |   |   |   |   |   |    |
| CLR-2                          | Explore the different industries that are using IT                            |                                                      |                                            |   |   |   |                   |                          |                         |                                                                                                                                                                                                                                                       |       |        |   |   |   |   |   |   |    |
| CLR-3                          | Enhance the skills in the system aspects                                      |                                                      |                                            |   |   |   |                   |                          |                         |                                                                                                                                                                                                                                                       |       |        |   |   |   |   |   |   |    |
| CLR-4                          | Understanding the professional connections with the knowledge learnt          |                                                      |                                            |   |   |   |                   |                          |                         |                                                                                                                                                                                                                                                       |       |        |   |   |   |   |   |   |    |
| CLR-5                          | Applying the skills in problem solving                                        |                                                      |                                            |   |   |   |                   |                          |                         |                                                                                                                                                                                                                                                       |       |        |   |   |   |   |   |   |    |
| Course Learning Outcomes (CLO) |                                                                               | At the end of this course, learners will be able to: |                                            |   |   |   |                   |                          |                         |                                                                                                                                                                                                                                                       |       |        |   |   |   |   |   |   |    |
|                                |                                                                               |                                                      |                                            |   |   |   |                   |                          |                         |                                                                                                                                                                                                                                                       |       |        |   |   |   |   |   |   |    |
| CLO-1                          | To get an insight of an industry and organization/company                     |                                                      | ✓                                          | ✓ | - | - | 2                 | 85                       | 75                      | 3                                                                                                                                                                                                                                                     | 2     | 1      | 3 | 3 | - | 3 | 2 | 3 | 3  |
| CLO-2                          | To gain valuable skills and knowledge                                         |                                                      | ✓                                          | ✓ | ✓ | - | 2                 | 85                       | 75                      | 2                                                                                                                                                                                                                                                     | 1     | 1      | 3 | 2 | - | 2 | 1 | 3 | 3  |
| CLO-3                          | To make professional connections and enhance networking                       |                                                      | ✓                                          | ✓ | ✓ | ✓ | 3                 | 85                       | 75                      | 2                                                                                                                                                                                                                                                     | 3     | 3      | 3 | 2 | 3 | 3 | 1 | 3 | 3  |
| CLO-4                          | To get experience in a field to allow the student to make a career transition |                                                      | ✓                                          | ✓ | ✓ | ✓ | 3                 | 85                       | 75                      | 2                                                                                                                                                                                                                                                     | 3     | 2      | 3 | 2 | - | 3 | 2 | 3 | 3  |
| CLO-5                          | To get an inside view of an industry and organization/company                 |                                                      | ✓                                          | ✓ | ✓ | ✓ | 3                 | 85                       | 75                      | 1                                                                                                                                                                                                                                                     | 2     | 2      | 3 | 3 | - | 2 | 2 | 3 | 3  |

Students can choose a company of their own interest for internship for a period of minimum four weeks to learn about the application of IT in real time environment. In the first week of July, all the students have to give a presentation about their observations made by them in internship. At the end of the internship period, every student shall submit a structured internship report within 15 days from the date of the completion of the internship period.

| LearningAssessment     |                                               |          |                                |           |
|------------------------|-----------------------------------------------|----------|--------------------------------|-----------|
| ProjectWork/Internship | Continuous Learning Assessment (50%weightage) |          | FinalEvaluation (50%weightage) |           |
|                        | Review-1                                      | Review-2 | InternshipReport               | Viva-Voce |
|                        | 20%                                           | 30%      | 30%                            | 20%       |

## SEMESTER - IV

| Course Code | USA24401J | Course Title | Python Programming | Category | C | Core | L | T | P | C |
|-------------|-----------|--------------|--------------------|----------|---|------|---|---|---|---|
|             |           |              |                    |          |   |      | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| Course Rationale (CLR)         | The purpose of learning this course is to:                                                | Depth    |        |           |         | Attainment        |                          |                         | Program Learning Outcomes                      |                                            |                                             |                                        |                           |                                              |                                 |                             |       |        |
|--------------------------------|-------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|------------------------------------------------|--------------------------------------------|---------------------------------------------|----------------------------------------|---------------------------|----------------------------------------------|---------------------------------|-----------------------------|-------|--------|
| CLR-1                          | Understand the basic concepts and features of Python Programming                          | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 1                                              | 2                                          | 3                                           | 4                                      | 5                         | 6                                            | 7                               | 8                           | 9     | 10     |
| CLR-2                          | Use basic flow control, including for loops and conditionals and function and string      | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity | Communication Skills, Collaborating Skills | Independent Thinking, Analytical Reasoning, | Leadership Qualities, Professionalism, | Digital Technology Skills | Value Incultation, Multicultural inclusivity | Environmental Action, Community | Entrepreneurial Risk Taking | PLO-9 | PLO-10 |
| CLR-3                          | Obtain Basic Knowledge about The List And Dictionaries                                    |          |        |           |         |                   |                          |                         |                                                |                                            |                                             |                                        |                           |                                              |                                 |                             |       |        |
| CLR-4                          | Understand the Designing application withClasses                                          |          |        |           |         |                   |                          |                         |                                                |                                            |                                             |                                        |                           |                                              |                                 |                             |       |        |
| CLR-5                          | Gain knowledge about the Exceptions And Creating the GUI Application                      |          |        |           |         |                   |                          |                         |                                                |                                            |                                             |                                        |                           |                                              |                                 |                             |       |        |
| Course Learning Outcomes (CLO) | At the end of this course, learners will be able to:                                      |          |        |           |         |                   |                          |                         |                                                |                                            |                                             |                                        |                           |                                              |                                 |                             |       |        |
| CLO-1                          | Write, Test and Debug Python Programs                                                     | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3                                              | 3                                          | 3                                           | 1                                      | 2                         | 3                                            | -                               | 2                           | 2     | 3      |
| CLO-2                          | Implement Conditionals and Loops for Python Programs                                      | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3                                              | 3                                          | 2                                           | 2                                      | 2                         | 3                                            | -                               | 1                           | 2     | 1      |
| CLO-3                          | Use functions and represent Compound data using Lists, Tuples and Dictionaries            | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                              | 3                                          | 3                                           | 1                                      | 3                         | 3                                            | -                               | 2                           | 1     | 2      |
| CLO-4                          | Read and write data from & to files in Python and develop Application using oops concepts | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                              | 3                                          | 3                                           | 3                                      | 3                         | 3                                            | -                               | 2                           | 3     | 3      |
| CLO-5                          | Identify Exceptions And Creating the GUI Application                                      | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                              | 3                                          | 3                                           | 2                                      | 3                         | 3                                            | -                               | 3                           | 3     | 3      |

| Title & Content | Introduction to Python Programming                                                                                 | Functions and String                                                                                        | List and Dictionaries                                                                                                 | Designing with Classes                                                        | Exceptions and Creating the GUI                                                                      |
|-----------------|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Duration (hour) | 18                                                                                                                 | 18                                                                                                          | 18                                                                                                                    | 18                                                                            | 18                                                                                                   |
| SLO-1           | Introduction: The need of Python Programming Language, History and features of Python Programming                  | Functions: Function Calls, Type Conversion Functions Math Functions.                                        | Introduction to Lists- List literals, Basic list operators- Replacing an Element in a List                            | Introduction to classes, Objects and Classes, Example program for class       | Exception Basics Exception Handler, User-Defined Exceptions, Default Exception Handler               |
| SLO-2           | The first Python program, Running and Debugging Python program.                                                    | Composition, Adding New Functions. Definitions and Uses, Flow of Execution                                  | Example program to Replace an Element in a List. List Methods for Inserting Elements                                  | Do strings- Method Definitions The init Method                                | Exception Coding Details Exception objects. Built-in-Exception Categories.                           |
| SLO-3           | Syntax Errors, Runtime Errors and Semantic Errors, Introducing python object types                                 | Parameters and Arguments, Variables and Parameters are Local, Functions and Void Functions                  | Program to List Methods for Inserting Elements, List Methods for Removing Elements.                                   | Instance Variables, The str Method                                            | Creating the GUI Form and Adding Widgets Button, Canvas, Check button Entry, Frame, Label, List box. |
| SLO-4-6         | <b>Lab 1: Write a Python code to display system information using pywhois.</b>                                     | <b>Lab 4: Write a Python code to implement a simple calculator.</b>                                         | <b>Lab 7: Implement Transpose a Matrix Program to List Methods for Inserting Elements</b>                             | <b>Lab 10: Program using classes and methods.</b>                             | <b>Lab 13: Create GUI based Application using python</b>                                             |
| SLO-7           | Numbers and String, List and types, Dictionaries- Mapping Operations- Tuples.                                      | Importing with from, Return Values, Composition- Boolean Functions                                          | Method for Searching a List and Sorting a List.                                                                       | Accessor- Mutators The Lifetime of Objects, Rules for Defining a Simple Class | Creating Menu and Menu button, Message, Radio button, Scale, Scrollbar, text, Top-level              |
| SLO-8           | Variables and Variable Names rules, Expressions and Keywords, Type conversion.                                     | Recursion - Checking Types, String: String Literals.                                                        | Mutator Methods Aliasing- Aliasing side effects                                                                       | Rational Number Arithmetic and Operator Overloading                           | TkMessageBox. Handling Standard attributes Properties of Widgets                                     |
| SLO-9           | Operators and Operands-Order of Operations.                                                                        | String Indexing and Slicing, String Methods                                                                 | Equality: Object Identity,                                                                                            | Comparison Methods, Equality and the eq Method                                | Spinbox, Paned Window, LabelFrame                                                                    |
| SLO-10-12       | <b>Lab 2: Write a python program to implement Magic 8Ball is a toy used for fortune-telling or seeking advice.</b> | <b>Lab 5: Write a program to Find the Factorial of a given Number, Convert Decimal to Binary, Octal and</b> | <b>Lab 8: Write a program using a List to Find the Median of a Set of Numbers Program using sorting and searching</b> | <b>Lab 11: Write a Python Program for Operator overloading.</b>               | <b>Lab 14: Designing GUI applications with proper Layout Management features.</b>                    |

|                  |                                                                                                                                    |                                                                        |                                                                                          |                                                                                                                                                                                |                                                                           |
|------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
|                  |                                                                                                                                    | <b>Hexadecimal.</b>                                                    |                                                                                          |                                                                                                                                                                                |                                                                           |
| <b>SLO-13</b>    | Conditional Statements And Looping Statements                                                                                      | Testing for a Substring with in Operator, Program substring using      | Tuples, Creation of several tuples                                                       | Functions as First-Class Data Objects, Mapping Methods.                                                                                                                        | Layout Management                                                         |
| <b>SLO-14</b>    | Working of if Statement If, if-else, nested if –else statements.                                                                   | String formatting Expression                                           | Dictionaries Dictionary Literals                                                         | Filtering, Reducing function                                                                                                                                                   | Input of Objects and the try-except Statement                             |
| <b>SLO-15</b>    | Demonstration of program using while – do loop and do while loop                                                                   | String formatting method calls. Example Program for slicing substrings | Adding Keys and Replacing Values. Accessing Values Removing Keys Traversing a Dictionary | Using lambda to Create Anonymous Functions. Creating Jump Tables                                                                                                               | Designing GUI using different appearances of widgets -Storage of Objects. |
| <b>SLO-16-18</b> | <b>Lab 3: i. Write a program to check whether a number is prime or not, ii. Write a Python Program to Generate a Random Number</b> | <b>Lab 6: Write a Program to read and write text and numbers.</b>      | <b>Lab 9: Write a Program to Adding Keys and Replacing Values python programming</b>     | <b>Lab 12: Write the code for a filtering that generates a list of the positive numbers in a list named numbers. You should use a lambda to create the auxiliary function.</b> | <b>Lab 15: Write a Program using polymorphism, abstract classes</b>       |

| Resources |                                                  |   |                                                                                                      |  |  |
|-----------|--------------------------------------------------|---|------------------------------------------------------------------------------------------------------|--|--|
| 1         | Mark Lutz, Learning Python, O'Reilly Media, 2009 | 2 | Kenneth A. Lambert Fundamentals of Python: First Programs, Course Technology, Cengage Learning, 2012 |  |  |

| Assessment        |            |                                                      |          |         |          |         |          |                  |          |        |          |         |  |
|-------------------|------------|------------------------------------------------------|----------|---------|----------|---------|----------|------------------|----------|--------|----------|---------|--|
| Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |          |         |          |         |          | Final Assessment |          |        |          |         |  |
|                   |            | CLA – 1                                              |          | CLA – 2 |          | CLA – 3 |          |                  |          |        |          | CLA – 4 |  |
|                   |            | (10 %)                                               |          | (10 %)  |          | (20 %)  |          |                  |          |        |          | (10%)   |  |
|                   |            | Theory                                               | Practice | Theory  | Practice | Theory  | Practice | Theory           | Practice | Theory | Practice |         |  |
|                   |            |                                                      |          |         |          |         |          |                  |          |        |          |         |  |
| 1                 | Remember   | 20%                                                  | 20%      | 20%     | 20%      | 20%     | 20%      | 15%              | 15%      | 20%    | 20%      |         |  |
| 2                 | Understand |                                                      |          |         |          |         |          |                  |          |        |          |         |  |
| 3                 | Apply      | 20%                                                  | 20%      | 20%     | 20%      | 20%     | 20%      | 20%              | 20%      | 20%    | 20%      |         |  |
| 4                 | Analyze    |                                                      |          |         |          |         |          |                  |          |        |          |         |  |
| 5                 | Evaluate   | 10%                                                  | 10%      | 10%     | 10%      | 10%     | 10%      | 15%              | 15%      | 10%    | 10%      |         |  |
| 6                 | Create     |                                                      |          |         |          |         |          |                  |          |        |          |         |  |
| Total             |            | 100 %                                                |          | 100 %   |          | 100 %   |          | 100 %            |          | 100%   |          |         |  |

| Strategies                 |   |                      |   |                            |
|----------------------------|---|----------------------|---|----------------------------|
| Technology                 |   | Pedagogy / Andragogy |   | Sustainable Development    |
| Simulations                | ✓ | Clarification/Pauses | ✓ | Good Health & Well Being ✓ |
| Presentation Tools         |   | Group Discussion     | ✓ | Quality Education ✓        |
| Learning Management System |   | Hands-on Practice    | ✓ | Gender Equality ✓          |
|                            |   | Debate               | ✓ |                            |
|                            |   | Interactive Lecture  | ✓ |                            |
|                            |   | Brainstorming        | ✓ |                            |
|                            |   |                      |   |                            |
|                            |   |                      |   |                            |
|                            |   |                      |   |                            |
|                            |   |                      |   |                            |

\* The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                                                                |                                                                                                                         |
|----------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Professional Experts |                                                                                                | Higher Institution Experts                                                                                              |
| 1                    | Mr. Navarathinamani P, Co-Founder/COO ,Datayaan Solutions Pvt. Ltd. Chennai, mani@datayaan.com | 1 Dr. Neelananarayanan, Professor, School of Computer Science and Engineering, VIT Chennai,neelananarayanan.v@vit.ac.in |
|                      |                                                                                                | 1 Dr. D.Elangovann, elangovd@srmist.edu.in                                                                              |

| Course Code | UMS24D01T | Course Title | Resource Management Techniques | Category | D | Discipline Core/<br>Elective Course | L | T | P | C |
|-------------|-----------|--------------|--------------------------------|----------|---|-------------------------------------|---|---|---|---|
|             |           |              |                                |          |   |                                     | 4 | 0 | 0 | 4 |

| Course Offering Department | Mathematics and Statistics | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|----------------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|----------------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                    | Depth    |        |           |         | Attainment        |    |    | Programme Learning Outcomes                                                                                                                                                            |   |   |   |   |   |   |   |   |    |
|-------|-----------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|----|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|----|
| CLR-1 | To provide foundations in Operations Research                                                 | 1        | 2      | 3         | 4       | 1                 | 2  | 3  | 1                                                                                                                                                                                      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-2 | To apply basic concepts of Linear programming problems                                        |          |        |           |         |                   |    |    |                                                                                                                                                                                        |   |   |   |   |   |   |   |   |    |
| CLR-3 | To learn and understand Operations research approach to various applications                  |          |        |           |         |                   |    |    |                                                                                                                                                                                        |   |   |   |   |   |   |   |   |    |
| CLR-4 | To provide a set of algorithms for solving sequencing problems                                |          |        |           |         |                   |    |    |                                                                                                                                                                                        |   |   |   |   |   |   |   |   |    |
| CLR-5 | To employ appropriate methods of Game theory                                                  |          |        |           |         |                   |    |    |                                                                                                                                                                                        |   |   |   |   |   |   |   |   |    |
| CLO   | At the end of this course, learners will be able to:                                          | Conceive | Design | Implement | Operate | Level of Thinking |    |    | Problem Solving, Critical Thinking, Communication Skills, Independent Thinking, Leadership Qualities, Digital Technology Value Incultation, Environmental Action, Entrepreneurial Risk |   |   |   |   |   |   |   |   |    |
| CLO-1 | To recognize the scope and models of Operations research methods for decision making process. | ✓        | ✓      | -         | -       | 2                 | 85 | 75 | 3                                                                                                                                                                                      | - | - | 1 | - | 3 | - | 2 | 2 | 1  |
| CLO-2 | To apply Operations research techniques for solving real life problems                        | ✓        | ✓      | ✓         | -       | 2                 | 85 | 75 | 3                                                                                                                                                                                      | 2 | 1 | 2 | 2 | 3 | - | 1 | 2 | 1  |
| CLO-3 | To know optimization through various transportation and assignment problems                   | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 75 | 3                                                                                                                                                                                      | 1 | 3 | 1 | 3 | 3 | - | 1 | 1 | 2  |
| CLO-4 | To schedule jobs through machines using the prescribed algorithm                              | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 75 | 3                                                                                                                                                                                      | 3 | 2 | 3 | 3 | 3 | - | 2 | 3 | 3  |
| CLO-5 | To calculate saddle point, strategy and value of the game by various methods                  | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 75 | 3                                                                                                                                                                                      | 3 | 2 | 3 | 3 | 3 | - | 3 | 3 | 3  |

| Title & Content | Introduction to Operations Research                                                      | Linear Programming                                                                                                               | Transportation & Assignment Problems                                                                            | Sequencing Problems                                                                                | Game Theory                                                                      |
|-----------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Duration (hour) | 12                                                                                       | 12                                                                                                                               | 12                                                                                                              | 12                                                                                                 | 12                                                                               |
| SLO-1           | Introduction to Operations Research(O.R)                                                 | Introduction to Linear Programming Problem (LPP)                                                                                 | Transportation Problems(TP) - Examples, Definitions – decision variables, supply and demand constraints         | Sequencing Problems: Introduction;                                                                 | Game theory: Definitions, Examples; Characteristics of Game theory               |
| SLO-2           | Scope of O.R, Some O.R. Models;                                                          | Mathematical formulation of LPP; Basic assumptions to formulate LPP; Procedure for forming a LPP model; Formulation of LPP Model | Mathematical formulation of TP; Balanced and Unbalanced TP; Methods for finding Initial basic feasible solution | Assumptions made while solving Sequencing problem; Total elapsed time, Idle time, No passing Rule; | Pure Strategies: Maximin - Minimax Principle, Saddle point and value of the game |
| SLO-3 & 4       | Characteristics of O.R; Principles of Modelling; General methods for solving O.R. Models | Graphic method of solving LPP; Graphic method Special Cases: Infeasibility, Unboundedness, Redundancy.                           | North West Corner Rule; Row Minima Method; Column Minima Method;                                                | Procedure for sequencing n jobs on 2 machines                                                      | Mixed Strategies: Games without saddle points                                    |
| SLO-5           | Main phases of O.R: Formulation of the problems;                                         | Advantages of LPP                                                                                                                | Least Cost Method                                                                                               | Sequencing n jobs on 2 machines                                                                    | Solving 2x2 games;                                                               |
| SLO-6           | Construction of a mathematical model                                                     | Limitations of LPP                                                                                                               | Vogel’s Approximation Method(VAM)                                                                               | Sequencing n jobs on 2 machines                                                                    | Solving 2x2 games;                                                               |
| SLO-7 & 8       | Solving the model constructed; Controlling and updating                                  | General Linear Programming Problem; Types of Solutions                                                                           | Unbalanced Transportation Problem; Maximization case in TP                                                      | Procedure for sequencing n jobs on 3 machines                                                      | Matrix oddment method for 3x3 games                                              |
| SLO-9           | Testing the model and its solution, Implementation                                       | Canonical form of LPP and Standard form of LPP                                                                                   | Assignment Problem(AP): Examples, Definitions – decision variables, supply and demand constraints               | Procedure for sequencing n jobs on m machines                                                      | Matrix oddment method for nxn games                                              |
| SLO-10          | Role of O.R in industry; various fields; O.R and decision making;                        | Simplex Algorithm Introduction; Simplex method: non-degenerate basic solution, degenerate basic solution                         | Mathematical formulation of AP, Balanced and Unbalanced AP                                                      | Processing of 2 jobs on n machines                                                                 | Dominance property                                                               |
| SLO-11          | Role of computers in O.R.;                                                               | Simplex method: basic feasible solution                                                                                          | Assignment Algorithm: Hungarian Method; Solving Unbalanced AP;                                                  | Processing of 2 jobs on n machines Graphical method                                                | Dominance property: computational details                                        |
| SLO-12          | Limitations of O.R.                                                                      | Simplex method-problem solved                                                                                                    | Maximization case in AP                                                                                         | Processing of 2 jobs on n machines Graphical method                                                | Dominance property: computational details                                        |
| Assessment      | Continuous Learning Assessment 1                                                         |                                                                                                                                  | Continuous Learning Assessment - 2                                                                              |                                                                                                    |                                                                                  |
|                 | Continuous Learning Assessment - 3                                                       |                                                                                                                                  |                                                                                                                 |                                                                                                    |                                                                                  |

| Resources |                                                                                            |   |                                                            |
|-----------|--------------------------------------------------------------------------------------------|---|------------------------------------------------------------|
| 1         | Resource Management Techniques by Prof.V.Sundaresan, K.S.Ganapathy Subramanian, K. Ganesan | 3 | Operations Research: An Introduction.H.A. Taha             |
| 2         | Linear Programming. K.G. Murthy                                                            | 4 | Operations Research. KantiSwarup, Gupta, P.K. and Manmohan |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) |
| 1                         | Remember   | 15                                                   | -            | 15         | -            | 10         | -            | 10         | -            | 15                                | -            |
| 2                         | Understand | 15                                                   | -            | 15         | -            | 10         | -            | 10         | -            | 15                                | -            |
| 3                         | Apply      | 20                                                   | -            | 25         | -            | 25         | -            | 25         | -            | 25                                | -            |
| 4                         | Analyze    | 20                                                   | -            | 25         | -            | 25         | -            | 25         | -            | 25                                | -            |
| 5                         | Evaluate   | 15                                                   | -            | 10         | -            | 15         | -            | 15         | -            | 10                                | -            |
| 6                         | Create     | 15                                                   | -            | 10         | -            | 15         | -            | 15         | -            | 10                                | -            |
| Total (%)                 |            | 100                                                  |              | 100        |              | 100        |              | 100        |              | 100                               |              |

| Strategies                 |  |                      |                     |                         |                          |
|----------------------------|--|----------------------|---------------------|-------------------------|--------------------------|
| Technology                 |  | Pedagogy / Andragogy |                     | Sustainable Development |                          |
| Simulations                |  | Clarification/Pauses |                     | ✓                       | Good Health & Well Being |
| Presentation Tools         |  | ✓                    | Group Discussion    | ✓                       | Quality Education        |
| Learning Management System |  | ✓                    | Hands-on Practice   | ✓                       | Gender Equality          |
|                            |  |                      | Debate              | ✓                       |                          |
|                            |  |                      | Interactive Lecture | ✓                       |                          |
|                            |  |                      | Brainstorming       | ✓                       |                          |
|                            |  |                      |                     |                         |                          |
|                            |  |                      |                     |                         |                          |
|                            |  |                      |                     |                         |                          |
|                            |  |                      |                     |                         |                          |

| Designers            |                                                 |                                                              |
|----------------------|-------------------------------------------------|--------------------------------------------------------------|
| Professional Experts |                                                 | Higher Institution Experts                                   |
| 1                    | Dr. D. Arivudai nambi, Anna University, Chennai | 1 Dr.N.Viswanathan, , Presidency college , Chennai           |
|                      |                                                 | 2 Dr.S.Poongodisathiya, SRM IST, KTR, poongods@srmist.edu.in |

| Course Code | UMS24D02T | Course Title | Numerical Methods | Category | C | Core | L | T | P | C |
|-------------|-----------|--------------|-------------------|----------|---|------|---|---|---|---|
|             |           |              |                   |          |   |      | 4 | 0 | 0 | 4 |

| Course Offering Department | Mathematics and Statistics | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|----------------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|----------------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                                                                                                                              | Depth    |        |           |         | Attainment        |    |    | Programme Learning Outcomes |   |   |   |   |   |   |   |   |    |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|----|----|-----------------------------|---|---|---|---|---|---|---|---|----|
| CLR-1 | Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.                                                             | 1        | 2      | 3         | 4       | 1                 | 2  | 3  | 1                           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-2 | Apply numerical methods to obtain approximate solutions to mathematical problems                                                                                                                                        |          |        |           |         |                   |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-3 | Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations |          |        |           |         |                   |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-4 | Analyze and evaluate the accuracy of common numerical methods.                                                                                                                                                          |          |        |           |         |                   |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-5 | Understand and solve problems on numerical differentiation, numerical integration& Milne's predictor-corrector method                                                                                                   |          |        |           |         |                   |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLO   | At the end of this course, learners will be able to:                                                                                                                                                                    | Conceive | Design | Implement | Operate | Level of Thinking |    |    | Expected Proficiency (%)    |   |   |   |   |   |   |   |   |    |
| CLO-1 | Gain knowledge about Bisection, Regula-falsi Newton's method                                                                                                                                                            | ✓        | ✓      | -         | -       | 2                 | 85 | 75 | 3                           | - | - | 1 | - | 3 | - | 2 | 2 | 1  |
| CLO-2 | Appreciate the concepts of simultaneous equations                                                                                                                                                                       | ✓        | ✓      | ✓         | -       | 2                 | 85 | 75 | 3                           | 2 | 1 | 2 | 2 | 3 | - | 1 | 2 | 1  |
| CLO-3 | Understand the basic ideas about Interpolation and extrapolation                                                                                                                                                        | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 75 | 3                           | 1 | 3 | 1 | 3 | 3 | - | 1 | 1 | 2  |
| CLO-4 | Acquire the knowledge on Numerical solutions of Ordinary differential equations of first and second order                                                                                                               | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 75 | 3                           | 3 | 2 | 3 | 3 | 3 | - | 2 | 3 | 3  |
| CLO-5 | Understand and solve the problems on Euler's and Improved Euler's Method - Modified Euler's Method, Runge-Kutta method of second and fourth order – Milne's predictor corrector method                                  | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 75 | 3                           | 3 | 2 | 3 | 3 | 3 | - | 3 | 3 | 3  |

| Title & Content | Algebraic Equations             | Numerical solution    | Finite difference operator   | Numerical solutions ODE     | Euler's method                 |
|-----------------|---------------------------------|-----------------------|------------------------------|-----------------------------|--------------------------------|
| Duration (hour) | 12                              | 12                    | 12                           | 12                          | 12                             |
| SLO-1           | Basic concepts of the algebraic | Numerical solution of | Finite difference operator - | Numerical differentiation - | Numerical solution of ordinary |

|                      |                                                                                              |                                                                                                                                                                                                         |                                                                                                                                                |                                                                                                                                            |                                                                                                                                  |
|----------------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
|                      | equation                                                                                     | simultaneous equations - solution of simultaneous linear algebraic equations                                                                                                                            | introduction                                                                                                                                   | Introduction - Newton's forward difference formula to get the derivative                                                                   | differential equation- <b>Point wise methods</b>                                                                                 |
| <b>SLO-2</b>         | Basic concepts of the transcendental equations - Finding of the range of the given equation  | Gauss elimination method- <b>Direct method explanation - Problems solved based on</b> Gauss elimination method                                                                                          | <b>Forward and Backward difference operator - Relation between the operators - Relation between d and delta</b>                                | Newton's backward difference formula to get the derivative- First derivative <b>using</b> Stirling's formula                               | Solution by Taylor series method- Taylor series method for simultaneous first order differential equations                       |
| <b>SLO-3 &amp; 4</b> | Bisection method explained - Solving Bisection method based problems with two decimal places | Gauss elimination method with unique solution- Gauss elimination method with negative roots- Computation of the inverse of a matrix using Gauss elimination method- More problems solved by this method | Newton-Gregory forward interpolation definition - Newton-Gregory forward difference table explanation                                          | <b>Problems solved based on</b> First derivative Stirling's formula - <b>Problems solved based on</b> second derivative Stirling's formula | Taylor series method for simultaneous second order differential equations - <b>Problems solved based on</b> Taylor series method |
| <b>SLO-5</b>         | Bisection method based problems upto three decimal places                                    | Jacobi method of iteration (Gauss-Jacobi Method) - Difference between the above methods                                                                                                                 | Newton-Gregory forward interpolation concept - Expression of any value y in terms of $y_n$ and the corresponding backward differences of $y_n$ | Numerical integration basic concept - <b>A general quadrature formula for equidistant ordinates-</b>                                       | Euler's method - <b>Improved euler's method-Modified euler's method</b>                                                          |
| <b>SLO-6</b>         | Bisection method based problems upto four decimal places-problems solved from these concepts | Iterative methods Jacobi method of iteration (Gauss-Jacobi Method) – basic problems                                                                                                                     | Newton-Gregory backward interpolation concept explanation - <b>Problems solved based on the above two concept</b>                              | Numerical integration using Trapezoidal rule- Trapezoidal rule formula given                                                               | <b>Problems solved based on Modified euler's method- Problems solved based on</b> Euler's method                                 |
| <b>SLO-7 &amp; 8</b> | Successive approximation method                                                              | Convergence condition for                                                                                                                                                                               | Newton's divided difference                                                                                                                    | Geometrical interpretation of                                                                                                              | <b>Problems solved based</b>                                                                                                     |

|            |                                                                                                                                                                                                          |                                                                                                        |                                                                                                                                                                                         |                                                                                                                                                                                                             |                                                                                                                                                                 |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            | - The condition for the convergence method- Order of convergence of an iterative method- problems solved from these concepts                                                                             | Gauss-Jacobi Method- based problems up to two decimal places-                                          | formula- <b>Problems solved based on</b> Newton’s divided difference formula-Lagrange’s interpolation formula for uneven intervals and its difference –problems based on these concepts | Trapezoidal rule - Truncation error in Trapezoidal rule - <b>Problems solved based on</b> Trapezoidal rule                                                                                                  | <b>onImproved</b> Euler’s method- Runge-Kutta method-second -order Runge-Kutta method- <b>Concept-based Simple Problems on</b> second -order Runge-Kutta method |
| SLO-9      | Regular falsi method<br>Introduction-Basic concepts of Regular falsi method- <b>Problems solved based on</b> Regular falsi method by two decimal places                                                  | Gauss-Jacobi Method based problems up to three decimal places - Problems solved based on these concept | Lagrange’s inverse interpolation formula for uneven intervals                                                                                                                           | Simpson’s 1/3 rule –introduction - Difference between Trapezoidal rule Simpson’s 1/3 rule- Truncation error in Simpson’s 1/3 rule - <b>Problems solved based on</b> Trapezoidal rule and Simpson’s 1/3 rule | Two decimal places based simple problems on second -order Runge-Kutta method - four decimal places based simple problems on second - order Runge-Kutta method   |
| SLO-10     | <b>Problems solved based on</b> Regular falsi method by three decimal places - <b>Problems solved based on</b> Regular falsi method by four decimal places - More problems based on Regular falsi method | Gauss Seidel iteration method- Introduction and formula explanation                                    | <b>Problems solved based on the</b> Lagrange’s inverse interpolation- <b>Problems solved based on the</b> Lagrange’s inverse interpolation                                              | Numerical integration using Simpson’s 3/8 rule - Truncation error in Simpson’s 3/8 rule                                                                                                                     | <b>Problems solved based on</b> second -order Runge-Kutta method                                                                                                |
| SLO-11     | Newton-Raphson method – Introduction                                                                                                                                                                     | Procedure and difference between the above two methods explanation                                     | Lagrange’s inverse interpolation formula for even intervals - explanation                                                                                                               | Truncation error in Simpson’s 3/8 rule                                                                                                                                                                      | Runge-Kutta method of fourth order                                                                                                                              |
| SLO-12     | Geometrical meaning of Newton-Raphson method-Criterion for the convergence in the above method and problems solved based on these concepts                                                               | Finding the solution by Gauss Seidel iteration method                                                  | <b>More Problems solved based on the</b> Lagrange’s forward and inverse interpolation                                                                                                   | <b>Problems solved based on</b> Simpson’s 3/8rule- <b>Problems solved based on the above three methods</b>                                                                                                  | Formula given for Runge-Kutta method of fourth order- <b>Problems solved based on fourth-order</b> Runge-Kutta method                                           |
| Assessment | Continuous Learning Assessment - 1                                                                                                                                                                       |                                                                                                        | Continuous Learning Assessment - 2                                                                                                                                                      |                                                                                                                                                                                                             |                                                                                                                                                                 |
|            | Continuous Learning Assessment - 3                                                                                                                                                                       |                                                                                                        |                                                                                                                                                                                         |                                                                                                                                                                                                             |                                                                                                                                                                 |

| Resources |                                                                                                           |   |                                                                                                            |
|-----------|-----------------------------------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------------------------------|
| 1         | Numerical methods, Dr.P. Kandasamy, Dr. K.Thilagavathy, Dr. K.Gunavathy, S Chand and Company Reprint 2020 | 2 | Kandasamy P, Thilagavathy. K and G. Gunawathy, Numerical Methods, S.Chand& Sons, 3rd Revised Edition, 2013 |
| 3         | Isaacson E. and Keller, H.B., “Analysis of Numerical Methods” Dover Publication, 1994                     | 4 | Philips G.M and Taylor P.J., “Theory and Applications of Numerical Analysis”, Academic Press, 1996         |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) |
| 1                         | Remember   | 15                                                   | -            | 15         | -            | 10         | -            | 10         | -            | 15                                | -            |
| 2                         | Understand | 15                                                   | -            | 15         | -            | 10         | -            | 10         | -            | 15                                | -            |
| 3                         | Apply      | 20                                                   | -            | 25         | -            | 25         | -            | 25         | -            | 25                                | -            |
| 4                         | Analyze    | 20                                                   | -            | 25         | -            | 25         | -            | 25         | -            | 25                                | -            |
| 5                         | Evaluate   | 15                                                   | -            | 10         | -            | 15         | -            | 15         | -            | 10                                | -            |
| 6                         | Create     | 15                                                   | -            | 10         | -            | 15         | -            | 15         | -            | 10                                | -            |
| Total (%)                 |            | 100                                                  |              | 100        |              | 100        |              | 100        |              | 100                               |              |

| Strategies                 |  |                      |                     |                         |                          |
|----------------------------|--|----------------------|---------------------|-------------------------|--------------------------|
| Technology                 |  | Pedagogy / Andragogy |                     | Sustainable Development |                          |
| Simulations                |  | Clarification/Pauses |                     | ✓                       | Good Health & Well Being |
| Presentation Tools         |  | ✓                    | Group Discussion    | ✓                       | Quality Education        |
| Learning Management System |  | ✓                    | Hands-on Practice   | ✓                       | Gender Equality          |
|                            |  |                      | Debate              | ✓                       |                          |
|                            |  |                      | Interactive Lecture | ✓                       |                          |
|                            |  |                      | Brainstorming       | ✓                       |                          |
|                            |  |                      |                     |                         |                          |
|                            |  |                      |                     |                         |                          |
|                            |  |                      |                     |                         |                          |
|                            |  |                      |                     |                         |                          |

| Designers            |                                                 |                            |                                                  |                  |                                                                                                              |
|----------------------|-------------------------------------------------|----------------------------|--------------------------------------------------|------------------|--------------------------------------------------------------------------------------------------------------|
| Professional Experts |                                                 | Higher Institution Experts |                                                  | Internal Experts |                                                                                                              |
| 1                    | Dr. D. Arivudai nambi, Anna University, Chennai | 1                          | Dr.N.Viswanathan, , Presidency college , Chennai | 1                | Dr.S.Lakshmipriya, Assistant Professor, Department of mathematics & Statistics, FSH, SRM IST, Kattankulathur |
|                      |                                                 |                            |                                                  | 2                | Dr.L.SIVAKAMI, Assistant Professor, Department of mathematics & Statistics, FSH, SRM IST, Kattankulathur     |

| CourseCode | UEN24S01L | CourseTitle | Communication Skills | Category | A | Ability Enhancement Course | L | T | P | C |
|------------|-----------|-------------|----------------------|----------|---|----------------------------|---|---|---|---|
|            |           |             |                      |          |   |                            | 0 | 0 | 4 | 2 |

| CourseOfferingDepartment | English,FSH,KTR | Pre-requisiteCourses | Nil | Co-requisiteCourses | Nil | ProgressiveCourses | Nil | DataBook/Codes/Standards | Nil |
|--------------------------|-----------------|----------------------|-----|---------------------|-----|--------------------|-----|--------------------------|-----|
|--------------------------|-----------------|----------------------|-----|---------------------|-----|--------------------|-----|--------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                                                 | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcomes                            |                                            |                                                                                                                        |                                            |                                            |                             |         |         |   |    |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|--------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------------------|-----------------------------|---------|---------|---|----|
| CLR-1 | Bridge the theoretical language knowledge with practical communication skills, essential for academic and professional contexts.           | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 1                                                      | 2                                          | 3                                                                                                                      | 4                                          | 5                                          | 6                           | 7       | 8       | 9 | 10 |
| CLR-2 | focus on enhancing listening, speaking, reading, and writing skills, crucial for effective interaction and teamwork.                       | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity Solving | Communication Skills, Collaborating Skills | Independent Thinking, Analytical Reasoning, Leadership Qualities, Professionalism, Autonomy, Digital Technology Skills | Value Education, Multicultural Inclusivity | Environmental Action, Community Engagement | Entrepreneurial Risk Taking | PSO - 1 | PSO - 2 |   |    |
| CLR-3 | prepare students for employability by building competence in interviews, group discussions, and professional communication.                |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                                                                        |                                            |                                            |                             |         |         |   |    |
| CLR-4 | promote understanding and sensitivity towards linguistic and cultural diversity, key to thriving in a globalized world.                    |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                                                                        |                                            |                                            |                             |         |         |   |    |
| CLR-5 | articulate ideas and emotions clearly, overcoming language barriers.                                                                       |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                                                                        |                                            |                                            |                             |         |         |   |    |
| CLO   | At the end of this course, learners will be able to:                                                                                       | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity Solving | Communication Skills, Collaborating Skills | Independent Thinking, Analytical Reasoning, Leadership Qualities, Professionalism, Autonomy, Digital Technology Skills | Value Education, Multicultural Inclusivity | Environmental Action, Community Engagement | Entrepreneurial Risk Taking | PSO - 1 | PSO - 2 |   |    |
| CLO-1 | acquire basic proficiency in listening, speaking, reading, and writing, enabling effective interaction in everyday and academic scenarios. |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                                                                        |                                            |                                            |                             |         |         |   |    |
| CLO-2 | express ideas clearly using appropriate verbal cues and non-verbal signals in social, academic, and professional contexts.                 |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                                                                        |                                            |                                            |                             |         |         |   |    |
| CLO-3 | enhance their ability to comprehend, evaluate, and respond to diverse forms of written and spoken communication critically.                |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                                                                        |                                            |                                            |                             |         |         |   |    |
| CLO-4 | produce well-organized written documents and oral presentations, showcasing logical thinking and clarity of expression.                    |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                                                                        |                                            |                                            |                             |         |         |   |    |
| CLO-5 | demonstrate awareness and sensitivity towards linguistic and cultural diversity, effectively navigating multicultural interactions.        |          |        |           |         |                   |                          |                         |                                                        |                                            |                                                                                                                        |                                            |                                            |                             |         |         |   |    |

| Sessions | CLO-1                                                                                                                 | CLO-2                                                                                                 | CLO-3                                                                                                    | CLO-4                                                                                                 | CLO-5                                                                                                                        |
|----------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
|          | 12                                                                                                                    | 12                                                                                                    | 12                                                                                                       | 12                                                                                                    | 12                                                                                                                           |
| SLO-1    | Introduction to Communication. Types of Communication- verbal and non-verbal communication                            | Introduction to Reading Skills. Discussion of techniques of Reading Skill                             | Introduction to Speaking Skills. Explaining the importance of phonetics and vocabulary                   | Introduction to Writing Skills Importance of writing skills                                           | Introduction to appreciation of texts.                                                                                       |
|          | Barriers of Communication dynamics of interpersonal communication, Interpret Cross-Cultural Differences in Non-Verbal | Reading Skills.(Barriers of reading skills and strategies of effective communication through reading) | Speaking Skills.(Barriers of speaking skills and strategies of effective communication through speaking) | Writing Skills.(Barriers of writing skills and strategies of effective communication through writing) | Encouraging the students to share a few of their favourite lines from any sources they have read or sharing a few lines from |

|       |                                                                                                                                                                                                                                                                       |                                                                                                          |                                                                                                                                                           |                                                                                                                                      |                                                                                                                                                                                      |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | Communication<br>Develop and Demonstrate Effective<br>Non-Verbal Communication Skills                                                                                                                                                                                 | Identifying common reading problems in students after making them read a few passages.                   | Explaining the usage of the Oxford Learner's Dictionary to learn phonetics of the words at the fundamental level.                                         | Explaining various forms of writing with examples:.                                                                                  | paditthadhil piditthadhu.                                                                                                                                                            |
|       | Introduction to Digital language lab/ usage of mobile applications                                                                                                                                                                                                    | Learners are enabled to record their speech and listen to it in order to correct their problematic areas | The right enunciation of certain words to be taught through phonetic representation and decoding the phonetic symbols by learning to use the dictionary.. | Introduction to letter writing. Types of letters- Formal and Informal letters with examples.<br>Learning E-mail etiquette.           | Explaining why appreciating texts creates a good reader.                                                                                                                             |
| SLO-2 | Equipping the listening skill of the learners<br>Listening Skills.(Barriers of listening skills and strategies of effective communication through listening)<br>Exploring Effective Ways of Listening.                                                                | repetitive practices of reading select paragraphs from web resources, their standard will be measured.   | Observe and repeat and learn the phonetic pronunciation of words by practicing continuously.                                                              | Class Assignment - write a formal letter and informal letter and check for e-mail etiquettes in writing.                             | Enabling the students to reflect in the classroom about any of their favourite books/ articles or magazines.                                                                         |
| SLO-3 | Introducing google podcasts.                                                                                                                                                                                                                                          | The speed, fluency, pronunciation, comprehension of the words in the paragraph                           | Teaching the usage of Thesaurus to understand and develop various words and improve vocabulary.                                                           | Enabling the students to unleash their potentials in creative writing through writing transcripts for advertisements of any product. | Introducing the text of Letters by Mathrubootham published in the Hindu.                                                                                                             |
| SLO-4 | Task to write down the words from the audio they have listened to. This activity should be done in two steps.<br>1. Jotting down the words simultaneously as they listen to the speaker.<br>2. Writing the transcript of the audio through repetitive play and pause. | hints and tricks to follow where the pauses are to be followed.                                          | Identifying common errors in concord, preposition, direct speech and indirect speech.                                                                     | write a review of any book or a movie or an interview or a debate.                                                                   | Reading and recitation of the text of the first letter-Enjoy within limits, says Mr. Mathrubootham<br><br>Understanding characters by analyzing the usage of their style of language |
| SLO-5 | Imitating the speakers by listening to them and attempting to learn the pronunciation of the words uttered in the audio.                                                                                                                                              | Students group 1- reads – group 2 identifies the flaws in reading.                                       | Identifying common errors in tenses, punctuation, and syntactical errors..                                                                                | Mechanics of writing like capitalization, punctuation, spelling, correct pronoun, preposition, concord usage can be taught.          | Reading of the second letter- Nobel? What Nobel, asks Mr. Mathrubootham.                                                                                                             |
|       | Repetitive listening to enhance pronunciation skills                                                                                                                                                                                                                  | The roles have to be exchanged between the two groups and the activity should be practiced.              | Rectifying the common errors and instructing the learners about the right usage in order to avoid common errors.                                          | meachnaics of writing - assessed and evaluated.                                                                                      | Mathrubootham's humour and the language of code switching from Tamil to English and vice –versa.                                                                                     |

|        |                                                                                                                                          |                                                                                                                                                                                                      |                                                                                                                                   |                                                                                                                                         |                                                                                                                                                 |
|--------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| SLO-6  | Introducing to the audios of TED TALK American Speakers. Listening to the native speakers of English Language through TED TALKS.         | Identify the key arguments in a passage<br>-introductory point, lead point, supportive argument statement, concluding point and the common connecting word between all the key words in the passage. | Practicing how to avoid common errors.                                                                                            | Teaching effective writing by learning to avoid common errors in concord, preposition, conjunction, relative pronouns, question tags.   | Reading of the third letter -Mr. Mathrubootham is fully supporting all new technologies                                                         |
|        | Introducing to the audios of TED TALK British Speakers. Listening to the native speakers of English Language through TED TALKS.          | encouraged to identify the key arguments in other passages on their own.                                                                                                                             | The learners are introduced to collocations for quick choice of learning how to speak in short time and how to speak effectively. | Practicing effective writing by learning to avoid common errors in concord, preposition, conjunction, relative pronouns, question tags. | Mathrubootham's frustration over the failure of technologies and the language that he positively uses to denote hopelessness over technologies. |
| SLO-7  | American and British styles can be differentiated.                                                                                       | Guiding the act of reading through scanning and skimming by model reading of the passages by the instructor.                                                                                         | Practice collocations                                                                                                             | common errors in tenses, direct and indirect speech and syntax structure.                                                               | Reading of the fourth letter in the classroom and discussion<br>Pizza maavu: Welcome to Mr. Mathrubootham food recipe website,                  |
| SLO-8  | The recognition of different accents should be practiced by speaking after listening.                                                    | scanning and skimming activities                                                                                                                                                                     | Idioms and phrases                                                                                                                | Practicing effective writing by learning to avoid common errors in tenses, direct and indirect speech and syntax structure.             | Mathrubootham's love for food and the miscommunication about food.                                                                              |
| SLO-9  | Learning advanced pronunciation and vocabulary through various computer applications like Woodpecker.                                    | Loud reading and slow mind reading                                                                                                                                                                   | A speaking task to learn- collocations, idioms and phrases, vocabulary and phonetic pronunciation                                 | Teaching how to write statement of purpose for admission to higher educations, and practicing the same.                                 | Analysing the text for regional relevance and National significance.                                                                            |
|        | imitate the different sounds and accents - repeat it after listening to any of the videos from the library based on individual interest. | Pauses, pronunciation, comprehension and fluency can be checked for improvement at this stage through repetitive practices.                                                                          | Their speaking activity is to be recorded and played again to rectify the errors and highlight the problematic areas in speaking. | Teaching how to write a story by looking at a picture.<br>Developing the writing skill through word ladders.                            | Appreciating the aesthetics of the comic element and the embodiment of humour in the narrative in the letter                                    |
| SLO-10 | Repeat listening to the same time frames and move from 02.01 to 03.00                                                                    | Students -groups -checking the comprehension skills. Analyse the text of a passage.                                                                                                                  | Automating vocabulary through engaging the students in various activity games like solving crossword puzzle and                   | Introduction to blog writing and steps to become an effective blog writer.                                                              | importance of bringing in the Indianized way of speaking the English Language in order to depict the character called                           |

|        |                                                                                                                              |                                                                                                  |                                                                                          |                                                                                       |                                                                                                                                                                   |
|--------|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |                                                                                                                              |                                                                                                  | playing scattergories.                                                                   |                                                                                       | Mathrubootham.                                                                                                                                                    |
|        | Choosing any particular time frame and practicing it.                                                                        | Brainstorming the comprehension skills-questioning the key points in the passage.                | Engaging the students to play the games in order to learn the vocabulary.                | Encourage the readers to create their own blogs and post articles on a regular basis. | relatable characters of both formal and informal everyday life experiences.                                                                                       |
| SLO-11 | Interested students can complete listening and reflecting the complete audio listening practice and speaking.                | Cross check with misunderstanding if any and rectify- match the question and answers.            | Spur of the moment speech.:                                                              | Selecting any news article and learning the writing style in it.                      | Talk about their favourite letter from the letters of Mathrubootham by recollecting the appreciation of the text according to their perception and understanding. |
| SLO-12 | Group activities and games can be conducted to test the listening skills by responding to the speech given by other students | Passages for reading comprehension are to be given for practice that tests their reading skills. | Prepared speech :<br>Giving a speaking task to the students to speak on their own choice | Students are given chances to write reports on various topics.                        | Enabling the students to share their appreciation of any of their favourite lines form the books they have read.                                                  |

| Resources |                                                                                                                         |   |                                                                                    |  |
|-----------|-------------------------------------------------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------|--|
| 1         | Horizon-EnglishText Book –CompiledandEditedbytheFacultyofEnglishDepartement,FSH, SRMIST, 2023                           | 5 | TheArtofPublicSpeakingbyStephen E.Lucas-2019                                       |  |
| 2         | TheCreativeWritingCoursebook:FortyAuthorsShareAdviceandExercisesforFictionand Poetry by Julia Bell and Paul Magrs- 2001 | 6 | TalkLikeTED:The9Public-SpeakingSecretsoftheWorld's Top MindsbyCarmine Gallo – 2014 |  |
| 3         | OnWriting:AMemoiroftheCraftbyStephenKing2000                                                                            | 7 | The AnatomyyofaBookReview:AGuide forCollege StudentsbyRonaldJ.Weber1994            |  |
| 4         | The WritingLife:Writers onHowTheyThinkandWorkeditedbyMarieArana-2003                                                    | 8 | HowtoWriteaSimpleBookReview:It's easierthanyouthink!byAllysonR. Abbott2013         |  |

| Assessment                      |            |                                                      |                 |               |                 |               |                 |               |                 |                                                |
|---------------------------------|------------|------------------------------------------------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|-----------------|------------------------------------------------|
| Bloom’s<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |                 |               |                 |               |                 |               |                 | Final<br>Assessment<br><br>(50 %<br>weightage) |
|                                 |            | CLA – 1                                              |                 | CLA – 2       |                 | CLA – 3       |                 | CLA – 4*      |                 |                                                |
|                                 |            | (10 %)                                               |                 | (10 %)        |                 | (20 %)        |                 | (10 %)        |                 |                                                |
|                                 |            | Theory<br>(%)                                        | Practice<br>(%) | Theory<br>(%) | Practice<br>(%) | Theory<br>(%) | Practice<br>(%) | Theory<br>(%) | Practice<br>(%) | Practice                                       |
| 1                               | Remember   | -                                                    | 20              | -             | 20              | -             | 15              | -             | 20              | 20                                             |
| 2                               | Understand | -                                                    | 20              | -             | 20              | -             | 15              | -             | 20              | 20                                             |
| 3                               | Apply      | -                                                    | 20              | -             | 20              | -             | 20              | -             | 20              | 20                                             |
| 4                               | Analyze    | -                                                    | 20              | -             | 20              | -             | 20              | -             | 20              | 20                                             |
| 5                               | Evaluate   | -                                                    | 10              | -             | 10              | -             | 15              | -             | 10              | 10                                             |
| 6                               | Create     | -                                                    | 10              | -             | 10              | -             | 15              | -             | 10              | 10                                             |
| Total (%)                       |            | -                                                    | 100             | -             | 100             | -             | 100             | -             | 100             | 100                                            |

\*The evaluation can be done on the one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences

| Strategies                 |   |                      |   |                          |   |
|----------------------------|---|----------------------|---|--------------------------|---|
| Technology                 |   | Pedagogy / Andragogy |   | Sustainable Development  |   |
| Simulations                |   | Clarification/Pauses | ✓ | Good Health & Well Being | ✓ |
| Presentation Tools         | ✓ | Group Discussion     | ✓ | Quality Education        | ✓ |
| Learning Management System | ✓ | Hands-on Practice    | ✓ | Gender Equality          | ✓ |
|                            |   | Debate               | ✓ |                          |   |
|                            |   | Interactive Lecture  | ✓ |                          |   |
|                            |   | Brainstorming        | ✓ |                          |   |
|                            |   |                      |   |                          |   |
|                            |   |                      |   |                          |   |
|                            |   |                      |   |                          |   |
|                            |   |                      |   |                          |   |

| Designers                                                   |                                                                                                                    |                                                                                         |
|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Professional Experts                                        | Higher Institution Experts                                                                                         | Internal Experts                                                                        |
| 1 Krishna Raj Sutherland, Krishna.Raj1@sutherlandglobal.com | 1 Dr. J. Mangayarkarasi<br>Associate Professor and Head, Department of English, Ethiraj College for Women, Chennai | 1 Dr. Pushpanjali Sampathkumar, Assistant Professor, Department of English, FSH, SRMIST |
|                                                             | 2 Dr. K. S. Antony Samy Loyola College Chennai<br>antony.samyks@loyolacollege.edu                                  | 2 Dr. Shanthichitra, Professor, Department of                                           |

|             |           |              |                                                       |          |   |                          |        |        |        |        |
|-------------|-----------|--------------|-------------------------------------------------------|----------|---|--------------------------|--------|--------|--------|--------|
| Course Code | UCD24S03J | Course Title | Industry Oriented Employability and Leadership Skills | Category | S | Skill Enhancement Course | L<br>1 | T<br>0 | P<br>2 | C<br>2 |
|-------------|-----------|--------------|-------------------------------------------------------|----------|---|--------------------------|--------|--------|--------|--------|

|                            |                 |                       |     |                      |     |                     |     |                             |     |
|----------------------------|-----------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
| Course Offering Department | Career Guidance | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|-----------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| Course Rationale (CLR)         |                                                                                                                                                                             | The purpose of learning this course is to:           | Depth    |        | Attainment |         |                   | Program Learning Outcomes |                         |                                                                                                                                                                                                                                                                                     |   |   |   |   |   |   |   |   |   |   |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----------|--------|------------|---------|-------------------|---------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|
| CLR-1                          | Help students to develop essential skills to influence and motivate others                                                                                                  |                                                      | Conceive | Design | Implement  | Operate | Level of Thinking | Expected Proficiency (%)  | Expected Attainment (%) | Problem Solving, Critical Thinking, Communication Skills, Collaborating Independent Thinking, Analytical Leadership Qualities, Professionalism, Digital Technology Skills Value Inculcation, Multicultural Environmental Action, Community Entrepreneurial Risk Taking PLO-9 PLO-10 | 3 | 2 | 3 | 2 | - | - | 2 | 3 | - | - |
| CLR-2                          | Inculcate emotional and social intelligence and integrative thinking for effective leadership                                                                               |                                                      |          |        |            |         |                   |                           |                         |                                                                                                                                                                                                                                                                                     |   |   |   |   |   |   |   |   |   |   |
| CLR-3                          | Create and maintain an effective and motivated team to work for the society                                                                                                 |                                                      |          |        |            |         |                   |                           |                         |                                                                                                                                                                                                                                                                                     |   |   |   |   |   |   |   |   |   |   |
| CLR-4                          | Nurture a creative and entrepreneurial mindset                                                                                                                              |                                                      |          |        |            |         |                   |                           |                         |                                                                                                                                                                                                                                                                                     |   |   |   |   |   |   |   |   |   |   |
| CLR-5                          | Make students understand the personal values and apply ethical principles in professional and social contexts                                                               |                                                      |          |        |            |         |                   |                           |                         |                                                                                                                                                                                                                                                                                     |   |   |   |   |   |   |   |   |   |   |
| Course Learning Outcomes (CLO) |                                                                                                                                                                             | At the end of this course, learners will be able to: |          |        |            |         |                   |                           |                         |                                                                                                                                                                                                                                                                                     |   |   |   |   |   |   |   |   |   |   |
| CLO-1                          | Examine various leadership models and understand/assess their skills, strengths and abilities that affect their own leadership style and can create their leadership vision |                                                      | ✓        | ✓      | -          | -       | 2                 | 85                        | 80                      | 3                                                                                                                                                                                                                                                                                   | 2 | 3 | 2 | - | - | 2 | 3 | - | - |   |
| CLO-2                          | Learn and master a set of practical skills such as time management, self-management, handling conflicts, team leadership                                                    |                                                      | ✓        | ✓      | ✓          | -       | 3                 | 85                        | 80                      | 2                                                                                                                                                                                                                                                                                   | 2 | 1 | 2 | 2 | 1 | 2 | 3 | - | - |   |
| CLO-3                          | Understand the basics of entrepreneurship and develop business plan                                                                                                         |                                                      | ✓        | ✓      | ✓          | ✓       | 3                 | 85                        | 80                      | 2                                                                                                                                                                                                                                                                                   | 3 | 3 | 3 | - | 3 | 2 | 3 | - | - |   |
| CLO-4                          | Apply the design thinking approach for leadership                                                                                                                           |                                                      | ✓        | ✓      | ✓          | ✓       | 3                 | 85                        | 80                      | -                                                                                                                                                                                                                                                                                   | 3 | 2 | - | 2 | 2 | 1 | 1 | - | - |   |
| CLO-5                          | Appreciate the importance of ethics and moral values for making of a balanced personality & be an integral human being                                                      |                                                      | ✓        | ✓      | ✓          | ✓       | 3                 | 85                        | 80                      | 3                                                                                                                                                                                                                                                                                   | 3 | 2 | 2 | 2 | 2 | 2 | 3 | - | - |   |

| Sessions     | CLO - 1                                                                      | CLO - 2                                            | CLO - 3                                                                  | CLO - 4                                                                  | CLO - 5                                                               |
|--------------|------------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------|
|              | 9                                                                            | 9                                                  | 9                                                                        | 9                                                                        | 9                                                                     |
| <b>SLO-1</b> | Leadership - definition & Qualities                                          | Team building & dynamics                           | Management – definition & Manager traits                                 | Innovative leadership – Concept of emotional and social intelligence     | Entrepreneurship                                                      |
| <b>SLO-2</b> | Leadership – styles                                                          | Work delegation with activity                      | Work schedule with activity                                              | Synthesis of human and Artificial intelligence                           | Successful Indian entrepreneurs – case study                          |
| <b>SLO-3</b> | Difference between leader and boss                                           | Decision making with activity                      | Strategic planning                                                       | Design thinking                                                          | Ethics – definition & Corporate ethics                                |
| <b>SLO-4</b> | Case study (based on leadership styles)                                      | Motivation & Motivation for results                | Conflict management                                                      | Measuring and Sustaining innovation                                      | Importance of ethics                                                  |
| <b>SLO-5</b> | Leadership in diverse organizational hierarchy , cultures and communications | Argumentation, Persuasion, Negotiation, Networking | Energy Management & Novel Ways to manage energy in work place – activity | Case study: Organizations with sustained innovation.                     | Essential elements of business ethics                                 |
| <b>SLO-6</b> | Leading the organisation through stability and turbulence                    | Interpersonal communication                        | Workforce management                                                     | Key elements of design thinking                                          | Creating a harmonious life with work-life balance                     |
| <b>SLO-7</b> | Understanding Leadership and its importance.                                 | Budget planning                                    | Time Management                                                          | How to transform challenges into opportunities                           | Ethics and Conduct : Ethical decision-making                          |
| <b>SLO-8</b> | Models of Leadership                                                         | Workflow optimization                              | Recruiting and Retaining Talent                                          | How to develop human-centric solutions for creating socially good humans | Importance of ethical principles in professional and social contexts. |
| <b>SLO-9</b> | Basic Leadership Skills                                                      | Critical thinking and Multitasking                 | Conflict & Stress Management                                             | Emerging trends in design thinking                                       | Building ethical culture: promoting ethical behavior in organization. |

| Resources |                                                                                                     |  |  |   |                                                                                                            |
|-----------|-----------------------------------------------------------------------------------------------------|--|--|---|------------------------------------------------------------------------------------------------------------|
| 1         | Craig E Johnson, Meeting the ethical challenges of leadership, Sage publications, 2018              |  |  | 4 | Alexander Osterwalder, Business Model Generation, Wiley, 2013                                              |
| 2         | T V Rao, Managers who make a difference: Sharpening your management skill, Random House India, 2016 |  |  | 5 | Deborah Tannen, Talking from nine to five: Women and men in the workplace, Harper Collins Publishers, 2010 |
| 3         | Allan R Cohen, David L Bradford, Influence without authority, Wiley, 2018                           |  |  | 6 | Dr Carrie Picardi Leadership Essentials you always wanted to know Vibrant Publishers,2021                  |

| Assessment        |            |                                                       |              |                       |              |                       |              |            |              | Strategies  |  |                      |   |                          |   |
|-------------------|------------|-------------------------------------------------------|--------------|-----------------------|--------------|-----------------------|--------------|------------|--------------|-------------|--|----------------------|---|--------------------------|---|
| Level of Thinking |            | Continuous Learning Assessment (CLA) (100% weightage) |              |                       |              |                       |              |            |              | Technology  |  | Pedagogy / Andragogy |   | Sustainable Development  |   |
|                   |            | CLA – 1<br><br>(20 %)                                 |              | CLA – 2<br><br>(20 %) |              | CLA – 3<br><br>(30 %) |              | CLA – 4    |              | Simulations |  | Clarification/Pauses | ✓ | Good Health & Well Being | ✓ |
|                   |            |                                                       |              |                       |              |                       |              | (30%)      |              |             |  |                      |   |                          |   |
|                   |            | Theory (%)                                            | Practice (%) | Theory (%)            | Practice (%) | Theory (%)            | Practice (%) | Theory (%) | Practice (%) |             |  |                      |   |                          |   |
| 1                 | Remember   | 5                                                     | 5            | 5                     | 5            | 15                    | 15           | 10         | 10           |             |  |                      |   |                          |   |
| 2                 | Understand | 5                                                     | 5            | 5                     | 5            | 15                    | 15           | 10         | 10           |             |  | Debate               | ✓ |                          |   |
| 3                 | Apply      | 25                                                    | 25           | 25                    | 25           | 20                    | 20           | 20         | 20           |             |  | Interactive Lecture  | ✓ |                          |   |
| 4                 | Analyze    | 25                                                    | 25           | 25                    | 25           | 20                    | 20           | 20         | 20           |             |  | Brainstorming        | ✓ |                          |   |
| 5                 | Evaluate   | 20                                                    | 20           | 20                    | 20           | 15                    | 15           | 20         | 20           |             |  |                      |   |                          |   |
| 6                 | Create     | 20                                                    | 20           | 20                    | 20           | 15                    | 15           | 20         | 20           |             |  |                      |   |                          |   |
| Total (%)         |            | 100                                                   | 100          | 100                   | 100          | 100                   | 100          | 100        | 100          |             |  |                      |   |                          |   |

\*The evaluation can be done on the one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences

| Designers            |                                                                                                                                                                |                            |                                                                                                                                                 |                                                                                                                                                            |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Professional Experts |                                                                                                                                                                | Higher Institution Experts |                                                                                                                                                 | Internal Experts                                                                                                                                           |
| 1                    | Mr. P. Chockalingam, Senior Lead Software Engineer, Virtusa Consulting Services Private Ltd, DLF IT Park SEZ, Chennai – 600089<br>p.chockalingam1986@gmail.com | 1                          | Dr. G. Saravana Prabu, Asst. Professor, Department of English, Amrita Vishwa Vidyapeetham, Coimbatore - 641112<br>g_saravanaprabu@cb.amrita.edu | 1 Mrs. Deepalakshmi S, HOD, Department of Career Guidance, FSH, SRMIST<br><a href="mailto:hod.dcgk.ktr@srmist.edu.in">hod.dcgk.ktr@srmist.edu.in</a>       |
|                      |                                                                                                                                                                |                            |                                                                                                                                                 | 2 Dr. Elamathiyan E, Assistant Professor, Department of Career Guidance, FSH, SRMIST, <a href="mailto:elamathe1@srmist.edu.in">elamathe1@srmist.edu.in</a> |

| Course Code | UMI24Y01L | Course Title | My India Project | Category | Y | Mandatory Courses | L | T | P | C |
|-------------|-----------|--------------|------------------|----------|---|-------------------|---|---|---|---|
|             |           |              |                  |          |   |                   | 0 | 0 | 0 | 0 |

| Course Offering Department | Mathematics and Statistics | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|----------------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|----------------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

(Assessment Method - Fully Internal)

| Assessment Tools                          | Marks |
|-------------------------------------------|-------|
| Review I (Activities)                     | 50    |
| Review II (Project Report & Presentation) | 50    |
| Total                                     | 100   |

## SEMESTER - V

| Course Code | UCS24D01J | Course Title | Software Engineering |  |  |  | Category | D | Discipline Core / Elective course | L | T | P | C |
|-------------|-----------|--------------|----------------------|--|--|--|----------|---|-----------------------------------|---|---|---|---|
|             |           |              |                      |  |  |  |          |   |                                   | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                       | Depth    |        |           |         | Attainment        |                      |                     | Programme Learning Outcomes |                       |                       |                       |                    |                    |                       |                      |       |       |
|-------|--------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|----------------------|---------------------|-----------------------------|-----------------------|-----------------------|-----------------------|--------------------|--------------------|-----------------------|----------------------|-------|-------|
| CLR-1 | Familiarize the software life cycle models and software development process                      | 1        | 2      | 3         | 4       | 1                 | 2                    | 3                   | 1                           | 2                     | 3                     | 4                     | 5                  | 6                  | 7                     | 8                    | 9     | 10    |
| CLR-2 | Understand the various techniques for requirements, planning and Testing                         |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLR-3 | Examine the basic methodologies for software design, development, testing                        |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLR-4 | Manage user expectations and software development team                                           |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLR-5 | Acquire the latest industry knowledge like agile for development                                 |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLO   | At the end of this course, learners will be able to:                                             | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency | Expected Attainment | Problem Solving,            | Communication Skills, | Independent Thinking, | Leadership Qualities, | Digital Technology | Value Incultation, | Environmental Action, | Entrepreneurial Risk | PSO-1 | PSO-2 |
| CLO-1 | Identify the process of project life cycle model and process                                     | ✓        | ✓      | -         | -       | 2                 | 85                   | 75                  | 3                           | -                     | -                     | 1                     | -                  | 3                  | -                     | 2                    | 2     | 1     |
| CLO-2 | Analyze and specify software requirements through a productive working Relationship Customers.   | ✓        | ✓      | ✓         | -       | 2                 | 85                   | 75                  | 3                           | 2                     | 1                     | 2                     | 2                  | 3                  | -                     | 1                    | 2     | 1     |
| CLO-3 | Design the system based on Functional Oriented and Object Oriented Approach for Software Design. | ✓        | ✓      | ✓         | ✓       | 3                 | 85                   | 75                  | 3                           | 1                     | 3                     | 1                     | 3                  | 3                  | -                     | 1                    | 1     | 2     |
| CLO-4 | Develop the correct and robust code for the software products                                    | ✓        | ✓      | ✓         | ✓       | 3                 | 85                   | 75                  | 3                           | 3                     | 2                     | 3                     | 3                  | 3                  | -                     | 2                    | 3     | 3     |
| CLO-5 | Perform by applying the test plan and various testing techniques                                 | ✓        | ✓      | ✓         | ✓       | 3                 | 85                   | 75                  | 3                           | 3                     | 2                     | 3                     | 3                  | 3                  | -                     | 3                    | 3     | 3     |

| Sessions | CLO-1                                                | CLO-2                                                                        | CLO-3                                 | CLO-4                                                    | CLO-5                                               |
|----------|------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------|----------------------------------------------------------|-----------------------------------------------------|
|          | 18                                                   | 18                                                                           | 18                                    | 18                                                       | 18                                                  |
| SLO-1    | The Evolving Role of Software Engineering Definition | Computer-Based Systems<br>The System Engineering Hierarchy – System Modeling | Project Management Spectrum, Four P's | Principles of Testing<br>Introduction-Testing Definition | Integration testing<br>Top down Integration testing |

|           |                                                                                          |                                                                                                                                                                                            |                                                                       |                                                                                        |                                                                           |
|-----------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| SLO-2     | Software Characteristics<br>Software Applications and A Crisis                           | System Simulation<br>Comparison of various Software Development                                                                                                                            | Role of People<br>Process and the Project                             | Phases of software<br>Error, Fault, Bug-Failure of the system –Comparison of the terms | Bottom up Integration testing<br>Bi-Directional Integration               |
| SLO-3     | Software Myths<br>Types of Myths, Software Engineering : Layered Technology              | Business Process Engineering: An Overview<br>Requirements Engineering process                                                                                                              | The project Planning process<br>Resources                             | Types of testing-<br>Quality assurance, Quality Control                                | System Integration<br>System Acceptance Testing<br>Functional Testing     |
| SLO 4-6   | Laboratory1:Identifying Project Objective and Scope                                      | Laboratory 4:Project Planning                                                                                                                                                              | Laboratory 7: Function Oriented Diagram                               | Laboratory 10:Test Case design for unit testing                                        | Laboratory 13: Preparation of Timeline charts and Tracking the Scheduling |
| SLO-7     | Software Process<br>Software Process Models                                              | Characteristics of Good Requirements<br>Types of Requirements                                                                                                                              | Risk Management<br>Re active and Proactive Risk Strategies            | Testing verification and validation<br>White Box Testing                               | Non Functional testing<br>Functional Vs Non Functional Testing            |
| SLO-8     | Linear Sequential Model<br>Advantages And Disadvantages                                  | Requirements Elicitation<br>Requirements Analysis and Negotiation                                                                                                                          | Software Risks,<br>Risk Identification and Risk Projection            | Techniques of White Box Testing<br>Black box testing                                   | System Testing<br>Design and Architectural Verification                   |
| SLO-9     | Prototyping Model<br>Advantages And Disadvantages<br>Rapid Application Development Model | Requirement Documentation<br>Requirement Specification and Analysis,<br>Software Requirement Specification and<br>System Requirement Specifications<br>Drawing E-R Diagram for any project | Risk Refinement,<br>Risk Mitigation<br>Risk Monitoring and Management | Techniques of Black box testing<br>Static Testing, Dynamic Testing                     | Deployment Testing<br>Beta Testing<br>Certification, Standards            |
| SLO 10-12 | Laboratory 2:Selection of Suitable software process Model of the suggested system        | Laboratory 5:Performing Various Requirement Analysis                                                                                                                                       | Laboratory 8:User's View Analysis                                     | Laboratory 11:Test Case design for Integration testing                                 | Laboratory 14: Estimation of Effort and Risk Identification               |
| SLO-13    | Evolutionary Process Models<br>Incremental Model                                         | Characteristics of Good SRS Document<br>Requirement Management                                                                                                                             | Quality Concepts<br>SQA Activities                                    | Challenges in white box testing<br>Black Box Testing                                   | Testing for Compliance<br>Scalability Testing                             |
| SLO-14    | Spiral Model, WIN WIN Model<br>Advantages and Disadvantages                              | Software Prototyping<br>Selecting the prototyping approach                                                                                                                                 | Software Reviews and FTR<br>Statistical Quality Assurance             | Techniques of<br>Black Box Testing, Structural testing                                 | Reliability testing<br>Stress testing                                     |

|              |                                                                                              |                                                                            |                                                            |                                                                                                         |                                                          |
|--------------|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| SLO-15       | Concurrent Development Model<br>Component Based Development,<br>Comparison of Process models | Specification Principles,<br>Representation<br>Specification Review,       | The software Configuration<br>Management<br>SCM Repository | Static testing<br>Verification & Validation<br>Techniques, Cyclomatic<br>complexity, Control flow graph | Acceptance Testing<br>Acceptance Criteria                |
| SLO<br>16-18 | Laboratory 3: Problem Statement<br>Preparation                                               | Laboratory 6: Develop Software<br>Requirement Specification Sheet<br>(SRS) | Laboratory 9: Structure view<br>diagram                    | Laboratory 12: Performing Testing<br>and Debugging for a sample code                                    | Laboratory 15: Software Quality<br>Assurance Components. |

| Resources |                                                                                                 |   |                                                                                                                                            |  |  |
|-----------|-------------------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| 1         | Behrouz A. Forouzan, (2010), "Data Communications and Networking", 5th Edition                  | 5 | Todd Lammle, (2011), "CCNA Study Guide", Seventh Edition                                                                                   |  |  |
| 2         | William Stallings, (2010), "Data and Computer Communications", Ninth Edition                    | 6 | <a href="https://www.netacad.com/courses/packet-tracer">https://www.netacad.com/courses/packet-tracer</a>                                  |  |  |
| 3         | AS Tanenbaum, DJ Wetherall, Computer Networks, 5th Ed., Prentice-Hall, 2010                     | 7 | JF Kurose, KW Ross, Computer Networking: A Top-Down Approach, 5th Ed., Addison-Wesley, 2009.                                               |  |  |
| 4         | Peterson and Davie, Computer Networks: A Systems Approach, Larry Peterson and Bruce Davie, 2019 | 8 | James D. McCabe, Network Analysis, Architecture, and Design (The Morgan Kaufmann Series in Networking) 3rd Edition, Morgan Kaufmann, 2007. |  |  |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              | Strategies                 |                      |                   |                          |                   |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|----------------------------|----------------------|-------------------|--------------------------|-------------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              | Technology                 | Pedagogy / Andragogy |                   | Sustainable Development  |                   |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              | Simulations                | Clarification/Pauses | ✓                 | Good Health & Well Being |                   |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              | Presentation Tools         | ✓                    | Group Discussion  | ✓                        | Quality Education |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) | Learning Management System | ✓                    | Hands-on Practice | ✓                        | Gender Equality   |
| 1                         | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Debate               | ✓                 |                          |                   |
| 2                         | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Interactive Lecture  | ✓                 |                          |                   |
| 3                         | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            | Brainstorming        | ✓                 |                          |                   |
| 4                         | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            |                      |                   |                          |                   |
| 5                         | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |
| 6                         | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |                            |                      |                   |                          |                   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |  |  |  |                            |                                               |  |  |  |  |                  |                                                      |  |
|----------------------|---------------------------------------------------------|--|--|--|--|----------------------------|-----------------------------------------------|--|--|--|--|------------------|------------------------------------------------------|--|
| Professional Experts |                                                         |  |  |  |  | Higher Institution Experts |                                               |  |  |  |  | Internal Experts |                                                      |  |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  |  |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT chennai |  |  |  |  | 1                | Dr. P. Yogalakshmi, Assistant Professor, FSH, SRMIST |  |

| Course Code | UCS24D02J | Course Title | Computer Networks and Data Communication | Category | Discipline Core/<br>Elective Course | L | T | P | C |
|-------------|-----------|--------------|------------------------------------------|----------|-------------------------------------|---|---|---|---|
|             |           |              |                                          |          |                                     | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                             | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcomes                |                           |                                            |                                                 |                                                                      |       |       |   |   |    |
|-------|------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|--------------------------------------------|---------------------------|--------------------------------------------|-------------------------------------------------|----------------------------------------------------------------------|-------|-------|---|---|----|
| CLR-1 | Understand the evolution of computer networks using the layered network architecture                                   | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 1                                          | 2                         | 3                                          | 4                                               | 5                                                                    | 6     | 7     | 8 | 9 | 10 |
| CLR-2 | Understand the addressing concepts and learn networks devices                                                          |          |        |           |         |                   |                          |                         |                                            |                           |                                            |                                                 |                                                                      |       |       |   |   |    |
| CLR-3 | Design computer networks using subnetting and routing concepts                                                         |          |        |           |         |                   |                          |                         |                                            |                           |                                            |                                                 |                                                                      |       |       |   |   |    |
| CLR-4 | Understand the error types, framing, flow control                                                                      |          |        |           |         |                   |                          |                         |                                            |                           |                                            |                                                 |                                                                      |       |       |   |   |    |
| CLR-5 | Understand the various Medium Access Control techniques and also the characteristics of physical layer functionalities |          |        |           |         |                   |                          |                         |                                            |                           |                                            |                                                 |                                                                      |       |       |   |   |    |
|       |                                                                                                                        | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Communication Skills, Collaboration Skills | Problem Solving, Critical | Communication Skills, Independent Thinking | Leadership Qualities, Digital Technology Skills | Value Incultation, Environmental Action, Entrepreneurial Risk Taking | PSO-1 | PSO-2 |   |   |    |
| CLO   | At the end of this course, learners will be able to:                                                                   |          |        |           |         |                   |                          |                         |                                            |                           |                                            |                                                 |                                                                      |       |       |   |   |    |
| CLO-1 | Understand the need for Network and various layers of OSI and TCP/IP reference model                                   | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 1                                          | -                         | -                                          | -                                               | 3                                                                    | 3     | -     | 2 | 2 | 3  |
| CLO-2 | Explain various Data Communications media                                                                              | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 1                                          | 2                         | 3                                          | -                                               | 3                                                                    | 3     | -     | 1 | 2 | 3  |
| CLO-3 | Identify the different types of network topologies and Switching methods                                               | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 1                                          | 3                         | 3                                          | -                                               | 3                                                                    | 3     | -     | 1 | 1 | 3  |
| CLO-4 | Identify the different types of network devices and their functions within a network                                   | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 1                                          | 3                         | 3                                          | -                                               | 3                                                                    | 3     | -     | 2 | 3 | 3  |
| CLO-5 | Analyze and Interpret various Network and Transport Layer protocols.                                                   | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 1                                          | 3                         | 3                                          | -                                               | 3                                                                    | 3     | -     | 3 | 3 | 3  |

| Sessions | CLO-1                                             | CLO-2                             | CLO-3                                    | CLO-4                            | CLO-5                                                      |
|----------|---------------------------------------------------|-----------------------------------|------------------------------------------|----------------------------------|------------------------------------------------------------|
|          | 18                                                | 18                                | 18                                       | 18                               | 18                                                         |
| SLO-1    | Evolution of Computer Networks, The Internet      | Data Link Layer , Functionalities | Network Layer, Functionalities           | Transport Layer, Functionalities | Physical Layer – Functionalities, Transmission Terminology |
| SLO-2    | The Internet today, Computer Network Architecture | MAC Addressing, Framing           | Network Addressing, Classfull Addressing | Port Numnber, TCP                | Frequency, Spectrum, And Bandwidth, Data and Signals       |

|           |                                                                                                                                  |                                                                      |                                                                       |                                                              |                                                                                                                          |
|-----------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| SLO-3     | Categories of Networks (LAN, WAN, MAN), A data Communications Model-Networks                                                     | Data Link Control, Line Discipline                                   | Routers and Their Functions, Routing Metrics                          | TCP Functionalities, UDP                                     | Analog And Digital Transmission, Transmission Impairments                                                                |
| SLO 4 - 6 | <b>Practice: Basic Network Commands and their functionalities</b>                                                                | <b>Practice: Construct N/W using bus topology, Star topology</b>     | <b>Practice: Multi-routing connection with static router</b>          | <b>Practice: Implementing a simple application using UCP</b> | <b>Practice: : Analyse the Working of a DNS</b>                                                                          |
| SLO-7     | Protocols, Elements of Protocol                                                                                                  | Flow Control – Stop and Wait, Sliding Window                         | Routing Table, Routing Algorithms                                     | UDP Functionalities, TCP Vs UDP                              | Analog to Digital and Digital to Analog Conversion                                                                       |
| SLO-8     | Network Topologies, Transmission Modes in a Network                                                                              | Error Control – Stop and Wait, Go back N                             | Distance Vector Routing, Distance Vector Routing with an Example      | Application Layer Functionalities, HTTP                      | Noise in transmission Attenuation, Twisted Pair-Physical Description- Applications- Unshielded And Shielded Twisted Pair |
| SLO-9     | N/W Layered Architecture, OSI Reference Model                                                                                    | Error Control – Selective Reject                                     | Link State Routing                                                    | : HTTP Messages                                              | Coaxial Cable and Optical Fiber Physical Description-Applications- Transmission Characteristics                          |
| SLO 10-12 | <b>Practice: Introduction to CISCO Packet Tracer (CPT)</b>                                                                       | <b>Practice: Construct N/W using Ring topology, Mesh topology</b>    | <b>Practice: Connecting 2 LANS Using Dynamic Routing</b>              | <b>Practice: Analysing the Working of RIP</b>                | <b>Practice: Implementing a simple web server</b>                                                                        |
| SLO-13    | Functions of the Various Layers of OSI reference model, TCP/IP Reference Model                                                   | Errors in Transmission – Types                                       | Switching in N/W, Electronic Mail, Circuit-Switching                  | DNS, Electronic mail                                         | Compare the various features of Guided Transmission media, Radio Waves -Applications-Transmission Characteristics        |
| SLO-14    | Functionalities of the Various layers of the TCP/IP reference model<br>Comparison of the OSI and TCP/IP Reference Models         | Error Detection – Parity, Checksum<br>Error Detection - CRC          | Circuit-Switching Advantages<br>Packet-Switching Principles           | Basic Electronic Mail Operation<br>SMTP & MIME               | Micro Waves Applications- Transmission Characteristics<br>Infrared Waves Characteristics- Application                    |
| SLO-15    | Comparison of Layers<br>Comparison of the services                                                                               | Error Correction -Types<br>Hamming Code                              | Advantage of Packet Switching<br>Compare Circuit and Packet Switching | SMTP Overview-Connection Setup- Mail Transfer                | Satellite Communication<br>Compare Feature of Guided Vs UnGuided Transmission Media                                      |
| SLO 16-18 | <b>Practice: Build a Peer to Peer N/W using Hub and Switch. Analyse the difference between the working of a Hub and a Switch</b> | <b>Practice: Connecting two LANS using router with static Router</b> | <b>Practice: Implementing a simple application using TCP</b>          | <b>Practice: ARP simulation in CPT</b>                       | <b>Practice: Emulate Working of a complete N/W using CPT</b>                                                             |

| Resources |                                                                                                 |  |  |  |  |  |  |  |   |                                                                                                                                            |  |
|-----------|-------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|---|--------------------------------------------------------------------------------------------------------------------------------------------|--|
| 1         | BehrouzA.Forouzan,(2010), "Data Communications and Networking", 5th Edition                     |  |  |  |  |  |  |  | 5 | ToddLammle,(2011), "CCNA Study Guide", Seventh Edition                                                                                     |  |
| 2         | WilliamStallings,(2010), "Data and Computer Communications", Ninth Edition                      |  |  |  |  |  |  |  | 6 | <a href="https://www.netacad.com/courses/packet-tracer">https://www.netacad.com/courses/packet-tracer</a>                                  |  |
| 3         | AS Tanenbaum, DJ Wetherall, Computer Networks, 5th Ed., Prentice-Hall, 2010                     |  |  |  |  |  |  |  | 7 | JF Kurose, KW Ross, Computer Networking: A Top-Down Approach, 5th Ed., Addison-Wesley, 2009.                                               |  |
| 4         | Peterson and Davie, Computer Networks: A Systems Approach, Larry Peterson and Bruce Davie, 2019 |  |  |  |  |  |  |  | 8 | James D. McCabe ,Network Analysis, Architecture, and Design (The Morgan Kaufmann Series in Networking) 3rd Edition, Morgan Kaufmann, 2007. |  |

| Assessment                      |            |                                                      |              |            |              |            |              |            |              |                                         |              |
|---------------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------------|--------------|
| Bloom’s<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final<br>Assessment<br>(50 % weightage) |              |
|                                 |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                         |              |
|                                 |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                         |              |
|                                 |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                              | Practice (%) |
| 1                               | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                      | 15           |
| 2                               | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                      | 15           |
| 3                               | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                      | 25           |
| 4                               | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                      | 25           |
| 5                               | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                      | 10           |
| 6                               | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                      | 10           |
| Total (%)                       |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                                     | 100          |

| Strategies                 |  |                      |                      |                         |                          |
|----------------------------|--|----------------------|----------------------|-------------------------|--------------------------|
| Technology                 |  | Pedagogy / Andragogy |                      | Sustainable Development |                          |
| Simulations                |  |                      | Clarification/Pauses | ✓                       | Good Health & Well Being |
| Presentation Tools         |  | ✓                    | Group Discussion     | ✓                       | Quality Education        |
| Learning Management System |  | ✓                    | Hands-on Practice    | ✓                       | Gender Equality          |
|                            |  |                      | Debate               | ✓                       |                          |
|                            |  |                      | Interactive Lecture  | ✓                       |                          |
|                            |  |                      | Brainstorming        | ✓                       |                          |
|                            |  |                      |                      |                         |                          |
|                            |  |                      |                      |                         |                          |
|                            |  |                      |                      |                         |                          |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |  |  |  |                            |                                               |  |  |                  |                                                      |
|----------------------|---------------------------------------------------------|--|--|--|--|----------------------------|-----------------------------------------------|--|--|------------------|------------------------------------------------------|
| Professional Experts |                                                         |  |  |  |  | Higher Institution Experts |                                               |  |  | Internal Experts |                                                      |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  |  |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT chennai |  |  | 1                | Dr. B. Mahalakshmi, Assistant Professor, FSH, SRMIST |

| Course Code | UCS24D03J | Course Title | Object Oriented Analysis and Design | Category | D | Discipline Core / Elective Course | L | T | P | C |
|-------------|-----------|--------------|-------------------------------------|----------|---|-----------------------------------|---|---|---|---|
|             |           |              |                                     |          |   |                                   | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                           | Depth |   |   |   | Attainment |    |    | Programme Learning Outcomes |   |   |   |   |   |   |   |   |    |
|-------|----------------------------------------------------------------------------------------------------------------------|-------|---|---|---|------------|----|----|-----------------------------|---|---|---|---|---|---|---|---|----|
| CLR-1 | Understanding Object Basics, Classes and Objects, Inheritance                                                        | 1     | 2 | 3 | 4 | 1          | 2  | 3  | 1                           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-2 | How software objects are altered to build software systems that are more robust                                      |       |   |   |   |            |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-3 | Gaining enough competence in object-oriented analysis and design (OOAD) to tackle a Complete object oriented project |       |   |   |   |            |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-4 | Understanding the issues and options in reuse                                                                        |       |   |   |   |            |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-5 | Using UML, a common language for talking about requirements, designs, and component Interfaces                       |       |   |   |   |            |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLO   | At the end of this course, learners will be able to:                                                                 |       |   |   |   |            |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLO-1 | Student will be able to demonstrate the importance of modelling in the software development life cycle               | ✓     | ✓ | - | - | 2          | 85 | 75 | 3                           | - | - | 1 | - | 3 | - | 2 | 2 | 1  |
| CLO-2 | Become familiar with the Unified modelling Language                                                                  | ✓     | ✓ | ✓ | - | 2          | 85 | 75 | 3                           | - | - | 2 | - | 3 | - | 2 | 2 | 1  |
| CLO-3 | Understand the object-oriented approach to analyzing and designing systems and software solutions                    | ✓     | ✓ | ✓ | ✓ | 3          | 85 | 75 | 3                           | 1 | 3 | 1 | 3 | 3 | - | 1 | 1 | 2  |
| CLO-4 | Employ the Unified modelling Language notations to create effective and efficient                                    | ✓     | ✓ | ✓ | ✓ | 3          | 85 | 75 | 3                           | 3 | 2 | 3 | 3 | 3 | - | 2 | 3 | 3  |
| CLO-5 | Understand the difference between writing programs for the software and doing analysis and design                    | ✓     | ✓ | ✓ | ✓ | 3          | 85 | 75 | 3                           | 3 | 2 | 3 | 3 | 3 | - | 3 | 3 | 3  |

| Sessions | CLO-1                                                | CLO-2                    | CLO-3                                  | CLO-4                                                       | CLO-5                                                      |
|----------|------------------------------------------------------|--------------------------|----------------------------------------|-------------------------------------------------------------|------------------------------------------------------------|
|          | 18                                                   | 18                       | 18                                     | 18                                                          | 18                                                         |
| SLO-1    | Introduction to Object Oriented development Concepts | Reification, Constraints | Special Constructs for Activity Models | Breaking a System into Subsystems - Identifying Concurrency | Advanced OOAD Concepts- Refactoring and code optimization. |

|            |                                                                        |                                                                    |                                                                                      |                                                                      |                                                                                                                         |
|------------|------------------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| SLO-2      | Evidence for Usefulness of Object Oriented development                 | Derived Data, Packages                                             | Process Overview:<br>Development Stages                                              | Allocation of Subsystems -<br>Management of Data<br>Storage          | Design for extensibility<br>and scalability.                                                                            |
| SLO-3      | Modeling Concepts: Modeling, Abstraction                               | State Modeling: Events –<br>States – Transitions &<br>Conditions   | Development Life Cycle                                                               | Handling<br>Global<br>Resources                                      | Principles of domain-<br>driven design (DDD).                                                                           |
| SLO 4 - 6  | The Three Models                                                       | State diagrams - State<br>Diagram Behavior                         | System Conception:<br>Devising a System Concept                                      | Choosing a Software<br>Control Strategy                              | Service-oriented architecture<br>(SOA) and microservices.                                                               |
| SLO-7      | Overview of Unified Modeling Language and introduction to UML diagrams | Advanced State Modeling:<br>Nested State Diagrams                  | Elaborating a Concept, Preparing a<br>problem Statement                              | Handling Boundary<br>Conditions,<br>Setting Trade-<br>off Priorities | Tools for<br>OOAD-<br>Introduction to<br>tools for OOAD<br>Rational Rose,<br>StarUML,<br>Enterprise<br>Architect,       |
| SLO-8      | Class Modeling: Object and Class Concepts                              | Nested States                                                      | Domain Analysis:<br>Overview of<br>Analysis                                          | Common Architectural<br>Styles - Architecture of the<br>ATM System   | Use of integrated development<br>environments (IDEs) in OOAD<br>(Eclipse, IntelliJ IDEA, Version<br>control tools (Git) |
| SLO-9      | Laboratory 1: Develop an SRS document                                  | Laboratory 3 : Create a<br>Domain model for business<br>activities | Laboratory 5: Design a state<br>chart diagram for passport<br>automation application | Laboratory 7 : Develop a<br>usecase diagram for Bank<br>ATM system   | Laboratory9 : Develop a<br>sequence diagram for<br><br>Foreign Trading system                                           |
| SLO 10- 12 | Link and Association Concepts                                          | Signal Generalization                                              | Domain Class Model                                                                   | Class Design: Bridging the<br>Gap                                    | Testing in OOAD- Unit<br>testing and test-driven<br>development (TDD).                                                  |
| SLO-13     | Inheritance, Sample Class Model                                        | Concurrency                                                        | Domain State Model, Domain<br>Interaction Model                                      | Realizing Use Cases                                                  | Integration testing in object-<br>oriented systems                                                                      |
| SLO-14     | Navigation of Class Models                                             | Sample State Model                                                 | Iterating the Analysis                                                               | Designing Algorithms -<br>Recusing Downward –<br>Refactoring         | Automation testing tools and<br>techniques                                                                              |

|                |                                                                   |                                                                                                |                                                                                                    |                                                        |                                                                                      |
|----------------|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------------------------------------|
| SLO-15         | Advanced Class Modeling:<br>Advanced Object & Class,<br>Concepts, | Relation of Class & State<br>Models, Interaction Modeling: Use<br>Case Models, Sequence Models | Application Analysis:<br>Application Interaction<br>Model, Application Class<br>Model, State Model | Design Optimization,<br>Reification of Behavior,       | Common<br>design patterns<br>and their<br>application in<br>software<br>development. |
| SLO<br>16 - 18 | Association Ends -N-ary<br>Associations,<br>Aggregation           | Activity Models, Advanced<br>Interaction<br>Modeling: Use Case<br>Relationships                | Operations, System Design:<br>Overview<br>of System Design                                         | Adjustment of Inheritance –<br>Organizing Class Design | Anti-patterns and how to avoid<br>them.                                              |

| Resources |                                                                                                                                      |   |                                                                    |  |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------|---|--------------------------------------------------------------------|--|
| 1         | OBJECT-ORIENTED ANALYSIS AND DESIGN With applications SECOND EDITION<br>Grady Booch Rational Santa Clara, California, ADDISON-WESLEY | 3 | Object-Oriented Modeling and Design with UML, James Rumbaugh, 2005 |  |
| 2.        | Object-Oriented Analysis and Design , Ramnath, Sarnath, Dathan, Brahmi, 2011                                                         |   |                                                                    |  |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              | Strategies                 |                      |                   |                          |                   |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|----------------------------|----------------------|-------------------|--------------------------|-------------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              | Technology                 | Pedagogy / Andragogy |                   | Sustainable Development  |                   |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              | Simulations                | Clarification/Pauses | ✓                 | Good Health & Well Being |                   |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              | Presentation Tools         | ✓                    | Group Discussion  | ✓                        | Quality Education |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) | Learning Management System | ✓                    | Hands-on Practice | ✓                        | Gender Equality   |
| 1                         | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Debate               | ✓                 |                          |                   |
| 2                         | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Interactive Lecture  | ✓                 |                          |                   |
| 3                         | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            | Brainstorming        | ✓                 |                          |                   |
| 4                         | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            |                      |                   |                          |                   |
| 5                         | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |
| 6                         | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |                            |                      |                   |                          |                   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |  |  |  |                            |                                               |  |  |  |  |                  |                                                  |  |
|----------------------|---------------------------------------------------------|--|--|--|--|----------------------------|-----------------------------------------------|--|--|--|--|------------------|--------------------------------------------------|--|
| Professional Experts |                                                         |  |  |  |  | Higher Institution Experts |                                               |  |  |  |  | Internal Experts |                                                  |  |
| 1                    | Mr. Navarathnamani, Datavan Solutions (P) Ltd., Chennai |  |  |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT chennai |  |  |  |  | 1                | Dr. S. Revathi, Assistant Professor, FSH, SRMIST |  |

| Course Code | UCS24D04J | Course Title | Machine Learning |  |  |  | Category | D | Discipline Core / Elective Course | L | T | P | C |
|-------------|-----------|--------------|------------------|--|--|--|----------|---|-----------------------------------|---|---|---|---|
|             |           |              |                  |  |  |  |          |   |                                   | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                  | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcomes |                                            |                           |                       |                       |                       |                           |                    |                       |                             |       |       |
|-------|-------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|-----------------------------|--------------------------------------------|---------------------------|-----------------------|-----------------------|-----------------------|---------------------------|--------------------|-----------------------|-----------------------------|-------|-------|
| CLR-1 | To provide basic concepts of machine learning                                                               | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 7                           | 1                                          | 2                         | 3                     | 4                     | 5                     | 6                         | 7                  | 8                     | 9                           | 10    |       |
| CLR-2 | To provide deeper understanding of various tools and techniques for Machine learning Algorithms and outputs |          |        |           |         |                   |                          |                         |                             |                                            |                           |                       |                       |                       |                           |                    |                       |                             |       |       |
| CLR-3 | Understand and Implement the major classification techniques                                                |          |        |           |         |                   |                          |                         |                             |                                            |                           |                       |                       |                       |                           |                    |                       |                             |       |       |
| CLR-4 | Understand and Implement the various Clustering Methods                                                     |          |        |           |         |                   |                          |                         |                             |                                            |                           |                       |                       |                       |                           |                    |                       |                             |       |       |
| CLR-5 | Learn and Understand the other machine Learning Algorithms                                                  |          |        |           |         |                   |                          |                         |                             |                                            |                           |                       |                       |                       |                           |                    |                       |                             |       |       |
|       |                                                                                                             | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) |                             | Communication Skills, Collaborative Skills | Problem Solving, Critical | Communication Skills, | Independent Thinking, | Leadership Qualities, | Digital Technology Skills | Value Incultation, | Environmental Action, | Entrepreneurial Risk Taking | PSO-1 | PSO-2 |
| CLO   | At the end of this course, learners will be able to:                                                        |          |        |           |         |                   |                          |                         |                             |                                            |                           |                       |                       |                       |                           |                    |                       |                             |       |       |
| CLO-1 | Understand the basics of machine learning                                                                   | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      |                             | 3                                          | 1                         | 2                     | -                     | 3                     | 3                         | -                  | -                     | -                           | -     |       |
| CLO-2 | Learn and understand the tools and libraries used for machine learning                                      | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      |                             | 3                                          | 1                         | 2                     | -                     | 3                     | 3                         | -                  | -                     | -                           | -     |       |
| CLO-3 | Learn and understand the supervised learning models and classification in machine learning                  | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                             | 3                                          | 1                         | 2                     | -                     | 3                     | 3                         | -                  | -                     | -                           | -     |       |
| CLO-4 | Understand the unsupervised learning techniques and their utilization in machine learning                   | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                             | 3                                          | 1                         | 2                     | -                     | 3                     | 3                         | -                  | -                     | -                           | -     |       |
| CLO-5 | Study the other machine learning techniques and to appreciate their capability                              | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                             | 3                                          | 1                         | 2                     | -                     | 3                     | 3                         | -                  | -                     | -                           | -     |       |

| Sessions | CLO-1                           | CLO-2                                              | CLO-3                                     | CLO-4                                            | CLO-5                                         |
|----------|---------------------------------|----------------------------------------------------|-------------------------------------------|--------------------------------------------------|-----------------------------------------------|
|          | 18                              | 18                                                 | 18                                        | 18                                               | 18                                            |
| SLO-1    | Machine Learning: What and Why? | Principal Component Analysis(PCA) - Regularization | Linear Regression with multiple variables | Multi class classification                       | Random Forest                                 |
| SLO-2    | Types of Machine Learning       | Machine learning python libraries                  | Logistic Regression                       | Case study on Multi class classification problem | Random Forest with scikit-learn               |
| SLO-3    | The Curse of dimensionality     | training data – testing data – validation data     | spam filtering with logistic regression   | Evaluation matrix for multi class problem        | Multivariate adaptive regression trees (MART) |

|           |                                                                                |                                                                            |                                                                             |                                                           |                                              |
|-----------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------|
| SLO 4-6   | Practice: : Practice elementary mathematical operations and control statements | Practice: Creating Various types of plots /charts from various data source | Practice : Implementation of Linear regression with multiple regression     | Practice:Implementation of Multi class classifier problem | practice : Implementation of Random Forest   |
| SLO-7     | Model Over fitting and under fitting                                           | Ensemble learning:-Bagging, Boosting                                       | Data Preprocessing methods                                                  | Unsupervised Vs. Supervised Machine learning              | Introduction to Artificial Neural Networks   |
| SLO-8     | Bias and Variance tradeoff                                                     | Maximum likeliwood estimation (least squares)                              | Feature scaling , Feature Selection                                         | Introduction to clustering                                | Perceptron Learning                          |
| SLO-9     | Linear Algebra for machine learning                                            | cross validation Features                                                  | Correlation matrix<br>Introduction to classifiers                           | K nearest neighbor and K-Means clustering                 | Back propogation Algorithm                   |
| SLO 10-12 | Practice:Operations on Matrices and Vectors                                    | Practice:Create subplots and color plots                                   | Practice: Implementation of Data preprocessing methods , Correlation matrix | Practice:: Implementation of K-Mean Clustering            | Practice: Implementation of ANN algorithm    |
| SLO-13    | Gradient Descent , Boot Strapping                                              | Statistical methods and probability for machine learning                   | Naïve Baiyes Method<br>Baiysean Classifier                                  | Decision tree representation                              | Reinforcement Learning                       |
| SLO-14    | Linear Discrimant Analysis                                                     | Performance metrics                                                        | Support Vector Machine classifier                                           | Classification and regression trees (CART)                | Ensembled models                             |
| SLO-15    | Parametric vs. non-parametric models                                           | Linear regression with one variable                                        | SVM classification model Example                                            | Issues in decision tree                                   | Case study for ensemble models               |
| SLO 16-18 | Practice : Vectorized operation on simple matrix operations                    | Practice:Implement Linear regression problem                               | Practice:Implementation of SVM and Naïve Bayes classifier methods.          | Practice:Implementation of decision tree                  | Practice: Implementation of ensembled models |

| Resources |                                                                                                      |   |                                                                                                                |  |  |
|-----------|------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------------------------------------------------------------|--|--|
| 1         | Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012                    | 4 | EthemAlpaydin, “Introduction to Machine Learning”, Prentice Hall of India, 2005                                |  |  |
| 2         | Tom Mitchell, "Machine Learning", McGraw-Hill, 1997.                                                 | 5 | Sebastian Raschka, VahidMirjilili, "Python Machine Learning and deep learning", 2nd edition, kindle book, 2018 |  |  |
| 3         | Carol Quadros, "Machine Learning with python, scikit-learn and Tensorflow", Packet Publishing, 2018. | 6 | Gavin Hackeling, "Machine Learning with scikit-learn", Packet publishing, O'Reily, 2018.                       |  |  |



| Course Code | UES24V01T | Course Title | Environmental Studies |  |  |  | Category | V | Value Added Course | L | T | P | C |
|-------------|-----------|--------------|-----------------------|--|--|--|----------|---|--------------------|---|---|---|---|
|             |           |              |                       |  |  |  |          |   |                    | 2 | 0 | 0 | 2 |

| Course Offering Department | Biotechnology | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|---------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|---------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                         | Depth    |        |           |         | Attainment        |                          |                         | PLO   |       |       |       |       |       |       |       |       |       |
|-------|--------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| CLR-1 | To create awareness on environment and renewable and non-renewable resources                                       | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    |
| CLR-2 | To understand about ecosystem and biodiversity                                                                     |          |        |           |         |                   |                          |                         |       |       |       |       |       |       |       |       |       |       |
| CLR-3 | To understand the natural and anthropogenic impact of the environmental pollution                                  |          |        |           |         |                   |                          |                         |       |       |       |       |       |       |       |       |       |       |
| CLR-4 | To create awareness on different environmental problems                                                            |          |        |           |         |                   |                          |                         |       |       |       |       |       |       |       |       |       |       |
| CLR-5 | To create awareness on various environment protection acts and the impact of human population on environment       |          |        |           |         |                   |                          |                         |       |       |       |       |       |       |       |       |       |       |
| CLO   | At the end of this course, learners will be able to:                                                               | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PSO 1 | PSO 2 |
| CLO-1 | Applying knowledge on renewable and non-renewable resources                                                        | ✓        | ✓      | -         | -       | 1                 | 75                       | 70                      |       | -     | 1     | -     | -     | 2     | 1     | -     | -     | -     |
| CLO-2 | Understanding about ecosystem and biodiversity                                                                     | ✓        | ✓      | -         | -       | 1                 | 80                       | 75                      | 3     | 2     | -     | 1     | -     | -     | 2     | -     | -     | -     |
| CLO-3 | Gathering knowledge on impact of environmental pollution                                                           | -        | ✓      | ✓         | -       | 2                 | 80                       | 75                      | -     | 3     | 2     | -     | 3     | -     | 3     | -     | -     | -     |
| CLO-4 | Understanding of different environmental problems                                                                  | ✓        | -      | ✓         | -       | 3                 | 80                       | 75                      | -     | 2     | 3     | -     | -     | 3     | 2     | -     | -     | -     |
| CLO-5 | Having knowledge on various environment protection acts and the impact of human population on environment problems | ✓        | -      | ✓         | ✓       | 3                 | 80                       | 75                      | -     | -     | 3     | -     | 3     | 2     | 1     | -     | -     | -     |

| Sessions | CLO - 1<br>6                                                                                                 | CLO - 2<br>6                                                                                                              | CLO - 3<br>6                                                                                                | CLO - 4<br>6                                                                          | CLO - 5<br>6                                                                                           |
|----------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| SLO-1    | Multidisciplinary nature of environmental studies, definition, scope and importance of environmental studies | Energy flow in the ecosystem, energy flow in the ecosystem, ecological succession                                         | Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity                              | Disaster management- floods, earthquakes, cyclones, landslides                        | Air, water, wildlife - environment protection act                                                      |
| SLO-2    | Need for public awareness. institutions in environment, people in environment                                | Food chains, food webs and ecological pyramids                                                                            | Environmental pollution- definition, causes, effects and control measures of air, water, and soil pollution | Social issues and the environment: From unsustainable to sustainable development      | Forest conservation act; issues involved in enforcement of environmental legislation, public awareness |
| SLO-3    | Introduction to natural resources- renewable and nonrenewable resources - associated problems                | Ecosystem, introduction, types, characteristic features, structure and functions: forest, grassland and desert ecosystems | Causes, effects and control measures of marine, and noise                                                   | Urban problems related to energy, waterconservation, rain water harvesting, watershed | Human population and the environment:population growth, variation among nations                        |

|              |                                                                                                                                              |                                                                                                                                                                                          |                                                                                              |                                                                                      |                                                                                |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| <b>SLO-4</b> | Forest, water, mineral, food resources                                                                                                       | Aquatic ecosystems; biodiversity and its conservation-genetic, species and ecosystem diversity                                                                                           | Causes, effects and control measures of thermal pollution and nuclear hazards                | Environmental ethics: issues and possible solutions, climate change & global warming | Population explosion – family welfare programme, human rights, value education |
| <b>SLO-5</b> | Energy and land resources; role of an individual in conservation of natural resources; equitable use of resources for sustainable lifestyles | Biogeographical classification of India, value of biodiversity, biodiversity at global, national and local levels                                                                        | Role of individuals in pollution prevention                                                  | Acid rain & ozone layer depletion                                                    | HIV/AIDS, women and child welfare                                              |
| <b>SLO-6</b> | Concept of an ecosystem, structure and functions of an ecosystem, producers, consumers and decomposers                                       | India as a mega diversity nation, hot-spots of biodiversity, threats to biodiversity: habitat loss, poaching of wildlife man-wildlife conflicts, endangered and endemic species of India | Solid waste management<br>Causes, effects and control measures of urban and industrial waste | Nuclear accidents and nuclear holocaust; wasteland reclamation                       | Role of information technology in environment and human health                 |

| Resources |                                                                                                                                    |
|-----------|------------------------------------------------------------------------------------------------------------------------------------|
| 1         | Bharucha, E (2013).Textbook of environmental studies for undergraduate courses(2 <sup>nd</sup> ed.).Orient BlackSwan.              |
| 2         | Basu,M., & Savarimuthu, X., (2017), SJ Fundamentals of environmental studies.Cambridge University Press, Cambridge, United Kingdom |
| 3         | Jeyalakshmi, R. (2014).Text book of environmental studies, Devi publications                                                       |
| 4         | Bharucha, E (2002).The Biodiversity of India, Mapin Publishing Pvt. Ltd.                                                           |

| Assessment                |            | Continuous Learning Assessment (CLA) (50% weightage) |           |            |            | Strategies                       |                            | Sustainable Development |                               |
|---------------------------|------------|------------------------------------------------------|-----------|------------|------------|----------------------------------|----------------------------|-------------------------|-------------------------------|
| Bloom's Level of Thinking |            | CLA – 1                                              | CLA– 2    | CLA– 3     | CLA– 4 *   | Final Assessment (50 %weightage) | Technology                 | Pedagogy / Andragogy    |                               |
|                           |            | (10%)                                                | (10%)     | (20%)      | (10%)      |                                  | Presentation Tools         | ✓ Clarification/Pauses  | ✓ Good Health & Well Being    |
|                           |            | Theory (%)                                           | Theory(%) | Theory (%) | Theory (%) |                                  | Learning Management System | ✓ Group Discussion      | ✓ Quality Education           |
|                           |            |                                                      |           |            |            |                                  |                            | ✓ Hands-on Practice     | ✓ Gender Equality             |
| 1                         | Remember   | 20                                                   | 20        | 20         | 20         | 20                               |                            | Debate                  | ✓ Life on Land                |
| 2                         | Understand | 20                                                   | 20        | 20         | 20         | 20                               |                            | Interactive Lecture     | ✓ Clean Water and Sanitation  |
| 3                         | Apply      | 20                                                   | 20        | 20         | 20         | 20                               |                            | Brainstorming           | ✓ Affordable and clean energy |
| 4                         | Analyze    | 20                                                   | 20        | 20         | 20         | 20                               |                            |                         |                               |
| 5                         | Evaluate   | 20                                                   | -         | 20         | 20         | 20                               |                            |                         |                               |
| 6                         | Create     | -                                                    | 20        | -          | -          | -                                |                            |                         |                               |
|                           | Total (%)  | 100                                                  | 100       | 100        | 100        | 100                              |                            |                         |                               |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                                              |                            |                                                                                      |
|----------------------|------------------------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------------|
| Professional Experts |                                                                              | Higher Institution Experts |                                                                                      |
| 1                    | Dr. Arumugam Perumal, ARMATS BIOTEK Training and Research Institute, Chennai | 1                          | Dr. N. Banu, Bharathi Women's College (Autonomous), Chennai                          |
|                      |                                                                              | 1                          | Dr. P. Parthipan, Assistant Professor, Department of Biotechnology, FSH, SRMIST, KTR |

| Course Code | UCD24S04J | Course Title | Career Readiness and Professional Skills | Category | S | Skill Enhancement Course | L<br>1 | T<br>0 | P<br>2 | C<br>2 |
|-------------|-----------|--------------|------------------------------------------|----------|---|--------------------------|--------|--------|--------|--------|
|-------------|-----------|--------------|------------------------------------------|----------|---|--------------------------|--------|--------|--------|--------|

| Course Offering Department | Career Guidance | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|-----------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|-----------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| Course Rationale (CLR)         | The purpose of learning this course is to:                                     | Depth    |        |           |         | Attainment        |    |    | Program Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                            |   |   |   |   |   |   |   |   |   |   |
|--------------------------------|--------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|----|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|
|                                |                                                                                | Conceive | Design | Implement | Operate | Level of Thinking |    |    | Problem Solving, Critical Thinking, Creativity Solving<br>Communication Skills, Collaborating Skills<br>Independent Thinking, Analytical Reasoning, Learning to Learn, Research Skills, Leadership Qualities, Professionalism, Autonomy, Accountability<br>Digital Technology Skills<br>Value Incultation, Multicultural Inclusivity<br>Environmental Action, Community Engagement<br>Entrepreneurial Risk Taking<br>PLO-9<br>PLO-10 |   |   |   |   |   |   |   |   |   |   |
|                                |                                                                                |          |        |           |         |                   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |   |   |   |   |   |   |   |   |   |
|                                |                                                                                |          |        |           |         |                   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |   |   |   |   |   |   |   |   |   |
|                                |                                                                                |          |        |           |         |                   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |   |   |   |   |   |   |   |   |   |
|                                |                                                                                |          |        |           |         |                   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |   |   |   |   |   |   |   |   |   |
|                                |                                                                                |          |        |           |         |                   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |   |   |   |   |   |   |   |   |   |
|                                |                                                                                |          |        |           |         |                   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |   |   |   |   |   |   |   |   |   |
| Course Learning Outcomes (CLO) | At the end of this course, learners will be able to:                           |          |        |           |         |                   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |   |   |   |   |   |   |   |   |   |
| CLO-1                          | Understand the importance of resume preparation and face interview confidently | ✓        | ✓      | -         | -       | 2                 | 85 | 80 | 2                                                                                                                                                                                                                                                                                                                                                                                                                                    | 3 | 2 | 3 | - | - | - | - | - | - | - |
| CLO-2                          | Perform appropriately and effectively in group discussions                     | ✓        | ✓      | ✓         | -       | 3                 | 85 | 80 | 2                                                                                                                                                                                                                                                                                                                                                                                                                                    | 3 | 2 | 3 | - | 1 | 2 | 3 | - | - | - |
| CLO-3                          | Empathize with and trust colleagues for improving interpersonal skills         | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 80 | 3                                                                                                                                                                                                                                                                                                                                                                                                                                    | 3 | 3 | 3 | 1 | - | 3 | 2 | - | - | - |
| CLO-4                          | Prepare effective presentations considering the important strategies           | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 80 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                    | 3 | 2 | 3 | - | 2 | 2 | - | - | - | - |
| CLO-5                          | Explore sources of (online/offline) opportunities                              | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 80 | -                                                                                                                                                                                                                                                                                                                                                                                                                                    | 3 | 2 | 3 | - | 1 | 2 | 2 | - | - | - |

| Sessions | CLO - 1                                                                                            | CLO - 2                                                                       | CLO - 3                                                                                       | CLO - 4                                                                                                                                                                                      | CLO - 5                                                                            |
|----------|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|          | 9                                                                                                  | 9                                                                             | 9                                                                                             | 9                                                                                                                                                                                            | 9                                                                                  |
| SLO-1    | Introduction of resume and its Importance - Difference between a CV, Resume and Bio Data           | Mock interview – face to face                                                 | Listening as a Team Skill                                                                     | Types of Presentation - Informative, Instructional, Arousing, Persuasive, Decision-making - Structure of a presentation – Introduction of the event, Introducing the speaker, vote of thanks | Process of Career Exploration - Knowing Yourself - Personal Characteristics        |
| SLO-2    | Essential components of a good resume, common errors people make while preparing a resume          | Mock interview- Feedback                                                      | Trust and Collaboration - Importance of Collaboration in Organization                         | Improvisation and unprepared presentations, man-woman view, feedback – appreciation and critique - Dos and Don'ts                                                                            | Knowledge about the World of Work - Requirements of Jobs including Self-employment |
| SLO-3    | Resume building format -Video resume – Tips and tricks – Do's and Don'ts                           | Meaning and Importance of Group Discussion - types of Group Discussion        | The Secret to be a high performing Team                                                       | PowerPoint presentation–body language and stage etiquette –practice session                                                                                                                  | Sources of Career Information - Career Opportunities                               |
| SLO-4    | Meaning and types of interview (face to face, telephonic, video) - Dress code, background research | Procedure of Group Discussion - Ground rules - Evaluation of Group Discussion | Creativity - Meaning - Strategies to increase Creativity - creativity skills at the Workplace | PowerPoint presentation–practice session                                                                                                                                                     | Critical Thinking Skills - Problem Solving Skills - Ability to Learn               |
| SLO-5    | STAR Technique (situation, task, approach and response) for facing an interview                    | Group Discussion - Common Errors Group Discussion Rubric                      | Methods and Process of Creativity Skills                                                      | PowerPoint presentation–practice session                                                                                                                                                     | Non- Cognitive Skills - Types of non-cognitive Skills and Strategies               |
| SLO-6    | Interview procedure (opening, listening skills, closure, asking questions)                         | Group discussion – Types and Tips to follow                                   | Social Skills - Peer Pressure                                                                 | Presentation for Internal and External Communication - online & offline Meetings                                                                                                             | Non-Cognitive Skills and Gaps I Socio Economic Status                              |
| SLO-7    | Keys to attain success in an interview                                                             | Group Discussion Practice                                                     | Stress and Stress Management - Meaning Stress Management Techniques                           | Visual elements in Presentation                                                                                                                                                              | Brainstorming                                                                      |
| SLO-8    | Rules and Elements of an Interview                                                                 | Email Drafting – formal and informal                                          | Social and Cultural Etiquette                                                                 | Oral Skills and Public Speaking Skills                                                                                                                                                       | Logic and Rationality of Critical Thinking                                         |
| SLO-9    | Preparation and Practice                                                                           | Writing Email – Practice                                                      | Characteristics and Enhancing Social Skills                                                   | Speaking Skills – Practice                                                                                                                                                                   | Habits and Traits of the Mind                                                      |

| Resources |                                                                                                                            |   |                                                                                             |  |
|-----------|----------------------------------------------------------------------------------------------------------------------------|---|---------------------------------------------------------------------------------------------|--|
| 1         | Scott Bennett, The Elements of Resume Style: Essential Rules for Writing Resumes and Cover Letters That Work, AMACOM, 2014 | 4 | Paul Newton, How to deliver a presentation e-book                                           |  |
| 2         | David John, Tricks and Techniques of Group Discussions, Arihant, 2012                                                      | 5 | Eric Garner, A-Z of Presentation, Eric Garner and Ventus Publishing ApS, 2012, bookboon.com |  |
| 3         | Singh O.P., Art of Effective Communication in Group Discussion and Interview, S Chand & Company, 2014                      |   |                                                                                             |  |



| Course Code | UCS24P02L | Course Title | Internship – II |  |  |  | Category | P | Project Work/Internship | L | T | P | C |
|-------------|-----------|--------------|-----------------|--|--|--|----------|---|-------------------------|---|---|---|---|
|             |           |              |                 |  |  |  |          |   |                         | 0 | 0 | 0 | 1 |

| Course Offering Department | Computer Applications | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|-----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|-----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| Course Rationale (CLR)         |                                                                               | The purpose of learning this course is to:           | Depth                                      |   |   |   | Attainment        |                          |                         | Program Learning Outcomes                              |                                            |                                                                                                                                    |                                              |                                            |                             |       |        |   |    |
|--------------------------------|-------------------------------------------------------------------------------|------------------------------------------------------|--------------------------------------------|---|---|---|-------------------|--------------------------|-------------------------|--------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------|-----------------------------|-------|--------|---|----|
|                                |                                                                               |                                                      | 1                                          | 2 | 3 | 4 | 1                 | 2                        | 3                       | 1                                                      | 2                                          | 3                                                                                                                                  | 4                                            | 5                                          | 6                           | 7     | 8      | 9 | 10 |
| CLR-1                          | Demonstrate skills learnt in the real time environment.                       |                                                      | Conceive<br>Design<br>Implement<br>Operate |   |   |   | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity Solving | Communication Skills, Collaborating Skills | Independent Thinking, Analytical Reasoning, Learning to Leadership Qualities, Professionalism, Autonomy, Digital Technology Skills | Value Incultation, Multicultural Inclusivity | Environmental Action, Community Engagement | Entrepreneurial Risk Taking | PLO-9 | PLO-10 |   |    |
| CLR-2                          | Explore the different industries that are using IT                            |                                                      |                                            |   |   |   |                   |                          |                         |                                                        |                                            |                                                                                                                                    |                                              |                                            |                             |       |        |   |    |
| CLR-3                          | Enhance the skills in the system aspects                                      |                                                      |                                            |   |   |   |                   |                          |                         |                                                        |                                            |                                                                                                                                    |                                              |                                            |                             |       |        |   |    |
| CLR-4                          | Understanding the professional connections with the knowledge learnt          |                                                      |                                            |   |   |   |                   |                          |                         |                                                        |                                            |                                                                                                                                    |                                              |                                            |                             |       |        |   |    |
| CLR-5                          | Applying the skills in problem solving                                        |                                                      |                                            |   |   |   |                   |                          |                         |                                                        |                                            |                                                                                                                                    |                                              |                                            |                             |       |        |   |    |
| Course Learning Outcomes (CLO) |                                                                               | At the end of this course, learners will be able to: |                                            |   |   |   |                   |                          |                         |                                                        |                                            |                                                                                                                                    |                                              |                                            |                             |       |        |   |    |
|                                |                                                                               |                                                      |                                            |   |   |   |                   |                          |                         |                                                        |                                            |                                                                                                                                    |                                              |                                            |                             |       |        |   |    |
| CLO-1                          | To get an insight of an industry and organization/company                     |                                                      | ✓                                          | ✓ | - | - | 2                 | 85                       | 75                      | 3                                                      | 2                                          | 1                                                                                                                                  | 3                                            | 3                                          | -                           | 3     | 2      | 3 | 3  |
| CLO-2                          | To gain valuable skills and knowledge                                         |                                                      | ✓                                          | ✓ | ✓ | - | 2                 | 85                       | 75                      | 2                                                      | 1                                          | 1                                                                                                                                  | 3                                            | 2                                          | -                           | 2     | 1      | 3 | 3  |
| CLO-3                          | To make professional connections and enhance networking                       |                                                      | ✓                                          | ✓ | ✓ | ✓ | 3                 | 85                       | 75                      | 2                                                      | 3                                          | 3                                                                                                                                  | 3                                            | 2                                          | 3                           | 3     | 1      | 3 | 3  |
| CLO-4                          | To get experience in a field to allow the student to make a career transition |                                                      | ✓                                          | ✓ | ✓ | ✓ | 3                 | 85                       | 75                      | 2                                                      | 3                                          | 2                                                                                                                                  | 3                                            | 2                                          | -                           | 3     | 2      | 3 | 3  |
| CLO-5                          | To get an inside view of an industry and organization/company                 |                                                      | ✓                                          | ✓ | ✓ | ✓ | 3                 | 85                       | 75                      | 1                                                      | 2                                          | 2                                                                                                                                  | 3                                            | 3                                          | -                           | 2     | 2      | 3 | 3  |

Students can choose a company of their own interest for internship for a period of minimum four weeks to learn about the application of IT in real time environment. In the first week of July, all the students have to give a presentation about their observations made by them in internship. At the end of the internship period, every student shall submit a structured internship report within 15 days from the date of the completion of the internship period.

| Learning Assessment     |                                                |          |                                  |           |
|-------------------------|------------------------------------------------|----------|----------------------------------|-----------|
| Project Work/Internship | Continuous Learning Assessment (50% weightage) |          | Final Evaluation (50% weightage) |           |
|                         | Review-1                                       | Review-2 | Internship Report                | Viva-Voce |
|                         | 20%                                            | 30%      | 30%                              | 20%       |

### SEMESTER VI

| Course Code | UCS24D05J | Course Title | Fundamentals of Business Application Development | Category | D | Discipline Core / Elective course | L | T | P | C |
|-------------|-----------|--------------|--------------------------------------------------|----------|---|-----------------------------------|---|---|---|---|
|             |           |              |                                                  |          |   |                                   | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                                      | Depth    |        |           |         | Attainment        |    |    | Programme Learning Outcomes |   |   |   |   |   |   |   |   |    |
|-------|---------------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|----|----|-----------------------------|---|---|---|---|---|---|---|---|----|
| CLR-1 | This module aims to introduce the students to some concepts of advanced programming and practice on reusing components.         | 1        | 2      | 3         | 4       | 1                 | 2  | 3  | 1                           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-2 | The course covers Graphical User Interface (GUI) networking, and database manipulation                                          |          |        |           |         |                   |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-3 | To work with Web and Application Servers like Apache Tomcat, Glassfish etc and understand the communication over HTTP protocol. |          |        |           |         |                   |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-4 | Enterprise application using JavaBeans I                                                                                        |          |        |           |         |                   |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-5 | Develop web application using Java Servlet and Server Pages technology                                                          |          |        |           |         |                   |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLO   | At the end of this course, learners will be able to:                                                                            | Conceive | Design | Implement | Operate | Level of Thinking |    |    | Expected Proficiency (%)    |   |   |   |   |   |   |   |   |    |
| CLO-1 | Advanced technology in Java such as Internationalization, and Remote method Invocation                                          | ✓        | ✓      | -         | -       | 2                 | 85 | 75 | 3                           | - | - | 1 | - | 3 | - | 2 | - | -  |
| CLO-2 | To write sophisticated Java applications                                                                                        | ✓        | ✓      | ✓         | -       | 2                 | 85 | 75 | 3                           | 2 | 1 | 2 | 2 | 3 | - | 1 | - | -  |
| CLO-3 | To use Java language for writing well-organized, complex computer programs with both command-line and GUI                       | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 75 | 3                           | 1 | 3 | 1 | 3 | 3 | - | 1 | - | -  |
| CLO-4 | Develop a JSP code to create a Web site                                                                                         | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 75 | 3                           | 3 | 2 | 3 | 3 | 3 | - | 2 | - | -  |
| CLO-5 | Construct Web Application using Servlets                                                                                        | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 75 | 3                           | 3 | 2 | 3 | 3 | 3 | - | 3 | - | -  |

| Sessions | CLO - 1                                                   | CLO - 2                | CLO - 3                                          | CLO - 4                                                             | CLO - 5                                    |
|----------|-----------------------------------------------------------|------------------------|--------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------|
|          | 18                                                        | 18                     | 18                                               | 18                                                                  | 18                                         |
| SLO-1    | Remote method invocation : Overview & Introduction to RMI | Result and Result Sets | Methods of Servlet Interface Single Thread Model | Request Dispatching: Anatomy of Request Processing JSP - Directives | When to use Entity Bean Use of Entity Bean |

|              |                                                                                                         |                                                                                        |                                                                                                                   |                                                                                   |                                                                                                             |
|--------------|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| SLO-2        | Developing an RMI Application<br>Setting up RMI                                                         | Commit and Rollback , Transaction<br>Control                                           | Thread Model<br>Session Tracking: Cookies                                                                         | Forwarding Requests , JSP Client<br>Request                                       | Life Cycle of Entity Bean ,<br>Message Driven Beans:                                                        |
| SLO-3        | RMI , Architecture and RMI<br>Application                                                               | JDBC - Exception Handling                                                              | Cookies , URL Rewriting,<br>Hidden Fields, The Session API                                                        | Request Dispatcher Object<br>JSP Server Response                                  | Create Message driven Beans<br>EJB Annotations                                                              |
| SLO<br>4-6   | Practice: Create distributed<br>applications using RMI                                                  | Practice: Develop Web<br>Applications using Servlet                                    | Practice: Web Application using<br>JSP                                                                            | Practice: An EJB application that<br>demonstrates Session Bean-<br>Stateless Bean | Practice: MVC Architecture(i)<br>Implementing MVC with Request<br>Dispatcher(ii) Data Sharing<br>Approaches |
| SLO-7        | RMI over IIOP. Database Access                                                                          | Servlet – Introduction                                                                 | JSP Overview , Why to Learn JSP                                                                                   | JSP Model1 and Model2<br>Architectures -, Actions in JSP                          | Describe Meta data using<br>Annotations , EJB – Access<br>Database                                          |
| SLO-8        | Overview of JDBC<br>Presentation to JDBC connection                                                     | Types : Generic Servlet,<br>Generic Servlet class                                      | How JSP works<br>JSP Working Principle                                                                            | EJB Architecture: Logical<br>Architecture<br>EJB overview                         | Database Using JDBC API<br>Exception Handling in EJB                                                        |
| SLO-9        | JDBC Drivers                                                                                            | HttpServlet                                                                            | Components of a JSP page                                                                                          | Software Architecture                                                             | Understanding the need for MVC                                                                              |
| SLO<br>10-12 | Practice: Create applications which<br>can demonstrate the use of JDBC<br>for Database Connectivity.    | Practice: Develop Web<br>Applications Using Servlet                                    | Practice: Web Applications<br>using JSP                                                                           | Practice: An EJB application that<br>demonstrates Session Bean-<br>Stateless Bean | Practice: MVC Architecture(i)<br>Implementing MVC with<br>Request Dispatcher                                |
| SLO-13       | Connecting to a Database ,<br>Statement Interface                                                       | Servlet Life Cycle , Servlet Classes,<br>Servlet request                               | JSP life Cycle, JSP API, JSP<br>Syntax                                                                            | EJB Stateful Bean                                                                 | MVC - frameworks , Architecture                                                                             |
| SLO-14       | Statement Interfaces                                                                                    | Servlet Request                                                                        | JSP : Scripting Elements                                                                                          | constraints on session beans                                                      | implementing MVC with request<br>dispatcher                                                                 |
| SLO-15       | Using Meta data, Statement<br>Objects                                                                   | Servlet Context, Servlet Config                                                        | JSP Implicit Objects, Predefined<br>variables                                                                     | Life Cycle of EJB with example,<br>Entity Bean                                    | Spring MVC, Spring Controller<br>Laboratory.                                                                |
| SLO<br>16-18 | Practice: Create applications<br>which can demonstrate the<br>use of JDBC for Database<br>Connectivity. | Practice: Program that<br>demonstrates the use of<br>session management in<br>Servlet. | Practice: Create a JSP based<br>Web application which allows<br>the user to edit his/her database<br>Information. | Practice: An EJB application<br>that demonstrates Entity Bean                     | Practice: Build a Web Application<br>using Struts2 Framework.                                               |

#### Resources

|   |                                                                                                                                  |   |                                                                                                                        |
|---|----------------------------------------------------------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------------------------------------------|
| 1 | Elliott Rusty Harold, (2013), “Java Network Programming”, O’Reilly Publishers. (For Unit I to III)                               | 4 | Antonio Goncalves, (2010), Beginning Java EE 6 Platform with GlassFish 3”, Apress, Second Edition. For Units IV to V ) |
| 2 | “H. M. Deitel,P. J. Deitel,,S. E. Santry,”Advanced Java 2 Platform HOW TO PROGRAM” PRENTICE HALL, Upper Saddle River, New Jersey | 5 | Richard Steflik, Prashant Sridharan,Advanced JAVA Networking , Pearson,2000                                            |
| 3 | Richard M Reese, Learning Network Programming with Java, Packt Publishing, 2015                                                  | 6 | Elliott Rusty Harold, Java Network Programming, 4th Edition, Elliott Rusty Harold, 2013                                |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              | Strategies                 |                      |                   |                         |                          |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|----------------------------|----------------------|-------------------|-------------------------|--------------------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              | Technology                 | Pedagogy / Andragogy |                   | Sustainable Development |                          |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              | Simulations                | Clarification/Pauses |                   | ✓                       | Good Health & Well Being |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              | Presentation Tools         | ✓                    | Group Discussion  | ✓                       | Quality Education        |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) | Learning Management System | ✓                    | Hands-on Practice | ✓                       | Gender Equality          |
| 13                        | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Debate               | ✓                 |                         |                          |
| 14                        | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Interactive Lecture  | ✓                 |                         |                          |
| 15                        | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            | Brainstorming        | ✓                 |                         |                          |
| 16                        | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            |                      |                   |                         |                          |
| 17                        | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                         |                          |
| 18                        | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                         |                          |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |                            |                      |                   |                         |                          |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |  |  |  |                            |                                               |  |  |  |  |                  |                                                                                                |  |  |
|----------------------|---------------------------------------------------------|--|--|--|--|----------------------------|-----------------------------------------------|--|--|--|--|------------------|------------------------------------------------------------------------------------------------|--|--|
| Professional Experts |                                                         |  |  |  |  | Higher Institution Experts |                                               |  |  |  |  | Internal Experts |                                                                                                |  |  |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  |  |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT Chennai |  |  |  |  | 1                | Dr.B.Mahalakshmi, Assistant Professor, Department of Computer Science, mahalakb1@srmist.edu.in |  |  |

| Course Code | UCS24D06J | Course Title | NLP and Language Models | Category | D | Discipline Core / Elective course | L | T | P | C |
|-------------|-----------|--------------|-------------------------|----------|---|-----------------------------------|---|---|---|---|
|             |           |              |                         |          |   |                                   | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                   | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcomes                    |                                     |                                  |                                        |                           |                                 |                                 |                             |       |       |
|-------|------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|------------------------------------------------|-------------------------------------|----------------------------------|----------------------------------------|---------------------------|---------------------------------|---------------------------------|-----------------------------|-------|-------|
|       |                                                                              | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 1                                              | 2                                   | 3                                | 4                                      | 5                         | 6                               | 7                               | 8                           | 9     | 10    |
| CLR-1 | To provide basic concepts of NLP                                             |          |        |           |         |                   |                          |                         |                                                |                                     |                                  |                                        |                           |                                 |                                 |                             |       |       |
| CLR-2 | To provide deeper understanding of various stages of NLP technique           |          |        |           |         |                   |                          |                         |                                                |                                     |                                  |                                        |                           |                                 |                                 |                             |       |       |
| CLR-3 | To understand parsing , preprocessing and feature extraction methods for NLP |          |        |           |         |                   |                          |                         |                                                |                                     |                                  |                                        |                           |                                 |                                 |                             |       |       |
| CLR-4 | Able to design, implement, and analyze NLP algorithms                        |          |        |           |         |                   |                          |                         |                                                |                                     |                                  |                                        |                           |                                 |                                 |                             |       |       |
| CLR-5 | Able to apply the NLP techniques for various purposes                        |          |        |           |         |                   |                          |                         |                                                |                                     |                                  |                                        |                           |                                 |                                 |                             |       |       |
| CLO   | At the end of this course, learners will be able to:                         | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity | Communication Skills, Collaborating | Independent Thinking, Analytical | Leadership Qualities, Professionalism, | Digital Technology Skills | Value Incubation, Multicultural | Environmental Action, Community | Entrepreneurial Risk Taking | PSO-1 | PSO-2 |
| CLO-1 | To provide basic concepts of NLP                                             | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3                                              | 1                                   | 2                                | -                                      | 3                         | 3                               | -                               | -                           | -     | -     |
| CLO-2 | To provide deeper understanding of various stages of NLP technique           | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3                                              | 1                                   | 2                                | -                                      | 3                         | 3                               | -                               | -                           | -     | -     |
| CLO-3 | To understand parsing , preprocessing and feature extraction methods for NLP | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                              | 1                                   | 2                                | -                                      | 3                         | 3                               | -                               | -                           | -     | -     |
| CLO-4 | Able to design, implement, and analyze NLP algorithms                        | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                              | 1                                   | 2                                | -                                      | 3                         | 3                               | -                               | -                           | -     | -     |
| CLO-5 | Able to apply the NLP techniques for various purposes                        | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                              | 1                                   | 2                                | -                                      | 3                         | 3                               | -                               | -                           | -     | -     |

| Sessions | CLO - 1                        | CLO - 2                          | CLO - 3                             | CLO - 4                            | CLO - 5                                                   |
|----------|--------------------------------|----------------------------------|-------------------------------------|------------------------------------|-----------------------------------------------------------|
|          | 18                             | 18                               | 18                                  | 18                                 | 18                                                        |
| SLO-1    | Introduction to NLP            | Textual sources and formats      | <b>Tagged corpora</b>               | ML Basics                          | Feed forward Neural networks                              |
| SLO-2    | Finding the Structure of Words | Web Scraping from online sources | <b>N-Gram tagging</b>               | Logistic regression                | Feed forward neural network model for text classification |
| SLO-3    | Morphological models           | Building your corpus             | <b>Transformation based tagging</b> | Word Embeddingsc – word , Sentence | iD CNN for text classification model                      |

|           |                                                                     |                                                                      |                                                        |                                                                     |                                                                                      |
|-----------|---------------------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| SLO 4-6   | Practice: Introduction to Python text operations                    | Practice: Webscraping and building the corpus for NLP process .      | <b>Practice : Determine the category of a word</b>     | Practice : Implementation of word embedding and logistic regression | Practice: Implementation of iD CNN for text classification                           |
| SLO-7     | Finding the Structure of Documents                                  | Measures of words association                                        | <b>Text features</b>                                   | Text classification                                                 | Applications of NLP                                                                  |
| SLO-8     | Complexity of the approaches                                        | Text retrieval methods                                               | <b>Bow and TF-IDF</b>                                  | N-Gram Models                                                       | Named Entity Recognition Model                                                       |
| SLO-9     | Stages in NLP                                                       | Regular expressions                                                  | N-gram model                                           | Text classification models using BoW , TFIDF                        | <b>Sentiment analysis</b>                                                            |
| SLO 10-12 | Practice: Python code for text processing                           | Practice : Implementation of Text retrieval and regular expression . | Practice : Implementation of TF-IDF and N-gram models. | Practice : Implementation of text classification models.            | <b>Practice :Implementation of Sentiment analysis and NER classification in Text</b> |
| SLO-13    | Parsing natural language                                            | Text preprocessing - Tokenization, N-grams                           | Semantic Interpretation , System Paradigms             | Predicaate – argument structure                                     | <b>Document clustering and word vectors</b>                                          |
| SLO-14    | Tree banks                                                          | Stemming and Lemmatization, Synsets and Hypernyms                    | , Word Sense Systems and its disambiguation            | Discourse processing - cohesion                                     | <b>Word2vec. Doc2Vec</b>                                                             |
| SLO-15    | Parsing Algorithms                                                  | POS Tagging and Stopwords                                            | Lexical semantics – wordnet and framenet               | Reference resolution , Discourse cohesion and structure             | <b>Large language models - overview</b>                                              |
| SLO 16-18 | Practice : Implementation of parsing algorithm using NLTK in Python | Practice :Implemetation of preprocessing techniques to the corpus.   | Practice : Word sense systems                          | Practice “ Implmentation of N-Gram model                            | <b>Practice :Implementaion of document classification using word vectors.</b>        |

| Resources |                                                                                                                                                                                                                                    |  |  |   |                                                                                                                                                                                                                                               |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1         | Steven Bird, Ewan Klein, Edward Loper, Natural Language Processing with Python – Analyzing Text with the Natural Language Toolkit (O'Reilly 2009, website 2018), <a href="http://www.nltk.org/book/">http://www.nltk.org/book/</a> |  |  | 4 | Dipanjan Sarkar, Text Analytics with Python (Apress/Springer, 2016) <a href="https://link-springer-com.proxy.uchicago.edu/book/10.1007%2F978-1-4842-2388-8">https://link-springer-com.proxy.uchicago.edu/book/10.1007%2F978-1-4842-2388-8</a> |
| 2         | Daniel Jurafsky& James H Martin , Speech and Natural Language Processing, , Pearson Publications.                                                                                                                                  |  |  | 5 | Carol Quadros,”Machine Learning with python, scikit-learn and Tensorflow”, Packet Publishing, 2018.                                                                                                                                           |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              | Strategies                 |                      |                      |                          |                         |  |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|----------------------------|----------------------|----------------------|--------------------------|-------------------------|--|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              | Technology                 |                      | Pedagogy / Andragogy |                          | Sustainable Development |  |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              | Simulations                | Clarification/Pauses | ✓                    | Good Health & Well Being |                         |  |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              | Presentation Tools         | ✓                    | Group Discussion     | ✓                        | Quality Education       |  |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) | Learning Management System | ✓                    | Hands-on Practice    | ✓                        | Gender Equality         |  |
| 19                        | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Debate               | ✓                    |                          |                         |  |
| 20                        | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Interactive Lecture  | ✓                    |                          |                         |  |
| 21                        | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            | Brainstorming        | ✓                    |                          |                         |  |
| 22                        | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            |                      |                      |                          |                         |  |
| 23                        | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                      |                          |                         |  |
| 24                        | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                      |                          |                         |  |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |                            |                      |                      |                          |                         |  |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |                            |                                               |  |  |                  |                                                      |  |
|----------------------|---------------------------------------------------------|--|----------------------------|-----------------------------------------------|--|--|------------------|------------------------------------------------------|--|
| Professional Experts |                                                         |  | Higher Institution Experts |                                               |  |  | Internal Experts |                                                      |  |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  | 1                          | Dr. Neela Narayanan V, Professor, VIT Chennai |  |  | 1                | Dr.Aarthi E , Assistant Professor , Computer Science |  |

| Course Code | USA24D07J | Course Title | Cloud Computing | Category | D | Discipline core / Elective course | L | T | P | C |
|-------------|-----------|--------------|-----------------|----------|---|-----------------------------------|---|---|---|---|
|             |           |              |                 |          |   |                                   | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                                | Depth    |        |           |         | Attainment        |    |    | Programme Learning Outcomes |   |   |   |   |   |   |   |   |    |
|-------|---------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|----|----|-----------------------------|---|---|---|---|---|---|---|---|----|
| CLR-1 | Understand and analyze the cost metrics, handle the security threats and construct different cloud delivery design models | 1        | 2      | 3         | 4       | 1                 | 2  | 3  | 1                           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-2 | Understand the architecture of cloud                                                                                      |          |        |           |         |                   |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-3 | Understand the need for virtualization                                                                                    |          |        |           |         |                   |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-4 | The concepts behind scheduling and load balancing that is happening across heterogeneous resources in the environment     |          |        |           |         |                   |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLR-5 | Justify the need for improved hardware and software infrastructures (servers, protocols, security algorithms)             |          |        |           |         |                   |    |    |                             |   |   |   |   |   |   |   |   |    |
| CLO   | At the end of this course, learners will be able to:                                                                      | Conceive | Design | Implement | Operate | Level of Thinking |    |    | Programme Learning Outcomes |   |   |   |   |   |   |   |   |    |
| CLO-1 | Defend the need for cloud computing to run an online business                                                             | ✓        | ✓      | -         | -       | 2                 | 85 | 75 | 3                           | - | - | 1 | - | 3 | - | 2 | 2 | 1  |
| CLO-2 | Understand and figure out the necessities of middleware technologies                                                      | ✓        | ✓      | ✓         | -       | 2                 | 85 | 75 | 3                           | 2 | 1 | 2 | 2 | 3 | - | 1 | 2 | 1  |
| CLO-3 | Practically create a virtual environment (lab purpose using VMware)                                                       | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 75 | 3                           | 1 | 3 | 1 | 3 | 3 | - | 1 | 1 | 2  |
| CLO-4 | Implement cryptoalgorithms that may be used in the computing environment                                                  | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 75 | 3                           | 3 | 2 | 3 | 3 | 3 | - | 2 | 3 | 3  |
| CLO-5 | Know the commercial functioning of cloud computing                                                                        | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 75 | 3                           | 3 | 2 | 3 | 3 | 3 | - | 3 | 3 | 3  |

| Sessions | CLO - 1                    | CLO - 2                                        | CLO - 3                                       | CLO - 4                                                           | CLO - 5                                              |
|----------|----------------------------|------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------------------------------------------|
|          | 18                         | 18                                             | 18                                            | 18                                                                | 18                                                   |
| SLO-1    | Introduction to Networking | Roles and Boundaries, Cloud Characteristics    | Data in Cloud, Data as a Service              | Cloud Usage Monitor, Resource Replication, Ready-Made environment | Simulation Tools: Cloud Sim, Cloud Analyst           |
| SLO-2    | Data Communication         | Cloud Delivery models, Cloud Deployment models | DaaS: Architecture, Advantages, Disadvantages | Load Balancer, SLA Monitor, Hypervisor, Resource Cluster          | Cloud based Web Applications & Service Testing Tools |

|           |                                          |                                                                                                   |                                                                           |                                                                                                                 |                                                                                    |
|-----------|------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| SLO-3     | Introduction to Cloud computing          | Cloud enabling technologies, Data center technologies, Web technologies, Multitenant technologies | Cloud Based data storage                                                  | Cloud Management Mechanisms: Remote Administration systems, SLA Management System                               | Cloud Applications and New Opportunity                                             |
| SLO 4-6   | <b>Lab 1:</b> Create a virtual machine   | <b>Lab 4:</b> Create a drop box using Google APPs                                                 | <b>Lab 7:</b> Security mechanisms: Encryption: Hashing: Digital Signature | <b>Lab 10:</b> Create GAE Launcher                                                                              | <b>Lab 13: File:</b> Create a Warehouse Application inn Salesforce.com             |
| SLO-7     | Origin of Cloud Computing                | Operator precedence Type conversion                                                               | Security Risks and Best Practice, Security Cloud: CIA Concept             | Platform as a Service, Evolution, Introduction, Service Providers                                               | Advanced Cloud, Mobile Cloud, Green Cloud                                          |
| SLO-8     | Basic Concepts and Terminology           | Hardware and Infrastructure, Client network                                                       | Types of Security Attacks                                                 | Service Quality Metrics, SLA Guidelines                                                                         | Strategies for Resource Allocation                                                 |
| SLO-9     | Goals and Benefits, Risks and Challenges | Web browsers, Cloud storage                                                                       | Security Policy Implementation, Techniques to Secure Data                 | Software as a Services: Evolution, Advantages, Unification Technologies                                         | Resource Allocation policies and Algorithms                                        |
| SLO 10-12 | <b>Lab 2:</b> Install virtual box        | <b>Lab 5:</b> Transfer Data using Google APPs                                                     | <b>Lab 8:</b> Simple Experiments in Cloud Sim                             | <b>Lab 11:</b> Client Server communication between two virtual machine instances, execution of chat application | <b>Lab 14:</b> Create a Warehouse Application in Salesforce.com using Apex proLang |
| SLO-13    | Download Linux                           | Cloud Storage Provider                                                                            | Cloud Encryption, Symmetric Encryption                                    | Integrated Products, Product Selection Criteria                                                                 | Performance-based RAS, Importance of Cloud Computing                               |
| SLO-14    | How to install Virtual box               | Infrastructure services                                                                           | Cloud Computing Security Architecture                                     | Infrastructure as a Service: Architecture                                                                       | Performance-based RAS, Importance of Cloud Computing                               |
| SLO-15    | Install Linux using Virtual box          | Client services                                                                                   | Cloud Security Alliance                                                   | IaaS Provider                                                                                                   | Cost based RAS                                                                     |
| SLO 16-18 | <b>Lab 3:</b> Installing C environment   | <b>Lab 6: Arrays</b> – upload and download using Google APPs                                      | <b>Lab 9:</b> Encryption and Decryption of Text                           | <b>Lab 12:</b> Then run the communication between the terminals                                                 | <b>Lab 15:</b> Implementation of SOAP Web Services                                 |

| Resources |                                                                                                                                                                       |  |  |   |                                                                                                                                                   |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|---|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 1         | Thomas Erl, ZaighamMahmood,RichardoPuttini, "Cloud Computing: Concepts,Technology& Architecture", Fourth Printing, Prentice Hall/PearsonPTR, 2014,ISBN: 780133387520. |  |  | 3 | K.Chandrasekaran, "Essentials of Cloud Computing", Chapman and Hall/CRC Press, 2014, ISBN 9781482205435.                                          |
| 2         | ArshdeepBahga, Vijay Madiseti, "Cloud Computing: A Hands-On Approach", University Press, 2016, ISBN: 9780996025508.                                                   |  |  | 4 | Thomas Erl, Robert Cope, Amin Naserpour, "Cloud Computing Design Patterns",Prentice Hall/Service Tech Press, Pearson, 2015, ISBN: 978-0133858563. |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              | Strategies                 |                      |                   |                          |                   |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|----------------------------|----------------------|-------------------|--------------------------|-------------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              | Technology                 | Pedagogy / Andragogy |                   | Sustainable Development  |                   |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              | Simulations                | Clarification/Pauses | ✓                 | Good Health & Well Being | ✓                 |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              | Presentation Tools         | ✓                    | Group Discussion  | ✓                        | Quality Education |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) | Learning Management System | ✓                    | Hands-on Practice | ✓                        | Gender Equality   |
| 25                        | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Debate               | ✓                 |                          |                   |
| 26                        | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Interactive Lecture  | ✓                 |                          |                   |
| 27                        | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            | Brainstorming        | ✓                 |                          |                   |
| 28                        | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            |                      |                   |                          |                   |
| 29                        | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |
| 30                        | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |                            |                      |                   |                          |                   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |                            |                                               |
|----------------------|---------------------------------------------------------|----------------------------|-----------------------------------------------|
| Professional Experts |                                                         | Higher Institution Experts |                                               |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai | 1                          | Dr. Neela Narayanan V, Professor, VIT Chennai |
|                      |                                                         | 1                          | Dr G Kalpana, Professor, FSH, SRMIST          |

| Course Code | UCS24D08J | Course Title | Microprocessors and Embedded Systems | Category | D | Discipline core / Elective course | L | T | P | C |
|-------------|-----------|--------------|--------------------------------------|----------|---|-----------------------------------|---|---|---|---|
|             |           |              |                                      |          |   |                                   | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                         | Depth |   |   |   | Attainment |   |   | Programme Learning Outcomes |   |   |   |   |   |   |   |   |    |
|-------|--------------------------------------------------------------------|-------|---|---|---|------------|---|---|-----------------------------|---|---|---|---|---|---|---|---|----|
| CLR-1 | Illustrate the internal architecture of 8085 microprocessor        | 1     | 2 | 3 | 4 | 1          | 2 | 3 | 1                           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-2 | Explain the interfacing of PPI and DMA with 8085 microprocessor    |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-3 | Illustrate the Architecture and serial interface                   |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-4 | Outline the programming model and interfacing devices with Arduino |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |
| CLR-5 | Evaluate the various analog sensors and output devices             |       |   |   |   |            |   |   |                             |   |   |   |   |   |   |   |   |    |

  

| CLO   | At the end of this course, learners will be able to:                                                                                                                     | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity | Communication Skills, Collaborating | Independent Thinking, Analytical | Leadership Qualities, Professionalism, Digital Technology Skills | Value Incubation, Multicultural | Environmental Action, Community | Entrepreneurial Risk Taking | PSO-1 | PSO-2 |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|------------------------------------------------|-------------------------------------|----------------------------------|------------------------------------------------------------------|---------------------------------|---------------------------------|-----------------------------|-------|-------|
| CLO-1 | Explain the architecture of 8085 , Discuss various addressing modes and instruction set of 8085                                                                          | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3                                              | -                                   | 1                                | -                                                                | 3                               | -                               | 2                           | 2     | 1     |
| CLO-2 | Describe the architecture of 8085 , Discuss various addressing modes and instruction set of 8085, Illustrate the importance of I/O, Memory and PPI interfacing with 8085 | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3                                              | 2                                   | 1                                | 2                                                                | 3                               | -                               | 1                           | 2     | 1     |
| CLO-3 | Describe the Timer/Clock I/O and external interrupts of Arduino , Determine the serial interface device with Arduino                                                     | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                              | 1                                   | 3                                | 1                                                                | 3                               | 3                               | -                           | 1     | 2     |
| CLO-4 | describe the Arduino software architecture (L2) 2. explain the designs using Bluetooth, USB and CAN control , Demonstrate Stepper, PWM and Servo control with Arduino    | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                              | 3                                   | 2                                | 3                                                                | 3                               | 3                               | -                           | 2     | 3     |
| CLO-5 | describe various analog sensors interfacing with Arduino microcontroller , Illustrate vibration and motion sensors with Arduino                                          | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                              | 3                                   | 2                                | 3                                                                | 3                               | 3                               | -                           | 3     | 3     |

| Sessions | CLO - 1                                                   | CLO - 2                    | CLO - 3                                            | CLO - 4                             | CLO - 5                   |
|----------|-----------------------------------------------------------|----------------------------|----------------------------------------------------|-------------------------------------|---------------------------|
|          | 18                                                        | 18                         | 18                                                 | 18                                  | 18                        |
| SLO-1    | An introduction to microprocessors and their applications | Memory hierarchy and types | Definition and characteristics of embedded systems | Design requirements and constraints | IoT architecture overview |
| SLO-2    | Overview of 8085/8086 architecture                        | Memory interfacing in 8085 | Examples in real-world applications                | Hardware-software co-design         | IoT layers and devices    |

|           |                                     |                                        |                                          |                                         |                                    |
|-----------|-------------------------------------|----------------------------------------|------------------------------------------|-----------------------------------------|------------------------------------|
| SLO-3     | Microprocessor vs. Microcontroller  | I/O interfacing and peripheral devices | Components of embedded systems           | Overview of system specifications       | Embedded systems in IoT            |
| SLO 4-6   | Key components: ALU, registers      | I/O ports                              | Embedded systems in computing            | System partitioning techniques          | IoT hardware platforms (ESP8266)   |
| SLO-7     | Data transfer instructions          | Interfacing methods                    | Overview of 8051 architecture            | Basics of UART and serial communication | Basics of MQTT and HTTP protocols  |
| SLO-8     | Arithmetic and logical instructions | Concept of stack and subroutine        | Key features of 8051                     | UART examples and applications          | Cloud integration for IoT          |
| SLO-9     | Branching instructions              | Stack operations                       | Registers, I/O ports, and memory in 8051 | I2C communication protocol              | Data logging and monitoring        |
| SLO 10-12 | Addressing modes and examples       | Subroutine calls                       | Differences between 8051 and ARM         | Interfacing using I2C                   | Sending data to the cloud          |
| SLO-13    | Introduction to Assembly Language   | Writing subroutines in ALP             | Introduction to embedded C programming   | Basics of SPI communication protocol    | Applications of IoT in healthcare  |
| SLO-14    | Basic ALP examples                  | Stack pointers in microprocessors      | Variables, loops, and functions          | SPI applications and interfacing        | Automotive applications            |
| SLO-15    | Writing simple ALP programs         | Types of interrupts                    | Writing embedded C programs              | Interfacing sensors: ADC and DAC        | Smart homes and automation         |
| SLO 16-18 | Debugging and testing ALP           | Handling interrupts in 8085            | Debugging techniques in C                | Reading sensor data                     | Consumer electronics and wearables |

| Resources |                                                                                                                                          |  |  |   |                                                                                                                           |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------|--|--|---|---------------------------------------------------------------------------------------------------------------------------|
| 1         | Gaonkar, Ramesh S. Microprocessor Architecture, Programming and Applications with the 8085-8080a. ,6th Edition, Prentice Hall PTR, 2013. |  |  | 3 | Mano, M. Morris, Digital logic and computer design.1st Edition, Pearson Education India, 2016                             |
| 2         | Hughes, John M. Arduino: a technical reference: a handbook for technicians, engineers, and makers. " O'Reilly Media, Inc.", 2016.        |  |  | 4 | Ray, Ajoy Kumar, and Kishor M. Bhurchandi. Advanced Microprocessors and Peripherals. 3rd Edition, Tata McGraw-Hill, 2006. |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              | Strategies                 |                      |                   |                          |                   |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|----------------------------|----------------------|-------------------|--------------------------|-------------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              | Technology                 | Pedagogy / Andragogy |                   | Sustainable Development  |                   |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              | Simulations                | Clarification/Pauses | ✓                 | Good Health & Well Being | ✓                 |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              | Presentation Tools         | ✓                    | Group Discussion  | ✓                        | Quality Education |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) | Learning Management System | ✓                    | Hands-on Practice | ✓                        | Gender Equality   |
| 1                         | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Debate               | ✓                 |                          |                   |
| 2                         | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Interactive Lecture  | ✓                 |                          |                   |
| 3                         | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            | Brainstorming        | ✓                 |                          |                   |
| 4                         | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            |                      |                   |                          |                   |
| 5                         | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |
| 6                         | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |                            |                      |                   |                          |                   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |  |  |  |                            |                                               |  |  |                  |                                                      |
|----------------------|---------------------------------------------------------|--|--|--|--|----------------------------|-----------------------------------------------|--|--|------------------|------------------------------------------------------|
| Professional Experts |                                                         |  |  |  |  | Higher Institution Experts |                                               |  |  | Internal Experts |                                                      |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  |  |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT Chennai |  |  | 1                | Dr.Meenakshi, Dept. of Computer Science, FSH, SRMIST |

| Course Code | UCS24P03L | Course Title | Project Work | Category | P | Project work / Internship | L | T | P | C |
|-------------|-----------|--------------|--------------|----------|---|---------------------------|---|---|---|---|
|             |           |              |              |          |   |                           | 0 | 0 | 4 | 2 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                    | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcomes |                                            |                                    |                                            |                                                 |                                         |                             |       |       |   |    |  |
|-------|-------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|-----------------------------|--------------------------------------------|------------------------------------|--------------------------------------------|-------------------------------------------------|-----------------------------------------|-----------------------------|-------|-------|---|----|--|
| CLR-1 | Demonstrate skills learnt in the real time environment.                       | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 7                           | 1                                          | 2                                  | 3                                          | 4                                               | 5                                       | 6                           | 7     | 8     | 9 | 10 |  |
| CLR-2 | Explore the different industries that are using IT                            |          |        |           |         |                   |                          |                         |                             |                                            |                                    |                                            |                                                 |                                         |                             |       |       |   |    |  |
| CLR-3 | Enhance the skills in the system aspects                                      |          |        |           |         |                   |                          |                         |                             |                                            |                                    |                                            |                                                 |                                         |                             |       |       |   |    |  |
| CLR-4 | Understanding the professional connections with the knowledge learnt          |          |        |           |         |                   |                          |                         |                             |                                            |                                    |                                            |                                                 |                                         |                             |       |       |   |    |  |
| CLR-5 | Applying the skills in problem solving                                        |          |        |           |         |                   |                          |                         |                             |                                            |                                    |                                            |                                                 |                                         |                             |       |       |   |    |  |
|       |                                                                               | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) |                             | Communication Skills, Collaborative Skills | Problem Solving, Critical Thinking | Communication Skills, Independent Thinking | Leadership Qualities, Digital Technology Skills | Value Incultation, Environmental Action | Entrepreneurial Risk Taking | PSO-1 | PSO-2 |   |    |  |
| CLO   | At the end of this course, learners will be able to:                          |          |        |           |         |                   |                          |                         |                             |                                            |                                    |                                            |                                                 |                                         |                             |       |       |   |    |  |
| CLO-1 | To get an inside view of an industry and organization/company                 | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      |                             | 3                                          | -                                  | -                                          | -                                               | -                                       | -                           | -     | -     | - | -  |  |
| CLO-2 | To gain valuable skills and knowledge                                         | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      |                             | 3                                          | -                                  | -                                          | -                                               | -                                       | -                           | -     | -     | - | -  |  |
| CLO-3 | To make professional connections and enhance networking                       | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                             | 3                                          | -                                  | -                                          | -                                               | 3                                       | -                           | -     | -     | - | -  |  |
| CLO-4 | To get experience in a field to allow the student to make a career transition | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                             | 3                                          | 3                                  | -                                          | -                                               | -                                       | -                           | -     | 3     | 3 |    |  |
| CLO-5 | To get an inside view of an industry and organization/company                 | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                             | 3                                          | 3                                  | -                                          | -                                               | 3                                       | -                           | -     | 3     | 3 | 3  |  |

\*Students can choose a company of their own interest for internship for a period of minimum four weeks to learn about the application of IT in real time environment. In the first week of July, all the students have to give a presentation about their observations made by them in internship. At the end of the internship period, every student shall submit a structured internship report within 15 days from the date of the completion of the internship period.

| Learning Assessment |                                                |            |                                  |           |
|---------------------|------------------------------------------------|------------|----------------------------------|-----------|
| Project Work        | Continuous Learning Assessment (50% weightage) |            | Final Evaluation (50% weightage) |           |
|                     | Review – 1                                     | Review – 2 | Project Report                   | Viva-Voce |
|                     | 20%                                            | 30 %       | 30 %                             | 20 %      |

| Course Code | UCD24V02T | Course Title | Universal Human Values | Category | V | Value added Course | L | T | P | C |
|-------------|-----------|--------------|------------------------|----------|---|--------------------|---|---|---|---|
|             |           |              |                        |          |   |                    | 2 | 0 | 0 | 2 |

| Course Offering Department | Career Guidance Cell | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                                                                                                                                           | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                           |   |   |   |   |   |   |   |   |    |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|----|
| CLR-1 | Help the students to understand need of value education, appreciate the essential complementarity between 'values' and 'skills' and to ensure sustained happiness and prosperity which are the core aspirations of all human beings, | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 1                                                                                                                                                                                                                                                                                                                                                                                                     | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-2 | Help students initiate a process of dialog within themselves to know what they really want to be' in their life and profession.                                                                                                      |          |        |           |         |                   |                          |                         |                                                                                                                                                                                                                                                                                                                                                                                                       |   |   |   |   |   |   |   |   |    |
| CLR-3 | Help students to understand the meaning of happiness and prosperity for a human being, understanding holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.        |          |        |           |         |                   |                          |                         |                                                                                                                                                                                                                                                                                                                                                                                                       |   |   |   |   |   |   |   |   |    |
| CLR-4 | Help students on right understanding of the Human reality and the rest of existence, harmony at all the levels of human living, and live accordingly.                                                                                |          |        |           |         |                   |                          |                         |                                                                                                                                                                                                                                                                                                                                                                                                       |   |   |   |   |   |   |   |   |    |
| CLR-5 | Highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.                                 |          |        |           |         |                   |                          |                         |                                                                                                                                                                                                                                                                                                                                                                                                       |   |   |   |   |   |   |   |   |    |
| CLO   | At the end of this course, learners will be able to:                                                                                                                                                                                 | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | 7<br>Communication Skills, Collaborating Skills<br>Problem Solving, Critical Thinking, Creativity<br>Communication Skills, Collaborating Skills<br>Independent Thinking, Analytical Reasoning, Leadership Qualities, Professionalism, Digital Technology Skills<br>Value Inculturation, Multicultural inclusivity<br>Environmental Action, Community<br>Entrepreneurial Risk Taking<br>PSO-1<br>PSO-2 |   |   |   |   |   |   |   |   |    |
| CLO-1 | Evaluate the significance of value inputs in formal education and start applying them in their life and profession                                                                                                                   | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      |                                                                                                                                                                                                                                                                                                                                                                                                       |   |   |   |   |   |   |   |   |    |
| CLO-2 | Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.                                                                     | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      |                                                                                                                                                                                                                                                                                                                                                                                                       |   |   |   |   |   |   |   |   |    |
| CLO-3 | Analyze the value of harmonious relationship based on trust and respect in their life and profession                                                                                                                                 | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                                                                                                                                                                                                                                                                                                                                                                                                       |   |   |   |   |   |   |   |   |    |
| CLO-4 | Examine the role of a human being in ensuring harmony in society and nature.                                                                                                                                                         | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                                                                                                                                                                                                                                                                                                                                                                                                       |   |   |   |   |   |   |   |   |    |
| CLO-5 | Apply the understanding of ethical conduct to formulate the strategy for ethical life and profession.                                                                                                                                | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                                                                                                                                                                                                                                                                                                                                                                                                       |   |   |   |   |   |   |   |   |    |

| Session |       | 6                                                                 | 6                                                                      | 6                                                           | 6                                                                                         | 6                                                                                    |
|---------|-------|-------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| S-1     | SLO 1 | Right Understanding, Relationship and Physical Facility           | Understanding Human being as the Co-existence of the Self and the Body | Harmony in the Family – the Basic Unit of Human Interaction | Understanding Harmony in the Nature                                                       | Natural Acceptance of Human Values                                                   |
| S-2     | SLO 1 | Understanding Value Education                                     | Distinguishing between the Needs of the Self and the Body              | Trust – the Foundational Value in Relationship              | Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature | Definitiveness of (Ethical) Human Conduct                                            |
| S-3     | SLO 1 | Self-exploration as the Process for Value Education               | The Body as an Instrument of the Self                                  | Respect – as the Right Evaluation                           | Exploring the Four Orders of Nature                                                       | A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order  |
| S-4     | SLO 1 | Continuous Happiness and Prosperity – the Basic Human Aspirations | Understanding Harmony in the Self                                      | Other Feelings, Justice in Human-to-Human Relationship      | Realizing Existence as Co-existence at All Levels                                         | Competence in Professional Ethics                                                    |
| S-5     | SLO 1 | Happiness and Prosperity – Current Scenario                       | Harmony of the Self with the Body                                      | Understanding Harmony in the Society                        | The Holistic Perception of Harmony in Existence                                           | Holistic Technologies, Production Systems and Management Models-Typical Case Studies |
| S-6     | SLO 1 | Method to Fulfill the Basic Human Aspirations                     | Programme to ensure self-regulation and Health                         | Vision for the Universal Human Order                        | Exploring Co-existence in Existence                                                       | Strategies for Transition towards Value-based Life and Profession                    |

|                           |                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Learning Resources</b> | <ol style="list-style-type: none"> <li>1. Gaur R.R., Sangal R., Bagaria G.P., 2019 (2nd Revised Edition), A Foundation Course in Human Values and Professional Ethics, Excel Books, New Delhi.</li> <li>2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond &amp; Briggs, Britain.</li> </ol> | <ol style="list-style-type: none"> <li>3. A Nagraj, 1998, Jeevan Vidya EkParichay, Divya Path Sansthan, Amarkantak.</li> <li>4. A N Tripathy, 2003, Human Values, New Age International Publishers.</li> </ol> |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Assessment                |                                                       |            |            |            |     | Strategies                 |   |                      |   |                          |
|---------------------------|-------------------------------------------------------|------------|------------|------------|-----|----------------------------|---|----------------------|---|--------------------------|
| Bloom's Level of Thinking | Continuous Learning Assessment (CLA) (100% weightage) |            |            |            |     | Technology                 |   | Pedagogy / Andragogy |   | Sustainable Development  |
|                           | CLA – 1                                               | CLA – 2    | CLA – 3    | CLA – 4    |     |                            |   |                      |   |                          |
|                           | (20 %)                                                | (20 %)     | (30 %)     | (30%)      |     |                            |   |                      |   |                          |
|                           | Theory (%)                                            | Theory (%) | Theory (%) | Theory (%) |     |                            |   |                      |   |                          |
| 7                         | Remember                                              | 20         | 10         | 20         | 10  | Simulations                | ✓ | Clarification/Pauses | ✓ | Good Health & Well Being |
| 8                         | Understand                                            | 20         | 10         | 20         | 10  | Presentation Tools         | ✓ | Group Discussion     |   | Quality Education        |
| 9                         | Apply                                                 | 20         | 20         | 20         | 20  | Learning Management System | ✓ | Hands-on Practice    | ✓ | Gender Equality          |
| 10                        | Analyze                                               | 20         | 20         | 20         | 20  |                            |   | Debate               |   |                          |
| 11                        | Evaluate                                              | 10         | 20         | 10         | 20  |                            |   | Interactive Lecture  | ✓ |                          |
| 12                        | Create                                                | 10         | 20         | 10         | 20  |                            |   | Brainstorming        | ✓ |                          |
| Total (%)                 |                                                       | 100        | 100        | 100        | 100 |                            |   |                      |   |                          |

\* The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Course Designers                                                  |                                                                                             |                                                                          |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Experts from Industry                                             | Experts from Higher Technical Institutions                                                  | Internal Experts                                                         |
| Prof. Rajiv Kumar, Member Secretary,<br>NCC-IP as member at AICTE | Mrs. V Sumathi, Associate Professor,<br>Sri Sairam Engineering College, Chennai, Tamil Nadu | Dr. Supraja P, UHV University Coordinator, SRMIST                        |
|                                                                   |                                                                                             | Dr. Deepalakshmi S, HoD, Department of Career Guidance Cell, FSH, SRMIST |
|                                                                   |                                                                                             | Dr. Sweety Bakyarani E, Department of Computer Science, FSH, SRMIST      |

## SEMESTER VII

| Course Code | UCS24D09J | Course Title | Mobile Application Development | Category | D | Disciplinary Core / Elective course | L | T | P | C |
|-------------|-----------|--------------|--------------------------------|----------|---|-------------------------------------|---|---|---|---|
|             |           |              |                                |          |   |                                     | 3 | 0 | 3 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                                                 | Depth    |        |           |         | Attainment        |                      |                     | Programme Learning Outcomes |                       |                       |                       |                    |                    |                       |                      |       |       |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|----------------------|---------------------|-----------------------------|-----------------------|-----------------------|-----------------------|--------------------|--------------------|-----------------------|----------------------|-------|-------|
| CLR-1 | Learn and apply software patterns for the development of the application models                                                            | 1        | 2      | 3         | 4       | 1                 | 2                    | 3                   | 1                           | 2                     | 3                     | 4                     | 5                  | 6                  | 7                     | 8                    | 9     | 10    |
| CLR-2 | Learn and work within the capabilities and limitations of mobile devices                                                                   |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLR-3 | Design, implement and deploy mobile applications using an appropriate software development environment.                                    |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLR-4 | Understand the need for cross platform tools to build rich commercial mobile applications                                                  |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLR-5 | Develop, distribute and monetize the mobile applications                                                                                   |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
|       |                                                                                                                                            | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency | Expected Attainment | Problem Solving,            | Communication Skills, | Independent Thinking, | Leadership Qualities, | Digital Technology | Value Inculcation, | Environmental Action, | Entrepreneurial Risk | PSO-1 | PSO-2 |
| CLO   | At the end of this course, learners will be able to:                                                                                       |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLO-1 | Build mobile applications                                                                                                                  | ✓        | ✓      | -         | -       | 2                 | 85                   | 75                  | 3                           | -                     | -                     | 1                     | -                  | 3                  | -                     | 2                    | 2     | 1     |
| CLO-2 | Use the reusability concepts to rebuild the existing applications for the present day need without losing the nature of the app's behavior | ✓        | ✓      | ✓         | -       | 2                 | 85                   | 75                  | 3                           | 2                     | 1                     | 2                     | 2                  | 3                  | -                     | 1                    | 2     | 1     |
| CLO-3 | Understand the concept of virtualization for running the code using emulators                                                              | ✓        | ✓      | ✓         | ✓       | 3                 | 85                   | 75                  | 3                           | 1                     | 3                     | 1                     | 3                  | 3                  | -                     | 1                    | 1     | 2     |
| CLO-4 | Experiment the application in the mobile device                                                                                            | ✓        | ✓      | ✓         | ✓       | 3                 | 85                   | 75                  | 3                           | 3                     | 2                     | 3                     | 3                  | 3                  | -                     | 2                    | 3     | 3     |
| CLO-5 | Simulate existing applications with rich UIs                                                                                               | ✓        | ✓      | ✓         | ✓       | 3                 | 85                   | 75                  | 3                           | 3                     | 2                     | 3                     | 3                  | 3                  | -                     | 3                    | 3     | 3     |

| Sessions | CLO-1                                                                                                       | CLO-2                                                      | CLO-3                                                                                  | CLO-4                                                                        | CLO-5                                                         |
|----------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------|
|          | 18                                                                                                          | 18                                                         | 18                                                                                     | 18                                                                           | 18                                                            |
| SLO-1    | What is mobile computing? History of mobile environments, Early mobile phones to smart phones and tablets   | Mobile Development: Introduction, Advantages, Limitations, | Android Overview, Features,                                                            | Understanding Activity                                                       | Animations                                                    |
| SLO-2    | Development for mobile environments,                                                                        | Features useful for mobile phones                          | Android Architecture                                                                   | Activity Lifecycle                                                           | OpenGL                                                        |
| SLO-3    | Differences from traditional application development                                                        | Geolocation, Offline applications                          | Android applications                                                                   | Multi device support                                                         | Wireless Connections                                          |
| SLO 4&5  | Practice: Understanding the installation procedure of android environment                                   | Practice: Animations and Graphics (2D/3D)                  | Practice: Android libraries                                                            | Practice: Intents                                                            | Practice: Location Aware Applications                         |
| SLO-6    | Trends in mobile development,                                                                               | Offline storage                                            | Android framework                                                                      | Fragments                                                                    | Data Syncing                                                  |
| SLO-7    | Understanding emulator Knowledge about build tools                                                          | Audio and Video                                            | Android Kernal                                                                         | MediaPlayer: Audio                                                           | Best Practices for the development of remarkable applications |
| SLO-8    | Web applications and mobile applications                                                                    | Framework: Phone Gap                                       | Application stores and publishing                                                      | Image Capture                                                                | Mobile App Distribution                                       |
| SLO 9&10 | Practice: Understanding Virtualization and enabling it in the Operating system to support emulation process | Practice: Framework: HTML5                                 | Practice: Android Ecosystem                                                            | Practice: MediaPlayer: Video                                                 | Practice: Using Color, Font, Intent                           |
| SLO-11   | Understanding SDK tools                                                                                     | Jquery Mobile Framework                                    | Android Development Tools, SDK, Emulator,                                              | Color                                                                        | Focusing on security                                          |
| SLO-12   | Mobile websites                                                                                             | Comparison of framework                                    | Android Activity Lifecycle                                                             | Font                                                                         | Monetization Models                                           |
| SLO-13   | Google services for mobile Applications,                                                                    | Features and utilities                                     | Android Layouts                                                                        | Information Design Tools                                                     | Knowing Monetization tools                                    |
| SLO 4&15 | Practice: Installing Android and setup environment                                                          | Practice: Using HTML5 implement geolocation, cookies       | Practice: Using Android implement Activity methods, Layout, TextView, Password, Button | Practice: Using Android implement MediaPlayer, Images ProgressBar, RatingBar | Practice: Monetization                                        |

| Resources |                                                                                                                                                   |  |  |  |  |  |  |  |   |                                                                                                                                                                |  |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 1         | Ed Burnette, “Hello Android: Introducing Google's Mobile DevelopmentPlatform”, 2010, The Pragmatic Programmers, 3rd edition. (For Units I to III) |  |  |  |  |  |  |  | 4 | Jeff McWherter and Scott Gowell, Professional Mobile Application Development", 2012, Wrox. (For Units IV to V )                                                |  |
| 2         | Reto Meier, “Professional Android 4 Application Development”, 2012, Wrox Publications                                                             |  |  |  |  |  |  |  | 5 | ZigurdMednieks, Laird Dornin, Blake Meike G, Masumi Nakamura, “Programming Android: Java Programming for the 2011, New Generation of Mobile Devices”, O'Reilly |  |
| 3         | WeiMeng Lee , “Beginning Android Application Development”, 2012, Wrox Publications                                                                |  |  |  |  |  |  |  |   |                                                                                                                                                                |  |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) |
| 1                         | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |
| 2                         | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |
| 3                         | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |
| 4                         | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |
| 5                         | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |
| 6                         | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |

| Strategies                 |  |                      |                     |                         |                          |
|----------------------------|--|----------------------|---------------------|-------------------------|--------------------------|
| Technology                 |  | Pedagogy / Andragogy |                     | Sustainable Development |                          |
| Simulations                |  | Clarification/Pauses |                     | ✓                       | Good Health & Well Being |
| Presentation Tools         |  | ✓                    | Group Discussion    | ✓                       | Quality Education        |
| Learning Management System |  | ✓                    | Hands-on Practice   | ✓                       | Gender Equality          |
|                            |  |                      | Debate              | ✓                       |                          |
|                            |  |                      | Interactive Lecture | ✓                       |                          |
|                            |  |                      | Brainstorming       | ✓                       |                          |
|                            |  |                      |                     |                         |                          |
|                            |  |                      |                     |                         |                          |
|                            |  |                      |                     |                         |                          |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |  |  |  |                            |                                               |  |  |                  |                                       |
|----------------------|---------------------------------------------------------|--|--|--|--|----------------------------|-----------------------------------------------|--|--|------------------|---------------------------------------|
| Professional Experts |                                                         |  |  |  |  | Higher Institution Experts |                                               |  |  | Internal Experts |                                       |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  |  |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT chennai |  |  | 1                | Dr.P.Muthulakshmi, Professor, SRMIST, |

| Course Code | USA24D10T | Course Title | Wireless Communication and Mobile Computing | Category | D | Discipline core / Elective course | L | T | P | C |
|-------------|-----------|--------------|---------------------------------------------|----------|---|-----------------------------------|---|---|---|---|
|             |           |              |                                             |          |   |                                   | 4 | 0 | 0 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                            | Depth    |        |           |         | Attainment        |                      |                     | Programme Learning Outcomes |                       |                       |                       |                    |                    |                       |                      |       |       |
|-------|---------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|----------------------|---------------------|-----------------------------|-----------------------|-----------------------|-----------------------|--------------------|--------------------|-----------------------|----------------------|-------|-------|
| CLR-1 | Build robust applications                                                             | 1        | 2      | 3         | 4       | 1                 | 2                    | 3                   | 1                           | 2                     | 3                     | 4                     | 5                  | 6                  | 7                     | 8                    | 9     | 10    |
| CLR-2 | High performance applications                                                         |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLR-3 | Create modular programs and reusable code                                             |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLR-4 | Emphasis on the fundamentals of structured design with classes.                       |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLR-5 | Build the base for learning mobile application and enterprise application development |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
|       |                                                                                       | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency | Expected Attainment | Problem Solving,            | Communication Skills, | Independent Thinking, | Leadership Qualities, | Digital Technology | Value Incultation, | Environmental Action, | Entrepreneurial Risk | PSO-1 | PSO-2 |
| CLO   | At the end of this course, learners will be able to:                                  |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLO-1 | Develop, document, and debug modular java programs                                    | ✓        | ✓      | -         | -       | 2                 | 85                   | 75                  | 3                           | -                     | -                     | 1                     | -                  | 3                  | -                     | 2                    | -     | -     |
| CLO-2 | Select a suitable programming construct and data structure for a situation.           | ✓        | ✓      | ✓         | -       | 2                 | 85                   | 75                  | 3                           | 2                     | 1                     | 2                     | 2                  | 3                  | -                     | 1                    | -     | -     |
| CLO-3 | Define classes and use them in applications                                           | ✓        | ✓      | ✓         | ✓       | 3                 | 85                   | 75                  | 3                           | 1                     | 3                     | 1                     | 3                  | 3                  | -                     | 1                    | -     | -     |
| CLO-4 | Use built-in packages, exception in applications.                                     | ✓        | ✓      | ✓         | ✓       | 3                 | 85                   | 75                  | 3                           | 3                     | 2                     | 3                     | 3                  | 3                  | -                     | 2                    | -     | -     |
| CLO-5 | Apply inheritance and interfaces to encourage reusability of code                     | ✓        | ✓      | ✓         | ✓       | 3                 | 85                   | 75                  | 3                           | 3                     | 2                     | 3                     | 3                  | 3                  | -                     | 3                    | -     | -     |

| Sessions | CLO – 1                                                | CLO – 2                                    | CLO – 3                          | CLO - 4                                                                                                                    | CLO - 5                                                                                            |
|----------|--------------------------------------------------------|--------------------------------------------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
|          | 18                                                     | 18                                         | 18                               | 18                                                                                                                         | 18                                                                                                 |
| SLO-1    | Short history of wireless communication, Applications, | Network Concepts<br>Communication Networks | Personal Communication Services  | Mobile Data Services and Short Range Network , Mobile Data Services Introduction Messaging, wireless web, WAP, site design | File systems:<br>Consistency, Examples; World Wide Web: Hypertext transfer protocol                |
| SLO-2    | Frequency for radio transmission,                      | LANs, MANs, WANs,                          | Introduction, HSCSD, GPRS        | Short-Range Wireless Networks: Unlicensed spectrum, WLANs, cordless telephony, IrDA, Bluetooth Smart Phones:               | Mobile File System, Mobile databases                                                               |
| SLO-3    | Frequency for the Signals and Antennas                 | Circuit switching, Packet switching,       | Introduction- CDMA One- CDMA Two | : Future phones, mobile OSs, smartphone applications                                                                       | Language Support: Hypertext markup language (XHTML)-MP,                                            |
| SLO-4    | Signal propagation                                     | : ATM Cellular Networks                    | D-AMPS, CDMA One,                | Data Services- Messaging- Wireless web- WAP- Site design-                                                                  | : Wireless markup language; WML script,                                                            |
| SLO-5    | Working of wireless ad hoc network                     | Introduction, Cells, Duplexing             | : CDMA Two                       | Short-Range Wireless Networks-                                                                                             | Mobile Application Languages- XML                                                                  |
| SLO-6    | Transmission Fundamentals                              | , Multiplexing, Voice coding               | Packet Data Systems- GSM- HSCSD- | Unlicensed spectrum- WLANs- Cordless telephony- IrDA                                                                       | Voice XML. Java, J2ME and JavaCard.                                                                |
| SLO-7    | Cellphone Generations- 1G and 2G- 2.5G- 3G             | Multiple Access Techniques: FDMA, TDMA,    | GPRS- D-AMPS                     | Bluetooth Smart Phones- Future phones                                                                                      | WAP Developer Toolkits and application environment                                                 |
| SLO-8    | Transmission Introduction- 4G                          | , SDMA, CDMA,                              | Packet Data Systems              | Unlicensed spectrum- WLANs- Cordless telephony- IrDA- Bluetooth Smart Phones- Future phones                                | Wireless telephony application, Mobile agents,                                                     |
| SLO - 9  | Transmission Fundamentals                              | Spectral efficiency                        | Hard and Soft Handoff            | Mobile OSs- Smart phone applications                                                                                       | WAP Developer Toolkits and application environment, Wireless telephony application, Mobile agents, |
| SLO-10   | Time domain concepts                                   | Polling, Inhibit sense multiple access     | Network Signaling :              | Mobile Computing Architecture: Three Tier Architecture for mobile computing,                                               | Application Server, Gateways, Portals, Service Discovery, Device Management                        |

|                |                                        |                                    |                                      |                                        |                                                                                   |
|----------------|----------------------------------------|------------------------------------|--------------------------------------|----------------------------------------|-----------------------------------------------------------------------------------|
| SLO-11         | Radio Media- Analog Vs Digital-Channel | CDMA: Spread Aloha multiple access | Interconnection and Message Routing, | Design considerations                  | Operating System : PalmOS; Windows CE; EPOC; Symbian OS Linux for Mobile Devices. |
| SLO-12         | Frequency domain concepts-             | Spread Aloha multiple access       | Mobility Management                  | Mobile Computing through the Internet. | Mobile Agents Threats and Security                                                |
| Assessm<br>ent | Continuous Learning Assessment – 1     |                                    | Continuous Learning Assessment - 2   |                                        |                                                                                   |
|                | Continuous Learning Assessment - 3     |                                    |                                      |                                        |                                                                                   |

| Resources |                                                                                                                    |                                                                                        |
|-----------|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 1         | <b>Wireless communications:</b> Principles and practice the odores. Rappaport pearson Education 2nd Edition (2002) | 2 Mobile communications jochenschiller pearson education 2 <sup>nd</sup> edition(2003) |

| Assessment                      |            |                                                      |              |            |              |            |              |            |              |                                         |              |
|---------------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------------|--------------|
| Bloom’s<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final<br>Assessment<br>(50 % weightage) |              |
|                                 |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                         |              |
|                                 |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                         |              |
|                                 |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                              | Practice (%) |
| 1                               | Remember   | 15                                                   |              | 15         |              | 10         |              | 10         |              | 15                                      |              |
| 2                               | Understand | 15                                                   |              | 15         |              | 10         |              | 10         |              | 15                                      |              |
| 3                               | Apply      | 20                                                   |              | 25         |              | 25         |              | 25         |              | 25                                      |              |
| 4                               | Analyze    | 20                                                   |              | 25         |              | 25         |              | 25         |              | 25                                      |              |
| 5                               | Evaluate   | 15                                                   |              | 10         |              | 15         |              | 15         |              | 10                                      |              |
| 6                               | Create     | 15                                                   |              | 10         |              | 15         |              | 15         |              | 10                                      |              |
| Total (%)                       |            | 100                                                  |              | 100        |              | 100        |              | 100        |              | 100                                     |              |

| Strategies                 |  |                      |                     |                         |                          |
|----------------------------|--|----------------------|---------------------|-------------------------|--------------------------|
| Technology                 |  | Pedagogy / Andragogy |                     | Sustainable Development |                          |
| Simulations                |  | Clarification/Pauses |                     | ✓                       | Good Health & Well Being |
| Presentation Tools         |  | ✓                    | Group Discussion    | ✓                       | Quality Education        |
| Learning Management System |  | ✓                    | Hands-on Practice   | ✓                       | Gender Equality          |
|                            |  |                      | Debate              | ✓                       |                          |
|                            |  |                      | Interactive Lecture | ✓                       |                          |
|                            |  |                      | Brainstorming       | ✓                       |                          |
|                            |  |                      |                     |                         |                          |
|                            |  |                      |                     |                         |                          |
|                            |  |                      |                     |                         |                          |
|                            |  |                      |                     |                         |                          |



\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |                            |                                               |                  |                                            |
|----------------------|---------------------------------------------------------|----------------------------|-----------------------------------------------|------------------|--------------------------------------------|
| Professional Experts |                                                         | Higher Institution Experts |                                               | Internal Experts |                                            |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai | 1                          | Dr. Neela Narayanan V, Professor, VIT chennai | 1                | Dr.Revathi.S,AssistantProfessor,FSH,SRMIST |

| Course Code | UCS24D11J | Course Title | Web Application Framework | Category | D | Discipline core / Elective course | L | T | P | C |
|-------------|-----------|--------------|---------------------------|----------|---|-----------------------------------|---|---|---|---|
|             |           |              |                           |          |   |                                   | 3 | 0 | 2 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                  | Depth    |        |           |         | Attainment |   |   | Programme Learning Outcomes                                          |                                            |   |   |   |   |   |   |   |   |    |  |
|-------|-------------------------------------------------------------|----------|--------|-----------|---------|------------|---|---|----------------------------------------------------------------------|--------------------------------------------|---|---|---|---|---|---|---|---|----|--|
| CLR-1 | To learn the fundamentals of web design and web development | 1        | 2      | 3         | 4       | 1          | 2 | 3 | 7                                                                    | 1                                          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |  |
| CLR-2 | Learning to write program using HTML5                       |          |        |           |         |            |   |   |                                                                      | Level of Thinking                          |   |   |   |   |   |   |   |   |    |  |
| CLR-3 | Developing skills to create web site using CSS              |          |        |           |         |            |   |   |                                                                      | Expected Proficiency (%)                   |   |   |   |   |   |   |   |   |    |  |
| CLR-4 | Build Resilient code using java script                      |          |        |           |         |            |   |   |                                                                      | Expected Attainment (%)                    |   |   |   |   |   |   |   |   |    |  |
| CLR-5 | Be able to use ruby to design dynamic web page              |          |        |           |         |            |   |   |                                                                      | Communication Skills, Collaborative Skills |   |   |   |   |   |   |   |   |    |  |
|       |                                                             | Conceive | Design | Implement | Operate |            |   |   | Problem Solving, Critical Thinking                                   |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   | Communication Skills, Independent Thinking                           |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   | Leadership Qualities, Digital Technology Skills                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   | Value Incultation, Environmental Action, Entrepreneurial Risk Taking |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   | PSO-1                                                                |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   | PSO-2                                                                |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |
|       |                                                             |          |        |           |         |            |   |   |                                                                      |                                            |   |   |   |   |   |   |   |   |    |  |

| Sessions | CLO-1                                                    | CLO-2                                               | CLO-3                                                | CLO-4                                        | CLO-5                             |
|----------|----------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------|----------------------------------------------|-----------------------------------|
|          | 15                                                       | 15                                                  | 15                                                   | 15                                           | 15                                |
| SLO-1    | Introduction to Internet, Internet and its applications  | Introduction : CSS and its types, Advantages of CSS | Introduction: Java Script, Advantages of Java Script | Introduction to Ruby, Ruby Syntax, Variables | Introduction to testing framework |
| SLO-2    | Client-Server Model, Protocols: HTTP/HTTPS, Telnet, FTP. | Inline CSS, Internal CSS, External CSS              | Client Side Java Script<br>Server Side Java Script   | Operators, Control structures and loops      | Testing and Debugging Ruby code   |

|           |                                                                                     |                                                                     |                                                                                                                                                                 |                                                                          |                                                                                  |
|-----------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| SLO-3     | : E-Mail, Internet Service Provider, DNS<br>Web page, Web site: Types of web sites. | : CSS syntax, Selector, Property, values                            | : Java Script Objects, Security                                                                                                                                 | : Functions and Methods                                                  | : Writing and running tests for ruby code                                        |
| SLO 4&5   | <b>Practice: Identify and differentiate between static and dynamic website</b>      | <b>Practice: Design a Simple web page using three types of CSS.</b> | <b>Practice: Design a web page using java script objects</b>                                                                                                    | <b>Practice: Write a simple program using control structures in ruby</b> | <b>Practice: Design a web page for testing debugging</b>                         |
| SLO-6     | Languages used for website development<br>Embedding multimedia in Web pages         | CSS comments, Colors, Backgrounds                                   | Data types, Java Script Operators                                                                                                                               | OOPs with Ruby: Classes and Object                                       | Coding Style standard                                                            |
| SLO-7     | Basics of web developer tools, Uniform Resource Locator (URL)                       | CSS Borders, Margins                                                | Control structures,                                                                                                                                             | Inheritance and Polymorphism                                             | Documentation using RDoc                                                         |
| SLO-8     | :<br>WWW, HTML Basics                                                               | : CSS Padding, CSS Text, CSS Fonts                                  | : Arrays, Dialog boxes                                                                                                                                          | : Abstraction and Encapsulation                                          | : Working with API                                                               |
| SLO 9&10  | <b>Practice: Simple web page using HTML Tags</b>                                    | <b>Practice: Design a simple web page using Text properties</b>     | <b>Practice: Design a web application using operators and arrays</b>                                                                                            | <b>Practice: Write a simple web application using OOPs concepts</b>      | <b>Practice: Simple application using APIs</b>                                   |
| SLO-11    | HTML5 : Document Structures, Text formatting, Paragraphs, Lists                     | CSS Lists                                                           | Documents and its associated objects: Math, String,                                                                                                             | Web Development using Ruby on Rails: Introduction                        | Meta programming                                                                 |
| SLO-12    | Working with multimedia tag: image, audi, video, Frames.                            | CSS Tables                                                          | Functions, Events and Event Handlers,                                                                                                                           | Setting up a Rail Application                                            | Performance optimization                                                         |
| SLO-13    | Forms and user input, Advanced form elements                                        | CSS Image Gallery                                                   | Defining Event handlers: on Click, on Dbl Click, on Drag Drop, on Error, on Focus, on Key Down, on Key Press, on Key Up, on Load, on Mouse Down, on Mouse Move. | MVC Architecture Database Integration                                    | Integration Ruby with other Languages                                            |
| SLO 14&15 | <b>Practice: Simple web site using Frames, Forms</b>                                | <b>Practice: Design a web page using CSS tables</b>                 | <b>Practice: Design a web page using event handler</b>                                                                                                          | <b>Practice: Design a web application using database</b>                 | <b>Practice: Web application to demonstrate integration with other language.</b> |

| Resources |                                                            |  |  |   |                                                                                      |
|-----------|------------------------------------------------------------|--|--|---|--------------------------------------------------------------------------------------|
| 1         | Tanenbaum, Wetherall, " Computer Networks", Pearson, Fifth |  |  | 3 | Douglas Crockford, Java Script: The Good Parts, O Reilly Media                       |
| 2         | Anne Boehm, "HTML 5 and CSS 3", Ninth Edition              |  |  | 4 | David Flanagan, The Ruby Programming Language Everything You need to know, O'Reilly. |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              | Strategies                 |                      |                   |                          |                   |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|----------------------------|----------------------|-------------------|--------------------------|-------------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              | Technology                 | Pedagogy / Andragogy |                   | Sustainable Development  |                   |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              | Simulations                | Clarification/Pauses | ✓                 | Good Health & Well Being |                   |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              | Presentation Tools         | ✓                    | Group Discussion  | ✓                        | Quality Education |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) | Learning Management System | ✓                    | Hands-on Practice | ✓                        | Gender Equality   |
| 1                         | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Debate               | ✓                 |                          |                   |
| 2                         | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Interactive Lecture  | ✓                 |                          |                   |
| 3                         | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            | Brainstorming        | ✓                 |                          |                   |
| 4                         | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            |                      |                   |                          |                   |
| 5                         | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |
| 6                         | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |                            |                      |                   |                          |                   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers                                                   |                                                   |                                                     |
|-------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------|
| Professional Experts                                        | Higher Institution Experts                        | Internal Experts                                    |
| 1   Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai | 1   Dr. Neela Narayanan V, Professor, VIT chennai | 1   Dr. Ramesh. M, Assistant Professor, FSH, SRMIST |

| Course Code | UCS24D12J | Course Title | Computer Vision | Category | D | Discipline Core / Elective course | L | T | P | C |
|-------------|-----------|--------------|-----------------|----------|---|-----------------------------------|---|---|---|---|
|             |           |              |                 |          |   |                                   | 3 | 0 | 2 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                                                                                                                                                                                                                                                                           | Depth    |        |           |         | Attainment               |    |    | Programme Learning Outcomes                |                                                |                                                      |   |   |   |   |   |   |   |    |  |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|--------------------------|----|----|--------------------------------------------|------------------------------------------------|------------------------------------------------------|---|---|---|---|---|---|---|----|--|
| CLR-1 | Inculcate the participants with the fundamentals of computer vision, their working principles and their functions in a business scenario.                                                                                                                                                                                                                            | 1        | 2      | 3         | 4       | 1                        | 2  | 3  | 7                                          | 1                                              | 2                                                    | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |  |
| CLR-2 | To teach the participants the functions of a Computer vision techniques involved in training the Computer vision models on different problems like image classification, image detection, Object recognition, object detection etc, with a deep dive into the role the computer vision techniques play in building a scalable enterprise machine learning solutions. |          |        |           |         |                          |    |    |                                            |                                                |                                                      |   |   |   |   |   |   |   |    |  |
| CLR-3 | To teach the participants to build intelligent and automated real-world Computer vision applications and use cases spanning healthcare, retail, energy verticals by intelligently analyzing different datasets collected from diverse data sources.                                                                                                                  |          |        |           |         |                          |    |    |                                            |                                                |                                                      |   |   |   |   |   |   |   |    |  |
| CLR-4 | To introduce the participants to the modelling pedigree of Text classification, Image classification, Image detection, Object recognition, and Object detection techniques.                                                                                                                                                                                          |          |        |           |         |                          |    |    |                                            |                                                |                                                      |   |   |   |   |   |   |   |    |  |
| CLR-5 | To bring the learners to an alignment, applies their learning to a real-world business problem, and then performs research, design, development, and delivers an end-to-end Computer vision for a given industry problem. The students will be working either in a group or individually.                                                                            |          |        |           |         |                          |    |    |                                            |                                                |                                                      |   |   |   |   |   |   |   |    |  |
|       |                                                                                                                                                                                                                                                                                                                                                                      | Conceive | Design | Implement | Operate | Level of Thinking        |    |    | Communication Skills, Collaborating Skills | Problem Solving, Critical Thinking, Creativity |                                                      |   |   |   |   |   |   |   |    |  |
|       |                                                                                                                                                                                                                                                                                                                                                                      |          |        |           |         | Expected Proficiency (%) |    |    |                                            |                                                | Communication Skills, Collaborating Skills           |   |   |   |   |   |   |   |    |  |
|       |                                                                                                                                                                                                                                                                                                                                                                      |          |        |           |         | Expected Attainment (%)  |    |    |                                            |                                                | Independent Thinking, Analytical Reasoning, Learning |   |   |   |   |   |   |   |    |  |
|       |                                                                                                                                                                                                                                                                                                                                                                      |          |        |           |         |                          |    |    |                                            |                                                | Leadership Qualities, Professionalism, Autonomy,     |   |   |   |   |   |   |   |    |  |
|       |                                                                                                                                                                                                                                                                                                                                                                      |          |        |           |         |                          |    |    |                                            |                                                | Digital Technology Skills                            |   |   |   |   |   |   |   |    |  |
|       |                                                                                                                                                                                                                                                                                                                                                                      |          |        |           |         |                          |    |    |                                            |                                                | Value Incultation, Multicultural Inclusivity         |   |   |   |   |   |   |   |    |  |
|       |                                                                                                                                                                                                                                                                                                                                                                      |          |        |           |         |                          |    |    |                                            | Environmental Action, Community Engagement     |                                                      |   |   |   |   |   |   |   |    |  |
|       |                                                                                                                                                                                                                                                                                                                                                                      |          |        |           |         |                          |    |    |                                            | Entrepreneurial Risk Taking                    |                                                      |   |   |   |   |   |   |   |    |  |
|       |                                                                                                                                                                                                                                                                                                                                                                      |          |        |           |         |                          |    |    |                                            | PSO-1                                          |                                                      |   |   |   |   |   |   |   |    |  |
|       |                                                                                                                                                                                                                                                                                                                                                                      |          |        |           |         |                          |    |    |                                            | PSO-2                                          |                                                      |   |   |   |   |   |   |   |    |  |
| CLO   | At the end of this course, learners will be able to:                                                                                                                                                                                                                                                                                                                 |          |        |           |         |                          |    |    |                                            |                                                |                                                      |   |   |   |   |   |   |   |    |  |
| CLO-1 | Have a strong control over the fundamental concepts of Computer vision including the ability to clearly define Computer vision from both academic and industry perspective.                                                                                                                                                                                          | ✓        | ✓      | -         | -       | 2                        | 85 | 75 |                                            | 3                                              | -                                                    | - | - | - | - | - | - | - | -  |  |
| CLO-2 | Gain hands-on solid skills, knowledge and expertise of real-world situations the applicability of tools and techniques in extracting valuable insights from the data of different formats on time.                                                                                                                                                                   | ✓        | ✓      | ✓         | -       | 2                        | 85 | 75 |                                            | 3                                              | -                                                    | - | - | - | - | - | - | - | -  |  |
| CLO-3 | Have solid hands-on skills, knowledge and expertise in Data gathering, Data collection, Model training, and model evaluation with domain-specific components.                                                                                                                                                                                                        | ✓        | ✓      | ✓         | ✓       | 3                        | 85 | 75 |                                            | 3                                              | -                                                    | - | - | 3 | - | - | - | - | -  |  |
| CLO-4 | Have a good Hands-on skills, knowledge and expertise on applying all the computer vision techniques to real -world industry problems.                                                                                                                                                                                                                                | ✓        | ✓      | ✓         | ✓       | 3                        | 85 | 75 |                                            | 3                                              | 3                                                    | - | - | - | - | - | 3 | 3 |    |  |
| CLO-5 | Have solid hands-on skills, knowledge and expertise in applying the right computer vision techniques for the problem statement at hand.                                                                                                                                                                                                                              | ✓        | ✓      | ✓         | ✓       | 3                        | 85 | 75 |                                            | 3                                              | 3                                                    | - | - | 3 | - | - | 3 | 3 | 3  |  |

| Sessions | CLO-1                                                                                                                               | CLO-2                                                                                                                                                                                  | CLO-3                                                                                                                                              | CLO-4                                                                             | CLO-5                                                                                                                  |
|----------|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
|          | 15                                                                                                                                  | 15                                                                                                                                                                                     | 15                                                                                                                                                 | 15                                                                                | 15                                                                                                                     |
| SLO-1    | ComputerVision Overview                                                                                                             | Computer Vision in Various Field                                                                                                                                                       | Computer Vision Frame Work, Feature of Computer Vision                                                                                             | Image Detection, Image Segmentation                                               | Source System, Target system, Training Data, Validation Data                                                           |
| SLO-2    | Computer Vision derived from academic perspective and industry perspective, Challenges of Computer Vision, Tasks in Computer Vision | Computer Vision Workflow Steps, Business Problem Identification, Success Criteria Definition, Right Computer Vision Techniques                                                         | PopularComputerVision frameworks: OpenCV, TensorFlow, Matlab, CUDA, YOLO                                                                           | Image Classification, Object Detection, Object Recognition, Object Classification | Building a Computer Vision Hardware system Benefits, Choosing the software components, Choosing the OS, AddingPackages |
| SLO-3    | Optical character recognition (OCR), Medical Imaging                                                                                | Collect Training Data, Label Train and Test Datasets, Train the computer vision model, Evaluate the computer vision model, Test the model, Deploy the model, Iterate the steps process | Image Processing Techniques Image Restoration, LinearFiltering, Independent, Component Analysis, Pixelation, Template Matching                     | Computer Vision Model                                                             | Challenges , High level decisions ‘ Choosing the hardware components (GPU, TPU) , Building a CV Software system        |
| SLO 4&5  | <b>Practice: Image Reading</b>                                                                                                      | <b>Practice: Image Filters</b>                                                                                                                                                         | <b>Practice: Apply Different FilteringTechniques to Images</b>                                                                                     | <b>Practice: Image Thresholding</b>                                               | <b>Practice: Face Detection</b>                                                                                        |
| SLO-6    | Surveillance, Fingerprintrecognitionandbiometrics                                                                                   | Components of Computer vision solution                                                                                                                                                 | Image GenerationTechnique(GAN)FilteringTechniquesinImageProcessing LinearFilter, Non-LinearFilter                                                  | ImageProcessingModels CannyEdgeDetectors                                          | Benefits and Challenges                                                                                                |
| SLO-7    | IntroductiontoComputer Vision                                                                                                       | Data Ingestion, Data Pre-processing, Multiprocessing                                                                                                                                   | MedianFilter                                                                                                                                       | HoughTransformers, SURF, ImageClassificationModels                                | High level decisions, CustomerImageSegmentation, Problemstatement, Problemtyp                                          |
| SLO-8    | ObjectRecognition                                                                                                                   | Transfer Learning/Model Processing                                                                                                                                                     | Featuredetectionandmatching                                                                                                                        | ImageNet, CIFAR, MNIST                                                            | Dataengineering, Datapipeline, Modelselection, Modelengineering                                                        |
| SLO 9&10 | <b>Practice: Image Display</b>                                                                                                      | <b>Practice: Increase Filter strength</b>                                                                                                                                              | <b>Practice: Image Blurring</b>                                                                                                                    | <b>Practice: Image Detection</b>                                                  | <b>Practice: Image Segmentation</b>                                                                                    |
| SLO-11   | Medical ImageAnalysis                                                                                                               | Data Transformation                                                                                                                                                                    | Harris Corner Detector, SIFT (scale invariant feature transform), SURF (speeded-up robust features), FAST (features from accelerated segment test) | ObjectDetectionModels, FastR-CNN                                                  | Modeloutcome, Modelanalysis                                                                                            |

|          |                                                         |                                       |                                                                                                                                                                                                           |                                          |                                      |
|----------|---------------------------------------------------------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|--------------------------------------|
| SLO-12   | Content-Based Image Retrieval                           | Parallel Processing                   | BRIEF (Binary Robust Independent Elementary Features), Harris Corner Detector, SIFT (scale invariant feature transform), SURF (speeded-up robust features), FAST (features from accelerated segment test) | Requirements of data in Computer Vision  | Model optimization                   |
| SLO-13   | Virtual Reality and Augmented Reality, Image Processing | User Interface and Advanced Analytics | Text Classification                                                                                                                                                                                       | Data Structure, Data Format<br>Data Type | Model pipeline<br>Data visualization |
| SLO 4&15 | <b>Practice: Image Conversion</b>                       | <b>Practice: Image Smoothing</b>      | <b>Practice: Morphology</b>                                                                                                                                                                               | <b>Practice: Contour Detection</b>       | <b>Practice: Video processing</b>    |

| Resources |                                                                                                                                                 |  |  |   |                                                                                                                                                                        |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------|--|--|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1         | R. Jain, R. Kasturi, and B.G. Schunck, Machine Vision, McGraw-Hill, Inc. 1995                                                                   |  |  | 4 | Digital Image Processing and Analysis: Application with MATLAB and CVIptools, 3 <sup>rd</sup> Edition, SE Umbaugh, Taylor & Francis/CRC Press, 2018                    |
| 2         | Computer Vision: Algorithms and Applications by Richard Szeliski                                                                                |  |  | 5 | Computer Vision: A Modern Approach (Second Edition) by David Forsyth and Jean Ponce.                                                                                   |
| 3         | Elements of Statistical Learning by Trevor Hastie, Robert Tibshirani, and Jerome Friedman. Available for free online (Warning: Direct PDF link) |  |  | 6 | Multiple View Geometry in Computer Vision (Second Edition) by Richard Hartley and Andrew Zisserman. Available for free online through the UM Library (Login required). |

| Assessment                      |            |                                                      |              |            |              |            |              |            |              |                                         |              | Strategies                 |                      |                   |                            |                   |
|---------------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------------|--------------|----------------------------|----------------------|-------------------|----------------------------|-------------------|
| Bloom’s<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final<br>Assessment<br>(50 % weightage) |              | Technology                 | Pedagogy / Andragogy |                   | Sustainable<br>Development |                   |
|                                 |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                         |              | Simulations                | Clarification/Pauses | ✓                 | Good Health & Well Being   |                   |
|                                 |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                         |              | Presentation Tools         | ✓                    | Group Discussion  | ✓                          | Quality Education |
|                                 |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                              | Practice (%) | Learning Management System | ✓                    | Hands-on Practice | ✓                          | Gender Equality   |
| 1                               | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                      | 15           |                            | Debate               | ✓                 |                            |                   |
| 2                               | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                      | 15           |                            | Interactive Lecture  | ✓                 |                            |                   |
| 3                               | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                      | 25           |                            | Brainstorming        | ✓                 |                            |                   |
| 4                               | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                      | 25           |                            |                      |                   |                            |                   |
| 5                               | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                      | 10           |                            |                      |                   |                            |                   |
| 6                               | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                      | 10           |                            |                      |                   |                            |                   |
| Total (%)                       |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                                     | 100          |                            |                      |                   |                            |                   |
|                                 |            |                                                      |              |            |              |            |              |            |              |                                         |              |                            |                      |                   |                            |                   |
|                                 |            |                                                      |              |            |              |            |              |            |              |                                         |              |                            |                      |                   |                            |                   |
|                                 |            |                                                      |              |            |              |            |              |            |              |                                         |              |                            |                      |                   |                            |                   |
|                                 |            |                                                      |              |            |              |            |              |            |              |                                         |              |                            |                      |                   |                            |                   |
|                                 |            |                                                      |              |            |              |            |              |            |              |                                         |              |                            |                      |                   |                            |                   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |  |                            |                                               |  |  |                  |                            |
|----------------------|---------------------------------------------------------|--|--|----------------------------|-----------------------------------------------|--|--|------------------|----------------------------|
| Professional Experts |                                                         |  |  | Higher Institution Experts |                                               |  |  | Internal Experts |                            |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT chennai |  |  | 1                | Dr.S.Kanchana, SRMIST, KTR |

| Course Code | UCS24D13J | Course Title | Big Data Analytics | Category | D | Discipline core / Elective course | L | T | P | C |
|-------------|-----------|--------------|--------------------|----------|---|-----------------------------------|---|---|---|---|
|             |           |              |                    |          |   |                                   | 3 | 0 | 2 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                             | Depth    |        |           |         | Attainment        |                      |                     | Programme Learning Outcomes |                       |                       |                       |                    |                    |                       |                      |       |       |
|-------|------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|----------------------|---------------------|-----------------------------|-----------------------|-----------------------|-----------------------|--------------------|--------------------|-----------------------|----------------------|-------|-------|
| CLR-1 | Understand the evolution of computer networks using the layered network architecture                                   | 1        | 2      | 3         | 4       | 1                 | 2                    | 3                   | 1                           | 2                     | 3                     | 4                     | 5                  | 6                  | 7                     | 8                    | 9     | 10    |
| CLR-2 | Understand the addressing concepts and learn networks devices                                                          |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLR-3 | Design computer networks using subnetting and routing concepts                                                         |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLR-4 | Understand the error types, framing, flow control                                                                      |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLR-5 | Understand the various Medium Access Control techniques and also the characteristics of physical layer functionalities |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
|       |                                                                                                                        | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency | Expected Attainment | Problem Solving,            | Communication Skills, | Independent Thinking, | Leadership Qualities, | Digital Technology | Value Incultation, | Environmental Action, | Entrepreneurial Risk | PSO-1 | PSO-2 |
| CLO   | At the end of this course, learners will be able to:                                                                   |          |        |           |         |                   |                      |                     |                             |                       |                       |                       |                    |                    |                       |                      |       |       |
| CLO-1 | Acquire the basics of computer network and its architecture                                                            | ✓        | ✓      | -         | -       | 2                 | 85                   | 75                  | -                           | -                     | 1                     | -                     | 3                  | -                  | 2                     | 2                    | 1     |       |
| CLO-2 | Acquire the knowledge of various networks devices and addressing methods                                               | ✓        | ✓      | ✓         | -       | 2                 | 85                   | 75                  | 3                           | 2                     | 1                     | 2                     | 2                  | 3                  | -                     | 1                    | 2     | 1     |
| CLO-3 | Design the network routing methods                                                                                     | ✓        | ✓      | ✓         | ✓       | 3                 | 85                   | 75                  | 3                           | 1                     | 3                     | 1                     | 3                  | 3                  | -                     | 1                    | 1     | 2     |
| CLO-4 | Find the error type that may happen during data transportation                                                         | ✓        | ✓      | ✓         | ✓       | 3                 | 85                   | 75                  | 3                           | 3                     | 2                     | 3                     | 3                  | 3                  | -                     | 2                    | 3     | 3     |
| CLO-5 | Understand the physical layer functions and components                                                                 | ✓        | ✓      | ✓         | ✓       | 3                 | 85                   | 75                  | 3                           | 3                     | 2                     | 3                     | 3                  | 3                  | -                     | 3                    | 3     | 3     |

| Sessions | CLO-1                              | CLO-2                                                                                             | CLO-3                                                 | CLO-4                                                 | CLO-5                            |
|----------|------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|----------------------------------|
|          | 15                                 | 15                                                                                                | 15                                                    | 15                                                    | 15                               |
| SLO-1    | Introduction to Big Data platform  | Null and Alternative Hypotheses. Type-I and Type-II ErrorCriticalRegion and Level of Significance | History of Hadoop, The Hadoop Distributed File System | Setting up a Hadoop Cluster - Cluster specification - | Applications on Big Data         |
| SLO-2    | Challenges of Conventional Systems | One tailed and two tailed tests, Critical values of significant values                            | Components of Hadoop                                  | Cluster Setup Installation                            | Data processing operators in Pig |

|           |                                                                                       |                                                                                                                                                                                                                        |                                                                                     |                                                          |                                                     |
|-----------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------|
| SLO-3     | Intelligent data Analysis                                                             | : Tests of Significance for Large Samples                                                                                                                                                                              | Analyzing the Data with Hadoop                                                      | Cluster Installation                                     | Hive QL, Tables                                     |
| SLO 4&5   | <b>Practice 1: Practice elementary mathematical operations and control statements</b> | <b>Practice 4: Creating Various types of plot/charts from various data source</b>                                                                                                                                      | <b>Practice 7: Implementation of Linear regression with multiple regression</b>     | <b>Practice 10: Implementation of classifier problem</b> | <b>Practice 13: Implementation of decision tree</b> |
| SLO-6     | Nature of data                                                                        | Test of Significance for Single Proportion                                                                                                                                                                             | Scaling Out- Hadoop Streaming                                                       | Hadoop Configuration                                     | Structure of Hbase                                  |
| SLO-7     | Analytic process and tools, Analysis Vs Reporting,                                    | Test of Significance for Difference of Proportions, Test of Significance for Single Mean,                                                                                                                              | Java interfaces to HDFS                                                             | Security in Hadoop                                       | Hbase QL                                            |
| SLO-8     | Modern Data analytic tools                                                            | Chi-Square Distribution                                                                                                                                                                                                | How Map Reduce Works                                                                | Administering Hadoop                                     | Comparing base with Relational Database             |
| SLO 9&10  | <b>Practice 2: Operations on Matrices and Vector</b>                                  | <b>Practice 5: Create subplots and color plots</b>                                                                                                                                                                     | <b>Practice 8: Implementation of Data preprocessing methods, Correlation matrix</b> | <b>Practice 11: Implementation of K-Mean Clustering</b>  | <b>Practice 14: Implementation of Random Forest</b> |
| SLO-11    | Parameter and Statistic, Sampling Distribution                                        | Test of Significance for Difference of Means.<br>To test the goodness of fit- To test the independence of Attributes.<br>Student's "t" - "t"<br>Distribution- To test for Single Mean- To test for Difference of Means | Anatomy of a Map Reduce Job run - Failures                                          | Administering Hadoop - HDFS                              | Structure of Zoo Keeper                             |
| SLO-12    | Meaning-Standard Error and its uses.                                                  | F-Distribution- Definition- To Test for Equality of Two Population variances.                                                                                                                                          | Job scheduling shuffle and sort - Task Execution -Map read and Map write anatomy    | Monitoring                                               | The Zoo keeper services                             |
| SLO-13    | Tests of Significance                                                                 | Meaning of Resampling and its uses, Prediction Error and its uses.                                                                                                                                                     | Map reduce features                                                                 | Maintenance                                              | Zoo keeper Case study                               |
| SLO 14&15 | <b>Practice 3: Vectorized operation on simple matrix operations</b>                   | <b>Practice 6: Implement Linear regression problem</b>                                                                                                                                                                 | <b>Practice 9: Implementation of spam and non-spam classification problem.</b>      | <b>Practice 12: Implementation of K-Mean Clustering</b>  | <b>Practice 15: Implementation of CART</b>          |

| Resources |                                                                                                                    |  |  |  |   |                                                                                                            |  |  |  |  |
|-----------|--------------------------------------------------------------------------------------------------------------------|--|--|--|---|------------------------------------------------------------------------------------------------------------|--|--|--|--|
| 1         | Michael Berthold, David J. Hand, (2007), “Intelligent Data Analysis”, Springer.                                    |  |  |  | 4 | RSN Pillai, Bagavathi, “Statistics Theory and Practice”, S.Chand                                           |  |  |  |  |
| 2         | Tom White (2012), “ Hadoop:The Definitive Guide” Third Edition, O’reilly Media                                     |  |  |  | 5 | Anand Rajaraman and Jeffrey David Ullman, (2012) “Mining of Massive Datasets”, Cambridge University Press. |  |  |  |  |
| 3         | Viktor Mayer,Schonberger,KennethCukier , “BIG Data : A Revolution That Will Transform How We Live, Work and Think” |  |  |  | 6 |                                                                                                            |  |  |  |  |

| Assessment                      |            |                                                      |              |            |              |            |              |            |              |                                         |              |
|---------------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------------|--------------|
| Bloom’s<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final<br>Assessment<br>(50 % weightage) |              |
|                                 |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                         |              |
|                                 |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                         |              |
|                                 |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                              | Practice (%) |
| 1                               | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                      | 15           |
| 2                               | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                      | 15           |
| 3                               | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                      | 25           |
| 4                               | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                      | 25           |
| 5                               | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                      | 10           |
| 6                               | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                      | 10           |
| Total (%)                       |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                                     | 100          |

| Strategies                 |  |                      |                     |                         |                          |
|----------------------------|--|----------------------|---------------------|-------------------------|--------------------------|
| Technology                 |  | Pedagogy / Andragogy |                     | Sustainable Development |                          |
| Simulations                |  | Clarification/Pauses |                     | ✓                       | Good Health & Well Being |
| Presentation Tools         |  | ✓                    | Group Discussion    | ✓                       | Quality Education        |
| Learning Management System |  | ✓                    | Hands-on Practice   | ✓                       | Gender Equality          |
|                            |  |                      | Debate              | ✓                       |                          |
|                            |  |                      | Interactive Lecture | ✓                       |                          |
|                            |  |                      | Brainstorming       | ✓                       |                          |
|                            |  |                      |                     |                         |                          |
|                            |  |                      |                     |                         |                          |
|                            |  |                      |                     |                         |                          |
|                            |  |                      |                     |                         |                          |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |  |                            |                                               |  |  |                  |                                               |  |
|----------------------|---------------------------------------------------------|--|--|----------------------------|-----------------------------------------------|--|--|------------------|-----------------------------------------------|--|
| Professional Experts |                                                         |  |  | Higher Institution Experts |                                               |  |  | Internal Experts |                                               |  |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT chennai |  |  | 1                | Dr.T.Nathiya, Assistant Professor,FSH, SRMIST |  |

| Course Code | UCS24D14J | Course Title | Cryptography and Network Security |  |  |  | Category | D | Disciplinary core/<br>Elective course | L | T | P | C |
|-------------|-----------|--------------|-----------------------------------|--|--|--|----------|---|---------------------------------------|---|---|---|---|
|             |           |              |                                   |  |  |  |          |   |                                       | 3 | 0 | 2 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                               | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcomes |                                            |                                    |                                            |                                                 |                                                                      |       |       |   |   |    |  |
|-------|------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|-----------------------------|--------------------------------------------|------------------------------------|--------------------------------------------|-------------------------------------------------|----------------------------------------------------------------------|-------|-------|---|---|----|--|
| CLR-1 | Understand cryptography basics, algorithms and mathematical background for cryptography. | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 7                           | 1                                          | 2                                  | 3                                          | 4                                               | 5                                                                    | 6     | 7     | 8 | 9 | 10 |  |
| CLR-2 | Analyze the important cryptographic algorithms                                           |          |        |           |         |                   |                          |                         |                             |                                            |                                    |                                            |                                                 |                                                                      |       |       |   |   |    |  |
| CLR-3 | Understand the Basic knowledge of Network security.                                      |          |        |           |         |                   |                          |                         |                             |                                            |                                    |                                            |                                                 |                                                                      |       |       |   |   |    |  |
| CLR-4 | Understand the various IPSECURITY concepts.                                              |          |        |           |         |                   |                          |                         |                             |                                            |                                    |                                            |                                                 |                                                                      |       |       |   |   |    |  |
| CLR-5 | To impart knowledge on Advanced Encryption Standard                                      |          |        |           |         |                   |                          |                         |                             |                                            |                                    |                                            |                                                 |                                                                      |       |       |   |   |    |  |
|       |                                                                                          | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) |                             | Communication Skills, Collaborative Skills | Problem Solving, Critical Thinking | Communication Skills, Independent Thinking | Leadership Qualities, Digital Technology Skills | Value Inculcation, Environmental Action, Entrepreneurial Risk Taking | PSO-1 | PSO-2 |   |   |    |  |
| CLO   | At the end of this course, learners will be able to:                                     |          |        |           |         |                   |                          |                         |                             |                                            |                                    |                                            |                                                 |                                                                      |       |       |   |   |    |  |
| CLO-1 | Understand the Overview Of Cryptography                                                  | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      |                             | 3                                          | -                                  | -                                          | 1                                               | -                                                                    | 3     | -     | 2 | - | -  |  |
| CLO-2 | Do research in the emerging areas of cryptography and network security.                  | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      |                             | 3                                          | 2                                  | 1                                          | 2                                               | 2                                                                    | 3     | -     | 1 | - | -  |  |
| CLO-3 | Implement various Network Security Algorithm.                                            | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                             | 3                                          | 1                                  | 3                                          | 1                                               | 3                                                                    | 3     | -     | 1 | - | -  |  |
| CLO-4 | Gain knowledge on IP Security Architecture                                               | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                             | 3                                          | 3                                  | 2                                          | 3                                               | 3                                                                    | 3     | -     | 2 | - | -  |  |
| CLO-5 | Understand the Overview on System Security                                               | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      |                             | 3                                          | 3                                  | 2                                          | 3                                               | 3                                                                    | 3     | -     | 3 | - | -  |  |

| Sessions | CLO-1                                       | CLO-2                                                      | CLO-3                                                            | CLO-4                    | CLO-5                       |
|----------|---------------------------------------------|------------------------------------------------------------|------------------------------------------------------------------|--------------------------|-----------------------------|
|          | 15                                          | 15                                                         | 15                                                               | 15                       | 15                          |
| SLO-1    | Overview on Symmetric Cipher Model          | Overview on Block ciphers and the data encryption standard | Basic knowledge of Network security – Authentication Application | IP Security Overview     | Overview on System Security |
| SLO-2    | Overview on Classical Encryption Techniques | Block Cipher Principles                                    | Kerberos                                                         | IP Security Architecture | Intruders                   |
| SLO-3    | : Brief on Symmetric Cipher Model           | : The Data Encryption Standard                             | : Kerberos Authentication Service                                | : Authentication Header  | : Intrusion Detection       |

|           |                                                                                                                    |                                                                                                            |                                                                    |                                                                                 |                                                                     |
|-----------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------|
| SLO 4&5   | <b>Laboratory1:</b> Perform encryption, decryption using the following substitution techniques<br>i) Ceaser cipher | <b>Laboratory4:</b><br>Vigenere Ciphers                                                                    | <b>Laboratory7:</b> Apply DES algorithm for practical applications | <b>Laboratory10:</b> Implement the SIGNATURE SCHEME-Digital Signature Standard. | <b>Laboratory13:</b> Apply AES algorithm for practical applications |
| SLO-6     | Techniques involved in Cryptography                                                                                | Describe the procedure of DES Encryption                                                                   | Overview on Electronic Mail Security                               | Encapsulating Security Payload                                                  | Password Management                                                 |
| SLO-7     | Techniques involved in Cryptanalysis                                                                               | Describe the procedure of DES Decryption                                                                   | Operational Description                                            | Combining Security Associations                                                 | Discuss on Malicious Software                                       |
| SLO-8     | Substitution Techniques-Caesar Cipher                                                                              | The strength of DES                                                                                        | Cryptographic Keys and Key Rings                                   | Key Management                                                                  | Viruses and Related Threats                                         |
| SLO 9&10  | <b>Laboratory2:</b> play fair cipher                                                                               | <b>Laboratory5:</b> Perform encryption and decryption using following transposition techniques. Rail fence | <b>Laboratory8:</b> Example on DES                                 | <b>Laboratory11:</b> Apply RSA algorithm for practical Applications.            | <b>Laboratory14:</b> example on AES                                 |
| SLO-11    | Mon alphabetic Ciphers Playfair Cipher                                                                             | Differential and Linear Cryptanalysis                                                                      | Public-Key Management                                              | Overview on Web Security                                                        | Virus Countermeasures                                               |
| SLO-12    | Hill Cipher                                                                                                        | Block Cipher Design Principles                                                                             | S/MIME (Secure/Multipurpose Internet Mail Extension)               | Web Security Considerations                                                     | Overview on Firewall                                                |
| SLO-13    | Polyalphabetic Ciphers, One-Time Pad                                                                               |                                                                                                            |                                                                    |                                                                                 |                                                                     |
| SLO 14&15 | Overview of Transposition Techniques                                                                               | Principles of Public-Key Cryptosystems                                                                     | S/MIME Functionality                                               | Secure Socket Layer and Transport Layer Security                                | Firewall Design Principles                                          |

| Resources |                                                                                         |   |                                                                                                                                                                    |  |  |
|-----------|-----------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| 1         | Anderson B.H., Dursaton and Poole, M: Thesis and assignment writing, Wiley Eastern 1997 | 4 | Walpole, R.A., Myers, R.H., Myers, S.L. and Ye, King: Probability and Statistics for Engineers and Scientists, Pearson Prentice Hall, Pearson Education Inc., 2012 |  |  |
| 2         | Bordens, K.S. and Abbott, B.B: Research design and Methods, McGraw Hill, 2008           | 5 | Kothari, C.K. [2004], 2.e, Research Methodology – Methods and Techniques [New Age International, New Delhi]                                                        |  |  |
| 3         | Leedy, P...: Practical Research – Planning and design, Ninth Edition, Pearson, 2010     |   |                                                                                                                                                                    |  |  |

| Assessment                      |            |                                                      |              |            |              |            |              |            |              |                                         |              | Strategies                 |                      |                   |                            |                   |
|---------------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------------|--------------|----------------------------|----------------------|-------------------|----------------------------|-------------------|
| Bloom’s<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final<br>Assessment<br>(50 % weightage) |              | Technology                 | Pedagogy / Andragogy |                   | Sustainable<br>Development |                   |
|                                 |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                         |              | Simulations                | Clarification/Pauses | ✓                 | Good Health & Well Being   |                   |
|                                 |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                         |              | Presentation Tools         | ✓                    | Group Discussion  | ✓                          | Quality Education |
|                                 |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                              | Practice (%) | Learning Management System | ✓                    | Hands-on Practice | ✓                          | Gender Equality   |
| 1                               | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                      | 15           |                            | Debate               | ✓                 |                            |                   |
| 2                               | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                      | 15           |                            | Interactive Lecture  | ✓                 |                            |                   |
| 3                               | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                      | 25           |                            | Brainstorming        | ✓                 |                            |                   |
| 4                               | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                      | 25           |                            |                      |                   |                            |                   |
| 5                               | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                      | 10           |                            |                      |                   |                            |                   |
| 6                               | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                      | 10           |                            |                      |                   |                            |                   |
| Total (%)                       |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                                     | 100          |                            |                      |                   |                            |                   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |                                                   |
|----------------------|---------------------------------------------------------|---------------------------------------------------|
| Professional Experts |                                                         | Higher Institution Experts                        |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai | 1 Dr. Neela Narayanan V, Professor, VIT chennai   |
|                      |                                                         | 1 Dr.D.Elangovan Assistant Professor, FSH, SRMIST |

### SEMESTER VIII

| Course Code | UCS24D15J | Course Title | AI and Business Analytics |  |  |  | Category | D | Discipline core / Elective course | L | T | P | C |
|-------------|-----------|--------------|---------------------------|--|--|--|----------|---|-----------------------------------|---|---|---|---|
|             |           |              |                           |  |  |  |          |   |                                   | 3 | 0 | 2 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                        | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcomes                |                           |                                            |                                                 |                                                                      |       |       |   |   |    |
|-------|---------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|--------------------------------------------|---------------------------|--------------------------------------------|-------------------------------------------------|----------------------------------------------------------------------|-------|-------|---|---|----|
| CLR-1 | Understand the Foundations of Business Analytics and Artificial Intelligence                      | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 1                                          | 2                         | 3                                          | 4                                               | 5                                                                    | 6     | 7     | 8 | 9 | 10 |
| CLR-2 | Understand the concepts of data processing and visualization                                      |          |        |           |         |                   |                          |                         |                                            |                           |                                            |                                                 |                                                                      |       |       |   |   |    |
| CLR-3 | Understand the Statistical Analysis and Machine Learning Fundamentals                             |          |        |           |         |                   |                          |                         |                                            |                           |                                            |                                                 |                                                                      |       |       |   |   |    |
| CLR-4 | Familiarize the Advanced Machine Learning techniques and Responsible AI                           |          |        |           |         |                   |                          |                         |                                            |                           |                                            |                                                 |                                                                      |       |       |   |   |    |
| CLR-5 | Familiarize the Integration of Business Analytics and AI                                          |          |        |           |         |                   |                          |                         |                                            |                           |                                            |                                                 |                                                                      |       |       |   |   |    |
|       |                                                                                                   | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Communication Skills, Collaborative Skills | Problem Solving, Critical | Communication Skills, Independent Thinking | Leadership Qualities, Digital Technology Skills | Value Incultation, Environmental Action, Entrepreneurial Risk Taking | PSO-1 | PSO-2 |   |   |    |
| CLO   | At the end of this course, learners will be able to:                                              |          |        |           |         |                   |                          |                         |                                            |                           |                                            |                                                 |                                                                      |       |       |   |   |    |
| CLO-1 | Apply Data Handling and Preprocessing Techniques                                                  | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3                                          | -                         | -                                          | 1                                               | -                                                                    | 3     | -     | 2 | 2 | 1  |
| CLO-2 | Analyze Data Using Statistical Methods                                                            | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3                                          | 2                         | 1                                          | 2                                               | 2                                                                    | 3     | -     | 1 | 2 | 1  |
| CLO-3 | Visualize Data for Effective Communication and Develop Predictive Models for Business Forecasting | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                          | 1                         | 3                                          | 1                                               | 3                                                                    | 3     | -     | 1 | 1 | 2  |
| CLO-4 | Apply AI Techniques to Solve Business Problems                                                    | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                          | 3                         | 2                                          | 3                                               | 3                                                                    | 3     | -     | 2 | 3 | 3  |
| CLO-5 | Integrate Business Analytics and AI for Holistic Analysis                                         | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                          | 3                         | 2                                          | 3                                               | 3                                                                    | 3     | -     | 3 | 3 | 3  |

| Sessions | CLO-1                            | CLO-2                       | CLO-3                               | CLO-4                                           | CLO-5                                        |
|----------|----------------------------------|-----------------------------|-------------------------------------|-------------------------------------------------|----------------------------------------------|
|          | 15                               | 15                          | 15                                  | 15                                              | 15                                           |
| SLO-1    | Introduction to Generative AI    | Data Analytics using Python | Introduction of Power BI            | Definition and Importance in Business Analytics | Key Concepts in ML: Data, Models, Algorithms |
| SLO-2    | Prompt Engineering, ChatGPT      | Introduction to Numpy       | Business Intelligence with Power BI | Correlation and Regression                      | Supervised and Unsupervised Learning         |
| SLO-3    | Importance of business analytics | Working with Numpy          | Power BI project                    | Full project in Regression                      | Techniques for implementing various learning |

|           |                                                                |                                                       |                                                |                                                                                     |                                                       |
|-----------|----------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------|
| SLO 4-5   | <b>Lab 1:</b> Prompt Engineering                               | <b>Lab 4:</b> Numpy                                   | <b>Lab 7:</b> Working with Web APIs in python  | <b>Lab 10:</b> linear Regression using python                                       | <b>Lab 13: File:</b> Supervised learning using python |
| SLO-6     | Python Fundamentals                                            | Introduction of R Programming                         | Introduction of Extract Transform and Load     | Popular Data Mining Techniques: Clustering, Classification, Association Rule Mining | Data Ethics                                           |
| SLO-7     | Python Installation                                            | Data Analytics with R                                 | Extract Transform and Load                     | Role of Data Mining in Decision Making                                              | Examine ethics in ML and AI development               |
| SLO-8     | Applications of Generative AI in Business and Data Analytics   | R programming project                                 | ETL- a complete project                        | Data mining in business analytics                                                   | <b>Modeling Optimization Problems:</b>                |
| SLO 9-10  | <b>Lab 2:</b> Python Basics                                    | <b>Lab 5:</b> Pandas                                  | <b>Lab 8:</b> Data Visualization using Python  | <b>Lab 11:</b> logistic Regression using python                                     | <b>Lab 14:</b> Unsupervised learning using python     |
| SLO-11    | Basic Statistics                                               | Introduction of Tableau                               | Data Visualization                             | Role of Data Mining in Decision Making                                              | Mathematical optimizations                            |
| SLO-12    | Python control statements                                      | Data Visualization with Tableau                       | Statistical Analysis using Excel               | Data classification in business analytics                                           | fundamentals of optimization modeling                 |
| SLO-13    | looping statements                                             | Tableau – a complete project                          | Data Analysis using Excel- a practical outlook | Tools for Data classification in business analytics                                 | Applications of Optimization in Machine Learning      |
| SLO 14-15 | <b>Lab 3:</b> Python control statements and looping statements | <b>Lab 6:</b> Working with CSV, EXCEL files in python | <b>Lab 9:</b> SciPy and Seaborn                | <b>Lab 12:</b> Data classification using python (SVM)                               | <b>Lab 15:</b> Capstone project                       |

| Resources |                                                                                                                                                              |  |  |   |                                                                                                              |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|---|--------------------------------------------------------------------------------------------------------------|
| 1         | Foster Provost, Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking 1st Edition, O'Reilly Media; 1st edition, 2013 |  |  | 4 | Andrew Ng, Machine Learning Yearning                                                                         |
| 2         | William McKinney, Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, 2nd Edition, Shroff/O'Reilly; Second edition ,2017               |  |  | 5 | Luiz Paulo Favero, Patricia Belfiore,Data Science for Business and Decision Making, Academic Press Inc ,2019 |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              | Strategies                 |                      |                   |                          |                   |   |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|----------------------------|----------------------|-------------------|--------------------------|-------------------|---|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              | Technology                 | Pedagogy / Andragogy |                   | Sustainable Development  |                   |   |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              | Simulations                | Clarification/Pauses | ✓                 | Good Health & Well Being | ✓                 |   |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              | Presentation Tools         | ✓                    | Group Discussion  | ✓                        | Quality Education | ✓ |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) | Learning Management System | ✓                    | Hands-on Practice | ✓                        | Gender Equality   | ✓ |
| 1                         | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Debate               | ✓                 |                          |                   |   |
| 2                         | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Interactive Lecture  | ✓                 |                          |                   |   |
| 3                         | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            | Brainstorming        | ✓                 |                          |                   |   |
| 4                         | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            |                      |                   |                          |                   |   |
| 5                         | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |   |
| 6                         | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |   |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |                            |                      |                   |                          |                   |   |
|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                            |                      |                   |                          |                   |   |
|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                            |                      |                   |                          |                   |   |
|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                            |                      |                   |                          |                   |   |
|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                            |                      |                   |                          |                   |   |
|                           |            |                                                      |              |            |              |            |              |            |              |                                   |              |                            |                      |                   |                          |                   |   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |  |  |  |                            |                                               |  |  |                  |                                                      |
|----------------------|---------------------------------------------------------|--|--|--|--|----------------------------|-----------------------------------------------|--|--|------------------|------------------------------------------------------|
| Professional Experts |                                                         |  |  |  |  | Higher Institution Experts |                                               |  |  | Internal Experts |                                                      |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  |  |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT chennai |  |  | 1                | Dr. S SABEEN, Dept. of Computer Science, FSH, SRMIST |

| Course Code | USA24D18J | Course Title | Cyber Security |  |  |  | Category | D | Discipline core / Elective course | L | T | P | C |
|-------------|-----------|--------------|----------------|--|--|--|----------|---|-----------------------------------|---|---|---|---|
|             |           |              |                |  |  |  |          |   |                                   | 3 | 0 | 2 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                            | Depth    |        |           |         | Attainment        |    |    | Programme Learning Outcomes                                                    |                                                                          |   |   |   |   |   |   |   |   |    |  |  |
|-------|-----------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|----|----|--------------------------------------------------------------------------------|--------------------------------------------------------------------------|---|---|---|---|---|---|---|---|----|--|--|
| CLR-1 | To become familiar with objective of cyber technologies               | 1        | 2      | 3         | 4       | 1                 | 2  | 3  | 7                                                                              | 1                                                                        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |  |  |
| CLR-2 | To become familiar with threats in OS                                 |          |        |           |         |                   |    |    |                                                                                | Level of Thinking<br>Expected Proficiency (%)<br>Expected Attainment (%) |   |   |   |   |   |   |   |   |    |  |  |
| CLR-3 | To gain knowledge on security issues                                  |          |        |           |         |                   |    |    |                                                                                |                                                                          |   |   |   |   |   |   |   |   |    |  |  |
| CLR-4 | To understand Security technologies and functions                     |          |        |           |         |                   |    |    |                                                                                |                                                                          |   |   |   |   |   |   |   |   |    |  |  |
| CLR-5 | To gain hands on experience in security related treads and techniques |          |        |           |         |                   |    |    |                                                                                |                                                                          |   |   |   |   |   |   |   |   |    |  |  |
|       |                                                                       |          |        |           |         |                   |    |    |                                                                                |                                                                          |   |   |   |   |   |   |   |   |    |  |  |
| CLO   | At the end of this course, learners will be able to:                  | Conceive | Design | Implement | Operate | Level of Thinking |    |    | Communication Skills, Problem Solving, Critical Thinking, Collaborative Skills |                                                                          |   |   |   |   |   |   |   |   |    |  |  |
| CLO-1 | Have a clear picture about cyber security                             | ✓        | ✓      | -         | -       | 2                 | 85 | 75 |                                                                                | 3                                                                        | - | - | 1 | - | 3 | - | 2 | - | -  |  |  |
| CLO-2 | Analyze the current security threats                                  | ✓        | ✓      | ✓         | -       | 2                 | 85 | 75 |                                                                                | 3                                                                        | 2 | 1 | 2 | 2 | 3 | - | 1 | - | -  |  |  |
| CLO-3 | Understandings on security related issues                             | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 75 |                                                                                | 3                                                                        | 1 | 3 | 1 | 3 | 3 | - | 1 | - | -  |  |  |
| CLO-4 | Analyse and gain knowledge on technologies                            | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 75 |                                                                                | 3                                                                        | 3 | 2 | 3 | 3 | 3 | - | 2 | - | -  |  |  |
| CLO-5 | Improves working skills with technologies                             | ✓        | ✓      | ✓         | ✓       | 3                 | 85 | 75 |                                                                                | 3                                                                        | 3 | 2 | 3 | 3 | 3 | - | 3 | - | -  |  |  |

| Sessions | CLO-1                                               | CLO-2                                      | CLO-3                                                    | CLO-4                                                | CLO-5                                                    |
|----------|-----------------------------------------------------|--------------------------------------------|----------------------------------------------------------|------------------------------------------------------|----------------------------------------------------------|
|          | 15                                                  | 15                                         | 15                                                       | 15                                                   | 15                                                       |
| SLO-1    | Introduction to cyber security                      | Overview of OS Threats                     | basics of digital security,                              | Introduction to cyber-attacks                        | Security Planning                                        |
| SLO-2    | Define Confidentiality -integrity, and availability | Security in Operating Systems              | protecting personal computers and devices                | Network- Security- Systems- Storage                  | Business Continuity Planning                             |
| SLO-3    | Computer Security - Threats                         | Security in the Design of Operating System | protecting devices from Virus and Malware                | application security design, development and testing | Handling Incidents                                       |
| SLO 4&5  | Practice: Perform encryption, decryption            | Practic : Vigenere Ciphers                 | Practice: Apply DES algorithm for practical applications | Practice: Implement the secutiytriats                | Practice: Apply AES algorithm for practical applications |

|           |                                                                  |                                                                                                  |                                                                                    |                                                          |                                                               |
|-----------|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------|
| SLO-6     | Vulnerabilities - Controls - Authentication in computer security | OS security Rootkit                                                                              | Authentication and Authorization,                                                  | operations security, monitoring                          | Dealing with Disaster                                         |
| SLO-7     | Cyber security policy - ESSP, ISSP, SYSSP.                       | Networking basics                                                                                | need for strong credentials                                                        | identifying threats and remediating them                 | Emerging Technologies                                         |
| SLO-8     | define Cryptography                                              | home network                                                                                     | keeping credentials secure,                                                        | Principles of data security                              | The Internet of Things                                        |
| SLO 9&10  | Practice:playfair<br>Cipher                                      | Practice: Perform encryption and decryption using following transposition techniques. Rail fence | Practice: Perform authentication                                                   | Practice : example on RSA                                | Practice: Laboratory: example on AES                          |
| SLO-11    | Techniques involved in – Cryptography                            | large-scale business networks                                                                    | protecting servers using physical and logical security                             | Confidentiality – integrity - availability               | Economics - Electronic Voting                                 |
| SLO-12    | Need for Cryptography                                            | Networking protocols                                                                             | World Wide Web (www),                                                              | Data Privacy, Data breaches,                             | Cyber Warfare- Cyberspace and the Law                         |
| SLO-13    | , Threats to Information System                                  | security protocols                                                                               | the Internet and the HTTP protocol, security of browser to web server interaction, | - preventing attacks and breaches with security controls | International Laws - Cyber crime                              |
| SLO 14&15 | Practice: HillCipher                                             | Practice: . Row & Column , Transformation                                                        | Practice: example on DES                                                           | Practice: Implement the Digital Signature Standard.      | Practice: Implement the Diffie-Hellman Key Exchange Algorithm |

| Resources |                                                                                                                             |   |                                                                                 |  |  |
|-----------|-----------------------------------------------------------------------------------------------------------------------------|---|---------------------------------------------------------------------------------|--|--|
| 1         | Joseph Muniz, Gary McIntyre, Security Operations Center, Cisco press 2015                                                   | 3 | Behrouz A. Forouzan, Cryptography and Network Security:6th Ed. McGraw Hill,2017 |  |  |
| 2         | Bordens, K. S. and Abbott, B.B : Research design and Methods, Mc Graw Hill, 2008                                            | 4 | William Stallings, “Cryptography and Network Security”, PHI/Pearson Education.  |  |  |
| 3         | Michael E. Whitman, Herbert J. Mattord, (2018). Principles of Information Security, 6th edition, Cenage Learning, N. Delhi. |   |                                                                                 |  |  |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              | Strategies                 |                      |                   |                          |                   |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|----------------------------|----------------------|-------------------|--------------------------|-------------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              | Technology                 | Pedagogy / Andragogy |                   | Sustainable Development  |                   |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              | Simulations                | Clarification/Pauses | ✓                 | Good Health & Well Being |                   |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              | Presentation Tools         | ✓                    | Group Discussion  | ✓                        | Quality Education |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) | Learning Management System | ✓                    | Hands-on Practice | ✓                        | Gender Equality   |
| 1                         | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Debate               | ✓                 |                          |                   |
| 2                         | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Interactive Lecture  | ✓                 |                          |                   |
| 3                         | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            | Brainstorming        | ✓                 |                          |                   |
| 4                         | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            |                      |                   |                          |                   |
| 5                         | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |
| 6                         | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |                            |                      |                   |                          |                   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |  |                            |                                               |  |  |                  |                                                 |  |  |
|----------------------|---------------------------------------------------------|--|--|----------------------------|-----------------------------------------------|--|--|------------------|-------------------------------------------------|--|--|
| Professional Experts |                                                         |  |  | Higher Institution Experts |                                               |  |  | Internal Experts |                                                 |  |  |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT chennai |  |  | 1                | Dr. Ramesh. M, Assistant Professor, FSH, SRMIST |  |  |

| Course Code | USA24D20J | Course Title | Blockchain Technology | Category | D | Disciplinary core/<br>Elective course | L | T | P | C |
|-------------|-----------|--------------|-----------------------|----------|---|---------------------------------------|---|---|---|---|
|             |           |              |                       |          |   |                                       | 3 | 0 | 2 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                  | Depth    |        |           |         | Attainment        |                          |                         | Programme Learning Outcomes                              |                                                        |                                                 |                                 |                                                   |       |       |   |   |   |    |  |
|-------|-----------------------------------------------------------------------------|----------|--------|-----------|---------|-------------------|--------------------------|-------------------------|----------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------|---------------------------------|---------------------------------------------------|-------|-------|---|---|---|----|--|
| CLR-1 | To understand the design principles of Bitcoin and Ethereum.                | 1        | 2      | 3         | 4       | 1                 | 2                        | 3                       | 7                                                        | 1                                                      | 2                                               | 3                               | 4                                                 | 5     | 6     | 7 | 8 | 9 | 10 |  |
| CLR-2 | To learn Nakamoto consensus                                                 |          |        |           |         |                   |                          |                         |                                                          |                                                        |                                                 |                                 |                                                   |       |       |   |   |   |    |  |
| CLR-3 | To interact with a blockchain system by sending and reading transactions    |          |        |           |         |                   |                          |                         |                                                          |                                                        |                                                 |                                 |                                                   |       |       |   |   |   |    |  |
| CLR-4 | To design, build, and deploy a distributed application                      |          |        |           |         |                   |                          |                         |                                                          |                                                        |                                                 |                                 |                                                   |       |       |   |   |   |    |  |
| CLR-5 | To evaluate security, privacy, and efficiency of a given blockchain system. |          |        |           |         |                   |                          |                         |                                                          |                                                        |                                                 |                                 |                                                   |       |       |   |   |   |    |  |
| CLO   | At the end of this course, learners will be able to:                        | Conceive | Design | Implement | Operate | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Communication Skills, Problem Solving, Critical Thinking | Communication Skills, Independent Thinking, Analytical | Leadership Qualities, Digital Technology Skills | Value Incubation, Multicultural | Environmental Action, Entrepreneurial Risk Taking | PSO-1 | PSO-2 |   |   |   |    |  |
| CLO-1 | To understand how blockchain systems (mainly Bitcoin and Ethereum) work     | ✓        | ✓      | -         | -       | 2                 | 85                       | 75                      | 3                                                        | -                                                      | -                                               | 1                               | -                                                 | 3     | -     | 2 | 2 | 1 |    |  |
| CLO-2 | To securely interact with blockchain nodes                                  | ✓        | ✓      | ✓         | -       | 2                 | 85                       | 75                      | 3                                                        | 2                                                      | 1                                               | 2                               | 3                                                 | -     | 1     | 2 | 1 |   |    |  |
| CLO-3 | To broadcast the transactions                                               | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                        | 1                                                      | 3                                               | 1                               | 3                                                 | 3     | -     | 1 | 1 | 2 |    |  |
| CLO-4 | To design, build, and deploy smart contracts and distributed applications   | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                        | 3                                                      | 2                                               | 3                               | 3                                                 | 3     | -     | 2 | 3 | 3 |    |  |
| CLO-5 | To integrate ideas from blockchain technology into their own projects       | ✓        | ✓      | ✓         | ✓       | 3                 | 85                       | 75                      | 3                                                        | 3                                                      | 2                                               | 3                               | 3                                                 | 3     | -     | 3 | 3 | 3 |    |  |

| Sessions |       | CLO -1                                       | CLO - 2                                     | CLO – 3                                                                | CLO - 4                                                                               | CLO - 5                                                |
|----------|-------|----------------------------------------------|---------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------|
|          |       | 15                                           | 15                                          | 15                                                                     | 15                                                                                    | 15                                                     |
| S-1      | SLO-1 | Blockchain Introduction                      | Database Vs. Blockchain Architecture        | The Structure of Blockchains                                           | Introduction to Cryptocurrency                                                        | Ethereum                                               |
|          | SLO-2 | Blockchain Architecture                      | Types of Blockchain Architecture            | Blockchain Data Structure                                              | Blockchain and Cryptocurrency                                                         | Overview of Ethereum                                   |
| S-2      | SLO-1 | Blockchain Working                           | Public Blockchains                          | Transactions                                                           | Double Spending                                                                       | Need for Ethereum                                      |
|          | SLO-2 | Blockchain Transactions                      | Private Blockchains                         | Blocks                                                                 | Double Spending Example                                                               | Purpose of Ethereum                                    |
| S-3      | SLO-1 | Need for Blockchain                          | Consortium Blockchains                      | Types of Blocks                                                        | Cryptography in Blockchain                                                            | Ethereum Vs Bitcoin                                    |
|          | SLO-2 | Applications of Blockchain                   | Hybrid Blockchains                          | Peer-to-Peer(P2P) Network                                              | Types                                                                                 | Ethereum Blockchain                                    |
| S4-5     | SLO-1 | Laboratory 1: Making the Blockchain          | Laboratory 4: Broadcasting the transactions | Laboratory 7: Implementation of an Interface with search functionality | Laboratory 10: Interact with a blockchain system by sending and reading transactions. | Laboratory 13: Smart Contract Construction in Solidity |
|          | SLO-2 | Network nodes to run                         |                                             |                                                                        |                                                                                       |                                                        |
| S-6      | SLO-1 | Blockchain Versions                          | Main components of Blockchain               | Difference between Blockchain and Normal Database                      | Applications                                                                          | Features of Ethereum                                   |
|          | SLO-2 | Blockchain Variants                          | Challenges in Blockchain                    | Consensus                                                              | Public Key Cryptography                                                               | Applications of Ethereum                               |
| S-7      | SLO-1 | Public                                       | Centralized System                          | Consensus Algorithm                                                    | Use of Cryptography in Blockchain                                                     | Smart Contracts on Ethereum                            |
|          | SLO-2 | Private                                      | De-centralized System                       | Mining                                                                 | Cryptographic hash functions                                                          | Ethereum Vs Ether                                      |
| S-8      | SLO-1 | Consortium                                   | Key Elements of Blockchain                  | Proof of Work (PoW)                                                    | Types of cryptographic hash functions                                                 | Ether- Gas                                             |
|          | SLO-2 | Blockchain Use Cases                         | Distributed ledger technology               | Proof of Work Mining                                                   | Bitcoin                                                                               | How Ethereum is different from Bitcoin?                |
| S-9      | SLO-1 | Laboratory 2: Implementation of Broadcasting | Laboratory 5: Broadcasting multiple         | Laboratory 8: Implementation of PoW                                    | Laboratory 11: Mining puzzles                                                         | Laboratory 14: Interact with Solidity                  |

| Duration (Hour) |       | 15                                     | 15                                             | 15                                            | 15                                                                 | 15                                                            |
|-----------------|-------|----------------------------------------|------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------|
| 9-10            | SLO-2 | Nodes                                  | transactions                                   | algorithm                                     |                                                                    | Contract in nodejs console                                    |
| S-11            |       |                                        |                                                |                                               |                                                                    |                                                               |
|                 | SLO-2 | Bitcoin Cryptocurrency                 | Smart contracts                                | How Proof of Stake (PoS) works?               | Blockchain Hashing                                                 | Ethereum and Solidity                                         |
| S-12            | SLO-1 | Most Popular Application of Blockchain | Components of Blockchain Architecture          | Difference between PoW and PoS                |                                                                    | Testing in Solidity                                           |
|                 | SLO-2 | Blockchain Vs. Shared Database         | Key Characteristics of Blockchain Architecture | SHA256 Algorithm                              | Bitcoin Mining                                                     | Debugging in Solidity                                         |
|                 |       |                                        |                                                |                                               |                                                                    |                                                               |
| S-13            | SLO-2 | Limitations of Blockchain Technology   | Blockchain Applications                        | Simplified Byzantine Fault Tolerance (SBFT)   | Process of Mining                                                  | Disadvantages of Ethereum                                     |
| S 14-S15        | SLO-1 | Laboratory 3: Synchronizing the nodes  | Laboratory 6: Implementation of Mining         | Laboratory 9: Implementation of POS algorithm | Laboratory 12: Design, build, and deploy a distributed application | Laboratory 15: Interact with solidity Contract in web browser |
|                 |       |                                        |                                                |                                               |                                                                    |                                                               |

| Resources |                                                                                           |  |   |                                                                                                                                                             |  |
|-----------|-------------------------------------------------------------------------------------------|--|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 1         | Tiana Laurence, BlockchainforDummies,(2017),Wiley India Pvt. Ltd.                         |  | 3 | Bikramaditya Singhal, Gautam Dhameja, Priyansu Sekhar Panda, Beginning Blockchain :A Beginner's Guide to Building Block chain Solutions(2018),Apress Media. |  |
| 2         | Tim Mathis, Block chain: The Technology Behind Bitcoin And Other Cryptocurrencies(EBook). |  |   |                                                                                                                                                             |  |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              | Strategies                 |                      |                   |                          |                   |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|----------------------------|----------------------|-------------------|--------------------------|-------------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              | Technology                 | Pedagogy / Andragogy |                   | Sustainable Development  |                   |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4    |              |                                   |              | Simulations                | Clarification/Pauses | ✓                 | Good Health & Well Being |                   |
|                           |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10%)      |              |                                   |              | Presentation Tools         | ✓                    | Group Discussion  | ✓                        | Quality Education |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) | Learning Management System | ✓                    | Hands-on Practice | ✓                        | Gender Equality   |
| 1                         | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Debate               | ✓                 |                          |                   |
| 2                         | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |                            | Interactive Lecture  | ✓                 |                          |                   |
| 3                         | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            | Brainstorming        | ✓                 |                          |                   |
| 4                         | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |                            |                      |                   |                          |                   |
| 5                         | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |
| 6                         | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |                            |                      |                   |                          |                   |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |                            |                      |                   |                          |                   |

\*The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                         |  |  |                            |                                               |  |  |                  |                                     |
|----------------------|---------------------------------------------------------|--|--|----------------------------|-----------------------------------------------|--|--|------------------|-------------------------------------|
| Professional Experts |                                                         |  |  | Higher Institution Experts |                                               |  |  | Internal Experts |                                     |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT Chennai |  |  | 1                | Dr.Kalpana. G, Professor,FSH,SRMIST |

| Course Code | UCS24D18T | Course Title | Introduction to Cyber Physical Systems |  |  |  | Category | D | Discipline Core / Elective Course | L | T | P | C |
|-------------|-----------|--------------|----------------------------------------|--|--|--|----------|---|-----------------------------------|---|---|---|---|
|             |           |              |                                        |  |  |  |          |   |                                   | 4 | 0 | 0 | 4 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| Course Rationale (CLR)         | The purpose of learning this course is to                                                                                                                              | Depth    |   |   |   | Attainment |    |    | Program Learning Outcomes |                          |                         |                                                                                                                                            |                                                                                              |       |        |   |   |   |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---|---|---|------------|----|----|---------------------------|--------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-------|--------|---|---|---|
| CLR-1                          | Obtain Physical Cyber Systems fundamentals and principles knowledge as building blocks to promote further design and implementation of more complex real time systems. | Conceive | 2 | 3 | 4 | 1          | 2  | 3  | Level of Thinking         | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Communication Skills, Independent Thinking, Analytical Leadership Qualities, Digital Technology Skills | Value Inculcation, Multicultural Environmental Action, Community Entrepreneurial Risk Taking | PLO-9 | PLO-10 |   |   |   |
| CLR-2                          | Understand Physical Cyber Systems design for synchronous model with specific case study for arm processor.                                                             |          |   |   |   |            |    |    |                           |                          |                         |                                                                                                                                            |                                                                                              |       |        |   |   |   |
| CLR-3                          | Understand the necessity of Cyber physical systems to have optimal performance of asynchronous model                                                                   |          |   |   |   |            |    |    |                           |                          |                         |                                                                                                                                            |                                                                                              |       |        |   |   |   |
| CLR-4                          | Comprehend the physical cyber systems design and implementation in dynamic models                                                                                      |          |   |   |   |            |    |    |                           |                          |                         |                                                                                                                                            |                                                                                              |       |        |   |   |   |
| CLR-5                          | Hybridization of Cyber physical systems which will help the students to anticipate upcoming technologies                                                               |          |   |   |   |            |    |    |                           |                          |                         |                                                                                                                                            |                                                                                              |       |        |   |   |   |
| Course Learning Outcomes (CLO) | At the end of this course, learners will be able to                                                                                                                    |          |   |   |   |            |    |    |                           |                          |                         |                                                                                                                                            |                                                                                              |       |        |   |   |   |
| CLO-1                          | Understand the Basics of Physical system                                                                                                                               | ✓        | ✓ | - | - | 2          | 85 | 75 | 3                         | -                        | -                       | 1                                                                                                                                          | -                                                                                            | 3     | -      | 2 | 2 | 1 |
| CLO-2                          | Design synchronous models for Real Time applications                                                                                                                   | ✓        | ✓ | ✓ | - | 2          | 85 | 75 | 3                         | 2                        | 1                       | 2                                                                                                                                          | 2                                                                                            | 3     | -      | 1 | 2 | 1 |
| CLO-3                          | Design Asynchronous models for real time applications                                                                                                                  | ✓        | ✓ | ✓ | ✓ | 3          | 85 | 75 | 3                         | 1                        | 3                       | 1                                                                                                                                          | 3                                                                                            | 3     | -      | 1 | 1 | 2 |
| CLO-4                          | Develop Deep Understanding on selection of hardware and software for designing dynamical systems.                                                                      | ✓        | ✓ | ✓ | ✓ | 3          | 85 | 75 | 3                         | 3                        | 2                       | 3                                                                                                                                          | 3                                                                                            | 3     | -      | 2 | 3 | 3 |
| CLO-5                          | Come up with cost effective, reliable, robust and feasible designs for real world problems.                                                                            | ✓        | ✓ | ✓ | ✓ | 3          | 85 | 75 | 3                         | 3                        | 2                       | 3                                                                                                                                          | 3                                                                                            | 3     | -      | 3 | 3 | 3 |

| Sessions | CLO-1                                                         | CLO-2                                                                                     | CLO-3                                                    | CLO-4                                      | CLO-5                                  |
|----------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------|----------------------------------------|
|          | 12                                                            | 12                                                                                        | 12                                                       | 12                                         | 12                                     |
| SLO-1    | Introduction To Cyber-Physical Systems                        | Synchronous model overview, Reactive Components,                                          | Asynchronous Process overview, States, Internal Actions, | Overview of dynamic systems                | Introduction to Hybrid systems         |
| SLO-2    | Interoperability, Survivability                               | Variables, Valuations                                                                     | Operations On Process                                    | Continuous Time Model                      | Hybrid Dynamical Model,                |
| SLO-3    | Cyber-Physical System Requirements                            | Expression and Execution,                                                                 | Blocking Vs Non-Blocking Synchronization                 | . Continuously Evolving Inputs and Outputs | Zeno Behavior                          |
| SLO-4    | Interoperability, Survivability                               | Extended-State Machines,                                                                  | Deadlocks                                                | Models with Disturbance,                   | Designing Hybrid Systems               |
| SLO-5    | Real Time System, Internet of Things (IOT),                   | Properties of Components                                                                  | Shared Memory,                                           | Composing Components Stability             | Automated Guided Vehicle,              |
| SLO-7    | Radio Frequency Identification Technology and its use in CPS, | Various Types of components,                                                              | Fairness Assumptions                                     | Linear Systems Linearity                   | Obstacle with Multi Robot Coordination |
| SLO-8    | Application in CPS,                                           | Composing Components                                                                      | Leader Election,                                         | Equations and stability,                   | Multi Hop Control Networks             |
| SLO-9    | Power line Communication                                      | Output Hiding                                                                             | Reliable Transmission                                    | Designing Controllers                      | Linear Hybrid Automata,                |
| SLO-10   | Smart Cities And Internet Of Everything                       | Synchronous Designs (Synchronous Circuits, Cruise Control Systems, Synchronous Networks). | Wait Free Consensus, Safety Specifications               | Open Loop Vs Feedback Controller           | Pursuit Game problem,                  |
| SLO-11   | Ubiquitous Computing Fundamentals                             | Cruise Control Systems, Synchronous Networks).                                            | Invariants Of Transition Systems,                        | PID Controllers, Analysis Techniques,      | Timed Automata,                        |
| SLO-12   | Autonomous Systems in Ubiquitous Computing                    | Case Study                                                                                | Safety Monitors                                          | Barrier Certificates                       | Model of Timed Automata                |

| Resources |                                                                                                                           |  |  |  |  |  |  |   |                                                                                 |  |
|-----------|---------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|---|---------------------------------------------------------------------------------|--|
| 1         | Rajeev Alur, “Principles of Cyber Physical Systems”, 1 <sup>st</sup> Edition, MIT Press 2015                              |  |  |  |  |  |  | 3 | Raj Rajkumar, “ Cyber Physical Systems” , 2 <sup>nd</sup> Edition Elsevier 2015 |  |
| 2         | Edward D Lamie, “ Computing Fundamentals of Cyber Physical Systems”, 2 <sup>nd</sup> Edition, Newnes Elsevier Publication |  |  |  |  |  |  |   |                                                                                 |  |

| Assessment        |            |                                                      |          |         |          |         |          |         |          |                  |          |
|-------------------|------------|------------------------------------------------------|----------|---------|----------|---------|----------|---------|----------|------------------|----------|
| Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |          |         |          |         |          |         |          | Final Assessment |          |
|                   |            | CLA – 1                                              |          | CLA – 2 |          | CLA – 3 |          | CLA – 4 |          |                  |          |
|                   |            | (10 %)                                               |          | (10 %)  |          | (20 %)  |          | (10 %)  |          |                  |          |
|                   |            | Theory                                               | Practice | Theory  | Practice | Theory  | Practice | Theory  | Practice | Theory           | Practice |
| 1                 | Remember   | 30%                                                  | ---      | 30%     | ---      | 30%     | ---      | 30%     | ---      | 30%              | ---      |
| 2                 | Understand |                                                      |          |         |          |         |          |         |          |                  |          |
| 3                 | Apply      | 30%                                                  | ---      | 30%     | ---      | 30%     | ---      | 30%     | ---      | 30%              | ---      |
| 4                 | Analyze    |                                                      |          |         |          |         |          |         |          |                  |          |
| 5                 | Evaluate   | 40%                                                  | ---      | 40%     | ---      | 40%     | ---      | 40%     | ---      | 40%              | ---      |
| 6                 | Create     |                                                      |          |         |          |         |          |         |          |                  |          |
| Total             |            | 100 %                                                |          | 100 %   |          | 100 %   |          | 100 %   |          | 100%             |          |

| Strategies                 |                        |                            |   |
|----------------------------|------------------------|----------------------------|---|
| Technology                 | Pedagogy / Andragogy   | Sustainable Development    |   |
| Simulations                | ✓ Clarification/Pauses | ✓ Good Health & Well Being | ✓ |
| Presentation Tools         | Group Discussion       | ✓ Quality Education        | ✓ |
| Learning Management System | Hands-on Practice      | ✓ Gender Equality          | ✓ |
|                            | Debate                 | ✓                          |   |
|                            | Interactive Lecture    | ✓                          |   |
|                            | Brainstorming          | ✓                          |   |
|                            |                        |                            |   |
|                            |                        |                            |   |
|                            |                        |                            |   |
|                            |                        |                            |   |

**\*The evaluation can be done on the one or more parameters that include, (i)Seminars, (ii)Mini-Project, (iii)Case-Studies, (iv)MOOC Certification (v)Publication of Article (vi)Presentation of Research Work in Conferences**

| Designers            |                                                         |  |  |                            |                                               |  |  |                  |                     |  |
|----------------------|---------------------------------------------------------|--|--|----------------------------|-----------------------------------------------|--|--|------------------|---------------------|--|
| Professional Experts |                                                         |  |  | Higher Institution Experts |                                               |  |  | Internal Experts |                     |  |
| 1                    | Mr. Navarathnamani, Datayan Solutions (P) Ltd., Chennai |  |  | 1                          | Dr. Neela Narayanan V, Professor, VIT Chennai |  |  | 1                | Dr. Yoga Lakshmi .P |  |

| Course Code | UCS24P04L | Course Title | Research Project and Dissertation | Category | P | ProjectWork /Internship | L | T | P  | C  |
|-------------|-----------|--------------|-----------------------------------|----------|---|-------------------------|---|---|----|----|
|             |           |              |                                   |          |   |                         | 0 | 0 | 24 | 12 |

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| Course Rationale (CLR)         | The purpose of learning this course is to                                     | Depth    |   |   |   | Attainment |    |    | Program Learning Outcomes |   |   |   |   |   |   |   |   |   |   |   |    |
|--------------------------------|-------------------------------------------------------------------------------|----------|---|---|---|------------|----|----|---------------------------|---|---|---|---|---|---|---|---|---|---|---|----|
| CLR-1                          | Demonstrate skills learnt in the real time environment.                       | Conceive | 2 | 3 | 4 | 1          | 2  | 3  | 1                         | 2 | 3 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CLR-2                          | Explore the different industries that are using IT                            |          |   |   |   |            |    |    |                           |   |   |   |   |   |   |   |   |   |   |   |    |
| CLR-3                          | Enhance the skills in the system aspects                                      |          |   |   |   |            |    |    |                           |   |   |   |   |   |   |   |   |   |   |   |    |
| CLR-4                          | Understanding the professional connections with the knowledge learnt          |          |   |   |   |            |    |    |                           |   |   |   |   |   |   |   |   |   |   |   |    |
| CLR-5                          | Applying the skills in problem solving                                        |          |   |   |   |            |    |    |                           |   |   |   |   |   |   |   |   |   |   |   |    |
| Course Learning Outcomes (CLO) | At the end of this course, learners will be able to                           |          |   |   |   |            |    |    |                           |   |   |   |   |   |   |   |   |   |   |   |    |
| CLO-1                          | To get an insight of an industry and organization/company                     | ✓        | ✓ | - | - | 2          | 85 | 75 | 3                         | - | 3 | 3 | 3 | - | - | - | 3 | 3 |   |   |    |
| CLO-2                          | To gain valuable skills and knowledge                                         | ✓        | ✓ | ✓ | - | 2          | 85 | 75 | 3                         | - | 3 | 3 | 3 | - | - | - | 3 | 3 |   |   |    |
| CLO-3                          | To make professional connections and enhance networking                       | ✓        | ✓ | ✓ | ✓ | 3          | 85 | 75 | 3                         | - | 3 | 3 | 3 | - | - | - | 3 | 3 |   |   |    |
| CLO-4                          | To get experience in a field to allow the student to make a career transition | ✓        | ✓ | ✓ | ✓ | 3          | 85 | 75 | 3                         | - | 3 | 3 | 3 | - | - | - | 3 | 3 |   |   |    |
| CLO-5                          | To get an inside view of an industry and organization/company                 | ✓        | ✓ | ✓ | ✓ | 3          | 85 | 75 | 3                         | - | 3 | 3 | 3 | - | - | - | 3 | 3 |   |   |    |

**\*\*\* Project Work Selection: Project Work Titles for students would be finalized by the Department Project Work Evaluation Committee.**

| LearningAssessment     |                                               |          |                                 |           |
|------------------------|-----------------------------------------------|----------|---------------------------------|-----------|
| ProjectWork/Internship | Continuous Learning Assessment (50%weightage) |          | Final Evaluation (50%weightage) |           |
|                        | Review-1                                      | Review-2 | Project Report                  | Viva-Voce |
|                        | 20%                                           | 30%      | 30%                             | 20%       |

| Course Code | UCS24P05L | Course Title | Professional Internship | Category | P | ProjectWork /Internship | L<br>0 | T<br>0 | P<br>24 | C<br>12 |
|-------------|-----------|--------------|-------------------------|----------|---|-------------------------|--------|--------|---------|---------|
|-------------|-----------|--------------|-------------------------|----------|---|-------------------------|--------|--------|---------|---------|

| Course Offering Department | Computer Science | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| Course Rationale (CLR)         | The purpose of learning this course is to                                     | Depth    |   |   |   | Attainment        |                          |                         | Program Learning Outcomes |                       |                                  |                       |                           |                                  |                                 |                             |                    |                        |
|--------------------------------|-------------------------------------------------------------------------------|----------|---|---|---|-------------------|--------------------------|-------------------------|---------------------------|-----------------------|----------------------------------|-----------------------|---------------------------|----------------------------------|---------------------------------|-----------------------------|--------------------|------------------------|
| CLR-1                          | Demonstrate skills learnt in the real time environment.                       | Conceive | 2 | 3 | 4 | 1                 | 2                        | 3                       | 1                         | 2                     | 3                                | 4                     | 5                         | 6                                | 7                               | 8                           | 9                  | 10                     |
| CLR-2                          | Explore the different industries that are using IT                            |          |   |   |   |                   |                          |                         |                           |                       |                                  |                       |                           |                                  |                                 |                             |                    |                        |
| CLR-3                          | Enhance the skills in the system aspects                                      |          |   |   |   |                   |                          |                         |                           |                       |                                  |                       |                           |                                  |                                 |                             |                    |                        |
| CLR-4                          | Understanding the professional connections with the knowledge learnt          |          |   |   |   |                   |                          |                         |                           |                       |                                  |                       |                           |                                  |                                 |                             |                    |                        |
| CLR-5                          | Applying the skills in problem solving                                        |          |   |   |   |                   |                          |                         |                           |                       |                                  |                       |                           |                                  |                                 |                             |                    |                        |
| Course Learning Outcomes (CLO) | At the end of this course, learners will be able to                           |          |   |   |   | Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical | Communication Skills, | Independent Thinking, Analytical | Leadership Qualities, | Digital Technology Skills | Value Inculcation, Multicultural | Environmental Action, Community | Entrepreneurial Risk Taking | Project Management | Individual & Team work |
| CLO-1                          | To get an insight of an industry and organization/company                     | ✓        | ✓ | - | - | 2                 | 85                       | 75                      | 3                         | -                     | 3                                | 3                     | 3                         | -                                | -                               | -                           | 3                  | 3                      |
| CLO-2                          | To gain valuable skills and knowledge                                         | ✓        | ✓ | ✓ | - | 2                 | 85                       | 75                      | 3                         | -                     | 3                                | 3                     | 3                         | -                                | -                               | -                           | 3                  | 3                      |
| CLO-3                          | To make professional connections and enhance networking                       | ✓        | ✓ | ✓ | ✓ | 3                 | 85                       | 75                      | 3                         | -                     | 3                                | 3                     | 3                         | -                                | -                               | -                           | 3                  | 3                      |
| CLO-4                          | To get experience in a field to allow the student to make a career transition | ✓        | ✓ | ✓ | ✓ | 3                 | 85                       | 75                      | 3                         | -                     | 3                                | 3                     | 3                         | -                                | -                               | -                           | 3                  | 3                      |
| CLO-5                          | To get an inside view of an industry and organization/company                 | ✓        | ✓ | ✓ | ✓ | 3                 | 85                       | 75                      | 3                         | -                     | 3                                | 3                     | 3                         | -                                | -                               | -                           | 3                  | 3                      |

\*\*\* Internship Training Selection: List of Industries/Research Centre's for Internship Training for students would be finalized by the Department Internship/Industrial Training Committee

| LearningAssessment     |                                               |          |                                 |           |
|------------------------|-----------------------------------------------|----------|---------------------------------|-----------|
| ProjectWork/Internship | Continuous Learning Assessment (50%weightage) |          | Final Evaluation (50%weightage) |           |
|                        | Review-1                                      | Review-2 | Internship Report               | Viva-Voce |
|                        | 20%                                           | 30%      | 30%                             | 20%       |

\*