

**DEPARTMENT OF COMPUTER SCIENCE**

**Nallamuthu Gounder Mahalingam College**

**(Autonomous)**

**(An ISO 9001:2015 Certified Institution)**

**Re-Accredited by NAAC**

**Pollachi-642001**



**SYLLABUS**

**B. Sc. COMPUTER SCIENCE**

**BATCH 2023-2026**

## **NGM COLLEGE**

### **Vision**

Our dream is to make the College an institution of excellence at the national level by imparting quality education of global standards to make students academically superior, socially committed, ethically strong, spiritually evolved and culturally rich citizens to contribute to the holistic development of the self and society.

### **Mission**

Training students to become role models in academic arena by strengthening infrastructure, upgrading curriculum, developing faculty, augmenting extension services and imparting quality education through an enlightened management and committed faculty who ensure knowledge transfer, instill research aptitude and infuse ethical and cultural values to transform students into disciplined citizens in order to improve quality of life.

## **DEPARTMENT OF COMPUTER SCIENCE**

### **Department Vision**

Our vision is to make the department, a department of excellence at the international level by imparting need based Information Technology education of global industry standards to make students academically and technically sound, enriched with rich spiritual quotients, contribute to the overall development of the self, society and country.

### **Department Mission**

Developing students to become role models as technocrats by imparting technical knowledge, recent curriculum in catering the needs of Information Technology industry and quality education through dedicated faculty and rejuvenate students into technically sound, in order to make globally fit and improve the standard of life.

| <b>Programme Educational Objectives (PEOs)</b>  |   |
|---|---|
| The <b>B. Sc. Computer Science</b> programme describe accomplishments that graduates are expected to attain within five to seven years after graduation |   |
| PEO1  | To enrich knowledge in core areas related to the field of computer science and Mathematics.   |
| PEO2  | To provide opportunities for acquiring in-depth knowledge in Industry 4.0/5.0 tools and techniques and there by design and implement software projects to meet customer's business objectives.          |
| PEO3  | To enable graduates to pursue higher education leading to Master and Research Degrees or have a successful career in industries associated with Computer Science or as entrepreneurs                    |
| PEO4  | To enhance communicative skills and inculcate team spirit through professional activities, skills in handling complex problems in data analysis and research project to make them a better team player. |
| PEO5  | To embed human values and professional ethics in the young minds and contribute towards nation building.  |

| <b>Programme Outcomes (POs)</b>                                       |  |
|---|--|
| On successful completion of the B.Sc. <b>Computer Science</b> program |  |
| PO1   | <b>Problem Solving:</b> Demonstrate the aptitude of Computer Programming and Computer based problem solving skills.  |
| PO2   | <b>Disciplinary Knowledge:</b> Display the knowledge of appropriate theory, practices and tools for the specification, design, implementation.                                 |
| PO3   | <b>Scientific reasoning/ Problem analysis:</b> Ability to link knowledge of Computer Science with other two chosen auxiliary disciplines of study.                             |
| PO4   | <b>Environment and sustainability:</b> Understand the impact of software solutions in environmental and societal context and strive for sustainable development.               |
| PO5   | <b>Modern tool usage:</b> Use contemporary techniques, skills and digital tools necessary for integrated solutions.  |
| PO6   | <b>Design Development Solution:</b> Ability to formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate         |
| PO7   | <b>Team Work :</b> Ability to operate as a member, leader and manage, deploy, Configure computer network, hardware, software operation of an organization                      |
| PO8   | <b>Communication Skills:</b> An ability to communicate effectively with diverse types of audience and also able to prepare and present technical documents to different groups |
| PO9   | <b>Emerging Technology Usage:</b> Ability to appreciate emerging technologies and tools.   |
| PO10  | <b>Decision Making :</b> Ability to apply decision making methodologies to evaluate solution forefficiency, effectiveness, and sustainability                                  |

| <b>Programme Specific Outcomes (PSOs)</b>  |  |
|--|--|
| After the successful completion of <b>B.Sc. Computer Science</b> program, the students are expected to |  |
| PSO1   | <b>Software Development:</b> Design and develop computer programs/computer -based systems Development in the areas related to algorithms, languages, networking, web development, cloud computing, IoT and data analytics. |
| PSO2   | <b>Education and Employment :</b> Ability to pursue higher studies of specialization and totake up technical employment  |

**MAPPING OF PEOs WITH POs 2 PSOs**

| <b>PEOs<br/>POs \ PSOs</b> | <b>PEO1</b> | <b>PEO2</b> | <b>PEO3</b> | <b>PEO4</b> | <b>PEO5</b> |
|----------------------------|-------------|-------------|-------------|-------------|-------------|
| <b>PO1</b>                 | H           | M           | M           | L           | L           |
| <b>PO2</b>                 | M           | M           | H           | L           | L           |
| <b>PO3</b>                 | M           | H           | M           | H           | L           |
| <b>PO4</b>                 | M           | H           | M           | L           | L           |
| <b>PO5</b>                 | M           | H           | H           | H           | M           |
| <b>PO6</b>                 | M           | H           | H           | H           | L           |
| <b>PO7</b>                 | H           | M           | H           | H           | M           |
| <b>PO8</b>                 | M           | H           | H           | H           | M           |
| <b>PO9</b>                 | H           | H           | M           | H           | L           |
| <b>PO10</b>                | H           | H           | H           | M           | L           |
| <b>PSO1</b>                | H           | H           | H           | M           | L           |
| <b>PSO2</b>                | H           | M           | H           | H           | M           |

**B.Sc. – COMPUTER SCIENCE DEGREE COURSE****(FOR THE CANDIDATES ADMITTED FROM THE ACADEMIC YEAR 2023 – 2024 ONWARDS)****I to VI SEMESTERS****SCHEME OF EXAMINATIONS**

| <b>SEMESTER - I</b> |                           |   |           |   |         |           |               |          |             |           |
|---------------------|---------------------------|---|-----------|---|---------|-----------|---------------|----------|-------------|-----------|
| Part                | Subject Code              | Title of the Paper  | Hrs/Week  |   | Hrs/Sem | Exam Hrs. | Maximum Marks |          | Total Marks | Credits   |
|                     |                           |   | L         | P |         |           | T             | Internal |             |           |
| I                   | 23UTL1C1                  | Tamil Paper-I (B)   |           |   |         |           |               |          |             |           |
|                     | 23UHN1C1                  | Hindi Paper-I   | 5         | - | -       | 3         | 25            | 75       | 100         | 3         |
|                     | 23UFR1C1                  | French Paper-I  |           |   |         |           |               |          |             |           |
| II                  | 23UEN101<br>/<br>23UEN102 | Communication Skills – I (Level I) /<br>Communication Skills – I (Level II)   | 5         | - | -       | 3         | 25            | 75       | 100         | 3         |
| III                 | 23UCS101                  | <b>CC I:</b> C Programming  | 4         | - | -       | 3         | 25            | 75       | 100         | 4         |
|                     | 23UCS102                  | <b>CC II:</b> Digital Computer Fundamentals and Organization  | 5         | - | -       | 3         | 25            | 75       | 100         | 4         |
|                     | 23UCS1A1/<br>23UCS1A2     | <b>GE I – Allied I:</b> Mathematics - Statistical Methods & Linear Algebra /<br>Advanced Mathematics and Applied Statistics | 5         | - | -       | 3         | 25            | 75       | 100         | 4         |
|                     | 23UCS103                  | <b>CC Lab I:</b> Programming Lab in C   | -         | 4 | -       | 3         | 20            | 30       | 50          | 2         |
| IV                  |                           | <b>AECC I:</b> Environmental Studies  | 1         | - | -       | -         | -             | -        | -           | -         |
|                     | 23HEC101                  | Human Excellence: Personal Values & SKY Yoga Practice -I  | 1         | - | -       | 2         | 20            | 30       | 50          | 1         |
| V                   |                           | Extension Activities – Annexure I   | -         | - | -       | -         | -             | -        | -           | -         |
| EC                  |                           | Online Course (Optional)<br>(MOOC / NPTEL / SWAYAM)   | -         | - | -       | -         | -             | -        | -           | Grade     |
| <b>Total</b>        |                           |   | <b>30</b> |   |         |           |               |          | <b>600</b>  | <b>21</b> |

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – Generic Elective; AECC - Ability Enhancement Compulsory Course

| SEMESTER - II |                     |  |             |   |             |           |               |          |             |           |
|---------------|---------------------|--|-------------|---|-------------|-----------|---------------|----------|-------------|-----------|
| Part          | Subject Code        | Title of the Paper   | Hrs. / Week |   | Hrs. / Sem. | Exam Hrs. | Maximum Marks |          | Total Marks | Credits   |
|               |                     |  | L           | P | T           |           | Internal      | External |             |           |
| I             | 23UTL2C2            | Tamil Paper-II (B)   | 5           | - | -           | 3         | 25            | 75       | 100         | 3         |
|               | 23UHN2C2            | Hindi Paper-II   |             |   |             |           |               |          |             |           |
|               | 23UFR2C2            | French Paper-II  |             |   |             |           |               |          |             |           |
| II            | 23UEN202 / 23UEN203 | Communication Skills – II (Level I) / Communication Skills – II (Level II) | 5           | - | -           | 3         | 25            | 75       | 100         | 3         |
| III           | 23UCS204            | CC III: Data Structures using C++  | 4           | - | -           | 3         | 25            | 75       | 100         | 4         |
|               | 23UCS205            | CC IV: Data Communication and Computer Networks                            | 4           | - | -           | 3         | 25            | 75       | 100         | 4         |
|               | 23UCS2A1 / 23UCS2A2 | GE II – Allied II: Discrete Mathematics / Discrete Mathematical Structures | 4           | - | -           | 3         | 25            | 75       | 100         | 4         |
|               | 23UCS206            | CC Lab II: Programming Lab in Data Structures using C++                    | -           | 4 | -           | 3         | 20            | 30       | 50          | 2         |
|               | 23UCS2S1 / 23UCS2S2 | SEC I: Naan Mudhalvan : Business English Communications / Blockchain       | 2           | - | -           | 2         | 12            | 38       | 50          | 2         |
| IV            | 23EVS201            | AECC I: Environmental Studies  | 1           | - | -           | 2         | -             | 50       | 50          | 2         |
|               | 23HEC202            | Human Excellence - Family Values & SKY Yoga Practice – II                  | 1           | - | -           | 2         | 20            | 30       | 50          | 1         |
| V             |                     | Extension Activities - Annexure I  | -           | - | -           | -         | -             | -        | -           | -         |
| EC            | 23CMM201            | ManaiyiyalMahathuvam - I   |             |   | 15 Hrs.     | 2         | -             | 50       | 50          | Grade     |
|               | 23CUB201            | UzhavuBharatham - I  |             |   | 15 Hrs.     | 2         | -             | 50       | 50          | Grade     |
|               | 23UCS2VA            | VAC I: Cloud based Office Automation                                       |             |   | 30 Hrs.     |           |               |          |             | 2*        |
|               |                     | Online Course (Optional) (MOOC / NPTEL / SWAYAM )                          |             |   |             |           |               |          |             | Grade     |
| <b>Total</b>  |                     |  | <b>30</b>   |   |             |           |               |          | <b>700</b>  | <b>25</b> |

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course  
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 SEC – Skill Enhancement Course

| SEMESTER – III |                        |  |             |   |             |           |               |          |             |           |
|----------------|------------------------|--|-------------|---|-------------|-----------|---------------|----------|-------------|-----------|
| Part           | Subject Code           | Title of the Paper   | Hrs. / Week |   | Hrs. / Sem. | Exam Hrs. | Maximum Marks |          | Total Marks | Credits   |
|                |                        |  | L           | P | T           |           | Internal      | External |             |           |
| I              | 23UTL3C3               | Tamil Paper-III (B)  | 3           | - | -           | 3         | 25            | 75       | 100         | 3         |
|                | 23UHN3C3               | Hindi Paper-III  |             |   |             |           |               |          |             |           |
|                | 23UFR3C3               | French Paper-III   |             |   |             |           |               |          |             |           |
| II             | 23UEN3C3               | Communication Skills – III   | 3           | - | -           | 3         | 25            | 75       | 100         | 3         |
| III            | 23UCS307               | CC V: Java Programming   | 4           | - | -           | 3         | 25            | 75       | 100         | 4         |
|                | 23UCS308               | CC VI: Operating System Concepts and Linux   | 5           | - | -           | 3         | 25            | 75       | 100         | 4         |
|                | 23UCS3A1 /<br>23UCS3A2 | GE III – Allied III: Computer Based Optimization Techniques / Resource Management Techniques | 5           | - | -           | 3         | 25            | 75       | 100         | 4         |
|                | 23UCS309               | CC Lab III: Programming Lab in Java  | -           | 4 | -           | 3         | 20            | 30       | 50          | 2         |
|                | 23UCS310               | CC Lab IV: Programming Lab in Linux  | -           | 4 | -           | 3         | 20            | 30       | 50          | 2         |
| IV             | 23UCS3N1 /<br>23UCS3N2 | Non-Major Elective I: Photoshop Lab/ Advanced Applications in MS Excel Lab                   | -           | 1 | -           | 2         | -             | 50       | 50          | 2         |
|                | 23HEC303               | Human Excellence - Professional Values & Ethics - SKY Yoga Practice – III                    | 1           | - | -           | 2         | 20            | 30       | 50          | 1         |
| V              |                        | Extension Activities - Annexure I  | -           | - | -           | -         | -             | -        | -           | -         |
| EC             | 23CMM302               | Manaiyiyal Mahathuvam - II   |             |   | 15 Hrs.     | 2         | -             | 50       | 50          | Grade     |
|                | 23CUB302               | Uzhavu Bharatham - II  |             |   | 15 Hrs.     | 2         | -             | 50       | 50          | Grade     |
| <b>Total</b>   |                        |  | <b>30</b>   |   |             |           |               |          | <b>700</b>  | <b>25</b> |

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – Generic Elective; VAC-Department Specific Value Added Course;

\*Extra Credits;



| SEMESTER - IV |                     |  |           |   |             |          |               |          |             |           |
|---------------|---------------------|--|-----------|---|-------------|----------|---------------|----------|-------------|-----------|
| Part          | Subject Code        | Title of the Paper   | Hrs/ Week |   | Hrs. / Sem. | Exam Hrs | Maximum Marks |          | Total Marks | Credits   |
|               |                     |  | L         | P | T           |          | Internal      | External |             |           |
| I             | 23UTL4C4            | Tamil Paper-IV (B)   | 3         | - | -           | 3        | 25            | 75       | 100         | 3         |
|               | 23UHN4C4            | Hindi Paper-IV   |           |   |             |          |               |          |             |           |
|               | 23UFR4C4            | French Paper-IV  |           |   |             |          |               |          |             |           |
| II            | 23UEN4C4            | Communication Skills – IV  | 3         | - | -           | 3        | 25            | 75       | 100         | 3         |
| III           | 23UCS411            | CC VII: Python Programming   | 4         | - | -           | 3        | 25            | 75       | 100         | 3         |
|               | 23UCS412            | CC VIII: Relational Database Management Systems                                  | 4         | - | -           | 3        | 25            | 75       | 100         | 3         |
|               | 23UCS4A1 / 23UCS4A2 | GE IV – Allied IV: Accountancy for Decision Making / Financial Accounting        | 5         | - | -           | 3        | 25            | 75       | 100         | 3         |
|               | 23UCS413            | CC Lab V: Programming Lab in Python  | -         | 4 | -           | 3        | 20            | 30       | 50          | 2         |
|               | 23UCS414            | CC Lab VI: Programming Lab in RDBMS  | -         | 3 | -           | 3        | 20            | 30       | 50          | 2         |
|               | 23UCS4S1 / 23UCS4S2 | SEC II: Naan Mudhalvan: Industry 4.0 / Aptitude for Placements                   | -         | 2 | -           | 2        | 12/20         | 38/30    | 50          | 2         |
| IV            | 23HEC404            | Human Excellence : Social Values & SKY Yoga Practice –IV                         | 1         | - | -           | 2        | 20            | 30       | 50          | 1         |
|               | 23UCS4N1 / 23UCS4N2 | Non-Major Elective Paper -II : Flash Lab/ Internet Services and Applications Lab | -         | 1 | -           | 2        | -             | 50       | 50          | 2         |
| V             |                     | Extension Activities - Annexure I  | -         | - | -           | -        | -             | -        | 50          | 1         |
| EC            | 23CMM403            | Manaiyiyal Mahathuvam-III  |           |   | 15 Hrs.     | 2        | -             | 50       | 50          | Grade     |
|               | 23CUB403            | Uzhavu Bharatham – III   |           |   | 15 Hrs.     | 2        | -             | 50       | 50          | Grade     |
|               | 23UCS4VA            | VAC II: Python for Data Analytics  |           |   | 30 Hrs.     |          |               |          |             | 2*        |
| <b>Total</b>  |                     |  | <b>30</b> |   |             |          |               |          | <b>800</b>  | <b>25</b> |

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CC – Core Course; GE – Generic Elective; SEC – Skill Enhancement Course; VAC-Department Specific Value Added Course;

\*Extra Credits;

| SEMESTER – V |                                    |   |             |   |             |          |               |          |             |           |
|--------------|------------------------------------|---|-------------|---|-------------|----------|---------------|----------|-------------|-----------|
| Part         | Subject Code                       | Title of the Paper  | Hrs. / Week |   | Hrs. / Sem. | Exam Hrs | Maximum Marks |          | Total Marks | Credits   |
|              |                                    |   | L           | P |             |          | T             | Internal |             |           |
| III          | 23UCS515                           | CC IX: Open Source Technologies   | 5           | - | -           | 3        | 25            | 75       | 100         | 5         |
|              | 23UCS516                           | CC X: Cyber Security  | 5           | - | -           | 3        | 25            | 75       | 100         | 5         |
|              | 23UCS5E1/<br>23UCS5E2/<br>23UCS5E3 | DSE -I: Data Mining and Warehousing / Data Engineering with Google Cloud / Mobile Application Development | 6           | - | -           | 3        | 25            | 75       | 100         | 5         |
|              | 23UCS517                           | CC Lab VII: Programming Lab in .NET   | -           | 5 | -           | 3        | 20            | 30       | 50          | 2         |
|              | 23UCS518                           | CC Lab VIII: Programming Lab in PHP & MySQL   | -           | 5 | -           | 3        | 20            | 30       | 50          | 2         |
|              | 23UCS5S1 /<br>23UCS5S2             | SEC III: Azure Fundamentals / DevOps Foundation   | 3           | - | -           | 2        | 12            | 38       | 50          | 2         |
| IV           | 23HEC505                           | Human Excellence: National Values & SKY Yoga Practice-V   | 1           | - | -           | 2        | 20            | 30       | 50          | 1         |
| EC           | 23CSD501                           | Soft Skills Development – I   | -           | - | -           | -        | -             | -        | -           | Grade     |
|              | 23GKL501                           | General Knowledge   | SS          | - | -           | 2        | -             | 50       | 50          | Grade     |
|              | 23UCS5AL                           | ALC – I: Cloud Computing  | SS          | - | -           | -        | -             | 100      | 100         | 2**       |
| <b>Total</b> |                                    |   | <b>30</b>   |   |             |          |               |          | <b>500</b>  | <b>22</b> |

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CC – Core Course; DSE – Discipline-Specific Elective; SEC – Skill Enhancement Course

ALC-Advanced Learner Course (Optional)

\*Extra Credits;\*\*Credits – Based on course content maximum of 4 credits

| SEMESTER - VI      |                       |  |           |   |             |          |               |           |             |            |
|--------------------|-----------------------|--|-----------|---|-------------|----------|---------------|-----------|-------------|------------|
| Part               | Subject Code          | Title of the Paper   | Hrs/Week  |   | Hrs. / Sem. | Exam Hrs | Maximum Marks |           | Total Marks | Credits    |
|                    |                       |  | L         | P | T           |          | Internal      | External  |             |            |
| III                | 23UCS619              | <b>Core XI</b> :R Programming  | 5         | - | -           | 3        | 25            | 75        | 100         | 3          |
|                    | 23UCS6E4              | <b>DSE–II</b> :Artificial Intelligence and Machine Learning /  |           |   |             |          |               |           |             |            |
|                    | 23UCS6E5<br>23UCS6E6  | FrontEnd Development with React / MongoDB  | 4         | 2 | -           | 3        | 25            | 75        | 100         | 5          |
|                    | 23UCS6E7<br>23UCS6E8  | <b>DSE–III</b> : Information Retrieval / HTML, Javascript and JQuery for Web Designing /                           | 4         | 2 | -           | 3        | 25            | 75        | 100         | 5          |
|                    | 23UCS6E9              | Angular and NodeJS   |           |   |             |          |               |           |             |            |
|                    | 23UCS620              | <b>CC Lab IX</b> : R Programming Lab   | -         | 4 | -           | 3        | 20            | 30        | 50          | 2          |
|                    | 23UCS621              | <b>CC Lab X</b> : Programming Lab in Android   | -         | 5 | -           | 3        | 20            | 30        | 50          | 2          |
|                    | 23UCS6S1/<br>23UCS6S2 | <b>SEC IV</b> : Naan Mudhalvan: Programming, Data Structures and Algorithms using Python / Data Science Foundation | 3         | - | -           | 2        | 12/<br>20     | 38/<br>30 | 50          | 2          |
| 23UCS622           | Project               | -  | -         | - | -           | 25       | 75            | 100       | 2           |            |
| IV                 | 23HEC606              | Human Excellence Paper: Global Values & SKY Yoga Practice-VI   | 1         | - | -           | 2        | 20            | 30        | 50          | 1          |
| EC                 | 23CSD602              | Soft Skills Development–II   | -         | - | -           | -        | -             | -         | -           | Grade      |
|                    | 23UCS6AL              | <b>ALC –II</b> : Advanced Data Analysis using R  | SS        | - | -           | -        | -             | 100       | 100         | 2**        |
| <b>Total</b>       |                       |  | <b>30</b> |   |             |          |               |           | <b>600</b>  | <b>22</b>  |
| <b>Grand Total</b> |                       |  |           |   |             |          |               |           | <b>3900</b> | <b>140</b> |

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; DSE – Discipline-Specific Elective; SEC – Skill Enhancement Course

ALC-Advanced Learner Course (Optional)

\*Extra Credits;\*\*Credits – Based on course content maximum of 4 credits

**List of Abbreviations:**

CC – Core Course

GE – Generic Elective

AECC –Ability Enhancement Compulsory Course

SEC – Skill Enhancement Course

DSE – Discipline-Specific Elective

VAC –Value Added Course

ALC – Advanced Learner Course

**Grand Total = 3900; Total Credits = 140**

## Question Paper Pattern (Based on Bloom's Taxonomy)

**K1-Remember; K2- Understanding; K3- Apply; K4-Analyze; K5- Evaluate**

### 1. Theory Examinations: 75 Marks (Part I, II, & III)

(i) Test- I & II, ESE:

| Knowledge Level    | Section   | Marks       | Description           | Total     |
|--------------------|---|-------------|-----------------------|-----------|
| K1 & K2 (Q1 - 10)  | A (Q1 – 5 MCQ)<br>(Q6 – 10 Define / Short Answer / MCQ) | 10 * 1 = 10 | MCQ / Define          | <b>75</b> |
| K3 (Q11-15)        | B (Either or pattern)                                   | 5 * 5 = 25  | Short Answers         |           |
| K4 & K5 (Q16 – 20) | C (Either or pattern)                                   | 5 * 8 = 40  | Descriptive/ Detailed |           |

### 2. Theory Examinations: 38 Marks (3 Hours Examination) (Part III: If applicable)

| Knowledge Level   | Section               | Marks       | Description           | Total                         |
|-------------------|-----------------------|-------------|-----------------------|-------------------------------|
| K1 & K2 (Q1 - 10) | A (Q 1 – 10 MCQ)      | 10 * 1 = 10 | MCQ                   | <b>50<br/>(Reduced to 38)</b> |
| K3 (Q11 – 15)     | B (Either or pattern) | 5 * 3 = 15  | Short Answers         |                               |
| K4 & K5 (Q16- 20) | C (Either or pattern) | 5 * 5 = 25  | Descriptive/ Detailed |                               |

### 3. Theory Examinations: 38 Marks (2 Hours Examination) (Part IV: If applicable)

| Knowledge Level      | Section   | Marks       | Description           | Total                         |
|----------------------|---|-------------|-----------------------|-------------------------------|
| K1 & K2 (Q1- 10)     | A (Q1 – 5 MCQ)<br>(Q6–10 Define / Short Answer) | 10 * 1 = 10 | MCQ / Define          | <b>50<br/>(Reduced to 38)</b> |
| K3, K4 & K5 (Q11-15) | B (Either or pattern)                           | 5 * 8 = 40  | Descriptive/ Detailed |                               |

### 4. Practical Examinations:

| Paper                       | Maximum Marks | Marks for |     | Components for CIA |                  |             |
|-----------------------------|---------------|-----------|-----|--------------------|------------------|-------------|
|                             |               | CIA       | CEE | Tests              | Observation Note | Record Note |
| Practical (Core / Elective) | 50            | 20        | 30  | 10                 | 05               | 05          |
| Practical (Core / Elective) | 75            | 30        | 45  | 20                 | 05               | 05          |
| Practical (Core / Elective) | 100           | 40        | 60  | 30                 | 05               | 05          |

**5. Project:**

| Paper   | Maximum Marks | Marks for |            |           |
|---------|---------------|-----------|------------|-----------|
|         |               | CIA       | CEE        |           |
|         |               |           | Evaluation | Viva-voce |
| Project | 100           | 25        | 50         | 25        |
| Project | 150           | 40        | 75         | 35        |
| Project | 200           | 50        | 100        | 50        |

\* CIA – Continuous Internal Assessment & CEE – Comprehensive External Examinations

## Components of Continuous Internal Assessment (CIA)

### THEORY

**Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75;**

| Components                      |    | Calculation               | CIA Total |
|---------------------------------|----|---------------------------|-----------|
| Test 1                          | 75 | $\frac{(75+75+15+10)}{7}$ | 25        |
| Test 2 / Model                  | 75 |                           |           |
| Assignment / Digital Assignment | 15 |                           |           |
| Others*                         | 10 |                           |           |

\*Others may include the following: Seminar / Socratic Seminars, Group Discussion, Role Play, APS, Class participation, Case Studies Presentation, Field Work, Field Survey, Term Paper, Workshop / Conference Participation, Presentation of Papers in Conferences, Quiz, Report / Content Writing, etc.

**Maximum Marks: 50; CIA Mark: 12; CEE Mark: 38; (Part III: If applicable)**

| Components                      |    | Calculation                | CIA Total |
|---------------------------------|----|----------------------------|-----------|
| Test 1                          | 50 | $\frac{(50+50+10+10)}{10}$ | 12        |
| Test 2 / Model                  | 50 |                            |           |
| Assignment / Digital Assignment | 10 |                            |           |
| Seminar                         | 10 |                            |           |

**PROJECT****Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75;**

| Components        |    | Calculation | CIA Total |
|-------------------|----|-------------|-----------|
| Review I          | 5  | 5+5+5+10    | 25        |
| Review II         | 5  |             |           |
| Review III        | 5  |             |           |
| Report Submission | 10 |             |           |

**Maximum Marks: 200; CIA Mark: 50; CEE Mark: 150;**

| Components        |    | Calculation  | CIA Total |
|-------------------|----|--------------|-----------|
| Review I          | 10 | 10+ 10+10+20 | 50        |
| Review II         | 10 |              |           |
| Review III        | 10 |              |           |
| Report Submission | 20 |              |           |

*\* Components for 'Review' may include the following:*

Originality of Idea, Relevance to Current Trend, Candidate Involvement, and Presentation of Report for Commerce, Management & Social Work.

Synopsis, System Planning, Design, Coding, Input form, Output format, Preparation of Report & Submission for Computer Science cluster.

## Continuous Internal Assessment for Project

### For Commerce, Management & Social Work Programme

The Final year Commerce, Management & Social Work students should undergo a project work during (V/VI) semester

- ❖ The period of study is for 4 weeks.
- ❖ Project / Internship work has to be done in an industrial organization (or) work on any industrial problem outside the organization is allowed.
- ❖ Students are divided into groups and each group is guided by a Mentor.
- ❖ The group should not exceed four students, also interested student can undergo individually.
- ❖ A problem is chosen, objectives are framed, and data is collected, analyzed and documented in the form of a report / Project.
- ❖ Viva – Voce is conducted at the end of this semester, by an External Examiner and concerned

Mentor (Internal Examiner).

- ❖ Project work constitutes 100 marks, out of which 25 is CIA and 75 is CEE Marks.

#### Mark Split UP

| CIA | CEE | Total |
|-----|-----|-------|
| 25  | 75  | 100   |

| S. No        | Components for CIA     | Marks     |
|--------------|------------------------|-----------|
| 1            | Review – I *           | 5         |
| 2            | Review – II *          | 5         |
| 3            | Review – III *         | 5         |
| 4            | Rough Draft Submission | 10        |
| <b>Total</b> |                        | <b>25</b> |

\* Review includes Objectives and Scope, Research Methodology, Literature Review, Data Analysis and Results, Discussion and Interpretation, Recommendations and Implications, Presentation and Format, Creativity and Originality, and Overall Impact and Contribution.

| S. No        | Components for CEE | Marks     |
|--------------|--------------------|-----------|
| 1            | Evaluation*        | 50        |
| 2            | Viva-Voce          | 25        |
| <b>Total</b> |                    | <b>75</b> |

\* Evaluation includes Originality of Idea, Relevance to Current Trend, Candidate Involvement, Thesis Style / Language, and Presentation of Report.



## Continuous Internal Assessment for Project For Science Stream

The Final year Science students should undergo a project work during (V/VI) semester

- ❖ The period of study is for 4 weeks.
- ❖ Project / Internship work has to be done in an industrial organization (or) work on any industrial problem outside the organization is allowed.
- ❖ Students are divided into groups and each group is guided by a Mentor.
- ❖ The group should not exceed four students, also interested student can undergo individually.
- ❖ A problem is chosen, objectives are framed, and data is collected, analyzed and documented

in the form of a report / Project.

- ❖ Viva – Voce is conducted at the end of this semester, by an External Examiner and concerned

Mentor (Internal Examiner).

- ❖ Project work constitutes 200 marks, out of which 50 is CIA and 150 is CEE Marks.

### Mark Split UP

| CIA | CEE | Total |
|-----|-----|-------|
| 50  | 150 | 200   |

| S. No        | Components for CIA                         | Marks     |
|--------------|--|-----------|
| 1            | Review – I *                               | 10        |
| 2            | Review – II *                              | 10        |
| 3            | Review – III *                             | 10        |
| 4            | Rough Draft Submission / Report Submission | 20        |
| <b>Total</b> |  | <b>50</b> |

\* **Review I:** - Problem Analysis

\* **Review II:** - Data collection & Design

\* **Review III:** - Data Analysis

| S. No        | Components for CEE | Marks      |
|--------------|--------------------|------------|
| 1            | Evaluation *       | 100        |
| 2            | Viva-Voce          | 50         |
| <b>Total</b> |                    | <b>150</b> |

\* Evaluation includes Problem and Hypothesis, Experimental Design / Materials / Procedure, Variables / Controls / Sample Size, and Data Collection / Analysis.

## **Continuous Internal Assessment for Project** **For Computer Science Cluster**

**Maximum Marks:** 100 Marks

**Components for CIA: 25 Marks**

| <b>Criterion</b> | <b>Mode of Evaluation</b>  | <b>Marks</b> | <b>Total</b> |
|------------------|--|--------------|--------------|
| I                | Synopsis, Company Profile, System Specification, Existing System, Proposed System<br>OR<br>(For Android Developments)<br>Planning Stage      | 05           | 25           |
| II               | Supporting Diagrams like system flowchart, ER, DFD, Usecase and Table Design<br>OR<br>UI and UX Design Application Architect and Prototyping | 05           |              |
| III              | Coding, Input forms, Output format, Testing<br>OR<br>Development, Testing  | 05           |              |
| IV               | Preparation of Report & Submission   | 10           |              |

**Components for CEE: 75 Marks**

| <b>Components for CEE</b>                 | <b>Marks</b> | <b>Total</b> | <b>Grand Total</b> |
|---|--------------|--------------|--------------------|
| <b>Evaluation</b>                         |              |              | 75                 |
| Title Relevance of the Industry/Institute | 10           | 50           |                    |
| Technology                                | 10           |              |                    |
| Design and Development Publishing         | 10           |              |                    |
| Testing, Report                           | 20           |              |                    |
| <b>Viva Voce</b>                          |              |              |                    |
| Project Presentation                      | 10           | 25           |                    |
| Q&A Performance                           | 15           |              |                    |

**STUDENT SEMINAR EVALUATION RUBRIC**

Grading Scale:

| <b>A</b>    | <b>B</b>   | <b>C</b>   | <b>D</b>   |
|-------------|------------|------------|------------|
| <b>8-10</b> | <b>5-7</b> | <b>3-4</b> | <b>0-2</b> |

| <b>CRITERIA</b>  | <b>A - Excellent</b>   | <b>B – Good</b>  | <b>C - Average</b>   | <b>D - Inadequate</b>  |
|--|--|--|--|--|
| <b>Organization of presentation</b>                    | Information presented as an interesting story in a logical, easy-to-follow sequence  | Information presented in logical sequence; easy to follow  | Most of the information is presented in sequence   | Hard to follow; sequence of information jumpy  |
| <b>Knowledge of the subject &amp; References</b>       | Demonstrated full knowledge; answered all questions with elaboration & Material sufficient for clear understanding AND exceptionally presented | At ease; answered all questions <b>but</b> failed to elaborate & Material sufficient for clear understanding AND effectively presented | At ease with information; answered most questions & Material sufficient for clear understanding <b>but</b> not clearly presented | Does not have a grasp of information; answered only rudimentary Questions & Material not clearly related to the topic <b>OR</b> background dominated seminar |
| <b>Presentation Skills using ICT Tools</b>             | Uses graphics that explain and reinforce text and presentation   | Uses graphics that explain the text and presentation   | Uses graphics that relate to text and presentation   | Uses graphics that rarely support text and presentation  |
| <b>Eye Contact</b>                                     | Refers to slides to make points; engaged with the audience   | Refers to slides to make points; eye contact the majority of the time  | Refers to slides to make points; occasional eye contact  | Reads most slides; no or just occasional eye contact   |
| <b>Elocution – (Ability to speak English language)</b> | Correct, precise pronunciation of all terms<br>The voice is clear and steady; the audience can hear well at all times                          | Incorrectly pronounces a few terms<br>Voice is clear with few fluctuations; the audience can hear well most of the time                | Incorrectly pronounces some terms<br>Voice fluctuates from low to clear; difficult to hear at times                              | Mumbles and/or Incorrectly pronounces some terms<br>Voice is low; difficult to hear  |

**WRITTEN ASSIGNMENT RUBRIC**

Grading Scale:

|              |              |            |            |            |
|--------------|--------------|------------|------------|------------|
| <b>A</b>     | <b>B</b>     | <b>C</b>   | <b>D</b>   | <b>F</b>   |
| <b>13-15</b> | <b>10-12</b> | <b>7-9</b> | <b>4-6</b> | <b>0-3</b> |

| <b>CRITERION</b>                      | <b>A - Excellent</b>   | <b>B - Good</b>  | <b>C - Average</b>   | <b>D - Below Average</b>   | <b>F - Inadequate</b>                  |
|---------------------------------------|--|--|--|--|--|
| <b>Content &amp; Focus</b>            | Hits on almost all content exceptionally clear   | Hits on most key points and the writing is interesting   | Hits in basic content and writing are understandable   | Hits on a portion of content and/or digressions and errors   | Completely off track or did not submit |
| <b>Sentence Structure &amp; Style</b> | <ul style="list-style-type: none"> <li>* Word choice is rich and varies</li> <li>* Writing style is consistently strong</li> <li>* Students own formal language</li> </ul> | <ul style="list-style-type: none"> <li>* Word choice is clear and reasonably precise</li> <li>* Writing language is appropriate to the topic</li> <li>* Words convey intended message</li> </ul> | <ul style="list-style-type: none"> <li>* Word choice is basic</li> <li>* Most writing language is appropriate to the topic</li> <li>* Informal language</li> </ul> | <ul style="list-style-type: none"> <li>* Word choice is vague</li> <li>* Writing language is not appropriate to the topic</li> <li>* Message is unclear</li> </ul> | * Not Adequate                         |
| <b>Sources</b>                        | Sources are cited and are used critically  | Sources are cited and some are used critically   | Some sources are missing   | Sources are not cited  | Sources are not at all cited           |
| <b>Neatness</b>                       | Typed; Clean; Neatly bound in a report cover; illustrations provided   | Legible writing, well-formed characters; Clean and neatly bound in a report cover  | Legible writing, some ill-formed letters, print too small or too large; papers stapled together  | Illegible writing; loose pages   | Same as below standard                 |
| <b>Timeliness</b>                     | Report on time   | Report one class period late   | Report two class periods late  | Report more than one week late   | Report more than 10 days late          |

|   |          |                               |   |                         |   |             |  |
|---|----------|-------------------------------|---|-------------------------|---|-------------|--|
| <b>Programme Code:</b>                                  | B.Sc.    |                               |   | <b>Programme Title:</b> | Bachelor of Science<br>(Computer Science) |             |  |
| <b>Course Code:</b>                                     | 23UCS101 |                               |   | <b>Title</b>            | <b>Batch:</b>                             | 2023 - 2026 |  |
|   |          |                               |   | CC I: C<br>Programming  | <b>Semester:</b>                          | I           |  |
| <b>Lecture Hrs./Week<br/>or<br/>Practical Hrs./Week</b> | 4        | <b>Tutorial<br/>Hrs./Sem.</b> | - |                         | <b>Credits:</b>                           | 4           |  |

### Course Objective

The course objective is to know the basic components of the computer and working of each device, the student gain experience about structured programming, understand the implementation of C language and understand various features in C.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | To keep in mind the fundamentals of C programming   | K1              |
| CO2       | To understand the loops and decision making statements to solve the problem               | K2              |
| CO3       | To implement different operations on arrays and use functions to solve the given problem. | K3              |
| CO4       | To review the C program that uses pointers, structures and files.                         | K4              |
| CO5       | To understand and evaluate File Concept.  | K2,K5           |

### Mapping

| PO,<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1       | H   | H   | H   | L   | L   | H   | L   | L   | M   | M    | H    | H    |
| CO2       | H   | H   | H   | L   | L   | H   | M   | M   | H   | M    | H    | H    |
| CO3       | H   | M   | H   | L   | M   | M   | L   | L   | H   | L    | M    | H    |
| CO4       | H   | M   | H   | L   | M   | M   | L   | M   | H   | L    | M    | H    |
| CO5       | H   | H   | H   | L   | M   | H   | M   | M   | H   | M    | H    | H    |

H-High; M-Medium; L-Low

## Syllabus

| Units           | Content   | Hrs |
|-----------------|---|-----|
| <b>Unit I</b>   | <b>Introduction to C</b> :Overview of C – History and Importance of C – Basic Structure of C programs - Development of program logic skills through Flowchart and Algorithm – Programming Style – Executing a ‘C’ program – Character set – C Tokens – Keywords – Identifiers – Constants– Variables – Rules for defining variables- Data types, – <i>Declaring and initializing variables</i> – Operators & Expressions – Precedence of arithmetic – Type conversion in expressions – Mathematical functions – <b>Managing Input and output operations</b> : Introduction –Reading a character –Writing a character – Formatted input- Formatted output.<br>Simple Programs. | 12  |
| <b>Unit II</b>  | <b>Control Statements:</b> IF, <i>IF..ELSE Statements</i> , ELSE...IF ladder – Switch Statement – GOTO Statement – WHILE Statement – Do Statement – FOR Statement.-Jumps in loops.<br><b>Arrays:</b> One dimensional Arrays – Two Dimensional Arrays – Multi Dimensional Arrays – Structures: Arrays within Structures – Structures within structures – Structures and Functions –Union.<br>Programs using Control Structures and Derived data types.   | 12  |
| <b>Unit III</b> | <b>Functions:</b> User-defined functions- A-Multi-function program- Elements of user defined function, definition of function-Return value &their types, function calls & declarations-Category of functions: No arguments & No return values-arguments that No return values – Arguments with return values-No arguments that return a value-Nesting of functions-Recursion - Passing arrays and strings to functions. The scope, Visibility and Lifetime of Variables in functions.<br>Programs using functions   | 12  |
| <b>Unit IV</b>  | <b>String manipulation:</b> Introduction - Declaring & Initializing String variables – Reading string from terminal, Writing string to screen – String handling Functions.<br><b>Pointers:</b> Introduction-Accessing, Declaring & Initializing pointer variables-- Pointers and Character strings-Array of pointers-Pointers as function arguments- Function returning pointers-Pointers to functions- Pointers and Structures.<br>Programs using String and Pointers  | 12  |
| <b>Unit V</b>   | <b>Files:</b> Defining and opening a file – Closing a file –I/O operations on file – Error handling during I/O operations – Random access files – Command line arguments- Preprocessor – Macro Substitution – File Inclusion – Compiler control directives.<br>Programs using Files and Command Line Arguments.   | 12  |
|                 | <b>Total Contact Hrs</b>  | 60  |

## Pedagogy and Assessment Methods:

|   |
|---|
| Direct Instruction Digital Presentation, Digital Assignments, Seminar, Power Point Presentation, Online Quiz, Group Talk (APS). |
|---|

**Text Books**

| S.NO | AUTHOR         | TITLE OF THE BOOK       | PUBLISHERS \ EDITION                                    | YEAR OF PUBLICATION |
|------|----------------|-------------------------|---|---------------------|
| 1    | E.Balagurusamy | “Programming in Ansi C” | Tata McGraw-Hill Publishing Co& Ltd.,<br>Second Edition | 2017                |

**Reference Books**

| S.NO | AUTHOR             | TITLE OF THE BOOK                | PUBLISHERS \ EDITION                    | YEAR OF PUBLICATION |
|------|--------------------|----------------------------------|---|---------------------|
| 1    | Yaswanth Kanishkar | LET US C                         | BPB Publications,<br>Fourteenth Edition | 2016                |
| 2    | Ashok N. Kamthane  | Programing with ANSI and Turbo C | First Edition                           | 2009                |

| Course Designed by   | Verified by HOD                                 | Checked by                                | Approved by                                     |
|--|---|---|---|
| <b>Name and Signature</b>                                  | <b>Name with Signature</b>                      | <b>CDC</b>                                | <b>COE</b>                                      |
| Dr.R.ManickaChezian<br><br>Dr. R.Nandhakumar<br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: | Name: Mr. K. Srinivasan<br><br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: |

|   |          |                           |   |  |  |            |
|---|----------|---------------------------|---|--|--|------------|
| <b>Programme Code:</b>                          | B.Sc.    |                           |   | <b>Programme Title:</b>                                      | Bachelor of Science (Computer Science) |            |
| <b>Course Code:</b>                             | 23UCS102 |                           |   | <b>Title</b>   | <b>Batch:</b>                          | 2023 –2026 |
| <b>Lecture Hrs./Week or Practical Hrs./Week</b> | 5        | <b>Tutorial Hrs./Sem.</b> | - | <b>CC II: Digital Computer Fundamentals and Organization</b> | <b>Semester:</b>                       | I          |
|   |          |                           |   |  | <b>Credits:</b>                        | 4          |

### Course Objective

On completion of this course, the students can understand the design of combinational and sequential digital logic circuits. Students will also have knowledge on Programmable Logic devices and its usage.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To recollect the fundamental concepts and techniques used in digital Electronics.  | K1              |
| CO2       | To get the idea of basic postulates of Boolean Algebra and to apply the methods of simplifying Boolean expressions                           | K2              |
| CO3       | To apply knowledge about internal circuitry and logic behind any digital system and to design various synchronous and asynchronous circuits. | K3              |
| CO4       | To identify the concept of memories, and to introduce microcontroller case study.  | K4              |
| CO5       | To analyze the usage of different kinds of Memory Management and mapping techniques  | K5              |

### Mapping

| PO\CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1   | H   | H   | M   | M   | M   | H   | H   | M   | M   | M    | M    | M    |
| CO2   | H   | H   | H   | H   | H   | H   | H   | M   | M   | H    | H    | H    |
| CO3   | H   | M   | H   | M   | H   | H   | M   | M   | H   | H    | H    | H    |
| CO4   | H   | M   | H   | M   | M   | H   | H   | H   | H   | H    | M    | H    |
| CO5   | H   | H   | M   | M   | H   | H   | H   | H   | M   | H    | H    | H    |

H-High; M-Medium; L-Low



## Syllabus

| Units                    | Contents   | Hrs       |
|--------------------------|--|-----------|
| Unit I                   | <b>Number System and Binary Codes:</b> Introduction – Number System – Conversion from Binary to Decimal, Octal, Hexadecimal- Conversion from Decimal to Binary , Octal ,Hexadecimal – Conversion from Octal to Decimal, Binary , Hexadecimal – Conversion from Hexadecimal to Binary , Decimal , Octal -Floating Point Representation of Numbers – Arithmetic Operation – 1's and 2's Complements. 1's Complement Subtraction – 2's Complement Subtraction. 9's Complement – 10's Complement – BCD | 15        |
| Unit II                  | <b>Boolean algebra, Minimization Techniques and Logic Gates:</b> Introduction – Boolean Logic Operations – <i>Basic Laws of Boolean Algebra</i> – Demorgan's Theorems – Sum of Products and Product of Sums – Karnaugh Map. Logic Gates: OR Gate – AND Gate – NOT Gate – NAND Gate – NOR Gate.   | 15        |
| Unit III                 | <b>Arithmetic Circuits and Flip Flops:</b> Introduction – Half Adder – Full Adder, Half Subtractor – Full Subtractor – Multiplexers – Demultiplexer – Decoders. FlipFlops: Types of Flip Flops – SR Flip Flop – JK Flip Flop – T Flip Flop.<br><b>Registers:</b> Shift registers- PIPO – PISO – SISO – SIPO  | 15        |
| Unit IV                  | Input – Output Organization – Input/output Interface – I/O Bus and Interface –I/O Bus Versus Memory Bus – Isolated Versus Memory – Mapped I/O – Example of I/O Interfaces – Asynchronous Data Transfer – Store Control and Handshaking – DMA –DMA Controller, DMA Transfer.  | 15        |
| Unit V                   | <b>Input – Output Processor:</b> CPU – IOP Communication – <b>Memory Organization:</b> Memory Hierarchy – <i>Main Memory</i> – <b>Associative Memory:</b> Hardware Organization – Match Logic – Cache Memory – Associative – Direct, set, Associative Mapping.   | 15        |
| <b>Total Contact Hrs</b> |  | <b>75</b> |

## Pedagogy and Assessment Methods:

Direct Instruction Digital Presentation, Digital Assignments, Seminar, Power Point Presentation, Online Quiz, Group Talk (APS).

## Text Books

| S.NO | AUTHOR                       | TITLE OF THE BOOK                        | PUBLISHERS \ EDITION               | YEAR OF PUBLICATION |
|------|------------------------------|--|------------------------------------|---------------------|
| 1    | V.K. Puri,.                  | Digital Electronics Circuits and Systems | TMH.                               | 2017                |
| 2    | S.Arivazhagan, S Salivahanan | Digital Circuits and Design              | Vikas Publishing House Pvt Limited | 2009                |
| 3    | M. Morris Mano               | Computer System Architecture             | PHI                                | 2015                |

**Reference Books**

| S.NO | AUTHOR                                    | TITLE OF THE BOOK                      | PUBLISHERS \ EDITION | YEAR OF PUBLICATION |
|------|---|--|----------------------|---------------------|
| 1    | M. Carter,<br>Schaum's                    | Computer Architecture                  | TMH                  | 2018                |
| 2    | Albert Paul<br>Malvino, Donald<br>P Leach | Digital principles<br>and applications | TMH,                 | 1996.               |

| Course Designed by            | Verified by HOD               | Checked by                    | Approved by                   |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Name and Signature            | Name with Signature           | CDC                           | COE                           |
| Dr.M.Malathi                  | Name: Dr.R.Manicka<br>Chezian | Name:Mr. Mr. K.<br>Srinivasan | Name: Dr.R.Manicka<br>Chezian |
| M.MeenaKrithika<br>Signature: | Signature:                    | Signature:                    | Signature:                    |

|   |          |                               |   |   |   |             |
|---|----------|-------------------------------|---|---|---|-------------|
| <b>Programme Code:</b>                                      | B.Sc.    |                               |   | <b>Programme Title:</b>   | Bachelor of Science<br>(Computer Science) |             |
| <b>Course Code:</b>   | 23UCS1A1 |                               |   | <b>Title</b>  | <b>Batch:</b>                             | 2023 - 2026 |
| <b>Lecture Hrs./Week<br/>or<br/>Practical<br/>Hrs./Week</b> | 5        | <b>Tutorial<br/>Hrs./Sem.</b> | - | <b>GE I – Allied I:</b><br>Mathematics - Statistical<br>Methods & Linear<br>Algebra | <b>Semester:</b>                          | I           |
|   |          |                               |   |   | <b>Credits:</b>                           | 4           |

### Course Objective

- To apply the computational aspects of basic statistical measures and applications of small and large samples in real life problems
- To introduce the computational techniques and algebraic skills essential for the study of systems of linear equations and matrix algebra

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Understand the statistical formula and apply them in various data analysis  | K3              |
| CO2       | Understand the concept of most powerful test and analyze the samples based on most powerful test like 't' and 'F' distributions | K4              |
| CO3       | Understand the concepts of probability and apply to solve real life situations  | K3              |
| CO4       | Recognize the basic concepts of vectors, matrices and linear equations and examine its application in the modern science        | K4              |
| CO5       | Apply the linear algebra techniques learned from determinants, differential equations to solve simple problems                  | K3              |

### Mapping

| PO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO  |     |     |     |     |     |     |     |     |     |      |      |      |
| CO1 | M   | M   | H   | L   | H   | M   | L   | L   | L   | M    | M    | M    |
| CO2 | H   | M   | H   | L   | H   | M   | M   | M   | M   | H    | M    | H    |
| CO3 | M   | M   | H   | L   | H   | M   | M   | M   | M   | H    | M    | H    |
| CO4 | H   | M   | H   | L   | H   | H   | H   | M   | H   | H    | M    | H    |
| CO5 | M   | M   | H   | L   | H   | H   | L   | M   | M   | M    | M    | M    |

H-High; M-Medium; L-Low

| Units           | Content   | Hrs |
|-----------------|---|-----|
| <b>Unit I</b>   | <b>Statistics:</b> Measure of Central Tendency - Mean, Median, Mode - Measure of Dispersion -Range, Quartile Deviation, Standard Deviation – Correlation: Definition, Rank Correlation, Co-efficient of Correlation - Regression.   | 15  |
| <b>Unit II</b>  | <b>Sampling Theory and Tests of Significance:</b> Standard Error, Tests of Significance for Attributes: Tests for Number of Successes- Tests for Proportion of Successes-Tests for Difference between Proportions- Tests of Significance for Large Samples: The Standard error of mean-Testing the difference between means of two samples-Standard Error of the Difference between two Standard Deviations- Tests of Significance for Small Samples: Students' t-Distribution-Test of Hypothesis about the population Mean-Test of Hypothesis about the difference between two means-Test of hypothesis about the difference between two means with dependent samples. | 15  |
| <b>Unit III</b> | <b>Probability:</b> Permutation, combination, trail, event, sample space, mutually exclusive cases, exhaustive events, Independent events and dependent events, simple and compound events. Measurement: Classical, relative frequency, theory of probability, Limitations, personality view of probability and Axiomatic Approach of probability, addition and multiplication theorem, odds, miscellaneous illustrations question.   | 15  |
| <b>Unit IV</b>  | <b>Linear Algebra:</b> Introduction – Vectors and Matrices – Length and Dot Products – Solving Linear Equations – Linear Equations – The Idea of Elimination – Elimination Using Matrices – Rules for Matrix Operations – Inverse Matrices – Transposes and Permutations.   | 15  |
| <b>Unit V</b>   | Determinants – The Properties of Determinants – Permutations and Cofactors – Cramer's Rule, Inverse, and Volumes – Eigen values and Eigenvectors – Introduction to Eigen values – Diagonalizing a Matrix – Applications to Differential Equations – Symmetric Matrices – Positive Definite Matrices – Similar Matrices.   | 15  |
|                 | <b>Total Contact Hrs</b>  | 75  |

### Pedagogy and Assessment Methods:

Direct Instruction, Digital Presentation, Digital Assignments, OnlineQuiz, Group Talk (APS), Seminar, Numerical Exercises.

### Text Books

| S.NO | AUTHOR                 | TITLE OF THE BOOK              | PUBLISHERS \ EDITION           | YEAR OF PUBLICATION |
|------|------------------------|--------------------------------|--------------------------------|---------------------|
| 1    | RSN Pillai & Bagavathi | Statistics Theory and Practice | S.Chand & Company Ltd/<br>17/e | 2017                |

|   |                |                                |  |      |
|---|----------------|--------------------------------|--|------|
| 2 | Gilbert Strang | Introduction to Linear Algebra | 5th Edition.<br>Wellesley –<br>Cambridge Press | 2016 |
|---|----------------|--------------------------------|--|------|

### Reference Books

| S.NO | AUTHOR  | TITLE OF THE BOOK                    | PUBLISHERS \ EDITION                    | YEAR OF PUBLICATION |
|------|---|--------------------------------------|---|---------------------|
| 1    | S.P. Gupta  | Statistical Methods                  | Sultan Chand & Sons Publishers,<br>13/e | 2016                |
| 2    | Gilbert Strang  | Linear Algebra and Its Applications. | Fourth Edition.<br>Cengage Learning     | 2006                |
| 3    | David C. Lay,<br>Steven R. Lay, and<br>Judi J. McDonald | Linear Algebra and Its Applications  | 5th Edition.<br>Pearson.                | 2014                |

| Course Designed by                                 | Verified by HOD                                 | Checked by                              | Approved by                                     |
|--|---|---|---|
| <b>Name and Signature</b>                          | <b>Name with Signature</b>                      | <b>CDC</b>                              | <b>COE</b>                                      |
| K. Srinivasan<br><br>G. Angayarkanni<br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: | Name: Mr.K.Srinivasan<br><br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: |

## Level II

|   |          |                           |   |   |  |             |
|---|----------|---------------------------|---|---|--|-------------|
| <b>Programme Code:</b>                          | B.Sc.    |                           |   | <b>Programme Title:</b>                               | Bachelor of Science (Computer Science) |             |
| <b>Course Code:</b>                             | 21UCS1A2 |                           |   | <b>Title</b>  | <b>Batch:</b>                          | 2023 - 2026 |
| <b>Lecture Hrs./Week or Practical Hrs./Week</b> | 5        | <b>Tutorial Hrs./Sem.</b> | - | Allied-1: Advanced Mathematics and Applied Statistics | <b>Semester:</b>                       | I           |
|   |          |                           |   |   | <b>Credits:</b>                        | 4           |

## Course Objective

- To apply the computational aspects of basic statistical measures and to enable the students to solve linear system of equations and integration using numerical methods.
- To present the concept of theoretical probability to acquaint the knowledge of testing of small and large samples which plays an important role in real life problems

## Course Outcomes

On the successful completion of the course, students will be able to

| CO  | CO Statement  | Knowledge Level |
|-----|---|-----------------|
| CO1 | Understand and analyze the statistical formula and apply them in various data analysis problems and Measure and interpret the degree of relationship between variables. | K4,K2           |
| CO2 | Apply the distributions to infer the behavior of observation in the sample space and also learn its moment generating function.   | K4              |
| CO3 | Analyze the concept of most powerful test and analyze the samples based on most powerful test like 't', 'F' and chi-square.   | K4              |
| CO4 | Understand the concepts of probability and apply to solve real life situations.   | K3,K2           |
| CO5 | Evaluate numerical solutions of algebraic equations and compute the integrals by using the appropriate technique.   | K5              |

## Mapping

| PO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P010 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO  |     |     |     |     |     |     |     |     |     |      |      |      |
| CO1 | H   | H   | H   | M   | H   | H   | M   | H   | H   | H    | M    | H    |
| CO2 | H   | M   | H   | M   | H   | H   | M   | H   | H   | H    | M    | H    |
| CO3 | M   | H   | H   | L   | H   | H   | M   | H   | H   | H    | L    | H    |
| CO4 | H   | H   | H   | M   | H   | H   | H   | H   | H   | H    | M    | H    |
| CO5 | M   | M   | H   | L   | M   | H   | M   | M   | M   | M    | L    | M    |

H-High; M-Medium; L-Low

## Syllabus

| Units                    | Content  | Hrs |
|--------------------------|--|-----|
| Unit I                   | <b>Statistics:</b> Measure of Central Tendency: Mean, Median, Mode, Geometric Mean, Harmonic Mean - Measure of Dispersion - Quartile Deviation, Standard Deviation, Coefficient of Variation – Correlation: Definition, Karl Pearson Co-efficient of Correlation, Rank Correlation, Bivariate Correlation – Regression: Lines of Regression, Co-efficient of Regression.   | 15  |
| Unit II                  | <b>Distributions:</b> Binomial, Poisson, Normal and Continuous Distribution - Moment - Moment Generating Functions of Binomial, Poisson and Normal Distribution- Fitting of Binomial, Poisson and Normal Distribution – Problems - Geometric Distribution, Multinomial Distribution, Power Series Distribution, Uniform Distribution, Gamma Distribution, Pearson Distribution (Definition only)   | 15  |
| Unit III                 | <b>Large Sample test:</b> Standard error- Test of Significance of Large Samples – Tests for (i) single proportion (ii) Difference of two proportions (iii) difference of two means (iv) difference of two standard deviations. Small sample test based on t, – t-test for (i) single mean (ii) Difference of two means (iii) Observed sample correlation co-efficient. F- Variance Ratio Test – chi square test of goodness of fit                     | 15  |
| Unit IV                  | <b>Probability:</b> Permutation, combination, trail, event, sample space, mutually exclusive cases, exhaustive events, Independent events, and dependent events, simple and compound events. Measurement: Classical, relative frequency, theory of probability, Limitations, personalistic view of probability and Axiomatic Approach of probability, addition and multiplication theorem, odds, miscellaneous illustrations question – Bayes theorem. | 15  |
| Unit V                   | <b>Numerical Methods:</b> Gauss-Jordan direct method, Gauss-Seidaliterative method for linear algebraic system – Bisection , Newton’s Rapshon method for polynomial system-Newton forward and backward interpolation-Trapezoidal rule-Simpson 1/3 rule and 3/8 rule for Numerical Integration.   | 15  |
| <b>Total Contact Hrs</b> |  | 75  |

**Pedagogy and Assessment Methods:**

Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk (APS), Numerical Exercises.

**Text Books**

| S.NO | AUTHOR   | TITLE OF THE BOOK                          | PUBLISHERS \ EDITION            | YEAR OF PUBLICATION |
|------|--|--|---------------------------------|---------------------|
| 1    | S.C.Gupta,<br>V.K.Kapoor                       | Fundamentals of<br>Mathematical Statistics | Sultan Chand and<br>Sons, 17/e  | 2017                |
| 2    | RSN Pillai<br>&Bagavathi                       | Statistics Theory and<br>Practice          | S.Chand&<br>Company Ltd         | 2013                |
| 3    | P.Kandasamy,<br>K.Thilagavathy,<br>K.Gunavathy | Numerical Methods                          | Sultan Chand & Co.<br>Ltd., 5/e | 2013                |

**Reference Books**

| S.NO | AUTHOR        | TITLE OF THE BOOK   | PUBLISHERS \ EDITION                                       | YEAR OF PUBLICATION |
|------|---------------|---|--|---------------------|
| 1    | S.P. Gupta    | Statistical Methods                                       | Sultan Chand &<br>Sons Publishers,<br>Thirty-third Edition | 2002                |
| 2    | Santosh Kumar | Computer Oriented<br>Statistical and Numerical<br>Methods | S.Chand and Co ,<br>5/e                                    | 2013                |

| Course Designed by            | Verified by HOD               | Checked by            | Approved by                   |
|-------------------------------|-------------------------------|-----------------------|-------------------------------|
| <b>Name and Signature</b>     | <b>Name with Signature</b>    | <b>CDC</b>            | <b>COE</b>                    |
| Mr K. Srinivasan              | Name: Dr.R.Manicka<br>Chezian | Name: Mr.K.Srinivasan | Name: Dr.R.Manicka<br>Chezian |
| G. Angayarkanni<br>Signature: | Signature:                    | Signature:            | Signature:                    |



|                        |          |                              |                          |   |                    |
|------------------------|----------|------------------------------|--------------------------|---|--------------------|
| <b>Programme code:</b> | B.Sc     |                              | <b>Programme Title :</b> | Bachelor of Science<br>(Computer Science) |                    |
| <b>Course Code:</b>    | 23UCS103 |                              | <b>Title :</b>           | <b>Batch :</b>                            | 2023-2026          |
| <b>Hrs/Week:</b>       | 4        | <b>Tutorial<br/>Hrs./Sem</b> | -                        | <b>CC Lab I: Programming Lab<br/>in C</b> | <b>Semester:</b> I |
|                        |          |                              |                          | <b>Credits:</b>                           | 02                 |

### Course Objective

The purpose of this course is to introduce students to the field of programming using C language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | To implement different operations on arrays and use functions to solve the given problems.          | K3              |
| CO2       | To evaluate the C program that uses pointers, structures and files                                  | K4              |
| CO3       | To validate programs with pointers and arrays, perform pointer arithmetic, and use the preprocessor | K5              |

### Mapping

| COs \ POs | POs |     |     |     |     |     |     |     |     |      |      |      |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|           | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
| CO1       | H   | H   | M   | H   | H   | H   | H   | H   | H   | M    | H    | H    |
| CO2       | H   | M   | M   | H   | H   | H   | H   | H   | H   | H    | H    | H    |
| CO3       | M   | M   | H   | H   | M   | H   | H   | M   | H   | H    | H    | H    |

H-High; M-Medium; L-Low

**Syllabus**

| Units | Contents   | Hrs       |
|-------|--|-----------|
|       | <ol style="list-style-type: none"> <li>1. C Program to find the greatest number among 'n' numbers.</li> <li>2. C Program to generate Fibonacci series of the given number.</li> <li>3. C Program to check whether the given number is Armstrong number or not.</li> <li>4. C Program to find Prime numbers between a given ranges.</li> <li>5. C Program for finding Sum of individual digits.</li> <li>6. C Program to display a set of numbers in descending order.</li> <li>7. C Program to display names in alphabetical order.</li> <li>8. C Program to find whether a given string is a palindrome or not.</li> <li>9. C Program to calculate matrix subtraction.</li> <li>10. C Program to find the transpose of a matrix.</li> <li>11. C Program to find the factorial numbers.</li> <li>12. C Program to check the set of numbers is odd or even.</li> </ol> <p style="text-align: center;"><b>SET B</b></p> <ol style="list-style-type: none"> <li>1. C Program for binary search.</li> <li>2. C Program to find a mean &amp; median for given values.</li> <li>3. C Program to calculate standard deviation and variance for given values.</li> <li>4. C Program to find the mark from the list of the students.</li> <li>5. C Program to find the all roots of a quadratic equation.</li> <li>6. C Program to calculate Matrix multiplication.</li> <li>7. C Program to find the Pascal/Floyd's triangle.</li> <li>8. C Program to find the string handling function.</li> <li>9. C Program to illustrate the concept of structures.</li> <li>10. C Program to count vowels and white spaces in a given sentence.</li> <li>11. C Program to illustrate the concept of subroutines.</li> <li>12. C Program to create and process a random access file.</li> <li>13. C Program using command line arguments.</li> </ol> <p style="text-align: center;"><b>INTERNAL MARK (20 Marks)      EXTERNAL MARK (30 Marks)</b></p> | <b>60</b> |

**Text Books**

| S.NO | AUTHOR         | TITLE OF THE BOOK     | PUBLISHERS \ EDITION                                | YEAR OF PUBLICATION |
|------|----------------|-----------------------|---|---------------------|
| 1    | E.Balagurusamy | Programming in Ansi C | Tata McGraw-Hill Publishing Co& Ltd., Sixth Edition | 2016.               |

**Reference Books**

| S.NO | AUTHOR             | TITLE OF THE BOOK                 | PUBLISHERS \ EDITION                 | YEAR OF PUBLICATION |
|------|--------------------|-----------------------------------|--------------------------------------|---------------------|
| 1    | Yaswanth Kanishkar | LET US C                          | BPB Publications, Fourteenth Edition | 2016                |
| 2    | Ashok N. Kamthane  | Programming with ANSI and Turbo C | First Edition                        | 2009                |

| Course Designed by  | Verified by HOD                                 | Checked by                                   | Approved by                                     |
|---|---|--|---|
| <b>Name and Signature</b>                                 | <b>Name with Signature</b>                      | <b>CDC</b>                                   | <b>COE</b>                                      |
| Dr.R.ManickaChezian<br><br>Dr.R.Nandhakumar<br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: | Name: Mr. K.<br>Srinivasan<br><br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: |

|                          |          |                           |   |  |   |           |  |
|--------------------------|----------|---------------------------|---|--|---|-----------|--|
| <b>Programme code:</b>   | B.Sc     |                           |   | <b>Programme Title :</b>                 | Bachelor of Science<br>(Computer Science) |           |  |
| <b>Course Code:</b>      | 23UCS204 |                           |   | <b>Title :</b>                           | <b>Batch :</b>                            | 2023-2026 |  |
|                          |          |                           |   | <b>CC III: Data Structures using C++</b> | <b>Semester:</b>                          | II        |  |
| <b>Lecture Hrs/Week:</b> | 4        | <b>Tutorial Hrs./Sem.</b> | - |  | <b>Credits:</b>                           | 4         |  |

### Course Objective

The objective of the course is to make the students to understand the concepts of data structures such as array, stack, queue, list, linked list, tree, searching and sorting, the principles of object oriented programming and the basics of C++.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To keep in mind the key concepts, benefits and applications of object oriented programming   | K1,K2           |
| CO2       | To get an idea about classes, objects, functions and constructors in C++   | K2, K4          |
| CO3       | To implement the stacks, queues, singly linked lists and doubly linked lists using C++   | K3              |
| CO4       | To analyze various searching techniques like sequential search, binary search and Fibonacci search, and sorting techniques like insertion sort, quick sort, merge sort and heap sort | K3              |
| CO5       | To evaluate the expressions using prefix, infix and postfix notations  | K4              |

### Mapping

| POs        | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>COs</b> |     |     |     |     |     |     |     |     |     |      |      |      |
| <b>CO1</b> | H   | H   | M   | M   | M   | H   | H   | M   | H   | M    | H    | H    |
| <b>CO2</b> | H   | M   | H   | H   | H   | H   | M   | H   | H   | H    | H    | M    |
| <b>CO3</b> | M   | H   | H   | H   | H   | M   | H   | H   | H   | H    | M    | H    |
| <b>CO4</b> | M   | H   | M   | H   | H   | M   | H   | M   | H   | H    | M    | H    |
| <b>CO5</b> | H   | M   | H   | H   | M   | M   | H   | M   | H   | H    | M    | H    |

H-High; M-Medium; L-Low

## Syllabus

| Units    | Contents   | Hrs       |
|----------|--|-----------|
| Unit I   | <b>Introduction:</b> Arrays –Ordered Lists – Representation of Arrays– <b>Stacks and Queues:</b> Fundamentals – Evaluation of Expressions – Multiple stacks and queues.<br><b>Linked List:</b> Singly Linked lists–Linked Stacks and Queues–Polynomial addition— More on Linked lists–Sparse matrices–Doubly Linked List.  | 10        |
| Unit II  | <b>Trees:</b> Basic Terminology – Binary Trees – Binary Trees Representation – Binary Trees Traversal – <b>Internal Sorting :</b> Searching –Sequential search – Binary search–Fibonacci search –Insertion sort – Quick sort - 2-way Merge – Heap sort – <b>Symbol Tables:</b> Hash Tables.  | 12        |
| Unit III | <b>Principles of object oriented programming:</b> Software Evolution – Procedure-Oriented Programming – Object-Oriented Programming Paradigm – Key Concepts of Object-Oriented Programming–Benefits of OOP– Object-Oriented Languages – Applications of OOP.<br><b>Beginning with C++:</b> What is C++? – A Simple C++ Program – Output Operator – Input Operator –Cascading of I/O Operators – Structure of C++ Program.<br><b>Tokens, Expressions and Control Structures:</b> Introduction– Tokens–Keywords–Identifiers and Constants–Basic Data Types– User-Defined Data Types–Derived Data Types – Symbolic Constants - Declaration of Variables – Dynamic Initialization of Variables–Reference Variables–Operators in C++ -Scope Resolution Operator – Member Dereferencing Operators – Memory Management Operators – Manipulators – Type Cast Operator – Expressions and Their Types –Special Assignment Expressions – Implicit Conversions– Operator Precedence –Control Structures. | 12        |
| Unit IV  | <b>Functions in C++:</b> Introduction – The Main Function – Function Prototyping–Call by Reference – Return by Reference – Inline Functions – Default Arguments –const Arguments – Function Overloading – Friend and Virtual Functions – Math Library Functions.<br><b>Classes and Objects:</b> Introduction – C Structures Revisited – Specifying a Class – Defining Member Functions – Making an Outside Function Inline – Nesting of Member Functions – Private Member Functions – Arrays within a Class – Memory Allocation for Objects – Static Data Members – Static Member Functions – Array of Objects – Objects as Function Arguments – Friendly Functions – Returning Objects.   | 14        |
| Unit V   | <b>Constructor and Destructor:</b> Introduction – Constructors – Parameterized Constructors– Multiple Constructors in a Class–Dynamic Initialization of Objects Copy Constructor–Dynamic Constructors–Constructor with Default Arguments - Destructors.<br><b>Operator Overloading and Type Conversions:</b> Introduction – Defining Operator Overloading – Overloading Unary Operators – Overloading Binary Operators – Overloading Binary Operator using Friends–Manipulation of Strings using Operators –Rules for Overloading Operators–Type Conversions.  | 12        |
|          | <b>Total Contact Hrs</b>   | <b>60</b> |

## Pedagogy &amp; Assessment Methods

Direct Instruction Digital Presentation, Digital Assignments, Seminar, Power Point Presentation, Online Quiz, Group Talk (APS).

**Text Books**

| S.NO. | AUTHOR                        | TITLE OF THE BOOK                    | PUBLISHER / EDITION                           | YEAR OF PUBLICATION |
|-------|-------------------------------|--------------------------------------|---|---------------------|
| 1.    | Ellis Horowitz & Sartaj Sahni | Fundamentals of Data Structures      | Galgotia Book Source                          | 1999                |
| 2.    | E. Balagurusamy               | Object Oriented Programming with C++ | Tata McGraw Hill Publication, Seventh Edition | 2015                |

**Reference Books**

| S.NO. | AUTHOR                               | TITLE OF THE BOOK                                    | PUBLISHER/EDITION                                | YEAR OF PUBLICATION |
|-------|--------------------------------------|--|--|---------------------|
| 1.    | Paul G Sorenson, Jean Paul, Tremblay | An Introduction to Data Structures with Applications | Tata McGraw Hill Publication, Second Edition     | 2008                |
| 2.    | D. Ravichandran                      | Programming with C++                                 | Tata McGraw Hill Publication, Fourteenth Edition | 2001                |
| 3.    | Ashok Kamathane                      | Programming in C++                                   | Prentice Hall                                    | 2015                |

| Course Designed by                                 | Verified by HOD                                 | Checked by                               | Approved by                                     |
|--|---|--|---|
| Name and Signature                                 | Name with Signature                             | CDC                                      | COE   |
| Mr. K. Srinivasan<br><br>N.Arulkumar<br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: | Name: Mr. K.Srinivasan<br><br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: |

|                          |          |                           |                             |   |                  |    |
|--------------------------|----------|---------------------------|-----------------------------|---|------------------|----|
| <b>Programme code:</b>   | B.Sc     |                           | <b>Programme Title</b><br>: | Bachelor of Science<br>(Computer Science)                       |                  |    |
| <b>Course Code:</b>      | 23UCS205 |                           | <b>Title:</b>               | <b>Batch :</b>  | 2023-2026        |    |
| <b>Lecture Hrs/Week:</b> | 4        | <b>Tutorial Hrs./Sem.</b> | 4                           | <b>CC IV:</b> Data<br>Communication<br>and Computer<br>Networks | <b>Semester:</b> | II |
|                          |          |                           |                             |   | <b>Credits:</b>  | 4  |

### Course Objective

To enable the students to understand the concepts and principles of data communication and networking including topology, protocols, and types of networks along with concepts of the OSI reference model.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Remember the basic concepts of Networks   | K1              |
| CO2       | Get the idea on Connection-oriented and Connection-less networks  | K2              |
| CO3       | Apply design principles and functionalities in OSI Reference Layers   | K3              |
| CO4       | Analyze ISDN network, TCP/IP, etc.,   | K4              |
| CO5       | Knowledge about different computer networks, reference models and the functions of each layer in the models | K5              |

### Mapping

| PO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | H   | M   | M   | L   | H   | M   | L   | M   | H   | H    | H    | L    |
| CO2 | H   | M   | H   | L   | H   | M   | L   | M   | H   | M    | L    | L    |
| CO3 | H   | M   | H   | M   | L   | M   | M   | M   | M   | L    | H    | M    |
| CO4 | H   | M   | M   | L   | M   | M   | M   | M   | L   | M    | L    | L    |
| CO5 | H   | M   | M   | L   | M   | M   | M   | M   | L   | H    | M    | L    |

H-High; M-Medium; L-Low

**Syllabus**

| <b>Units</b>             | <b>Contents</b>   | <b>Hrs</b> |
|--------------------------|---|------------|
| <b>Unit I</b>            | <b>Introduction:</b> Communications and Networking-Fundamental concepts-Data communications-Protocols-Standards-Signal Propagation-Analog and Digital Signals-Parallel and Serial Communications-Simplex, Half-duplex and Full duplex communications-Multiplexing-Transmission errors- Detection and Correction - Error classification-Delay Distortion-Attenuation- noise. Types of Errors - Error Detection.      | 12         |
| <b>Unit II</b>           | <b>Transmission Media:</b> Guided Media-Twisted Pair-Coaxial Cable-Optical Fiber-Unguided Media –Microwave Communication-Satellite Communication– FDMA, TDMA and CDMA.<br><b>Network Topology:</b> Mesh Topology-Star Topology-Tree Topology-Ring Topology-Bus Topology-Hybrid Topology.<br><b>Switching and Routing:</b> Switching basics-Circuit switching-Packetswitching- Message switching-Router and Routing. | 12         |
| <b>Unit III</b>          | <b>Networking protocols and OSI Model:</b> Protocols in Computer Communication- OSI Reference Models-Physical Layer-Data link Layer-Network Layer-Transport Layer-Session Layer-Presentation Layer-Application Layer.   | 12         |
| <b>Unit IV</b>           | Local Area Network (LAN)-Ethernet-Ethernet properties- CSMA/CD- Metropolitan Area Network (MAN)-Distributed Queue Dual Bus(DQDB)-Switched Multimegabit Data Services(SMDS)-Wide Area Network(WAN)-WAN Architecture.   | 12         |
| <b>Unit V</b>            | Integrated Services Digital Network (ISDN)-ISDN Architecture-ISDN Interfaces-X.25 Protocol-Understanding and Working of X.25 protocol.<br><b>TCP/IP:</b> An Introduction to TCP/IP- Basics- IP Addresses-Logical Addresses-TCP/IP Example. ARP-RARP.  | 12         |
| <b>Total Contact Hrs</b> |   | <b>60</b>  |

**Pedagogy & Assessment Methods**

Direct Instruction Digital Presentation, Digital Assignments, Seminar, Power Point Presentation, Online Quiz, Group Talk (APS).

**Text Books**

| <b>S.NO.</b> | <b>AUTHOR</b>     | <b>TITLE OF THE BOOK</b>                  | <b>PUBLISHER / EDITION</b> | <b>YEAR OF PUBLICATION</b> |
|--------------|-------------------|---|----------------------------|----------------------------|
| 1.           | Achyut S. Godbole | Data Communications and Computer Networks | Tata Mc GrawHill           | 2007                       |



**Reference Books**

| S.NO. | AUTHOR            | TITLE OF THE BOOK                        | PUBLISHER/ EDITION               | YEAR OF PUBLICATION |
|-------|-------------------|--|----------------------------------|---------------------|
| 1.    | Prakash. C. Gupta | Data Communication and Computer Networks | PHI Publicaitons, Second Edition | 2013                |
| 2.    | Brijendra Singh   | Data Communication and Computer Networks | PHI Publicaitons, Fourth Edition | 2014                |

| Course Designed by             | Verified by HOD            | Checked by              | Approved by              |
|--------------------------------|----------------------------|-------------------------|--------------------------|
| <b>Name and Signature</b>      | <b>Name with Signature</b> | <b>CDC</b>              | <b>COE</b>               |
| Dr.Archamy Rajini              | Name:Dr.R.Manicka Chezian  | Name: Mr. K. Srinivasan | Name:Dr.R.ManickaChezian |
| Dr.R.Nandhakumar<br>Signature: | Signature:                 | Signature:              | Signature:               |

|                        |          |                           |                          |  |                      |
|------------------------|----------|---------------------------|--------------------------|--|----------------------|
| <b>Programme Code:</b> | B.Sc     |                           | <b>Programme Title :</b> | Bachelor of Science (Computer Science) |                      |
| <b>Course Code:</b>    | 23UCS2A1 |                           | <b>Title :</b>           | <b>Batch :</b>                         | 2023-2026            |
| <b>Hrs/Week:</b>       | 4        | <b>Tutorial Hrs./Sem.</b> | -                        | <b>GE II – Allied II:</b>              | <b>Semester:</b> II  |
|                        |          |                           |                          | <b>Credits:</b>                        | 4                    |
|                        |          |                           |                          |  | Discrete Mathematics |

### Course Objective

On successful completion of the course the students are able to understand the concepts and principles of relations, functions, fuzzy sets, partial ordering, algebraic structures, mathematical logic, and formal languages and graph theory.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | To keep in mind about the fundamental ideas and notation of discrete mathematics with examples                            | K1              |
| CO2       | To Understand and evaluate the concepts of Relations  | K2,K5           |
| CO3       | To get the idea of relations and its types and fuzzy sets and its operations  | K2              |
| CO4       | To analyze the formal language such as formation of words with examples ,groups and monoids                               | K4              |
| CO5       | To Understand and apply basic properties of graphs and types of graphs, and be able to relate these to practical examples | K2,K3           |

### Mapping

| POs<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1        | H   | M   | H   | M   | H   | H   | H   | L   | M   | M    | H    | M    |
| CO2        | H   | H   | H   | H   | M   | L   | H   | M   | M   | H    | H    | H    |
| CO3        | H   | M   | H   | M   | H   | H   | H   | M   | M   | H    | H    | M    |
| CO4        | H   | M   | H   | H   | H   | M   | M   | H   | H   | H    | H    | H    |
| CO5        | H   | M   | H   | H   | H   | M   | M   | H   | H   | H    | H    | H    |

H: High M: Medium L: Low

**Syllabus**

| Units           | CONTENTS   | Hours     |
|-----------------|--|-----------|
| <b>Unit I</b>   | <b>Mathematical logic:</b> Connectives – Tautology and contradiction-Equivalence of Propositions- Duality law- Normal forms – Disjunctive and conjunctive normal Forms-PDNF-PCNF– Worked examples-Predicate calculus – Quantifiers – Free and bound variables(Definitions only).   | 11        |
| <b>Unit II</b>  | <b>Relations:</b> Types of relations-some operation of relation- Composition of Relations – Properties of relation-Equivalence Classes-matrix representation of relation-Worked Examples. <b>Fuzzy Sets:</b> Fuzzy sets – Crisp Sets –Overview of operations on fuzzy sets – Fuzzy complement – Fuzzy union – Fuzzy Intersection – Aggregation operations. | 12        |
| <b>Unit III</b> | <b>Functions:</b> Representation of function- <i>Types of function</i> - Composition of functions – Inverse of functions-Worked Examples.<br><b>Partial ordering:</b> Hasse diagrams for partial ordering-terminology related to posets-Lattice- Properties of Lattices Worked Examples.   | 13        |
| <b>Unit IV</b>  | <b>Algebraic Structure:</b> Semigroups & monoids- Homomorphism of semigroups and monoids- sub semigroups and submonoids-groups<br><b>Formal languages:</b> Basic definitions-phase structure grammar- types of phase structure grammar-Worked examples   | 11        |
| <b>Unit V</b>   | <b>Graph Theory:</b> Graph –Degree of the vertex – some special simple graphs- <i>Matrix representation of graphs</i> -Paths, Cycles and connectivity- Eulerian Graphs - Hamiltonian graphs- Connectedness in directed graphs- Shortest path algorithm-Dijkstra’s Algorithm-Worked Examples  | 13        |
|                 | <b>Total Hours</b>   | <b>60</b> |

**Pedagogy and Assessment Methods:**

|  |
|--|
| Seminar, Power Point Presentation, Chalk and Talk, Quiz, Assignments, Group Task |
|--|

**Text Books**

| S.NO | AUTHOR                    | TITLE OF THE BOOK  | PUBLISHERS/<br>EDITION                 | YEAR OF<br>PUBICATION |
|------|---------------------------|--|--|-----------------------|
| 1    | T.Veerarajan              | Discrete mathematics   | Tata McGraw Hill                       | 2007                  |
| 2    | GeorgeKlir& Tina A Folger | Fuzzy Sets, Uncertainty& Information                               | Prentice hall of India, Eighth Edition | 2003                  |
| 3    | Narasingh Deo             | Graph theory with applications to Engineering and computer science | Prentice hall                          | 2008                  |

**Reference Books**

| S.NO | AUTHOR   | TITLE OF THE BOOK   | PUBLISHERS/<br>EDITION                                | YEAR OF<br>PUBICATION |
|------|--|---|---|-----------------------|
| 1    | V. Sundaresan,<br>K.S.Ganapathi<br>Subramanian, K. Ganesan | Discrete Mathematics  | A.P.Publications,<br>Sirkali                          | 2006                  |
| 2    | RaniSironmani  | Formal Languages  | The Christian<br>Literature Society,<br>First Edition | 1984                  |
| 3    | J.P.Tremplay & R.<br>Manohar                               | Discrete Mathematical<br>structures with<br>Applications to<br>Computer Science | Tata Mc Graw-<br>Hill Pub.Co. Ltd,<br>New Delhi       | 2003                  |

| Course Designed by                              | Verified by HOD                                 | Checked by                             | Approved by                                  |
|---|---|--|--|
| <b>Name and<br/>Signature</b>                   | <b>Name with<br/>Signature</b>                  | <b>CDC</b>                             | <b>COE</b>                                   |
| Dr.M.Malathi<br><br>Dr.S.Sharmila<br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: | Name:Mr.K.Srinivasan<br><br>Signature: | Name: Dr.R. ManickaChezian<br><br>Signature: |

|                        |          |                           |   |   |  |           |  |
|------------------------|----------|---------------------------|---|---|--|-----------|--|
| <b>Programme Code:</b> | B.Sc     |                           |   | <b>Programme Title :</b>                                      | Bachelor of Science (Computer Science) |           |  |
| <b>Course Code:</b>    | 23UCS2A2 |                           |   | <b>Title :</b>  | <b>Batch :</b>                         | 2023-2026 |  |
| <b>Hrs/Week:</b>       | 4        | <b>Tutorial Hrs./Sem.</b> | - | <b>GE II – Allied II:</b><br>Discrete Mathematical Structures | <b>Semester:</b>                       | II        |  |
|                        |          |                           |   |   | <b>Credits:</b>                        | 4         |  |

### Course Objective

On successful completion of the course the students are able to understand the concepts and principles of relations, functions, set theory, partial ordering, mathematical logic, and formal languages and graph theory and trees.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | To keep in mind about the fundamental ideas and notation of discrete mathematics with examples                          | K1              |
| CO2       | To get the idea of relations, types of relations and functions, types of functions                                      | K2,K5           |
| CO3       | To analyze the formal language such as formation of words and monoids with examples                                     | K2              |
| CO4       | To apply algebraic structures   | K4              |
| CO5       | To Understand some basic properties of graphs, types of graphs, trees and be able to relate these to practical examples | K2,K3           |

### Mapping

| POs<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1        | H   | M   | H   | M   | H   | H   | H   | L   | M   | M    | H    | M    |
| CO2        | H   | H   | H   | H   | M   | L   | H   | M   | M   | H    | H    | H    |
| CO3        | H   | M   | H   | M   | H   | H   | H   | M   | M   | H    | H    | M    |
| CO4        | H   | M   | H   | H   | H   | M   | M   | H   | H   | H    | H    | H    |
| CO5        | H   | M   | H   | H   | H   | M   | M   | H   | H   | H    | H    | H    |

H: High M: Medium L: Low

**Syllabus**

| <b>Units</b>    | <b>CONTENTS</b>  | <b>Hours</b> |
|-----------------|--|--------------|
| <b>Unit I</b>   | <b>Set Theory:</b> -Introduction-Set & its Elements-Set Description-Types of sets, Venn-Euler Diagrams- Set operations & Laws of set theory-Fundamental products-partitions of sets-Minsets- Algebra of sets and Duality- The Inclusion and Exclusion principle  | 11           |
| <b>Unit II</b>  | <b>Mathematical logic:</b> – Introduction- Statements and Notation-Connectives-Negation- Conjunction-Disjunction-Statement formulas and Truth tables-Conditional and Biconditional-Tautologies, Equivalence of Formulas-Duality Law-Tautological Implications-Normal Forms-DNF-CNF-PDNF-PCNF-Predicate Calculus-Predicates-The statement function, variables, and Quantifiers-Predicate Formulas-Free and Bound Variables-The Universe of Discourse. | 12           |
| <b>Unit III</b> | <b>Relations:</b> – Introduction- Cartesian Product of Sets- Binary Relations – Set operations on relations-Types of Relations – Partial order relations – Equivalence relation – Composition of relations. <b>Functions:</b> – Types of functions – Invertible functions – Composition of functions.  | 13           |
| <b>Unit IV</b>  | <b>Algebraic Structure:</b> Semigroups & monoids- Homomorphism of semigroups and monoids- sub semigroups and submonoids-groups<br><b>Formal languages:</b> Basic definitions-phase structure grammar- types of phase structure grammar-Worked examples   | 11           |
| <b>Unit V</b>   | <b>Graph Theory:</b> – Basic concepts of Graph theory-Basic Definitions-Paths, Reachability and Connectedness- Matrix Representation of graphs-Trees-Storage representation and Manipulation of Graphs- Trees: Their Representation and Operations-List structures and Graphs  | 13           |
|                 | <b>Total Hours</b>   | <b>60</b>    |

**Pedagogy and Assessment Methods:**

|  |
|--|
| Seminar, Power Point Presentation, Chalk and Talk, Quiz, Assignments, Group Task |
|--|

**Text Books**

| S.NO | AUTHOR                                  | TITLE OF THE BOOK  | PUBLISHERS/<br>EDITION              | YEAR OF<br>PUBICATION |
|------|---|--|-------------------------------------|-----------------------|
| 1    | J.K. Sharma (Unit I & III)              | Discrete mathematics   | Macmillan India Ltd, Second Edition | 2005                  |
| 2    | J.P.Tremplay & R. Manohar (Unit II & V) | Discrete Mathematical structures with Applications to computer Science | Tata Mc Graw-Hill Companies         | 2008                  |
| 3    | T.Veerarajan (Unit IV)                  | Discrete mathematics   | Tata McGraw Hill                    | 2007                  |

**Reference Books**

| S.NO | AUTHOR  | TITLE OF THE BOOK    | PUBLISHERS/<br>EDITION                                | YEAR OF<br>PUBICATION |
|------|---|----------------------|---|-----------------------|
| 1    | Dr M. K.<br>Venketaramen, Dr<br>N.Sridharan,<br>N.Chandarasekaran | Discrete Mathematics | The National<br>publishing<br>Company Chennai.        | 2006                  |
| 2    | V. Sundaresan,<br>K.S. Ganapathi<br>Subramanian,<br>K. Ganesan    | Discrete Mathematics | A.P.Publications,<br>Sirkali                          | 2006                  |
| 3    | RaniSironmani   | Formal Languages     | The Christian<br>Literature Society,<br>First Edition | 1984                  |

| Course Designed by                              | Verified by HOD                                 | Checked by                             | Approved by                                  |
|---|---|--|--|
| <b>Name and<br/>Signature</b>                   | <b>Name with<br/>Signature</b>                  | <b>CDC</b>                             | <b>COE</b>                                   |
| Dr.M.Malathi<br><br>Dr.S.Sharmila<br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: | Name:Mr.K.Srinivasan<br><br>Signature: | Name: Dr.R. ManickaChezian<br><br>Signature: |

|                        |          |                       |   |  |  |           |  |
|------------------------|----------|-----------------------|---|--|--|-----------|--|
| <b>Programme Code:</b> | B.Sc     |                       |   | <b>Programme Title :</b>                                       | Bachelor of Science (Computer Science) |           |  |
| <b>Course Code:</b>    | 23UCS206 |                       |   | <b>Title :</b>   | <b>Batch :</b>                         | 2023-2026 |  |
| <b>Hrs/Week:</b>       | 4        | Tutorial<br>Hrs./Sem. | - | <b>CC Lab II:</b> Programming Lab in Data Structures using C++ | <b>Semester:</b>                       | II        |  |
|                        |          |                       |   |  | <b>Credits:</b>                        | 2         |  |

### Course Objective

The objective of this course is to make the students to write and execute programs in C++ to solve problems using data structures such as arrays, linked lists, stacks, queues, trees and binary search trees, and also to implement various sorting and searching algorithms.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | To apply the data structures such as stacks, queues and trees to solve various computing problems | K3              |
| CO2       | To analyze various tree traversals in a binary search tree  | K4              |
| CO3       | To validate various kinds of searching and sorting techniques                                     | K5              |

### Mapping

| COs \ POs | POs |     |     |     |     |     |     |     |     |      |      |      |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|           | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
| CO1       | H   | M   | H   | M   | H   | H   | H   | M   | M   | L    | H    | M    |
| CO2       | H   | H   | M   | H   | M   | M   | H   | M   | M   | L    | M    | H    |
| CO3       | M   | M   | H   | H   | M   | M   | H   | M   | M   | L    | H    | H    |

H: High M: Medium L: Low



**Syllabus**

| Units | Contents  | Hrs       |
|-------|---|-----------|
|       | <p style="text-align: center;"><b>SET A</b></p> <ul style="list-style-type: none"> <li>• C++ Program to implement Stack using array</li> <li>• C++ Program to implement Queue using array</li> <li>• C++ Program to implement singly linked lists</li> <li>• C++ Program to implement doubly linked lists</li> <li>• C++ Program to add given two polynomials</li> <li>• C++ Program to insert an element in to a binary search tree</li> <li>• C++ Program to search an element in a binary search tree</li> <li>• C++ Program to delete an element from a binary search tree</li> <li>• C++ Program to search for a key element in a list of elements using sequential search</li> </ul> <p style="text-align: center;"><b>SET B</b></p> <ul style="list-style-type: none"> <li>• C++ Program to perform preorder traversal in a binary search tree</li> <li>• C++ Program to perform inorder traversal in a binary search tree</li> <li>• C++ Program to perform postorder traversal in a binary search tree</li> <li>• C++ Program to search for a key element in a list of sorted elements using binary search.</li> <li>• C++ Program to perform Fibonacci search</li> <li>• C++ Program to perform Insertion sort</li> <li>• C++ Program to perform Quick sort</li> <li>• C++ Program to perform Merge sort</li> <li>• C++ Program to perform Heap sort</li> </ul> <p style="text-align: center;"><b>INTERNAL MARK(20 Marks)                      EXTERNAL MARK (30 Marks)</b></p> | <b>60</b> |
|       | <b>Total Contact Hrs</b>  | <b>60</b> |

| <b>Course Designed by</b>                          | <b>Verified by HOD</b>                          | <b>Checked by</b>                       | <b>Approved by</b>                              |
|--|---|---|---|
| <b>Name and Signature</b>                          | <b>Name with Signature</b>                      | <b>CDC</b>                              | <b>COE</b>                                      |
| Mr. K. Srinivasan<br><br>N.Arulkumar<br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: | Name: Mr.K.Srinivasan<br><br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: |

|                        |          |                           |                          |  |                     |
|------------------------|----------|---------------------------|--------------------------|--|---------------------|
| <b>Programme Code:</b> | B.Sc     |                           | <b>Programme Title :</b> | Bachelor of Science (Computer Science) |                     |
| <b>Course Code:</b>    | 23UCS2S2 |                           | <b>Title :</b>           | <b>Batch :</b>                         | 2023-2026           |
| <b>Hrs/Week:</b>       | 2        | <b>Tutorial Hrs./Sem.</b> | -                        | <b>SEC I: Naan Mudhalvan :</b>         | <b>Semester:</b> II |
|                        |          |                           |                          | <b>Credits:</b>                        | 2                   |
|                        |          |                           | Block chain              |  |                     |

### Course Objective

To impart knowledge on Block chain and Crypto currency and make the students to design, build and deploy distributed applications by integrating the ideas from Block chain technology.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Remember the basics of Cryptography.  | K1              |
| CO2       | Understand emerging abstract models for Block chain technology              | K2              |
| CO3       | Design, build, and deploy a distributed application.                        | K3              |
| CO4       | Analyze the differences between proof-of-work and proof-of-stake consensus. | K4              |
| CO5       | Evaluate security, privacy, and efficiency of a Block chain system.         | K5              |

### Mapping

| PO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1      | H   | M   | M   | L   | H   | M   | L   | M   | H   | H    | H    | L    |
| CO2      | H   | M   | H   | L   | H   | M   | L   | M   | H   | M    | L    | L    |
| CO3      | H   | M   | H   | M   | L   | M   | M   | M   | M   | L    | H    | M    |
| CO4      | H   | M   | M   | L   | M   | M   | M   | M   | L   | M    | L    | L    |
| CO5      | H   | M   | M   | L   | M   | M   | M   | M   | L   | H    | M    | L    |

H-High; M-Medium;L-Low

**Syllabus**

| Units                    | Contents  | Hrs       |
|--------------------------|---|-----------|
| <b>UnitI</b>             | <b>Introducing Blockchain:</b> Beginning at the Beginning: What Blockchains Are - What blockchains do - Why blockchains matter - The Structure of Blockchains - Blockchain Applications - The Blockchain Life Cycle. <b>Picking a Blockchain</b> - Where Blockchains Add Substance - Determining your needs - Defining your goal - Choosing a Solution - Drawing a blockchain decision tree - Making a plan.                              | 6         |
| <b>UnitII</b>            | <b>Cryptography:</b> Types of Cryptography - Use of Cryptography in Blockchain - Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.   | 6         |
| <b>UnitIII</b>           | <b>Basic Distributed Computing &amp; Crypto primitives:</b> Atomic Broadcast, Consensus, Byzantine Models of fault tolerance, Hash functions, Puzzle friendly Hash, Collision resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge systems.   | 6         |
| <b>UnitIV</b>            | <b>Getting Your Hands on Blockchain</b> - Diving into the Bitcoin Blockchain - Creating your first Bitcoin wallet - Creating a second Bitcoin wallet - Generating a Bitcoin vanity address - Transferring your vanity address - Making an entry into the Bitcoin blockchain - Reading a blockchain entry in Bitcoin - Using Smart Contracts with Bitcoin - Checking the status of your contract.  | 6         |
| <b>UnitV</b>             | <b>Encountering the Ethereum Blockchain</b> - Exploring the Brief History of Ethereum - Ethereum: The Open-Source World Wide Computer - Decentralized applications: Welcome to the future - The power of decentralized autonomous organizations - Hacking a Blockchain - Understanding smart contracts - Discovering the crypto currency Ether - Getting Up and Running on Ethereum - Mining for ether - Setting up your Ethereum wallet. | 6         |
| <b>Total Contact Hrs</b> |   | <b>30</b> |

**Pedagogy and Assessment Methods:**

|  |
|--|
| Seminar, Power Point Presentation, Chalk and Talk, Quiz, Assignments, Group Task |
|--|

**Text Books**

| S.NO | AUTHOR   | TITLE OF THE BOOK   | PUBLISHERS \ EDITION                | YEAR OF PUBLICATION |
|------|--|---|-------------------------------------|---------------------|
| 1    | Tiana laurence   | Blockchain for dummies  | 1st Edition, John Wiley & Sons, Inc | 2017                |
| 2    | Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder | Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction | Illustrated Edition                 | 2016                |

**Reference Books**

| S.NO | AUTHOR          | TITLE OF THE BOOK  | PUBLISHERS \ EDITION | YEAR OF PUBLICATION |
|------|-----------------|--|----------------------|---------------------|
| 1    | Daniel Drescher | Blockchain Basics:<br>A Non-Technical<br>Introduction in 25<br>Steps | Apress, 2nd Edition  | 2017                |

| Course Designed by        | Verified by HOD              | Checked by        | Approved by                   |
|---------------------------|------------------------------|-------------------|-------------------------------|
| <b>Name and Signature</b> | <b>Name with Signature</b>   | <b>CDC</b>        | <b>COE</b>                    |
| Dr.R.ManickaChezian       | Name:Dr.R.Manicka<br>Chezian | Name:K.Srinivasan | Name: Dr.R.Manicka<br>Chezian |
| M. Dhavapriya             | Signature:                   | Signature:        | Signature:                    |
| Signature:                |                              |                   |                               |

|   |          |                           |    |                                      |  |             |
|---|----------|---------------------------|----|--------------------------------------|--|-------------|
| <b>Programme Code:</b>                          | B.Sc.    |                           |    | <b>Programme Title:</b>              | Bachelor of Science (Computer Science) |             |
| <b>Course Code:</b>                             | 23UCS2VA |                           |    | <b>Title</b>                         | <b>Batch:</b>                          | 2023 – 2026 |
| <b>Lecture Hrs./Week or Practical Hrs./Week</b> | -        | <b>Tutorial Hrs./Sem.</b> | 30 | VAC I: Cloud based Office Automation | <b>Semester:</b>                       | II          |
|   |          |                           |    |                                      | <b>Credits:</b>                        | 2*          |

### Course Objective

To reinforce human connections is even more important when people are working remotely and interacting with their customers digitally.

### Syllabus

| Programs  | Hrs |
|---|-----|
| <ul style="list-style-type: none"> <li>• Calendar: Create and manage events</li> <li>• Docs: Create and manage comments and action items, set preferences suit your work style, and use the Google Docs Explore tool.</li> <li>• Drive: Organize, protect, and share files.</li> <li>• Gmail : Compose, send, and reply to messages.</li> <li>• Meet &amp; Chat : Manage video meetings and collaborate using instant messages</li> <li>• Sheets: Create and edit spreadsheets directly in your browser—no other software is required.</li> <li>• Sheets Advanced Topic: Apply themes and conditional formatting, and use advanced formulas and functions</li> <li>• Slides: Create and collaborate on professional presentations for proposals, sales, marketing, or training</li> <li>• Form: To create online forms and surveys with multiple question types.</li> </ul> |     |
| <b>Total Contact Hrs</b>  | 30  |

### Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

| Course Designed by                                    | Verified by HOD                                   | Checked by                                | Approved by                                       |
|---|---|---|---|
| <b>Name and Signature</b>                             | <b>Name with Signature</b>                        | <b>CDC</b>                                | <b>COE</b>  |
| Name: Dr.M.Malathi<br><br>Dr.S.Sharmila<br>Signature: | Name: Dr. R. Manicka<br>chezian<br><br>Signature: | Name: Mr. K. Srinivasan<br><br>Signature: | Name: Dr. R. Manicka<br>chezian<br><br>Signature: |

|   |          |                           |   |                                   |   |             |  |
|---|----------|---------------------------|---|-----------------------------------|---|-------------|--|
| <b>Programme Code:</b>                                  | B.Sc.    |                           |   | <b>Programme Title:</b>           | Bachelor of Science<br>(Computer Science) |             |  |
| <b>Course Code:</b>                                     | 23UCS307 |                           |   | <b>Title</b>                      | <b>Batch:</b>                             | 2023 - 2026 |  |
| <b>Lecture Hrs./Week<br/>or<br/>Practical Hrs./Week</b> | 4        | <b>Tutorial Hrs./Sem.</b> | - | <b>CC V: Java<br/>Programming</b> | <b>Semester:</b>                          | III         |  |
|   |          |                           |   |                                   | <b>Credits:</b>                           | 4           |  |

### Course Objective

The objective of this course is to make the students to understand the various features of Java such as Packages, Applets, AWT controls, Stream classes and Files and make the students to apply the same for writing the programs.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | To remember and understand the OOPs concepts such as class, methods, inheritance, encapsulation and polymorphism etc. | K1, K2          |
| CO2       | To understand the differences between application programs and applets, applet life cycle and graphics programming.   | K2              |
| CO3       | To implement programs using Thread, Applet and AWT controls, Swings, Beans and Servlets                               | K3              |
| CO4       | To evaluate java programs using stream classes and files.   | K4              |
| CO5       | To design webpage using Applets   | K5              |

### Mapping

| POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| COs |     |     |     |     |     |     |     |     |     |      |      |      |
| CO1 | H   | H   | H   | M   | H   | L   | H   | M   | M   | H    | M    | H    |
| CO2 | M   | M   | M   | M   | M   | L   | M   | M   | M   | M    | M    | M    |
| CO3 | M   | M   | H   | H   | H   | M   | H   | H   | H   | M    | H    | H    |
| CO4 | H   | H   | M   | M   | H   | M   | M   | H   | M   | L    | M    | H    |
| CO5 | H   | M   | H   | M   | M   | L   | M   | M   | M   | M    | M    | M    |

H-High; M-Medium; L-Low

**Syllabus**

| Units           | Contents   | Hrs       |
|-----------------|--|-----------|
| <b>Unit I</b>   | Java Evolution-Overview of Java Language-Constants, Variables & Data types- Operators & Expressions-Decision making & branching-Decision making & looping.   | 11        |
| <b>Unit II</b>  | Classes, Objects & methods- Arrays, Strings & Vectors-Interfaces: Multiple Inheritance – Packages: Putting classes together - Multithreaded Programming.   | 12        |
| <b>Unit III</b> | Managing Errors & Exceptions- Applet Programming: Introduction-How Applets differ from application-Preparing to Write Applets-Building applet code- Applet lifecycle-Creating an Executable Applet - Designing Web page-Applet tag-Adding Applet to HTML file - Running the Applet-Passing Parameters to Applets - Graphics Programming. | 12        |
| <b>Unit IV</b>  | The Java Library: String Handling - Networking - Event Handling - Introducing the AWT: Working with Windows, Frames, Graphics, and Text - Using AWT Controls,Layout Managers, and Menus - JDBC.  | 12        |
| <b>Unit V</b>   | Managing Input/Output in files in Java: Introduction-Concept of Streams-Stream Classes-Byte Stream classes-Character Stream Classes-Using Streams-other useful I/O Classes- using the File Class-I/O Exceptions-Creation of Files-Reading/Writing Characters - Reading/Writing Bytes.  | 13        |
|                 | <b>Total Contact Hrs</b>   | <b>60</b> |

**Pedagogy and Assessment Methods:**

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

**Text Books**

| S.NO. | AUTHOR                                  | TITLE OF THE BOOK                   | PUBLISHER / EDITION  | YEAR OF PUBLICATION |
|-------|---|-------------------------------------|--|---------------------|
| 1     | E.Balagurusamy<br>(Unit-I,II,III and V) | Programming with Java<br>– A Primer | Tata McGraw Hill<br>Publishing<br>Company Limited,<br>New Delhi, 5th<br>Edition. | 2019                |
| 2     | Herbert Schildt<br>(Unit- IV)           | Java: The Complete<br>Reference     | ORACLEPress,<br>Tenth Edition  | 2017                |



**Reference Books**

| S.No. | AUTHOR                                    | TITLE OF THE PAPER                              | PUBLISHER / EDITION                     | YEAR OF PUBLICATION |
|-------|---|---|---|---------------------|
| 1     | C.Xavier                                  | Java Programming – A Practical Approach         | McGraw Hill Education                   | 2011                |
| 2     | Phil Hanna                                | The Complete Reference JSP 2.0                  | Tata McGraw Hill Publishing Company Ltd | 2011                |
| 3     | K.Somasundram                             | Programming in Java2                            | Jaico Publishing House, Chennai         | 2005                |
| 4     | Sagayaraj, Denis, Karthik and Gajalakshmi | Java Programming for Core and Advanced Learners | Universities Press                      | 2018                |

| Course Designed by                                     | Verified by HOD                              | Checked by                                | Approved by                                 |
|--|--|---|---|
| <b>Name and Signature</b>                              | <b>Name with Signature</b>                   | <b>CDC</b>                                | <b>COE</b>                                  |
| Dr. Aruchamy Rajini<br><br>N. Arul kumar<br>Signature: | Name: Dr.R.Manicka Chezian<br><br>Signature: | Name: Mr. K. Srinivasan<br><br>Signature: | Name:Dr.R.Manicka Chezian<br><br>Signature: |

|                          |          |                          |   |   |   |             |  |
|--------------------------|----------|--------------------------|---|---|---|-------------|--|
| <b>Programme Code:</b>   | B.Sc.    |                          |   | <b>Programme Title:</b>                           | Bachelor of Science<br>(Computer Science) |             |  |
| <b>Course Code:</b>      | 23UCS308 |                          |   | <b>Title</b>                                      | <b>Batch:</b>                             | 2023 - 2026 |  |
|                          |          |                          |   | <b>CC VI: Operating System Concepts and Linux</b> | <b>Semester:</b>                          | III         |  |
| <b>Lecture Hrs./Week</b> | 5        | <b>Tutorial Hrs./Sem</b> | - | <b>Credits:</b>                                   | 4   |             |  |

### Course Objective

Understand the fundamental concepts of operating systems, including process management, memory management, and virtual storage management and also learn about the different storage management strategies, job and processor scheduling algorithms

Understand the basics of Linux, including the GNU Project and the Free Software Foundation, shell programming, and Linux commands and Gain knowledge of processes, threads, and interprocess communication and file system permissions.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Develop a solid understanding of operating system fundamentals, including process concepts, process states and transitions, operations on processes, interrupt processing, and real storage management strategies | K1              |
| CO2       | Understands the use of different process scheduling algorithm and virtual storage techniques  | K2              |
| CO3       | Apply the concept of Disk Performance Optimization to improve system performance and can be effectively navigate and utilize the Linux environment for various tasks.   | K3              |
| CO4       | Design, develop, and manage processes and threads, enable to build robust and efficient software systems.   | K4              |
| CO5       | Evaluate the different methods of interprocess communication and implement secure communication and access control mechanisms in software systems.  | K5              |

### Mapping

| PO / CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1     | H   | H   | M   | H   | M   | M   | M   | M   | M   | M    | H    | M    |
| CO2     | M   | M   | H   | M   | H   | M   | H   | H   | L   | M    | M    | H    |
| CO3     | M   | M   | M   | H   | H   | M   | M   | L   | M   | L    | H    | H    |
| CO4     | H   | H   | M   | H   | M   | M   | M   | M   | L   | M    | H    | M    |
| CO5     | M   | M   | M   | H   | M   | H   | M   | L   | M   | M    | H    | M    |

H-High; M-Medium; L-Low

## Syllabus

| Units    | Content   | Hrs       |
|----------|---|-----------|
| Unit I   | <b>OPERATING SYSTEM:</b> What is an Operating System? – <b>Process Concepts:</b> Definition of Process - Process States - Process States Transition Operations on Processes – Interrupt Processing<br><b>Storage Management: Real Storage:</b> Real Storage Management Strategies – Contiguous versus Non-contiguous storage allocation – Single User Contiguous Storage allocation- Fixed partition multiprogramming – Variable partition multiprogramming.                        | 15        |
| Unit II  | <b>Virtual Storage:</b> Basic Concepts - Virtual Storage Management Strategies – Page Replacement Strategies – Working Sets – Demand Paging – Page Size.<br><b>Processor Management:</b> Job and Processor Scheduling: Scheduling Levels - Preemptive Vs Non-preemptive scheduling – Priorities – Deadline scheduling – FIFO - Round Robin – Shortest Job First – Shortest Remaining Time – Highest Response Ratio Next Scheduling.   | 15        |
| Unit III | <b>Disk Performance Optimization:</b> Operation of moving head disk storage – Need for disk scheduling – Seek Optimization.<br><b>LINUX:</b> What Is Linux? - The GNU Project and the Free Software Foundation - Shell Programming: What Is a Shell? - Shell as a Programming Language – <b>Linux Commands:</b> Basic Commands – File Permission Commands – Environmental Variable Commands - Vi Editing commands – User Management Commands – Network Commands – Process Commands. | 15        |
| Unit IV  | <b>Processes:</b> Looking at Processes - Creating Processes – Signals - Process Termination – <b>Threads:</b> Thread Creation - Thread Cancellation - Synchronization and Critical Sections - GNU/Linux Thread Implementation - Processes Vs. Threads   | 15        |
| Unit V   | <b>Interprocess Communication:</b> Introduction - Shared Memory - Processes Semaphores - Mapped Memory – Pipes – Sockets – <b>Security:</b> Users and Groups - Process User IDs and Process Group IDs - File System Permissions.  | 15        |
|          | <b>Total Contact Hrs</b>  | <b>75</b> |

## Pedagogy and Assessment Methods:

|   |
|---|
| Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task. |
|---|

## Text Books

| S.NO | AUTHOR                                     | TITLE OF THE BOOK            | PUBLISHERS \ EDITION               | YEAR OF PUBLICATION |
|------|--|------------------------------|------------------------------------|---------------------|
| 1    | H.M. Deitel                                | Operating Systems            | 2nd Edition, Perason               | 2003                |
| 2    | Neil Matthew Richard Stones                | Beginning Linux® Programming | 4th Edition, Wiley Publishing, Inc | 2008                |
| 3    | Mark Mitchell, Jeffrey Oldham, Alex Samuel | Advanced Linux Programming   | New Riders Publishing              | 2001                |

**Reference Books**

| S.NO | AUTHOR               | TITLE OF THE BOOK             | PUBLISHERS \ EDITION       | YEAR OF PUBLICATION |
|------|----------------------|-------------------------------|----------------------------|---------------------|
| 1    | Achyut S. Godbole,   | Operating systems             | TMH                        | 2002.               |
| 2    | Petersen and Richard | LINUX: The Complete Reference | McGraw Hill, Sixth edition | 2007                |

| Course Designed by                               | Verified by HOD                             | Checked by                                | Approved by                                  |
|--|---|---|--|
| <b>Name and Signature</b>                        | <b>Name with Signature</b>                  | <b>CDC</b>                                | <b>COE</b>                                   |
| K.Srinivasan<br><br>G.Angayarkanni<br>Signature: | Name:Dr.R.Manicka Chezian<br><br>Signature: | Name: Mr. K. Srinivasan<br><br>Signature: | Name: Dr.R.Manicka Chezian<br><br>Signature: |

|                          |          |                      |   |  |   |           |  |
|--------------------------|----------|----------------------|---|--|---|-----------|--|
| <b>Programme Code:</b>   | B.Sc     |                      |   | <b>Programme Title :</b>   | Bachelor of Science<br>(Computer Science) |           |  |
| <b>Course Code:</b>      | 23UCS3A1 |                      |   | <b>Title :</b>   | <b>Batch :</b>                            | 2023-2026 |  |
| <b>Lecture Hrs/Week:</b> | 5        | Tutorial<br>Hrs/Sem. | - | <b>GE III – Allied III:</b><br>Computer Based<br>Optimization Techniques | <b>Semester:</b>                          | III       |  |
|                          |          |                      |   |  | <b>Credits:</b>                           | 4         |  |

### Course Objective

To enable the students to understand and to apply the resource management techniques available in OR including linear programming transportation assignment problem, inventory control, queuing theory and network problems.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Remember and understand the concepts of relations   | K1,K2           |
| CO2       | Understand the concept of transportation, networking, replacement, etc.,                    | K2              |
| CO3       | Apply the appropriate optimization techniques to solve the computer based business problems | K3,K5           |
| CO4       | Become familiar with, LPP, Hungarian method, Game theory, Replacement problem.              | K4,K5           |
| CO5       | Analyze the ability of critical thinking, to find shortest time duration                    | K5              |

### Mapping

| POs |     |     |     |     |     |     |     |     |     |     |      |      |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | PSO1 | PSO2 |
| CO1 | H   | H   | H   | M   | M   | H   | H   | M   | M   | M   | M    | H    |
| CO2 | H   | M   | H   | H   | H   | M   | M   | M   | M   | H   | H    | M    |
| CO3 | M   | H   | H   | M   | M   | M   | M   | M   | M   | H   | M    | M    |
| CO4 | H   | H   | H   | H   | M   | H   | M   | M   | M   | M   | M    | H    |
| CO5 | H   | H   | H   | H   | M   | M   | M   | H   | M   | M   | M    | M    |

H-High; M-Medium; L-Low

### Syllabus

| Units           | Contents   | Hrs |
|-----------------|--|-----|
| <b>Unit I</b>   | Origin and development of OR – <i>Applications of OR</i> – Linear programming problem – Mathematical formulation of the problem – Graphical Method – Simplex Method.   | 15  |
| <b>Unit II</b>  | <b>Transportation Problem:</b> Balanced Transportation problem and Un-Balanced Transportation problem-Row Minimum-Column Minimum-North-West Corner-Matrix Minima Method-Vogel's Approximation Methods-U-VMethod for OBFS.<br><b>Assignment Problem:</b> Balanced Assignment Problem and Un-Balanced Assignment Problem– Hungarian method . | 15  |
| <b>Unit III</b> | <b>Network Scheduling:</b> Network and Basic components – <i>Logical sequencing:</i> Formation of a Loop, Dangling, Redundancy-Network Construction- Rules of Network construction –Time calculation in Network-Numbering the events– Critical Path Method (CPM)– PERT Calculations.   | 15  |

|                          |   |           |
|--------------------------|---|-----------|
| <b>Unit IV</b>           | <b>Replacement Problem and System Reliability:</b><br>Model 1: Value of Money does not change with time.<br>Model 2: Value of Money change with time.<br><b>Game and Strategies:</b> Introduction-Two-Person Zero-Sum games-Pure Strategies: Maximin-Minimax Principles-Saddle Point and Value of the Game-Rule for Determining a Saddle Point- Mixed Strategies: Games without Saddle Points- 2x2 Rectangular Games. | 15        |
| <b>Unit V</b>            | <b>Sequencing problem:</b> Problems with n jobs and 2 machines – Problems with ‘n’ jobs and ‘k’ machines.<br><b>Inventory control</b> – Types of inventory-Economic Order Quantity:<br>Model 1: EOQ problem with no shortages<br>Model 2: EOQ problem with no shortages and several production runs of unequal length<br>Model 3: EOQ problem with shortages.   | 15        |
| <b>Total Contact Hrs</b> |   | <b>75</b> |

**Pedagogy and Assessment Methods:**

Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.

**Text Book**

| S.NO | AUTHOR                            | TITLE OF THE BOOK   | PUBLISHERS \ EDITION  | YEAR OF PUBLICATION |
|------|-----------------------------------|---------------------|-----------------------|---------------------|
| 1    | Kanti Swarup, PK Gupta, Man Mohan | Operations Research | Sultan Chand and Sons | 2020                |

**References Books**

| S.NO | AUTHOR                    | TITLE OF THE BOOK                                | PUBLISHERS \ EDITION     | YEAR OF PUBLICATION |
|------|---------------------------|--|--------------------------|---------------------|
| 1    | S. Dharani Venkatakrisnan | Operations Research                              | Keerthi Publishing P.Ltd | 2015                |
| 2    | PK Gupta , Man Mohan      | Problems in Operations Research                  | 3rd Edition              | 2018                |
| 3    | G. Srinivasan             | Operations Research: principles and Applications | 2 <sup>nd</sup> Edition  | 2017                |

| Course Designed by                                  | Verified by HOD                                    | Checked by                                  | Approved by  |
|---|--|---|--|
| <b>Name and Signature</b>                           | <b>Name with Signature</b>                         | <b>CDC</b>                                  | <b>COE</b>   |
| Dr. M.Malathi<br><br>Dr.R,Nandhakumar<br>Signature: | Name:<br>Dr.R.Manicka<br>Chezian<br><br>Signature: | Name:<br>Mr. K.Srinivasan<br><br>Signature: | <b>Name:</b> Dr.R.Manicka<br>Chezian<br><br>Signature: |

|                          |          |                      |   |                                   |   |           |  |
|--------------------------|----------|----------------------|---|-----------------------------------|---|-----------|--|
| <b>Programme Code:</b>   | B.Sc     |                      |   | <b>Programme Title :</b>          | Bachelor of Science<br>(Computer Science) |           |  |
| <b>Course Code:</b>      | 23UCS3A2 |                      |   | <b>Title :</b>                    | <b>Batch :</b>                            | 2023-2026 |  |
|                          |          |                      |   | <b>GE III – Allied III:</b>       | <b>Semester:</b>                          | III       |  |
| <b>Lecture Hrs/Week:</b> | 5        | Tutorial<br>Hrs/Sem. | - | Resource Management<br>Techniques | <b>Credits:</b>                           | 4         |  |

**Course Objective**

To enhance the students' knowledge in decision analysis, sequencing of the jobs to be carried out based on cost optimization, replacement policies and analyze the cases according to their categories.

**Course Outcomes (CO)**

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Know the principles and applications of information theory             | K1,K2           |
| CO2       | To understand sequencing, replacement problems.                        | K2              |
| CO3       | Demonstrate skills to achieve their objective using sequencing models. | K3,K5           |
| CO4       | Apply decision making under different business environments.           | K4,K5           |
| CO5       | Determine a solution to a rectangular game using simplex method        | K5              |

**Mapping**

| POs |     |     |     |     |     |     |     |     |     |     |      |      |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | PSO1 | PSO2 |
| CO1 | H   | H   | H   | M   | M   | H   | H   | M   | M   | M   | M    | H    |
| CO2 | H   | M   | H   | H   | H   | M   | M   | M   | M   | H   | H    | M    |
| CO3 | M   | H   | H   | M   | M   | M   | M   | M   | M   | H   | M    | M    |
| CO4 | H   | H   | H   | H   | M   | H   | M   | M   | M   | M   | M    | H    |
| CO5 | H   | H   | H   | H   | M   | M   | M   | H   | M   | M   | M    | M    |

H-High; M-Medium; L-Low

**Syllabus**

| Units                    | Contents  | Hrs       |
|--------------------------|---|-----------|
| <b>Unit I</b>            | <b>Decision Analysis:</b> Decision Making environment – Decisions under uncertainty – Decision under risk – Decision –Tree Analysis.  | 15        |
| <b>Unit II</b>           | <b>Sequencing Problems:</b> Introduction-problem of sequencing - basic terms used in sequencing- processing n-jobs through 2 machines - processing n –jobs through k machines - processing 2 jobs through k machines (Problems only). | 15        |
| <b>Unit III</b>          | <b>Replacement Problems:</b> Introduction - Replacement of equipment / assets that deteriorates gradually - replacement of equipment that fails suddenly and problems.  | 15        |
| <b>Unit IV</b>           | <b>Information Theory:</b> Introduction- A measure of Information-Axiomatic Approach to Information- Entropy-The expected information- Some properties of entropy function-Joint and conditional entropies.                           | 15        |
| <b>Unit V</b>            | Applications: General solution of (mxn) rectangular games using simplex method - Reliability and system failure rates using replacement problems.   | 15        |
| <b>Total Contact Hrs</b> |   | <b>75</b> |

**Pedagogy and Assessment Methods:**

Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.

**Text Books**

| S.NO | AUTHOR                            | TITLE OF THE BOOK   | PUBLISHERS \ EDITION                              | YEAR OF PUBLICATION |
|------|-----------------------------------|---------------------|---|---------------------|
| 1    | Kanti Swarup, PK Gupta, Man Mohan | Operations Research | S.Chand & sons education publications ; New Delhi | 2014                |

**References Books**

| S.NO | AUTHOR                    | TITLE OF THE BOOK                                | PUBLISHERS \ EDITION     | YEAR OF PUBLICATION |
|------|---------------------------|--|--------------------------|---------------------|
| 1    | S. Dharani Venkatakrisnan | Operations Research                              | Keerthi Publishing P.Ltd | 2015                |
| 2    | PK Gupta , Man Mohan      | Problems in Operations Research                  | 3rd Edition              | 2018                |
| 3    | G. Srinivasan             | Operations Research: principles and Applications | 2 <sup>nd</sup> Edition  | 2017                |

| Course Designed by             | Verified by HOD            | Checked by             | Approved by                |
|--------------------------------|----------------------------|------------------------|----------------------------|
| <b>Name and Signature</b>      | <b>Name with Signature</b> | <b>CDC</b>             | <b>COE</b>                 |
| Dr. M.Malathi                  | Name: Dr.R.Manicka Chezian | Name: Mr. K.Srinivasan | Name: Dr.R.Manicka Chezian |
| Dr.R,Nandhakumar<br>Signature: | Signature:                 | Signature:             | Signature:                 |



|                        |          |   |   |           |
|------------------------|----------|---|---|-----------|
| <b>Programme code:</b> | B.Sc     | <b>Programme Title :</b>                      | Bachelor of Science<br>(Computer Science) |           |
| <b>Course Code:</b>    | 23UCS309 | <b>Title :</b>                                | <b>Batch :</b>                            | 2023-2026 |
|                        |          | <b>CC Lab III: Programming<br/>Labin Java</b> | <b>Semester:</b>                          | III       |
| <b>Hrs/Week:</b>       | 4        |   | <b>Credits:</b>                           | 2         |

### Course Objective

The objective of this course is to make the students to implement various features of Javaprogramming by using Java SDK environment to create, debug and run Java programs.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To apply the basic concepts of Java such as class, methods, constructors, arrays and interfaces to solve the problems. | K3              |
| CO2       | To analyze programs using method overloading, methodoverriding, packages and threads.                                  | K4              |
| CO3       | To validate programs using event handling, applets, AWT controls andfiles.   | K5              |

### Mapping

| POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| COs |     |     |     |     |     |     |     |     |     |      |      |      |
| CO1 | H   | H   | H   | M   | M   | M   | H   | H   | H   | L    | M    | M    |
| CO2 | H   | H   | M   | M   | H   | H   | H   | M   | M   | L    | M    | H    |
| CO3 | H   | H   | M   | M   | M   | M   | H   | H   | H   | H    | M    | M    |

H-High; M-Medium; L-Low

**Syllabus**

| Units | Contents   | Hrs       |
|-------|--|-----------|
|       | <p style="text-align: center;"><b>SET-A</b></p> <ul style="list-style-type: none"> <li>• Program to sort the given names in alphabetical order.</li> <li>• Program to determine whether two strings are anagram or not.</li> <li>• Program to calculate area of different shapes using method overloading.</li> <li>• Program for command line Argument.</li> <li>• Program to illustrate the use of single inheritance.</li> <li>• Program to implement the concept of Multithreading.</li> <li>• Program to create an Exception called Pay out of bounds &amp; throw the Exception.</li> <li>• Program to draw smiley using Applet.</li> <li>• Program to perform method overriding.</li> <li>• Program to get the parts of the URL using networking concepts.</li> <li>• Program for Key Events.</li> <li>• Program to create Thread by implementing Runnable interface.</li> <li>• Program to draw several shapes.</li> </ul> <p style="text-align: center;"><b>SET-B</b></p> <ul style="list-style-type: none"> <li>• Program for processing Bank details using the concept of multiple inheritance using the interfaces.</li> <li>• Program for Employee salary details using Packages.</li> <li>• Program to demonstrate the multiple selection List-Box.</li> <li>• Program to create menu Bars and pull down menus.</li> <li>• Program to create a frame with four Text Fields, name, street, city and pincode with suitable Labels. Also add a Button called my details, when the Button is clicked is corresponding details to be displayed.</li> <li>• Program to create a frame with three text fields for name, age and qualification and a text field for multiple lines for Address.</li> <li>• Program to perform arithmetic operations using AWT controls.</li> <li>• Program to display the student information system using Swing.</li> <li>• Program to extract a portion of character string and print the extractedstring.</li> <li>• Program for Mouse Events.</li> <li>• Program for processing Random Access File.</li> <li>• Program to copy one file to another file.</li> <li>• Program for creating a simple JDBC application</li> </ul> <p><b>INTERNAL MARK (20 Marks)</b>                      <b>EXTERNAL MARK (30 Marks)</b></p> | <b>60</b> |

| Course Designed by         | Verified by HOD            | Checked by             | Approved by                |
|----------------------------|----------------------------|------------------------|----------------------------|
| <b>Name and Signature</b>  | <b>Name with Signature</b> | <b>CDC</b>             | <b>COE</b>                 |
| Dr. Aruchamy Rajini        | Name:R.Manicka Chezian     | Name: Mr. K.Srinivasan | Name: Dr. R.ManickaChezian |
| N.Arul Kumar<br>Signature: | Signature:                 | Signature:             | Signature:                 |

|                            |          |                           |   |   |  |             |  |
|----------------------------|----------|---------------------------|---|---|--|-------------|--|
| <b>Programme Code:</b>     | B.Sc.    |                           |   | <b>Programme Title:</b>                       | Bachelor of Science (Computer Science) |             |  |
| <b>Course Code:</b>        | 23UCS310 |                           |   | <b>Title</b>                                  | <b>Batch:</b>                          | 2023 - 2026 |  |
|                            |          |                           |   | <b>CC Lab IV:</b><br>Programming Lab in Linux | <b>Semester:</b>                       | III         |  |
| <b>Practical Hrs./Week</b> | 4        | <b>Tutorial Hrs./Sem.</b> | - |   | <b>Credits:</b>                        | 2           |  |

### Course Objective

The objective of this course is to make effective use of Linux utilities and shell scripting language to solve problems.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | To Develop shell scripts for simple applications.   | K3, K4, K5      |
| CO2       | To Develop programs to create and manage processes. | K3, K4, K5      |
| CO3       | To Develop programs for system administration       | K3, K4, K5      |

### Mapping

| POs, PSOS<br>COs | PO1        | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|------------------|------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|                  | <b>CO1</b> | H   | H   | L   | L   | H   | H   | M   | L   | M    | H    | H    |
| <b>CO2</b>       | H          | H   | L   | L   | H   | H   | H   | L   | M   | H    | H    | H    |
| <b>CO3</b>       | H          | H   | L   | L   | H   | H   | H   | L   | M   | H    | H    | H    |

H-High; M-Medium; L-Low



|                        |          |                             |   |           |
|------------------------|----------|-----------------------------|---|-----------|
| <b>Programme code:</b> | B.Sc     | <b>Programme Title :</b>    | Bachelor of Science<br>(Computer Science) |           |
| <b>Course Code:</b>    | 23UCS3N1 | <b>Title :</b>              | <b>Batch :</b>                            | 2023-2026 |
|                        |          | Non-Major Elective Paper-I: | <b>Semester:</b>                          | III       |
| <b>Hrs/Week:</b>       | 1        | Photoshop Lab               | <b>Credits:</b>                           | 2         |

### Course Objective

The objective of this course is to make the students to gain a working knowledge of Photoshop and develop their skills in editing and altering photographs for through a basic understanding of the toolbar, layers, and the adjustments panel.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To apply the different type of tools available in Photoshop to create simple applications. | K3              |
| CO2       | To interpret programs using various filters in Photoshop                                   | K4              |
| CO3       | To Identify the basic tools and components of multimedia components.                       | K5              |

### Syllabus

| Units | Contents   | Hrs |
|-------|--|-----|
|       | <p style="text-align: center;"><b>SET A</b></p> <ul style="list-style-type: none"> <li>• Image Menu using Photoshop</li> <li>• Reduce Picture Size using Photoshop</li> <li>• Replace color in an image using Photoshop</li> <li>• Make a simple book cover by using basic functionalities using Photoshop</li> <li>• Transfer an object from one image to another and erase background using Photoshop</li> <li>• Add a pattern as background using Photoshop</li> </ul> <p style="text-align: center;"><b>SET B</b></p> <ul style="list-style-type: none"> <li>• Create India Map using Photoshop</li> <li>• Retouching photos using Photoshop</li> <li>• Take a logo and modify it using Photoshop</li> <li>• Alter an image using filters using Photoshop</li> <li>• Special Effects-Color in black and white image using Photoshop</li> <li>• Special Effects-Feathered Portraits (Soft fade) using Photoshop</li> </ul> <p style="text-align: center;"><b>EXTERNAL MARK (50 Marks)</b></p> | 15  |

| Course Designed by        | Verified by HOD              | Checked by           | Approved by                   |
|---------------------------|------------------------------|----------------------|-------------------------------|
| <b>Name and Signature</b> | <b>Name with Signature</b>   | <b>CDC</b>           | <b>COE</b>                    |
| Dr.M. Malathi             | Name:Dr.R.Manicka<br>Chezian | Name:Mr.K.Srinivasan | Name: Dr.R.Manicka<br>Chezian |
| Dr.S. Sharmila            | Signature:                   | Signature:           | Signature:                    |
| Signature:                |                              |                      |                               |

|                        |          |  |   |           |
|------------------------|----------|--|---|-----------|
| <b>Programme code:</b> | B.Sc     | <b>Programme Title :</b>                 | Bachelor of Science<br>(Computer Science) |           |
| <b>Course Code:</b>    | 23UCS3N2 | <b>Title :</b>                           | <b>Batch :</b>                            | 2023-2026 |
|                        |          | Non-Major Elective Paper-I:              | <b>Semester:</b>                          | III       |
| <b>Hrs/Week:</b>       | 1        | Advanced Applications in MS Excel<br>Lab | <b>Credits:</b>                           | 2         |

### Course Objective

This course was designed for the intermediate student who has already mastered the basic skills and wants to gain more advanced skills to put to work in a business environment or for personal use.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To apply the different type of tools available in Photoshop to create simple applications. | K3              |
| CO2       | To interpret programs using various filters in Photoshop                                   | K4              |
| CO5       | To Identify the basic tools and components of multimedia components                        | K5              |

### Syllabus

| Units | Contents   | Hrs |
|-------|--|-----|
|       | <p style="text-align: center;"><b>SET A</b></p> <ul style="list-style-type: none"> <li>• In a new worksheet, create a table and insert information of student details. Use features of Format Menu.</li> <li>• Create employee table and calculate the salary. Use mathematical functions for the worksheet.</li> <li>• Create own templates in Excel.</li> <li>• Create and use data validation rules.</li> <li>• Create, manage, and format pivot tables and pivot charts.</li> <li>• Create a data and use sumif and countif formulas</li> </ul> <p style="text-align: center;"><b>SET B</b></p> <ul style="list-style-type: none"> <li>• Create and write complex formulas.</li> <li>• Create and use IF statements.</li> <li>• Apply custom and prebuilt conditional formatting.</li> <li>• Work with functions to manipulate strings of text and data.</li> <li>• Create charts in excel</li> <li>• Create a data and using that data perform Match and index</li> <li>• Create a data and using that data perform Vlookup concept</li> </ul> <p style="text-align: center;"><b>EXTERNAL MARK (50 Marks)</b></p> | 15  |

| Course Designed by        | Verified by HOD               | Checked by                 | Approved by                   |
|---------------------------|-------------------------------|----------------------------|-------------------------------|
| <b>Name and Signature</b> | <b>Name with Signature</b>    | <b>CDC</b>                 | <b>COE</b>                    |
| Dr. M.Malathi             | Name: Dr.R.Manicka<br>Chezian | Name: Mr. K.<br>Srinivasan | Name: Dr.R.Manicka<br>Chezian |
| Dr.R.Nandhakumar          | Signature:                    | Signature:                 | Signature:                    |

|                          |          |                           |   |                               |  |             |
|--------------------------|----------|---------------------------|---|-------------------------------|--|-------------|
| <b>Programme Code:</b>   | B.Sc.    |                           |   | <b>Programme Title:</b>       | Bachelor of Science (Computer Science) |             |
| <b>Course Code:</b>      | 23UCS411 |                           |   | <b>Title</b>                  | <b>Batch:</b>                          | 2023 - 2026 |
| <b>Lecture Hrs./Week</b> | 4        | <b>Tutorial Hrs./Sem.</b> | - | CC VII:<br>Python Programming | <b>Semester:</b>                       | IV          |
|                          |          |                           |   |                               | <b>Credits:</b>                        | 3           |

### Course Objective

On successful completion of this course the students should understand the core principles of the Python Language and use the tools to produce well designed programs in python and create effective GUI applications.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To remember the principles of structured programming and to understand basics of python.                       | K1              |
| CO2       | To understand the common programming idioms: variables, loop, branch, subroutine and input/output              | K2              |
| CO3       | To deploy the concepts of functions, standard libraries, modular programming and the design of user interfaces | K3              |
| CO4       | To figure out ability to analyze and solve the problems using advanced facilities of the Python Language       | K4              |
| CO5       | To evaluate the object oriented features in python using functions and standard libraries.                     | K5              |

### Mapping

| PO /PSO    | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P010 | PSO1 | PSO2 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>CO</b>  |     |     |     |     |     |     |     |     |     |      |      |      |
| <b>CO1</b> | H   | H   | H   | H   | H   | M   | L   | H   | H   | M    | H    | H    |
| <b>CO2</b> | H   | M   | H   | H   | H   | L   | L   | H   | L   | H    | M    | H    |
| <b>CO3</b> | H   | H   | H   | H   | M   | M   | M   | M   | M   | H    | H    | H    |
| <b>CO4</b> | M   | H   | M   | M   | H   | L   | L   | L   | L   | M    | H    | M    |
| <b>CO5</b> | H   | H   | M   | H   | M   | M   | M   | M   | M   | H    | H    | M    |

H-High; M-Medium; L-Low

**Syllabus**

| Units                    | Content  | Hrs       |
|--------------------------|--|-----------|
| <b>Unit I</b>            | <b>BASICS :</b> Python - Variables - Executing Python from the Command Line - Editing Python Files - Python Reserved Words - Basic Syntax-Comments - Standard Data Types – Relational Operators - Logical Operators - Bit Wise Operators - Simple Input and Output.  | 12        |
| <b>Unit II</b>           | <b>CONTROL STATEMENTS:</b> Control Flow and Syntax - Indenting - if statement – else Statement – elif statement – conditional expression – while statement – for statement – break statement – continue statement – pass statement – Iterators and the iter() function- break and continue - for Loop - Lists – Tuples - Sets – Dictionaries.  | 12        |
| <b>Unit III</b>          | <b>FUNCTIONS:</b> Definition – calling functions – creating functions – passing functions– Mapping Functions in a Dictionary -Built-in Functions: apply( ), filter( ), map( ) and reduce( ) – Lambda – Modules and Files-module-Built-in-Functions.  | 12        |
| <b>UnitIV</b>            | <b>ERROR HANDLING:</b> Run Time Errors - Exception Model - Exception Hierarchy - Handling Multiple Exceptions - Data Streams - Access Modes Writing - Data to a File Reading - Data From a File - Additional File Methods - Using Pipes as Data Streams - Handling IO Exceptions - Working with Directories.   | 12        |
| <b>UnitV</b>             | <b>OBJECT ORIENTED FEATURES:</b> Classes Principles of Object Orientation - Creating Classes - Instance Methods - File Organization - Special Methods - Class Variables – Inheritance – Polymorphism - Type Identification - Simple Character Matches - Special Characters - Character Classes – Quantifiers - Dot Character - Greedy Matches – Grouping - Matching at Beginning or End - Match Objects – Substituting - Splitting a String - Compiling Regular Expressions. | 12        |
| <b>Total Contact Hrs</b> |  | <b>60</b> |

**Pedagogy and Assessment Methods:**

|   |
|---|
| Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, APS |
|---|

**Text Books**

| S.NO | AUTHOR           | TITLE OF THE BOOK   | PUBLISHERS \ EDITION        | YEAR OF PUBLICATION |
|------|------------------|---|-----------------------------|---------------------|
| 1    | Mark Summerfield | Programming in Python 3: A Complete introduction to the Python Language | Addison-Wesley Professional | 2009                |
| 2    | Martin C. Brown  | PYTHON: The Complete Referencell  | McGraw-Hill                 | 2001                |



**Reference Books**

| S.NO | AUTHOR                                | TITLE OF THE BOOK                                    | PUBLISHERS \ EDITION        | YEAR OF PUBLICATION |
|------|---------------------------------------|--|-----------------------------|---------------------|
| 1    | Allen B. Downey                       | Think Python: How to Think Like a Computer Scientist | Shroff/ O'Reilly Publishers | 2016                |
| 2    | Guido van Rossum and Fred L. Drake Jr | An Introduction to Python                            | Network Theory Ltd          | 2011                |
| 3    | Wesley J Chun                         | Core Python Applications Programming                 | Prentice Hall               | 2012                |

| Course Designed by                                  | Verified by HOD                              | Checked by                               | Approved by                                 |
|---|--|--|---|
| <b>Name and Signature</b>                           | <b>Name with Signature</b>                   | <b>CDC</b>                               | <b>COE</b>                                  |
| Mr. K.Srinivasan<br><br>Dr.S.Sharmila<br>Signature: | Name: Dr.R.Manicka Chezian<br><br>Signature: | Name: Mr. K.Srinivasan<br><br>Signature: | Name:Dr.R.Manicka Chezian<br><br>Signature: |

|                          |          |                           |                          |  |                     |
|--------------------------|----------|---------------------------|--------------------------|--|---------------------|
| <b>Programme code:</b>   | B.Sc     |                           | <b>Programme Title :</b> | Bachelor of Science<br>(Computer Science)              |                     |
| <b>Course Code:</b>      | 23UCS412 |                           | <b>Title:</b>            | <b>Batch :</b>   | 2023-2026           |
| <b>Lecture Hrs/Week:</b> | 4        | <b>Tutorial Hrs./Sem.</b> | -                        | <b>CC VIII: Relational Database Management Systems</b> | <b>Semester:</b> IV |
|                          |          |                           |                          | <b>Credits:</b>  | 3                   |

### Course Objective

The objective of this course is to make the students to understand and apply the principles of data modeling using Entity Relationship and normalization techniques and understand the use of Structured Query Language (SQL) and its syntax.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To remember the basic concepts and applications of database systems and SQL.   | K1              |
| CO2       | To understand the relational database theory, and be able to write relational algebra expressions for queries  | K2              |
| CO3       | To apply design principles using the E-R method and normalization approach   | K3              |
| CO4       | To interpret SQL interface of a relational DBMS package to create, secure, populate, maintain, and query a database and PL/SQL programming using Triggers and Cursors. | K4              |
| CO5       | To attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)   | K5              |

### Mapping

| PO / CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1     | H   | H   | M   | H   | M   | M   | M   | M   | M   | M    | H    | M    |
| CO2     | M   | M   | H   | M   | H   | M   | H   | H   | L   | M    | M    | H    |
| CO3     | M   | M   | M   | H   | H   | M   | M   | L   | M   | L    | H    | H    |
| CO4     | H   | H   | M   | H   | M   | M   | M   | M   | L   | M    | H    | M    |
| CO5     | M   | M   | M   | H   | M   | H   | M   | L   | M   | M    | H    | M    |

H-High; M-Medium; L-Low

| Units    | Content  | Hrs       |
|----------|--|-----------|
| Unit I   | <b>Database Concepts: A Relational Approach:</b> An Introduction- Relationships- Database Management System- The Relational Database Model – Integrity Rules – Theoretical Relational Languages – Relational Algebra, Applications of Relational Algebra, Relational Calculus. <b>Database Design:</b> Data Modeling – Dependency – Database Design – Entity – Relationship Model – DFD Diagrams– Codd’s Rules for RDBMS.                                      | 12        |
| Unit II  | <b>Normalization:</b> Normal Forms (1NF, 2NF, 3NF, BCNF, 4NF) – Dependency Diagrams – <i>Denormalization</i> .<br><b>Oracle SQL:</b> Personal Databases-Client/Server Databases- Structured Query Language (SQL)-SQL*Plus Commands.<br><b>Oracle Table: Data Definition Language (DDL):</b> Naming rules and conventions-Data Types-Constraints-Creating an Oracle Table-Displaying Table Information-Altering, Dropping, Renaming a Table-Truncating a Table. | 12        |
| Unit III | <b>Working with Table: Data Management and Retrieval:</b> DML – Adding a new Row /Record – Customized Prompts – Updating and Deleting an existing Rows/Records – Retrieving data from table – Arithmetic Operations – Restricting data with WHERE Clause – Sorting – Revisiting substitution variables – DEFINE Command – CASE structure. Functions and Grouping:Built-in functions- Grouping Data.  | 12        |
| Unit IV  | <b>Multiple Tables: Joins and Set Operations:</b> Join – Set Operations.<br><b>PL/SQL:</b> Introduction – Block Structure – Comments – <i>Data types</i> – Other data types – Declaration – Assignment Operators. <b>Control Structures and Embedded SQL:</b> Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control Statements.   | 12        |
| Unit V   | <b>PL/SQL Cursors and Exceptions:</b> Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR Loops – SELECT...FOR UPDATE – WHERE CURRENT OF Clause – Cursor with parameters – Cursor Variables – Exceptions– Types of Exceptions. <b>PL/SQL Composite Data Types: Records – Tables – arrays. Named Blocks: Procedures – Functions – Packages –Triggers –Data Dictionary Views.</b>  | 12        |
|          | <b>Total Contact Hrs</b>   | <b>60</b> |

### Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

#### Text Books

| S.NO | AUTHOR                         | TITLE OF THE BOOK              | PUBLISHERS \ EDITION                | YEAR OF PUBLICATION |
|------|--------------------------------|--------------------------------|-------------------------------------|---------------------|
| 1    | Nilesh Shah                    | Database Systems using Oracle  | PHI ,2nd edition                    | 2004                |
| 2    | Diana Lorentz                  | Oracle® Database SQL Reference | ORACLE                              | 2005                |
| 3    | Bill Pribyl, Steven Feuerstein | Oracle PL/SQL Programming      | O’Reilly Media, Inc., 6 th Edition, | 2014                |

**Reference Books**

| S.No | AUTHOR       | TITLE OF THE BOOK                                  | PUBLISHERS \ EDITION                     | YEAR OF PUBLICATION |
|------|--------------|--|--|---------------------|
| 1    | Ivan Bayross | SQL, PL/SQL-<br>The programming language of Oracle | BPB Publication, 3 <sup>rd</sup> edition | 2010                |
| 2    | Ivan Bayross | Commercial Application Development using Oracle.   | BPB Publication                          | 2000                |
| 3    | George Koch  | The Complete Reference - Oracle 8i                 | Tata McGraw Hill publication.            | 2000                |

| Course Designed by            | Verified by HOD            | Checked by              | Approved by               |
|-------------------------------|----------------------------|-------------------------|---------------------------|
| Name and Signature            | Name with Signature        | CDC                     | COE                       |
| Dr. Aruchamy Rajini           | Name: Dr.R.Manicka Chezian | Name: Mr. K. Srinivasan | Name:Dr.R.Manicka Chezian |
| M.Meenakrithika<br>Signature: | Signature:                 | Signature:              | Signature:                |

|                            |          |                            |   |   |  |            |
|----------------------------|----------|----------------------------|---|---|--|------------|
| <b>Programme Code:</b>     | B.Sc.    |                            |   | <b>Programme Title:</b>                       | Bachelor of Science (Computer Science) |            |
| <b>Course Code:</b>        | 23UCS413 |                            |   | <b>Title</b>                                  | <b>Batch:</b>                          | 2023 -2026 |
| <b>Practical Hrs./Week</b> | 4        | <b>Practical Hrs./Sem.</b> | - | <b>CC Lab V:</b><br>Programming Lab in Python | <b>Semester:</b>                       | IV         |
|                            |          |                            |   |   | <b>Credits:</b>                        | 2          |

### Course Objective

On successful completion of the course the students should write well-documented programs in the Python language, including use of the logical constructs of that language.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To implement, Interpret, Contrast of various operators.  | K3              |
| CO2       | To review and analyze database with variables, loop,branch, subroutine, and input/output.                        | K4              |
| CO3       | To validate how databases are integrated with components, modular programming and the design of user interfaces. | K5              |

### Mapping

| PO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1      | H   | H   | M   | H   | M   | M   | M   | M   | M   | M    | H    | M    |
| CO2      | M   | M   | H   | M   | H   | M   | H   | H   | L   | M    | M    | H    |
| CO3      | M   | M   | M   | H   | H   | M   | M   | L   | M   | L    | H    | H    |

H-High; M-Medium; L-Low

## Syllabus

| Units | Contents   | Hrs       |
|-------|--|-----------|
|       | <p style="text-align: center;"><b>SET A</b></p> <ul style="list-style-type: none"> <li>• Write a Python Program to solve quadratic equation.</li> <li>• Write a Python Program to generate a random number.</li> <li>• Write a Python Program by implementing tuples.</li> <li>• Write a Python Program for Insertion sort.</li> <li>• Write a Python Program to Make a Simple Calculator.</li> <li>• Write a Python Program to print the elements of an array in reverse order.</li> <li>• Write a Python Program using strings and their built-in functions.</li> <li>• Write a Python Program to find the product of two matrices.</li> <li>• Write a Python Program that writes a series of random numbers to a file from 1 to n and display.</li> <li>• Write a Python Program using apply ( ), filter ( ), map ( ) and reduce ( ) functions.</li> </ul> <p style="text-align: center;"><b>SET B</b></p> <ul style="list-style-type: none"> <li>• Write a Python Program to convert list to dictionary, sort a dictionary, and Merge two Dictionaries.</li> <li>• Write a program for linear search and Binary Search.</li> <li>• Write a program to create file, write the content and display the contents of File.</li> <li>• Write a function in Python to count the words "this" and "these" present in a text file</li> <li>• Write a function in Python to count number of words, number of characters in a File.</li> <li>• Write a GUI program that converts Celsius temperatures to Fahrenheit temperatures.</li> <li>• Write a GUI program that displays your details when a button is clicked.</li> <li>• Write a program to delete or remove elements from a list.</li> <li>• Write a program to slice lists in Python</li> <li>• Write a Program to Illustrate Different Set Operations.</li> </ul> <p style="text-align: center;"><b>INTERNAL MARK (20 Marks) EXTERNAL MARK (30 Marks)</b></p> | <b>60</b> |

| Course Designed by                                      | Verified by HOD                                     | Checked by                                  | Approved by   |
|---|---|---|---|
| <b>Name and Signature</b>                               | <b>Name with Signature</b>                          | <b>CDC</b>                                  | <b>COE</b>  |
| Mr. K.Srinivasan<br><br>Dr.S.Sharmila<br><br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br><br>Signature: | Name: Mr.K.Srinivasan<br><br><br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br><br>Signature: |

|                            |          |                           |   |                          |  |             |
|----------------------------|----------|---------------------------|---|--------------------------|--|-------------|
| <b>Programme Code:</b>     | B.Sc.    |                           |   | <b>Programme Title:</b>  | Bachelor of Science (Computer Science) |             |
| <b>Course Code:</b>        | 23UCS414 |                           |   | <b>Title</b>             | <b>Batch:</b>                          | 2023 - 2026 |
|                            |          |                           |   | <b>CC Lab VI:</b>        | <b>Semester:</b>                       | IV          |
| <b>Practical Hrs./Week</b> | 3        | <b>Tutorial Hrs./Sem.</b> | - | Programming Lab in RDBMS | <b>Credits:</b>                        | 2           |

### Course Objective

The objective of this lab is to provide a strong formal foundation in database concepts, technology and practice to the participants to groom them into well-informed database application developers.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To apply the normalization techniques for development of application software to realistic problems and ability to formulate queries using SQL DML/DDI/DCL commands    | K3              |
| CO2       | To interpret SQL interface of a relational DBMS package to create, secure, populate, maintain, and query a database and PL/SQL programming using Triggers and Cursors. | K4              |
| CO3       | To access data stored in an Oracle Relational DBMS using Oracle SQL, PL/SQL  | K5              |

### Mapping

| PO/<br>CO | PO1 | PO2 | PS3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1       | H   | M   | M   | H   | H   | H   | M   | M   | H   | H    | M    | H    |
| CO2       | H   | H   | M   | M   | M   | H   | H   | M   | M   | M    | M    | M    |
| CO3       | M   | H   | M   | H   | M   | H   | H   | M   | H   | M    | M    | H    |

**Syllabus**

| Units | Contents  | Hrs             |         |                 |      |      |     |     |           |         |         |      |     |              |         |         |    |
|-------|---|-----------------|---------|-----------------|------|------|-----|-----|-----------|---------|---------|------|-----|--------------|---------|---------|----|
|       | <p style="text-align: center;"><b>SET A</b></p> <ul style="list-style-type: none"> <li>• Write the SQL Commands for DDL</li> <li>• Write the SQL Commands for DML</li> <li>• Write the SQL Commands for TCL</li> <li>• Write the SQL Commands to perform SQL Operations</li> <li>• Write the SQL Commands for Views</li> <li>• Write the SQL Commands for Joins</li> <li>• Write the SQL Commands to perform Set Operations</li> <li>• Write the SQL Commands for Sub Queries</li> <li>• Write a Pl/Sql program to Reverse a given number</li> <li>• Write a Pl/Sql program to find given number is Odd Or Even</li> <li>• Write a Pl/Sql program to display Fibonacci Series</li> <li>• Write a Pl/Sql program to find given number is Prime Or Not</li> </ul> <p style="text-align: center;"><b>SET B</b></p> <ul style="list-style-type: none"> <li>• Apply Normalizations (1<sup>st</sup>, 2<sup>nd</sup> &amp; 3<sup>rd</sup>) to the following table:</li> </ul> <p><b>Table Name:</b> Users</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Name</th> <th>Company</th> <th>Company_Address</th> <th>Url1</th> <th>Url2</th> </tr> </thead> <tbody> <tr> <td>Joe</td> <td>ABC</td> <td>Work Lane</td> <td>abc.com</td> <td>xyz.com</td> </tr> <tr> <td>Jill</td> <td>XYZ</td> <td>1 Job Street</td> <td>abc.com</td> <td>xyz.com</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>• Salary Calculation Using Cursor</li> <li>• Write a Pl/Sql program to generate all prime numbers below 100</li> <li>• Write a program to demonstrate %type and %rowtype attributes</li> <li>• Create a trigger before/after update on employee table for each row/statement</li> <li>• Create a trigger before/after delete on employee table for each row/statement</li> <li>• Create a trigger before/after insert on employee table for each row/statement</li> <li>• Create a cursor, which displays all employee numbers and names from the EMP table</li> <li>• Create a cursor, which update the salaries of all employees as per the given data</li> <li>• Create a cursor, which displays names of employees having salary &gt; 50000</li> <li>• Cursor For Loop</li> <li>• <b>Database Schema for a Employee-pay scenario</b><br/>                     Tables: Employee , department, pay details, payroll<br/>                     For the above schema, perform the following—                 </li> <li>• Create the tables with the appropriate integrity constraints</li> <li>• Insert around 10 records in each of the tables</li> <li>• List the employee details department wise</li> <li>• List all the employee names who joined after particular date</li> <li>• List the details of employees whose basic salary is between 10,000 and 20,000</li> <li>• Give a count of how many employees are working in each department</li> <li>• Give a names of the employees whose netsalary&gt;10,000</li> <li>• List the details for an employee_id=5</li> <li>• Create a view which lists out the emp_name, department, basic, deductions, netsalary</li> <li>• Create a view which lists the emp_name and his netsalary</li> </ul> <p><b>INTERNAL MARK (20Marks)</b> <span style="float: right;"><b>EXTERNAL MARK (30 Marks)</b></span></p> | Name            | Company | Company_Address | Url1 | Url2 | Joe | ABC | Work Lane | abc.com | xyz.com | Jill | XYZ | 1 Job Street | abc.com | xyz.com | 45 |
| Name  | Company   | Company_Address | Url1    | Url2            |      |      |     |     |           |         |         |      |     |              |         |         |    |
| Joe   | ABC   | Work Lane       | abc.com | xyz.com         |      |      |     |     |           |         |         |      |     |              |         |         |    |
| Jill  | XYZ   | 1 Job Street    | abc.com | xyz.com         |      |      |     |     |           |         |         |      |     |              |         |         |    |



| <b>Course Designed by</b>                                | <b>Verified by HOD</b>                         | <b>Checked by</b>                      | <b>Approved by</b>                              |
|--|--|--|---|
| <b>Name and Signature</b>                                | <b>Name with Signature</b>                     | <b>CDC</b>                             | <b>COE</b>                                      |
| Dr. Aruchamy Rajini<br><br>M.Meenakrithika<br>Signature: | Name:Dr.R.Manicka<br>Chezian<br><br>Signature: | Name:Mr.K.Srinivasan<br><br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: |

|                        |          |  |   |           |
|------------------------|----------|--|---|-----------|
| <b>Programme code:</b> | B.Sc     | <b>Programme Title :</b>                       | Bachelor of Science<br>(Computer Science) |           |
| <b>Course Code:</b>    | 23UCS4S1 | <b>Title :</b>                                 | <b>Batch :</b>                            | 2023-2026 |
|                        |          | <b>SEC II:</b> Naan Mudhalvan:<br>Industry 4.0 | <b>Semester:</b>                          | IV        |
| <b>Hrs/Week:</b>       | 2        |  | <b>Credits:</b>                           | 2         |

### Course Objective

The objective of the course is to develop a wide variety of soft skills starting from communication, to working in different environments, learning creative and critical decision making, developing awareness of how to work with people and to resolve stress.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | To understand the importance of augmented reality in Industry 4.0 with real-time      | K1              |
| CO2       | To impart the importance of AI technologies in assistive technology                   | K2              |
| CO3       | To discuss the available applications of AI for promoting early diagnosis of diseases | K3              |
| CO4       | To understand the various AI technologies   | K4              |
| CO5       | To provide Big Data scope into different application areas                            | K5              |

### Mapping

| POs, PSOs<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1             | H   | M   | M   | H   | H   | H   | M   | M   | H   | H    | M    | H    |
| CO2             | H   | H   | M   | M   | M   | H   | H   | M   | M   | M    | M    | M    |
| CO3             | M   | H   | M   | H   | M   | H   | H   | M   | H   | M    | M    | H    |
| CO4             | H   | M   | M   | H   | H   | H   | M   | M   | H   | H    | M    | H    |
| CO5             | H   | H   | M   | M   | M   | H   | H   | M   | M   | M    | M    | M    |

H - High; M-Medium; L-Low

**Syllabus**

| Units           | Contents   | Hrs |
|-----------------|--|-----|
| <b>Unit I</b>   | Introduction to Augmented Reality: Augmented reality characteristics- History- types -Hardware technology- virtual scenes- 3D objects- Technologies used in AR- Real world uses of AR- AR technological components-Technology use and integration in industrial settings-Micro learning techniques-Virtual Reality-VR technology-VR in Education- Tools available for Augmented Reality and Virtual reality. | 6   |
| <b>Unit II</b>  | History of AI- AI Environment- Challenges in AI- use of AI – Future of AI- AI Environment -AI Powered technology for an inclusive world-AI in medical diagnosis-Emerging Agricultural Technologies-Motivations to develop AI-Based systems for Radiation protection.   | 6   |
| <b>Unit III</b> | Machine Learning: Importance of Machine Learning- Types of Machine Learning-Machine Learning Algorithm- Machine learning methods- Application areas of Machine Learning- Influence of AI and ML in Clinical and Genomic Diagnostics.   | 6   |
| <b>Unit IV</b>  | Big Data Analytics: Data: Terminologies -Data Evolution-Data Formats and sources-Data Integration Methodologies- Big Data related technologies – Big Data Industry 4.0 Applications  | 6   |
| <b>Unit V</b>   | Big Data for Education 4.0: Education 4.0 in India- Digital Revolution of Education 4.0 –Education 4.0 –Requirements of Education 4.0 in Industry- Business Analytics- Business Intelligence- Applications of Big Data- Big Data in Biomedical Research.   | 6   |
|                 | <b>Total Contact Hrs</b>   | 30  |

**Pedagogy and Assessment Methods:**

|   |
|---|
| Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk(APS) |
|---|

**Text Books**

| S.NO. | AUTHOR                    | TITLE OF THE BOOK  | PUBLISHER/EDITION                              | YEAR OF PUBLICATION                          |
|-------|---------------------------|--|--|--|
| 1.    | Kaliraj P, Devi T, (2021) | Artificial Intelligence Theory, Models, and Applications | CRC Press, Taylor & Francis Group, Boca Raton, | ISBN 9781032008097<br>Auerbach Publications. |

**Reference Books**

| S.NO. | AUTHOR               | TITLE OF THE BOOK                     | PUBLISHER/EDITION            | YEAR OF PUBLICATION  |
|-------|----------------------|---------------------------------------|------------------------------|----------------------|
| 1.    | Kaliraj, P. Devi, T. | Big Data Applications in Industry 4.0 | (P. Kaliraj, Ed.) (1st ed.). | Auerbach Publication |



|                        |          |   |   |           |
|------------------------|----------|---|---|-----------|
| <b>Programme code:</b> | B.Sc     | <b>Programme Title :</b>                                  | Bachelor of Science<br>(Computer Science) |           |
| <b>Course Code:</b>    | 23UCS4S2 | <b>Title :</b>  | <b>Batch :</b>                            | 2023-2026 |
|                        |          | <b>SEC II: Naan Mudhalvan:</b><br>Aptitude for Placements | <b>Semester:</b>                          | IV        |
| <b>Hrs/Week:</b>       | 2        |   | <b>Credits:</b>                           | 2         |

### Course Objective

The objective of the course is to develop a wide variety of soft skills starting from communication, to working in different environments, learning creative and critical decision making, developing awareness of how to work with people and to resolve stress.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To remember the basic mathematics and its functions.   | K1              |
| CO2       | To understand the various problems in the real world related to shapes, purchase, sales, interest. | K2              |
| CO3       | To apply the skills required for various problems.   | K3              |
| CO4       | To analyze the illustration and steps involved in problem solving approach.                        | K4              |
| CO5       | To build the quantitative aptitude skills for solving various mathematical and application.        | K5              |

### Mapping

| POs, PSOs<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1             | H   | M   | M   | H   | H   | H   | M   | M   | H   | H    | M    | H    |
| CO2             | H   | H   | M   | M   | M   | H   | H   | M   | M   | M    | M    | M    |
| CO3             | M   | H   | M   | H   | M   | H   | H   | M   | H   | M    | M    | H    |
| CO4             | H   | M   | M   | H   | H   | H   | M   | M   | H   | H    | M    | H    |
| CO5             | H   | H   | M   | M   | M   | H   | H   | M   | M   | M    | M    | M    |

H - High; M-Medium; L-Low

**Syllabus**

| Units           | Contents  | Hrs |
|-----------------|---|-----|
| <b>Unit I</b>   | Numeral- Place Value or Local Value of a Digit in a Numeral- Face Value- Types – Of Numbers- Tests Of - Multiplication By Short Cut Methods Divisibility- Basic Formulae-Progression.                                     | 6   |
| <b>Unit II</b>  | Time – Speed – Distance – Heights And Distances -Races - Problems On Trains – Boats & Streams- Time And Work - Ratio Proportion- Partnership - - Pipes and Cisterns -Chain Rule- Mixtures & Solutions- Clocks – Calendar. | 6   |
| <b>Unit III</b> | LCM AND GCD - Unit digit, Number of zeroes, Factorial notation - Sets- Functions Square root, Cube roots, Remainder concepts—Identities- Fractions and Decimals, Surds.   | 6   |
| <b>Unit IV</b>  | Problems On Ages- Percentage- Profit And Loss- Discount- . Simple Interest- Compound Interest-Installments- Stocks And Shares- True Discount.   | 6   |
| <b>Unit V</b>   | Logarithms- Linear Equations - Quadratic Equations And In-Equations Volume And Surface Area- Permutations And Combinations - Probability – Bar Graphs-Pie Charts-Line Graphs.   | 6   |
|                 | <b>Total Contact Hrs</b>  | 30  |

**Pedagogy and Assessment Methods:**

|   |
|---|
| Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk(APS) |
|---|

**Text Books**

| S.NO. | AUTHOR      | TITLE OF THE BOOK     | PUBLISHER/EDITION     | YEAR OF PUBLICATION |
|-------|-------------|-----------------------|-----------------------|---------------------|
| 1.    | R.S Agarwal | Quantitative Aptitude | S.Chand Publications. | 2015                |

**Reference Books**

| S.NO. | AUTHOR                | TITLE OF THE BOOK                           | PUBLISHER/EDITION                              | YEAR OF PUBLICATION |
|-------|-----------------------|---|--|---------------------|
| 1.    | Abhijit Guha          | Quantitative Aptitude for Competitive Exams | McGrawhill Education, 6 <sup>th</sup> edition  | 2016                |
| 2.    | Dilip Kumar Yugnirmal | Quantitative Aptitude for Competitive Exams | Trail Blazer Winning Edge Series Publications. | 2017                |



|                        |          |   |   |           |
|------------------------|----------|---|---|-----------|
| <b>Programme code:</b> | B.Sc     | <b>Programme Title :</b>                  | Bachelor of Science<br>(Computer Science) |           |
| <b>Course Code:</b>    | 23UCS4N1 | <b>Title :</b>                            | <b>Batch :</b>                            | 2023-2026 |
| <b>Hrs/Week:</b>       | 1        | Non-Major Elective Paper-II:<br>Flash Lab | <b>Semester:</b>                          | IV        |
|                        |          |   | <b>Credits:</b>                           | 2         |

### Course Objective

The objective of this course is to make the students to learn about Macromedia Flash and develop their skills increasing animations and special effects by using the tools.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To Remember the concepts of animation with flash Software.             | K1              |
| CO2       | To understand various applications and view its presentations.         | K2              |
| CO3       | To apply the various tools available in Flash for creating animations. | K3              |
| CO4       | To get the idea about timeline, frames and motion tweens.              | K4              |
| CO5       | To validate the animations by running the test movies.                 | K5              |

### Syllabus

| Units | Contents  | Hrs |
|-------|---|-----|
|       | <p style="text-align: center;"><b>SET A</b></p> <ul style="list-style-type: none"> <li>• Wind mill effect using flash</li> <li>• Drawing and creating text with effects using Flash</li> <li>• Logo using Flash</li> <li>• Moving car using Flash</li> <li>• Eye ball rotation using Flash</li> <li>• Growing moon using Flash.</li> </ul> <p style="text-align: center;"><b>SET B</b></p> <ul style="list-style-type: none"> <li>• Rotating globe using Flash</li> <li>• Fog Effect using Flash</li> <li>• Lightning Effect using Flash</li> <li>• Animated Effect using Flash</li> <li>• Raining Effect using Flash</li> <li>• Bouncing ball using Flash.</li> </ul> <p style="text-align: center;"><b>EXTERNAL MARK (50 Marks)</b></p> | 15  |

| Course Designed by                                | Verified by HOD                                 | Checked by                             | Approved by                                     |
|---|---|--|---|
| <b>Name and Signature</b>                         | <b>Name with Signature</b>                      | <b>CDC</b>                             | <b>COE</b>                                      |
| Dr.M.Malathi<br><br>Dr. S. Sharmila<br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: | Name:Mr.K.Srinivasan<br><br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: |



|                        |          |   |   |           |
|------------------------|----------|---|---|-----------|
| <b>Programme code:</b> | B.Sc     | <b>Programme Title :</b>                                  | Bachelor of Science<br>(Computer Science) |           |
| <b>Course Code:</b>    | 23UCS4N2 | <b>Title :</b>  | <b>Batch :</b>                            | 2023-2026 |
| <b>Hrs/Week:</b>       | 1        | Non-Major Elective Paper-II:<br>Internet Applications Lab | <b>Semester:</b>                          | IV        |
|                        |          |   | <b>Credits:</b>                           | 2         |

### Course Objective

To enable the students to know how to work with internet, the usage of internet and its applications.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement                           | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To Know about basic of internet        | K3              |
| CO2       | To analyze the concept through online. | K4              |
| CO3       | To get idea about online applications. | K5              |

### Syllabus

| Contents   | Hrs |
|--|-----|
| <p style="text-align: center;"><b>SET A</b></p> <ul style="list-style-type: none"> <li>• Download a information about “Power of Indian president” from a website by using a search engine.</li> <li>• Select two electronics items by e-shopping.</li> <li>• Select mobile phone items by e-shopping.</li> <li>• Book Online train Tickets from Coimbatore to Chennai.</li> <li>• Using Search Engine download information on “Benefits of Yoga”.</li> <li>• Open an email account in your names in gmail/yahoomail/hotmail.</li> <li>• Write e-mail to Pradeep by marking a blind copy to Priya.</li> <li>• Download information about “greatness of Himalayas for tourism interest” in PowerPoint presentation.</li> <li>• Create an electronic greeting card with personal remarks and pictures.</li> <li>• Create an album edited by using online photo editor tools.</li> <li>• Create a questions and post it to any online evaluation tool to conduct a test</li> <li>• Download information about greatness of Himalayas for tourism interest.</li> </ul> <p style="text-align: center;"><b>SET B</b></p> <ul style="list-style-type: none"> <li>• Write a congratulating letter to your friend on his promotion using mail.</li> <li>• Download research articles on “Information technology Applications” and save as doc. Files.</li> <li>• Download M.Phil application form in Bharathiar university</li> <li>• Search the information about “ PowerPoint creation” in youtube</li> <li>• Download pdf about the concept of “Environmental studies”.</li> <li>• Convert word to pdf and pdf to word using online convertor.</li> <li>• Pay EB-Bill through online</li> <li>• Create a new video using online video editing tools</li> </ul> <p style="text-align: center;"><b>EXTERNAL MARK (50 Marks)</b></p> | 15  |

| <b>Course Designed by</b>                       | <b>Verified by HOD</b>                          | <b>Checked by</b>                        | <b>Approved by</b>                              |
|---|---|--|---|
| <b>Name and Signature</b>                       | <b>Name with Signature</b>                      | <b>CDC</b>                               | <b>COE</b>                                      |
| Dr.M.Malathi<br><br>R.Shiddharthy<br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: | Name: Mr. K.Srinivasan<br><br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: |

|                        |          |  |   |           |
|------------------------|----------|--|---|-----------|
| <b>Programme code:</b> | B.Sc     | <b>Programme Title :</b>                 | Bachelor of Science<br>(Computer Science) |           |
| <b>Course Code:</b>    | 23UCS4VA | <b>Title :</b>                           | <b>Batch :</b>                            | 2023-2026 |
|                        |          | <b>VAC II: Python for Data Analytics</b> | <b>Semester:</b>                          | IV        |
| <b>Hrs/semester:</b>   | 30       |  | <b>Credits:</b>                           | 2*        |

### Course Objective

To introduce the concepts of python programming constructs

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Apply the concept of Decision making statements, looping constructs , functions for solving basic programs | K3              |
| CO2       | Analyze the concepts of Lists, tuples and error handling mechanisms  | K4              |
| CO3       | Evaluate a program incorporating all the python language constructs  | K5              |

### Syllabus

| Contents   | Hrs |
|--|-----|
| <p style="text-align: center;"><b>SET A</b></p> <ul style="list-style-type: none"> <li>Write a python program that displays the following information: Your name, Full address Mobile number, College name, Course subjects.</li> <li>Write a python program to find the largest three integers using if-else and conditional operator</li> <li>Write a python program that asks the user to enter a series of positive numbers (The user should enter a negative number to signal the end of the series) and the program should display the numbers in order and their sum.</li> </ul> <p style="text-align: center;"><b>SET B</b></p> <ul style="list-style-type: none"> <li>Write a python program to find the product of two matrices [A]m<sup>x</sup>p and [B]p<sup>x</sup>r</li> <li>Write recursive functions for GCD of two integers.</li> <li>Write recursive functions for the factorial of positive integer.</li> <li>Write recursive functions for Fibonacci Sequence up to given number n.</li> <li>Write recursive functions to display prime number from 2 to n.</li> <li>Write a python program that writes a series of random numbers to a file from 1 to n and display.</li> <li>Write a python program to sort a given sequence: String, List and Tuple.</li> </ul> | 30  |

| Course Designed by                                   | Verified by HOD                                 | Checked by                               | Approved by                                     |
|--|---|--|---|
| <b>Name and Signature</b>                            | <b>Name with Signature</b>                      | <b>CDC</b>                               | <b>COE</b>                                      |
| Name: Dr.M.Malathi<br><br>M.Dhavapriya<br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: | Name: Mr. K.Srinivasan<br><br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: |

|                          |          |                           |   |  |  |           |  |
|--------------------------|----------|---------------------------|---|--|--|-----------|--|
| <b>Programme code:</b>   | B.Sc     |                           |   | <b>Programme Title :</b>               | Bachelor of Science (Computer Science) |           |  |
| <b>Course Code:</b>      | 23UCS515 |                           |   | <b>Title:</b>                          | <b>Batch :</b>                         | 2023-2026 |  |
| <b>Lecture Hrs/Week:</b> | 5        | <b>Tutorial Hrs./Sem.</b> | - | <b>CC IX: Open Source Technologies</b> | <b>Semester:</b>                       | V         |  |
|                          |          |                           |   |  | <b>Credits:</b>                        | 5         |  |

### Course Objective

On successful completion of the course the students are enabling to learn about creating dynamic web pages using different open source technology like PHP, MYSQL and Apache.

### Course Outcomes (CO)

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To understand PHP functions and arrays   | K1              |
| CO2       | To remember PHP basic syntax for variables types, operators and flow controls  | K2              |
| CO3       | To analyze basic MySQL commands  | K3              |
| CO4       | To apply MYSQL commands to create and connect PHP application  | K4              |
| CO5       | To evaluate application accessing restrictions, logging and monitoring Apache webserveractivity, optimizing and tuning MYSQL | K5              |

### Mapping

| POs<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1        | M   | H   | L   | L   | M   | M   | H   | L   | M   | H    | L    | L    |
| CO2        | H   | H   | L   | L   | M   | H   | H   | L   | M   | H    | L    | L    |
| CO3        | H   | H   | H   | M   | H   | H   | H   | M   | H   | M    | H    | M    |
| CO4        | H   | H   | H   | M   | H   | H   | M   | H   | M   | H    | H    | M    |
| CO5        | M   | H   | H   | H   | H   | M   | M   | M   | H   | H    | H    | H    |

H-High; M-Medium; L-Low.

**Syllabus**

| <b>Units</b>    | <b>Contents</b>  | <b>Hrs</b> |
|-----------------|--|------------|
| <b>Unit I</b>   | <b>PHP Language Structure:</b> The Building Blocks of PHP-Variables-Data Types-Operators and Expressions-Constants-Flow Control Functions in PHP-Switching Flow-Loops-Code Blocks and Browser Output.  | 15         |
| <b>UnitII</b>   | <b>Working with Functions:</b> What Is a Function?-Calling Functions- Defining a Function- Returning Values from User-Defined Functions-Variable Scope-Saving State Between Function Calls with the static Statement-More About Arguments-Testing for the Existence of a Function.<br><b>Working with Arrays:</b> Arrays:- Creating Arrays-Some Array-Related Constructs and Functions.  | 15         |
| <b>Unit III</b> | <b>PHP and MySQL Integration.</b> Learning Basic SQL Commands- Learning the MySQL Data Types-Learning the Table-Creation Syntax-Using the INSERT Command-Using the SELECT Command-Using WHERE in Your Queries-Selecting from Multiple Tables-Using the UPDATE Command to Modify Records-Using the REPLACE Command-Using the DELETE Command-Frequently Used String Functions in MySQL-Using Date and Time Functions in MySQL.   | 15         |
| <b>Unit IV</b>  | <b>Using Transactions and Stored Procedures in MySQL:</b> What Are Transactions?-What Are Stored Procedures?-Interacting with MySQL Using PHP-MySQL or MySQLi Functions?-Connecting to MySQL with PHP-Working with MySQL Data.   | 15         |
| <b>Unit V</b>   | <b>Restricting Access to Your Applications:</b> Authentication Overview-Apache Authentication Module Functionality-Using Apache for Access Control-Combining Apache Access Methods-Limiting Access Based on HTTP Methods-Restricting Access Based on Cookie Values. Logging and Monitoring Web Server Activity-Standard Apache Access Logging, Standard Apache Error Logging-Managing Apache Logs-Logging Custom Information to a Database. <b>Optimizing and Tuning MySQL:</b> Building an Optimized Platform, Benchmarking Your Database Server-MySQL Startup Options, Optimizing Your Table Structure-Optimizing Your Queries-Using the FLUSH Command-Using the SHOW Command. | 15         |
|                 | <b>Total Contact Hrs</b>   | 75         |

**Pedagogy and Assessment Methods**

|   |
|---|
| Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task. |
|---|

**Text Books**

| S.NO. | AUTHOR         | TITLE OF THE BOOK                        | PUBLISHER / EDITION     | YEAR OF PUBLICATION |
|-------|----------------|--|-------------------------|---------------------|
| 1.    | Julie C.Meloni | Sams Teach Yourself PHP, MSQL and Apache | Pearson Education, Inc. | 2012                |

**Reference Books**

| S.NO. | AUTHOR   | TITLE OF THE BOOK  | PUBLISHER / EDITION | YEAR OF PUBLICATION |
|-------|--|--|---------------------|---------------------|
| 1.    | Robert Sheldon, Geoff Moes                                     | Beginning MySQL  | Wiley Publishing    | 2005                |
| 2     | Jason Gerner, Elizabeth Naramore, Morgan L. Owens, Matt Warden | Professional LAMP Linux, Apache, MySQL, and PHP5 Web Development | Wiley Publishing    | 2006                |

| Course Designed by                            | Verified by HOD                              | Checked by                              | Approved by                                  |
|---|--|---|--|
| <b>Name and Signature</b>                     | <b>Name with Signature</b>                   | <b>CDC</b>                              | <b>COE</b>                                   |
| Dr.M.Malathi<br><br>N.ArulKumar<br>Signature: | Name: Dr.R.Manicka Chezian<br><br>Signature: | Name: Mr.K.Srinivasan<br><br>Signature: | Name: Dr.R.Manicka Chezian<br><br>Signature: |

|                          |          |                           |   |                             |  |             |  |
|--------------------------|----------|---------------------------|---|-----------------------------|--|-------------|--|
| <b>Programme Code:</b>   | B.Sc.    |                           |   | <b>Programme Title:</b>     | Bachelor of Science (Computer Science) |             |  |
| <b>Course Code:</b>      | 23UCS516 |                           |   | <b>Title</b>                | <b>Batch:</b>                          | 2023 - 2026 |  |
| <b>Lecture Hrs./Week</b> | 5        | <b>Tutorial Hrs./Sem.</b> | - | <b>CC X:</b> Cyber Security | <b>Semester:</b>                       | V           |  |
|                          |          |                           |   |                             | <b>Credits:</b>                        | 5           |  |

### Course Objective

This course provides students with concepts of computer security, cryptography, digital money, secure protocols, detection and other security techniques. Upon the completion of this course, students should be able to understand, appreciate, employ, design and implement appropriate security technologies and policies to protect computers and digital information.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Evaluate the computer network and information security needs of an organization.   | K5              |
| CO2       | Assess cyber security risk management policies in order to adequately protect an organization's critical information and assets. | K2              |
| CO3       | Troubleshoot, maintain and update an enterprise-level information security system.   | K3              |
| CO4       | Implement continuous network monitoring and provide real-time security solutions.  | K4              |
| CO5       | Formulate, update and communicate short- and long-term organizational cyber security strategies and policies.                    | K5              |

### Mapping

| POs,PSOs<br>COs | PO1        | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----------------|------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|                 | <b>CO1</b> | H   | M   | M   | H   | H   | H   | M   | M   | H    | H    | H    |
| <b>CO2</b>      | M          | M   | H   | H   | H   | M   | M   | H   | H   | H    | M    | M    |
| <b>CO3</b>      | H          | H   | H   | H   | H   | H   | H   | H   | H   | H    | H    | H    |
| <b>CO4</b>      | H          | M   | H   | H   | H   | H   | M   | H   | H   | H    | H    | M    |
| <b>CO5</b>      | M          | H   | M   | H   | M   | M   | H   | M   | H   | M    | M    | H    |

**Syllabus**

| <b>Units</b>             | <b>Contents</b>   | <b>Hrs</b> |
|--------------------------|---|------------|
| <b>Unit I</b>            | Introduction: Why Network Security is needed – Management principles – Security principles - Network management - Security attacks – Qualities of a Good Network. Organizational Policy and Security: Security policies, Standards and Guidelines – Information Policy – Security Policy - Physical Security – Social Engineering – Security Procedures – Building a Security Plan. Security Infrastructure: Infrastructure Components – Goals of Security Infrastructure – Design Guidelines – Security Models | 15         |
| <b>Unit II</b>           | Cryptography: Terminology and background – Data Encryption Methods – Cryptographic Algorithms- Secret Key Cryptography - Public key cryptography – Message Digest – Security Mechanisms. Database Security: Introduction to Database – Characteristics of a Database Approach – Database Security Issues - Database Security – Vendor-Specific Security – Data Warehouse Control and Security   | 15         |
| <b>Unit III</b>          | Intrusion Detection Systems: What is not ad IDS – Infrastructure of IDS – Classification of Intrusion Detection Systems – Host-Based IDS – Network-Based IDS - Anomaly Vs Signature Detection – Manage an IDS – Intrusion Detection Tools – IDS Products and Vendors. Network Security: Fundamental Concepts – Identification and Authentication – Access Control – A Model for Network Security – Malicious Software – Firewalls   | 15         |
| <b>Unit IV</b>           | Network Management: Goal of Network Management – Network Management Standards – Network Management Model – Infrastructure for Network Management - Simple Network Management Protocol (SNMP). Security Management: Security Plan - Security Analysis - Change Management - Systems Security Management - Protecting Storage Media- Exchanges of Information and Software – Security Requirements of Systems.  | 15         |
| <b>Unit V</b>            | Electronic Mail Policy: Electronic Mail – What are the E-mail threats that organization's face - Why do you need an E-mail Policy - How do you create an E-mail Policy - Publishing the E-mail Policy - University E-mail Policy. Security of Internet Banking Systems: Introduction Banking System – Security Problem – Methodology for Security Problem – Schematic flow of Internet Banking – A layered approach to security.  | 15         |
| <b>Total Contact Hrs</b> |   | <b>75</b>  |

**Pedagogy and Assessment Methods:**

|   |
|---|
| Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task. |
|---|

**Text Book**

| S.NO | AUTHOR          | TITLE OF THE BOOK               | PUBLISHERS \ EDITION | YEAR OF PUBLICATION |
|------|-----------------|---------------------------------|----------------------|---------------------|
| 1    | Brijendra Singh | Network Security and Management | PHI                  | 2007                |



**Reference Books**

| S.NO | AUTHOR      | TITLE OF THE BOOK         | PUBLISHERS \ EDITION  | YEAR OF PUBLICATION |
|------|-------------|---------------------------|-----------------------|---------------------|
| 1    | Rick Howard | Cyber Security Essentials | Auerbach Publications | 2011.               |

| Course Designed by            | Verified by HOD           | Checked by          | Approved by               |
|-------------------------------|---------------------------|---------------------|---------------------------|
| Name and Signature            | Name with Signature       | CDC                 | COE                       |
| Dr.Archamy Rajini             | Name:Dr.R.Manicka Chezian | Name:Mr.KSrinivasan | Name:Dr.R.Manicka Chezian |
| M.Meenakrithika<br>Signature: | Signature:                | Signature:          | Signature:                |

|                          |          |                           |   |  |  |             |
|--------------------------|----------|---------------------------|---|--|--|-------------|
| <b>Programme Code:</b>   | B.Sc     |                           |   | <b>Programme Title:</b>                    | Bachelor of Science<br>(ComputerScience) |             |
| <b>Course Code:</b>      | 23UCS5E1 |                           |   | <b>Title</b>                               | <b>Batch:</b>                            | 2023 - 2026 |
| <b>Lecture Hrs./Week</b> | 6        | <b>Tutorial Hrs./Sem.</b> | - | <b>DSE I : Data Mining and Warehousing</b> | <b>Semester:</b>                         | V           |
|                          |          |                           |   |  | <b>Credits:</b>                          | 5           |

### Course Objective

This course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data ware housing concepts.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | To remember the basics of data mining and data warehousing  | K1              |
| CO2       | To understand the methodology of data mining and its best practices   | K2              |
| CO3       | To analyze how data mining fits in with data warehousing, OLAP as well as Architecture of data warehousing. | K4              |
| CO4       | To apply data for data mining   | K3              |
| CO5       | To evaluate different kinds of patterns with many data mining algorithms                                    | K5              |

### Mapping

| PO / PSO   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P010 | PSO1 | PSO2 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>CO</b>  |     |     |     |     |     |     |     |     |     |      |      |      |
| <b>CO1</b> | L   | H   | M   | L   | M   | H   | M   | M   | M   | H    | M    | H    |
| <b>CO2</b> | M   | H   | H   | M   | M   | H   | H   | M   | H   | H    | M    | H    |
| <b>CO3</b> | M   | H   | H   | M   | H   | H   | H   | M   | H   | H    | H    | H    |
| <b>CO4</b> | M   | H   | M   | M   | H   | H   | M   | H   | H   | H    | H    | H    |
| <b>CO5</b> | H   | H   | H   | H   | H   | M   | M   | H   | H   | H    | H    | M    |

H- High; M-Medium; L-Low

### Syllabus

| Units          | Content  | Hrs |
|----------------|--|-----|
| <b>Unit I</b>  | Introduction: Data Mining- Analytic Customer Relationship Management, What Is Data Mining?, What Tasks Can Be Performed with Data Mining?, Why Now?, How Data Mining Is Being Used Today.  | 16  |
| <b>Unit II</b> | Data Mining Methodology and Best Practices: The Methodology, Step One: Translate the Business Problem into a Data Mining Problem, Step Two: Select Appropriate Data, Step Three: Get to Know the Data, Step Four: Create a Model Set, Step Five: Fix Problems with the Data Step Six: Transform Data to Bring Information to the Surface, Step Seven: Build Models, Step Eight: Assess Models, Step Nine: Deploy Models, Step Ten: Assess Results, Step Eleven: Begin Again. | 18  |

|                          |   |           |
|--------------------------|---|-----------|
| <b>Unit III</b>          | Data Warehousing, OLAP, and Data Mining: The Architecture of Data, A General Architecture for Data Warehousing, Where Does OLAP Fit In?, What's in a Cube?, Where Data Mining Fits in with Data Warehousing.  | 18        |
| <b>Unit IV</b>           | Preparing Data for Mining: What Data Should Look Like, The Customer Signature, The Columns, Model Roles in Modeling, Variable Measures, Data for Data Mining, The Dark Side of Data, Computational Issues.  | 19        |
| <b>Unit V</b>            | Association Pattern Mining: Introduction, The Frequent Pattern Mining Model, The Apriori algorithm. Cluster Analysis: Introduction, The K-Means Algorithm. Data Classification: Introduction, Decision Trees, Split Criteria, Stopping Criterion and Pruning, Practical Issues. Mining Web Data: Introduction, Ranking Algorithms, Page Rank. | 19        |
| <b>Total Contact Hrs</b> |   | <b>90</b> |

**Pedagogy and Assessment Methods:**

|   |
|---|
| Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task. |
|---|

**Text Book**

| S.NO | AUTHOR                              | TITLE OF THE BOOK   | PUBLISHERS \ EDITION   | YEAR OF PUBLICATION |
|------|-------------------------------------|---|------------------------|---------------------|
| 1    | Michael J.A. Berry, Gordon S.Linoff | Data Mining Techniques - For Marketing, Sales, and Customer Relationship Management | Wiley Publishing, Inc. | 2004                |
| 2    | Charu C. Aggarwal                   | Data Mining: The Textbook   | Springer               | 2015                |

**Reference Books**

| S.NO | AUTHOR             | TITLE OF THE BOOK  | PUBLISHERS \ EDITION                       | YEAR OF PUBLICATION |
|------|--------------------|--|--|---------------------|
| 1    | Margaret H. Dunham | Data mining Introductory and Advanced Topics                       | Pearson education                          | 2003                |
| 2    | C.S.R. Prabhu      | Data warehousing concepts, techniques, products and a applications | PHI  | 2008                |
| 3    | Arun K. Pujari     | Data Mining Techniques   | Universities Press (India) Private Limited | 2008                |

| Course Designed by         | Verified by HOD            | Checked by            | Approved by                |
|----------------------------|----------------------------|-----------------------|----------------------------|
| <b>Name and Signature</b>  | <b>Name with Signature</b> | <b>CDC</b>            | <b>COE</b>                 |
| Dr.Archamy Rajini          | Name: Dr.R.Manicka Chezian | Name: Mr.K.Srinivasan | Name: Dr.R.Manicka Chezian |
| M.Dhavapriya<br>Signature: | Signature:                 | Signature:            | Signature:                 |

|                          |          |                           |   |  |   |           |  |
|--------------------------|----------|---------------------------|---|--|---|-----------|--|
| <b>Programme code:</b>   | B.Sc     |                           |   | <b>Programme Title :</b>                         | Bachelor of Science<br>(Computer Science) |           |  |
| <b>Course Code:</b>      | 23UCS5E2 |                           |   | <b>Title:</b>                                    | <b>Batch :</b>                            | 2023-2026 |  |
| <b>Lecture Hrs/Week:</b> | 6        | <b>Tutorial Hrs./Sem.</b> | - | <b>DSE I: Data Engineering with Google Cloud</b> | <b>Semester:</b>                          | V         |  |
|                          |          |                           |   |  | <b>Credits:</b>                           | 5         |  |

### Course Objective

On successful completion of the course the students are enabling to data-driven decision making by collecting, transforming, and publishing data.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To remember the concepts of Data and storage.                          | K1              |
| CO2       | To understand the idea of designing data models                        | K2              |
| CO3       | To Apply Data Engineering Concepts in building Data Processing Systems | K3              |
| CO4       | To Analyze the Operational zing of Data Processing Systems.            | K4              |
| CO5       | To evaluate the Data Processing System.                                | K5              |

### Mapping

| POs,PSOs<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|                 | CO1 | H   | H   | H   | H   | H   | H   | M   | H   | H    | H    | H    |
| CO2             | M   | H   | H   | M   | M   | M   | M   | H   | M   | M    | M    | M    |
| CO3             | H   | M   | H   | H   | M   | H   | H   | H   | M   | H    | M    | H    |
| CO4             | H   | H   | H   | M   | H   | H   | H   | M   | H   | H    | H    | H    |
| CO5             | H   | H   | H   | H   | H   | H   | M   | H   | H   | H    | H    | H    |

H-High;M-Medium;L-Low.

### Syllabus

| Units         | Contents   | Hrs |
|---------------|--|-----|
| <b>Unit I</b> | <b>Selecting the appropriate storage technologies:</b> Mapping storage systems to business requirements-Data modeling-Tradeoffs involving latency-throughput, transactions-Distributed systems-Schema design. <b>Designing data pipelines:</b> Data publishing and visualization-Batch and streaming data-Online vs. batch predictions Job automation and orchestration. <b>Designing a data processing solution:</b> Choice of infrastructure System availability and fault tolerance-Use of distributed systems-Capacity planning, Hybrid cloud and edge computing- Architecture options-event processing. <b>Migrating data warehousing and data processing:</b> Awareness of current state and how to migrate a design to a future state migrating from on-premises to cloud validating a migration. | 18  |

|                          |  |    |
|--------------------------|--|----|
| <b>Unit II</b>           | <b>Building and operationalizing storage systems:</b> Effective use of managed services (Cloud Bigtable, Cloud Spanner, Cloud SQL, BigQuery, Cloud Storage, Cloud Datastore, Cloud Memorystore)-Storage costs and performance-Lifecycle management of data. <b>Building and operationalizing pipelines:</b> Data cleansing Batch and streaming-Transformation Data acquisition and import integrating with new data sources. <b>Building and operationalizing processing infrastructure:</b> Provisioning resources Monitoring pipelines Adjusting pipelines testing and quality control.  | 18 |
| <b>Unit III</b>          | <b>Operationalizing machine learning models:</b> Leveraging pre-built ML models as a service ML APIs (e.g., Vision API, Speech API)-Customizing ML APIs (e.g.,AutoML Vision, Auto ML text) Conversational experiences (e.g., Dialogflow).Deploying an ML pipeline ingesting appropriate data retraining of machine learning- models (Cloud Machine Learning Engine, BigQuery ML, Kubeflow, and Spark ML) Continuous evaluation. <b>Choosing the appropriate training and serving infrastructure:</b> Distributed vs. single machine Use of edge compute Hardware accelerators (e.g., GPU, TPU).  | 18 |
| <b>Unit IV</b>           | <b>Measuring, monitoring, and troubleshooting machine learning models:</b> Machine learning terminology (e.g., features, labels, models, regression, classification, recommendation, supervised and unsupervised learning, evaluation metrics)-Impact of dependencies of machine learning models Common sources of error (e.g., assumptions about data) <b>Designing for security and compliance:</b> Identity and access management (e.g., Cloud IAM)-Data security (encryption, key management)-Ensuring privacy (e.g., Data Loss Prevention API)Legal compliance (e.g., Health - Insurance Portability and Accountability Act (HIPAA)-Children's Online Privacy Protection Act (COPPA)-FedRAMP-General Data Protection Regulation (GDPR))   | 18 |
| <b>Unit V</b>            | <b>Ensuring scalability and efficiency:</b> Building and running test suites Pipeline monitoring (e.g., Stackdriver)-Assessing-troubleshooting and improving data representations and data processing infrastructure-Resizing and autoscaling resources <b>Ensuring reliability and fidelity:</b> Performing data preparation and quality control (e.g., Cloud Dataprep)-Verification and monitoring Planning, executing, and stress testing data recovery (fault tolerance, rerunning failed jobs, performing retrospective re-analysis)-Choosing between ACID, idempotent, eventually consistent requirements <b>Ensuring flexibility and portability:</b> Mapping to current and future business requirements-Designing for data and application portability (e.g., multi-cloud, data residency requirements) -Data staging-cataloging and discovery. | 18 |
| <b>Total Contact Hrs</b> |  | 90 |

### Pedagogy and Assessment Methods

|   |
|---|
| Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task. |
|---|

### Text Books

| S.NO. | AUTHOR       | TITLE OF THE BOOK                      | PUBLISHER / EDITION          | YEAR OF PUBLICATION |
|-------|--------------|--|------------------------------|---------------------|
| 1.    | Dan Sullivan | Professional Data Engineer Study Guide | SYBEX Imprint, First Edition | 2020                |

**Reference Books**

| S.NO. | AUTHOR                                     | TITLE OF THE BOOK   | PUBLISHER / EDITION              | YEAR OF PUBLICATION |
|-------|--|---|----------------------------------|---------------------|
| 1.    | Alasdair Gilchrist                         | Google Cloud Platform for Data Engineering: Learn Fundamental to advanced data Engineering concepts and techniques using 30+ real-world use cases | Kindle Edition                   | 2019.               |
| 2     | Laura Lemay, Rafe Colburn, Jennifer Kyrnin | Data Analytics with Google Cloud Platform: Build Real time data Analytics on Google Cloud Platform.   | BPB Publications, Kindle Edition | 2019.               |

| Course Designed by                                    | Verified by HOD                              | Checked by                               | Approved by                                  |
|---|--|--|--|
| <b>Name and Signature</b>                             | <b>Name with Signature</b>                   | <b>CDC</b>                               | <b>COE</b>                                   |
| Dr.R.Manicka Chezian<br><br>P.Jayapriya<br>Signature: | Name: Dr.R.Manicka Chezian<br><br>Signature: | Name: Mr. K.Srinivasan<br><br>Signature: | Name: Dr.R.Manicka Chezian<br><br>Signature: |

|                          |          |                           |   |  |  |             |  |
|--------------------------|----------|---------------------------|---|--|--|-------------|--|
| <b>Programme Code:</b>   | B.Sc.    |                           |   | <b>Programme Title:</b>                      | Bachelor of Science (Computer Science) |             |  |
| <b>Course Code:</b>      | 23UCS5E3 |                           |   | <b>Title</b>                                 | <b>Batch:</b>                          | 2023 - 2026 |  |
| <b>Lecture Hrs./Week</b> | 6        | <b>Tutorial Hrs./Sem.</b> | - | <b>DSE I: Mobile Application Development</b> | <b>Semester:</b>                       | V           |  |
|                          |          |                           |   |  | <b>Credits:</b>                        | 5           |  |

### Course Objective

On successful completion of the course the students can design the right user interface of mobile application, and develop mobile applications using various tools and platforms.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Understand the fundamentals and characteristics of mobile application and apply the right user interface for designing mobile application | K2, K3          |
| CO2       | Implement mobile application using UI toolkits and frameworks and also implement android application with multimedia support              | K3              |
| CO3       | Design a mobile application that is aware of the resource constraints of mobile devices.  | K5              |
| CO4       | Develop web based mobile application that accesses internet and location data   | K5              |
| CO5       | Implement android application to use telephony for SMS communication  | K3              |

### Mapping

| POs, PSOs<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1             | H   | H   | M   | M   | H   | H   | H   | M   | H   | M    | M    | M    |
| CO2             | M   | H   | M   | L   | H   | H   | H   | M   | H   | L    | H    | H    |
| CO3             | M   | H   | L   | L   | M   | H   | M   | M   | M   | M    | H    | H    |
| CO4             | H   | H   | L   | H   | H   | H   | H   | M   | H   | L    | H    | H    |
| CO5             | H   | H   | L   | H   | H   | H   | M   | L   | H   | L    | H    | H    |

H-High; M-Medium; L-Low

| Units          | Content  | Hrs |
|----------------|--|-----|
| <b>Unit I</b>  | INTRODUCTION<br>Mobile Applications – Characteristics and Benefits – Application Model – Infrastructure and Managing Resources – Mobile Device Profiles – Frameworks and Tools.  | 18  |
| <b>UnitII</b>  | USER INTERFACE<br>Generic UI Development – Designing the Right UI – Multimodal and Multichannel UI – Gesture Based UI – Screen Elements and Layouts – Voice XML  | 18  |
| <b>UnitIII</b> | APPLICATION DESIGN<br>Memory Management – Design Patterns for Limited Memory – Work Flow for Application Development – Java API – Dynamic Linking – Plug-ins and Rule of Thumb for using DLLs – Concurrency and Resource Management. | 18  |
| <b>UnitIV</b>  | APPLICATION DEVELOPMENT I<br>Mobile OS: Android, iOS – Android Application Architecture – Android basic Components – Intents and Services – Storing and Retrieving data – Packaging and Deployment – Security and Hacking.           | 18  |
| <b>UnitV</b>   | APPLICATION DEVELOPMENT II<br>Communication via the Web – Notification and Alarms – Graphics and Multimedia: Layer Animation, Event Handling and Graphics Services – Telephony – Location Based Services.                            | 18  |
|                | Total ContactHrs   | 90  |

#### Text Book

| S.NO | AUTHOR  | TITLE OF THE BOOK                              | PUBLISHERS \ EDITION | YEAR OF PUBLICATION |
|------|---|--|----------------------|---------------------|
| 1    | Reto Meier  | Professional Android 4 Application Development | Wiley                | 2012                |
| 2    | Zigurd Mednieks,<br>Laird Dornin,<br>G. Blake Meike,<br>Masumi Nakamura | Programing Android                             | O'Reilly             | 2012                |
| 3    | Alasdair Allan  | iPhone Programming                             | O'Reilly             | 2010                |



**Reference Books**

| S.NO | AUTHOR   | TITLE OF THE BOOK   | PUBLISHERS \ EDITION | YEAR OF PUBLICATION |
|------|--|---|----------------------|---------------------|
| 1    | Charlie Collins,<br>Michael Galpin and<br>Matthias Kappler         | Android in Practice   | DreamTech            | 2012                |
| 2    | David Mark, Jack<br>Nutting, Jeff LaMarche<br>and Frederic Olsson, | Beginning iOS 6<br>Development:<br>Exploring the iOS<br>SDK | Apress               | 2013                |

| Course Designed by            | Verified by HOD               | Checked by            | Approved by                   |
|-------------------------------|-------------------------------|-----------------------|-------------------------------|
| Name and Signature            | Name with Signature           | CDC                   | COE                           |
| Mr.K. Srinivasan              | Name: Dr.R.Manicka<br>Chezian | Name: Mr.K.Srinivasan | Name: Dr.R.Manicka<br>Chezian |
| G. Angayarkanni<br>Signature: | Signature:                    | Signature:            | Signature:                    |

|                        |          |                              |  |   |           |
|------------------------|----------|------------------------------|--|---|-----------|
| <b>Programme code:</b> | B.Sc     |                              | <b>Programme Title :</b>                       | Bachelor of Science<br>(Computer Science) |           |
| <b>Course Code:</b>    | 23UCS517 |                              | <b>Title :</b>                                 | <b>Batch :</b>                            | 2023-2026 |
| <b>Hrs/Week:</b>       | 5        | <b>Tutorial<br/>Hrs./Sem</b> | -  | <b>Semester:</b>                          | V         |
|                        |          |                              | <b>CC Lab VII: Programming<br/>Lab in .NET</b> | <b>Credits:</b>                           | 2         |

**Course Objective**

This Lab course will help students to achieve the following objectives:

1. Introduce to .Net IDE Component Framework.
2. Programming concepts in .Net Framework.
3. Creating website using ASP.Net Controls.

**Course Outcomes**

On the successful completion of the course, students will be able to

| <b>CO Number</b> | <b>CO Statement</b>   | <b>Knowledge Level</b> |
|------------------|---|------------------------|
| CO1              | To Create user interactive web pages using ASP.Net. K3 CO2 K4 CO3 K5  | K3                     |
| CO2              | To Create simple data binding applications using ADO.Net connectivity | K4                     |
| CO3              | Performing Database operations for Windows Form and web applications. | K5                     |

**Mapping**

| <b>POs,<br/>PSOs</b> | <b>PO1</b> | <b>PO2</b> | <b>PO3</b> | <b>PO4</b> | <b>PO5</b> | <b>PO6</b> | <b>PO7</b> | <b>PO8</b> | <b>PO9</b> | <b>PO10</b> | <b>PSO1</b> | <b>PSO2</b> |
|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|
| <b>CO</b>            |            |            |            |            |            |            |            |            |            |             |             |             |
| <b>CO1</b>           | H          | H          | M          | M          | H          | H          | H          | M          | H          | M           | M           | M           |
| <b>CO2</b>           | M          | H          | M          | L          | H          | H          | H          | M          | H          | L           | H           | H           |
| <b>CO3</b>           | M          | H          | L          | L          | M          | H          | M          | M          | M          | M           | H           | H           |

H-High; M-Medium; L-Low



|                            |          |                            |   |                                |  |             |
|----------------------------|----------|----------------------------|---|--------------------------------|--|-------------|
| <b>Programme Code:</b>     | B.Sc     |                            |   | <b>Programme Title:</b>        | Bachelor of Science (Computer Science) |             |
| <b>Course Code:</b>        | 23UCS518 |                            |   | <b>Title</b>                   | <b>Batch:</b>                          | 2023 - 2026 |
| <b>Practical Hrs./Week</b> | 5        | <b>Practical Hrs./Sem.</b> | - | <b>CC Lab VIII:</b>            | <b>Semester:</b>                       | V           |
|                            |          |                            |   | Programming Lab in PHP & MySQL | <b>Credits:</b>                        | 2           |

### Course Objective

To learn about creating dynamic web pages using different open source technology like PHP, MYSQL and Apache.

### Course Outcomes


On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To remember PHP basic syntax for variables types, operators and flow controls  | K1              |
| CO2       | To understand PHP functions and arrays   | K2              |
| CO3       | To analyze basic MySQL commands  | K4              |
| CO4       | To apply MYSQL commands to create and connect PHP application  | K3              |
| CO5       | To evaluate application accessing restrictions, logging and monitoring Apache web server activity, optimizing and tuning MYSQL | K5              |

### Mapping

| PO /PSO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P010 | PSO1 | PSO2 |
|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1           | M   | H   | L   | L   | M   | M   | H   | L   | M   | L    | M    | L    |
| CO2           | H   | M   | L   | L   | M   | H   | L   | L   | M   | M    | H    | L    |
| CO3           | H   | H   | H   | M   | M   | M   | M   | M   | L   | M    | H    | M    |
| CO4           | H   | H   | H   | M   | H   | H   | M   | H   | M   | L    | M    | M    |
| CO5           | M   | M   | H   | H   | H   | M   | M   | M   | M   | H    | M    | M    |

H-High; M-Medium; L-Low

| Units | Contents   | Hrs              |
|-------|--|------------------|
|       | <p style="text-align: center;"><b>Set A</b></p> <ul style="list-style-type: none"> <li>• Write a PHP program to check student grade based on the marks using if-else statement.</li> <li>• Write a PHP program to convert a string into uppercase.</li> <li>• Write a PHP program to reverse the string.</li> <li>• Write a PHP program to count the words in the string.</li> <li>• Write a Program to create following pattern with * using for loops.</li> </ul> <div style="text-align: center; margin: 10px 0;">  </div> <ul style="list-style-type: none"> <li>• Write a PHP program using nested for loop that creates a chess board.</li> <li>• Write a PHP program to find factorial of a number using recursive function.</li> <li>• Write a PHP program for shopping cart.</li> <li>• Create a table and implement all DCL commands.</li> <li>• Write a query to get the first 3 characters of first name from employees table</li> <li>• Write a query to get unique department ID from employee table.</li> <li>• Write a query to get the firstname, lastname who joined in the month of June.</li> </ul> <p style="text-align: center;"><b>Set B</b></p> <ul style="list-style-type: none"> <li>• Write a PHP program for students marklist preparation using database connection.</li> <li>• Write a PHP program to check if a person is eligible to vote or not.</li> <li>• write a program in PHP to remove specific element by value from an array using PHP program.</li> <li>• Write a simple calculator program in PHP using switch case</li> <li>• Create a table and implement all DDL Commands.</li> <li>• Create a table and implement all DML commands.</li> <li>• Write a SQL statement to create a table named jobs including columns</li> </ul> | <p><b>75</b></p> |

|  |   |  |
|--|---|--|
|  | <p>job_id, job_title, min_salary, max_salary and check whether the max_salary amount exceeding the upper limit 25000.</p> <ul style="list-style-type: none"> <li>• Write a SQL statement to create a table named countries including columns country_id, country_name and region_id and make sure that the country_id column will be a key field which will not contain any duplicate data at the time of insertion.</li> <li>• Write a SQL statement to increase the minimum and maximum salary of PU_CLERK by 2000 as well as the salary for those employees by 20% and commission percent by 10.</li> <li>• Create salesman table with fields like salesman_id, name, city, commission and create cusstomer table with column names like customer_id, cust_name, city, grade, salesman_id. Write a SQL statement to prepare a list with salesman name, customer name and their cities for the salesmen and customer who belongs to the same city.</li> <li>• Create salesman table with fields like salesman_id, name, city, commission and create cusstomer table with column names like customer_id, cust_name, city, grade, salesman_id. Write a SQL statement to know which salesman are working for which customer.</li> <li>• Create a MYSQL database for electricity bill processing.</li> <li>• Create salesman table with fields like salesman_id, name, city, commission and create cusstomer table with column names like customer_id, cust_name, city, grade, salesman_id. Write a query to display all salesmen and customer located in London.</li> </ul> <p style="text-align: center;"><b>INTERNAL MARK (20 Marks)    EXTERNAL MARK (30 Marks)</b></p> |  |
|--|---|--|

| Course Designed by        | Verified by HOD               | Checked by             | Approved by                   |
|---------------------------|-------------------------------|------------------------|-------------------------------|
| <b>Name and Signature</b> | <b>Name with Signature</b>    | <b>CDC</b>             | <b>COE</b>                    |
| Dr.M.Malathi              | Name: Dr.R.Manicka<br>Chezian | Name: Mr. K.Srinivasan | Name: Dr.R.Manicka<br>Chezian |
| P.Jayapriya               | Signature:                    | Signature:             | Signature:                    |
| Signature:                |                               |                        |                               |

|                          |          |                           |   |  |  |            |
|--------------------------|----------|---------------------------|---|--|--|------------|
| <b>Programme Code:</b>   | B.Sc.    |                           |   | <b>Programme Title:</b>                  | Bachelor of Science<br>(ComputerScience) |            |
| <b>Course Code:</b>      | 23UCS5S1 |                           |   | <b>Title</b>                             | <b>Batch:</b>                            | 2023- 2026 |
| <b>Lecture Hrs./Week</b> | 3        | <b>Tutorial Hrs./Sem.</b> | - | <b>SEC III:</b><br>Azure<br>Fundamentals | <b>Semester:</b>                         | V          |
|                          |          |                           |   |  | <b>Credits:</b>                          | 2          |

### Course Objective

The objective of the course is to make the students to understand the basics of cloud computing and explore Microsoft Azure Storage services and their functionalities.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Remember the basics of cloud computing.                                | K1              |
| CO2       | Understand the fundamental concepts of Azure Virtual Machines.         | K2              |
| CO3       | Apply availability options and scale sets for VMs                      | K3              |
| CO4       | Utilize Azure Load Balancer, Application Gateway, and Traffic Manager. | K4              |
| CO5       | Implement lifecycle management for Azure Blob storage.                 | K5              |

### Mapping

| POs, PSOs<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1             | H   | M   | M   | H   | H   | H   | M   | M   | H   | H    | M    | H    |
| CO2             | H   | H   | M   | M   | M   | H   | H   | M   | M   | M    | M    | M    |
| CO3             | M   | H   | M   | H   | M   | H   | H   | M   | H   | M    | M    | H    |
| CO4             | H   | M   | M   | H   | H   | H   | M   | M   | H   | H    | M    | H    |
| CO5             | H   | H   | M   | M   | M   | H   | H   | M   | M   | M    | M    | M    |

H - High; M-Medium; L-Low

**Syllabus**

| Units           | Contents   | Hrs |
|-----------------|--|-----|
| <b>Unit I</b>   | <b>Introduction:</b> Cloud computing concepts - Benefits and considerations of using cloud services – Cloud service types – Types of cloud.          | 9   |
| <b>Unit II</b>  | <b>Azure services:</b> Azure architectural Components- workload products available in Azure  | 9   |
| <b>Unit III</b> | <b>Core solutions and management tools in Azure:</b> Core solutions available in Azure- Azure management tools.                                      | 9   |
| <b>Unit IV</b>  | <b>General security and network security features:</b> Azure security features- Azure network security.  | 9   |
| <b>Unit V</b>   | <b>Identity, governance, privacy, and compliance features:</b> Azure identity services- Azure governance features- Privacy and compliance resources. | 9   |
|                 | <b>Total Contact Hrs</b>   | 45  |

**Pedagogy and Assessment Methods:**

|   |
|---|
| Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk(APS) |
|---|

**Text Books**

| S.NO. | AUTHOR       | TITLE OF THE BOOK                              | PUBLISHER/EDITION                                | YEAR OF PUBLICATION |
|-------|--------------|--|--|---------------------|
| 1.    | Jim Cheshire | Exam AZ-900<br>Microsoft Azure<br>Fundamentals | Pearson<br>Education,<br>2 <sup>nd</sup> Edition | 2021                |

**Reference Books**

| S.NO. | AUTHOR      | TITLE OF THE BOOK    | PUBLISHER/EDITION    | YEAR OF PUBLICATION |
|-------|-------------|----------------------|----------------------|---------------------|
| 1.    | Ritesh Modi | Azure for Architects | Packt Publishing     | 2017                |
| 2.    | Chris Hay   | Azure in Action      | Manning Publications | 2011                |





|   |          |                           |   |                            |  |             |
|---|----------|---------------------------|---|----------------------------|--|-------------|
| <b>Programme Code:</b>                          | B.Sc.    |                           |   | <b>Programme Title:</b>    | Bachelor of Science (Computer Science) |             |
| <b>Course Code:</b>                             | 23UCS5S2 |                           |   | <b>Title</b>               | <b>Batch:</b>                          | 2023 - 2026 |
|   |          |                           |   | SEC III: DevOps Foundation | <b>Semester:</b>                       | V           |
| <b>Lecture Hrs./Week or Practical Hrs./Week</b> | 3        | <b>Tutorial Hrs./Sem.</b> | - |                            | <b>Credits:</b>                        | 2           |

### Course Objective

The objective of the course is to provide the principles and practices of DevOps, focusing on the integration of development and operations to achieve efficient and collaborative software delivery.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Remember the core concepts and principles of DevOps  | K1              |
| CO2       | Understand the mechanisms to improve software quality and performance                        | K2              |
| CO3       | Apply DevOps practices and tools to streamline software development and deployment processes | K3              |
| CO4       | Analyze and evaluate the benefits and challenges of implementing DevOps in organizations     | K4              |
| CO5       | Implement continuous integration, delivery, and deployment pipelines                         | K5              |

### Mapping

| POs, PSOs<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1             | H   | M   | M   | H   | H   | H   | M   | M   | H   | H    | M    | H    |
| CO2             | H   | H   | M   | M   | M   | H   | H   | M   | M   | M    | M    | M    |
| CO3             | M   | H   | M   | H   | M   | H   | H   | M   | H   | M    | M    | H    |
| CO4             | H   | M   | M   | H   | H   | H   | M   | M   | H   | H    | M    | H    |
| CO5             | H   | H   | M   | M   | M   | H   | H   | M   | M   | M    | M    | M    |

H - High; M-Medium; L-Low

**Syllabus**

| Units           | Contents  | Hrs |
|-----------------|---|-----|
| <b>Unit I</b>   | <b>INTRODUCTION:</b> Software Engineering - traditional and Agile process models - DevOps -Definition - Practices - DevOps life cycle process - need for DevOps - Barriers  | 9   |
| <b>Unit II</b>  | <b>DEVOPS PLATFORM AND SERVICES:</b> Cloud as a platform - IaaS, PaaS, SaaS - Virtualization - Containers –Supporting Multiple Data Centers - Operation Services - Hardware provisioning- software Provisioning - IT services - SLA - capacity planning - security - Service Transition - Service Operation Concepts. | 9   |
| <b>Unit III</b> | <b>BUILDING , TESTING AND DEPLOYMENT:</b> Microservices architecture - coordination model - building and testing - Deployment pipeline - Development and Pre-commit Testing -Build and Integration Testing - continuous integration - monitoring - security - Resources to Be Protected - Identity Management         | 9   |
| <b>Unit IV</b>  | <b>DEVOPS AUTOMATION TOOLS:</b> Infrastructure Automation- Configuration Management - Deployment Automation - Performance Management - Log Management -Monitoring   | 9   |
| <b>Unit V</b>   | <b>MLOPS:</b> MLOps - Definition - Challenges -Developing Models - Deploying to production - Model Governance - Real world examples   | 9   |
|                 | <b>Total Contact Hrs</b>  | 45  |

**Pedagogy and Assessment Methods:**

|   |
|---|
| Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk(APS) |
|---|

**Text Books**

| S.NO. | AUTHOR                              | TITLE OF THE BOOK                          | PUBLISHER/EDITION | YEAR OF PUBLICATION |
|-------|-------------------------------------|--|-------------------|---------------------|
| 1.    | Len Bass, Ingo Weber and Liming Zhu | DevOps: A Software Architect's Perspective | Pearson Education | 2016                |
| 2     | Joakim Verona                       | Practical DevOps                           | Packet Publishing | 2016                |

**Reference Books**

| S.NO. | AUTHOR                             | TITLE OF THE BOOK                    | PUBLISHER/EDITION | YEAR OF PUBLICATION |
|-------|------------------------------------|--------------------------------------|-------------------|---------------------|
| 1.    | Mark Treveil, and the Dataiku Team | Introducing MLOps                    | O'Reilly Media    | 2020                |
| 2.    | Viktor Farcic                      | The DevOps 2.1 Toolkit: Docker Swarm | Packet Publishing | 2017                |



|                          |          |                           |   |                                |  |             |  |
|--------------------------|----------|---------------------------|---|--------------------------------|--|-------------|--|
| <b>Programme Code:</b>   | B.Sc.    |                           |   | <b>Programme Title:</b>        | Bachelor of Science (Computer Science) |             |  |
| <b>Course Code:</b>      | 23UCS619 |                           |   | <b>Title</b>                   | <b>Batch:</b>                          | 2023 - 2026 |  |
| <b>Lecture Hrs./Week</b> | 5        | <b>Tutorial Hrs./Sem.</b> | - | <b>Core XI : R Programming</b> | <b>Semester:</b>                       | VI          |  |
|                          |          |                           |   |                                | <b>Credits:</b>                        | 3           |  |

### Course Objective

This course is laid to master techniques like data exploration, data visualization, and predictive analytics and descriptive analytics with the help of R language.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | To remember the core to provide a conceptual understanding of the basics of R programming | K1              |
| CO2       | To understand the common programming Variable classes, Data frames and lists              | K2              |
| CO3       | To deploy the concepts of Reading, creating and storing R -CSV file                       | K3              |
| CO4       | To figure out appropriate statistical tests using R                                       | K4              |
| CO5       | To describe the various data visualization methods.                                       | K5              |

### Mapping

| POs, PSOs<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1              | H   | H   | H   | H   | H   | H   | H   | H   | H   | H    | H    | H    |
| CO2              | H   | M   | H   | H   | H   | M   | H   | H   | M   | H    | M    | H    |
| CO3              | H   | H   | H   | H   | H   | H   | H   | H   | H   | H    | H    | H    |
| CO4              | M   | H   | M   | M   | M   | H   | M   | M   | H   | H    | H    | M    |
| CO5              | H   | H   | M   | H   | H   | H   | M   | H   | H   | M    | H    | M    |

H – High; M: Medium L: Low

### Syllabus

| Units           | Contents   | Hrs       |
|-----------------|--|-----------|
| <b>Unit I</b>   | <b>OVERVIEW OF THE R LANGUAGE:</b> Defining the R project, Obtaining R, Generating R codes, Scripts, Comments, Text editors for R, Graphical User Interfaces (GUIs) for R, Packages. | 15        |
| <b>Unit II</b>  | <b>R OBJECTS AND DATA STRUCTURES:</b> Variable classes, Vectors and matrices, Data frames and lists, Array and Factors.  | 15        |
| <b>Unit III</b> | <b>MANIPULATING OBJECTS IN R:</b> Mathematical operations, Decision making, loops, functions and Strings.  | 15        |
| <b>Unit IV</b>  | <b>EXPLORATORY DATA ANALYSIS:</b> Reading, creating and storing R -CSV file, Excel File, Binary file, XML File - R -Mean, Median, Mode- Regression.                                  | 15        |
| <b>Unit V</b>   | <b>GRAPHICAL REPRESENTATION:</b> R-PIE chart – Bar chart – Box plots- Histograms – line graphs - Scatter plots.  | 15        |
|                 | <b>Total Contact Hrs</b>   | <b>75</b> |

**Pedagogy and Assessment Methods:**

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

**Text Book**

| S.NO | AUTHOR         | TITLE OF THE BOOK        | PUBLISHERS \ EDITION | YEAR OF PUBLICATION |
|------|----------------|--------------------------|----------------------|---------------------|
| 1    | Jared Lander   | R for everyone           | Pearson Education    | 2017                |
| 2    | Norman Matloff | The Art of R Programming | No Starch Press      | 2011                |

**Reference Books**

| S.NO | AUTHOR                 | TITLE OF THE BOOK             | PUBLISHERS \ EDITION | YEAR OF PUBLICATION |
|------|------------------------|-------------------------------|----------------------|---------------------|
| 1    | Garrett Grolemond      | Hands on Programming with R   | O'Reilly Media       | 2014                |
| 2    | Nina Zumel &John Mount | Practical data science with R | Manning Publications | 2014                |

| Course Designed by             | Verified by HOD            | Checked by            | Approved by                |
|--------------------------------|----------------------------|-----------------------|----------------------------|
| Name and Signature             | Name with Signature        | CDC                   | COE                        |
| Dr.Aruchamy Rajini             | Name: Dr.R.Manicka Chezian | Name: Mr.K.Srinivasan | Name: Dr.R.Manicka Chezian |
| Dr.R.Nandhakumar<br>Signature: | Signature:                 | Signature:            | Signature:                 |

|  |          |                                    |   |   |           |
|--|----------|------------------------------------|---|---|-----------|
| <b>Programme code:</b>                                     | B.Sc     |                                    | <b>Programme Title :</b>  | Bachelor of Science<br>(Computer Science) |           |
| <b>Course Code:</b>  | 23UCS6E4 |                                    | <b>Title:</b>   | <b>Batch :</b>                            | 2023-2026 |
| <b>Lecture Hrs./Week<br/>&amp;<br/>Practical Hrs./Week</b> | 4&2      | <b>Tutorial<br/>Hrs./<br/>Sem.</b> | -   | <b>Semester:</b>                          | VI        |
|  |          |                                    | <b>DSE-II: Artificial<br/>Intelligence and Machine<br/>learning</b> | <b>Credits:</b>                           | 5         |

### Course Objective

On successful completion of the course the students are able to understand the concepts of problem solving logics, reasoning knowledge, Decision making, Learning with searches and algorithms.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To recall the basic logical searches, learning algorithms and improve decision making systems. | K1              |
| CO2       | To Summarize the idea about knowledge representation and reasoning                             | K2              |
| CO3       | To illustrate new knowledge with probabilistic reasoning solutions                             | K3              |
| CO4       | To Analyze Decision making system and its different process                                    | K4              |
| CO5       | To evaluate the learning skills with many observations and machine learning algorithms         | K5              |

### Mapping

| POs, PSOs<br>COs |     |     |     |     |     |     |     |     |     |      |      |      |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|                  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
| CO1              | H   | H   | H   | H   | H   | H   | H   | H   | H   | H    | H    | H    |
| CO2              | H   | M   | H   | H   | H   | M   | H   | H   | M   | H    | M    | H    |
| CO3              | H   | H   | H   | H   | H   | H   | H   | H   | H   | H    | H    | H    |
| CO4              | M   | H   | M   | M   | M   | H   | M   | M   | H   | H    | H    | M    |
| CO5              | H   | H   | M   | H   | H   | H   | M   | H   | H   | M    | H    | M    |

H – High; M: Medium L: Low

### Syllabus

| Units          | Contents   | Hrs |
|----------------|--|-----|
| <b>Unit I</b>  | <b>INTRODUCTION:</b> The Introduction of AI - The History of AI - Intelligent agents – Agent based system. <b>PROBLEM SOLVING:</b> State Space models - Searching for solution - Uninformed/Blind search - Informed/ Heuristic search - A* search - Hill- climbing search - Meta Heuristic: Genetic Algorithm - Adversary based search : Minimax - Expectimax – Alpha Beta pruning – Constraint satisfaction problem - Backtracking search | 18  |
| <b>Unit II</b> | <b>KNOWLEDGE REPRESENTATION AND REASONING:</b> Knowledge representation - Logics - bivalent logic - inference - Fuzzy logic: membership - Fuzzy rules and reasoning - Fuzzy inference  | 18  |

|                 |   |    |
|-----------------|---|----|
| <b>Unit III</b> | <b>UNCERTAIN KNOWLEDGE AND PROBABILISTIC REASONING:</b> Uncertainty - Probabilistic reasoning - Semantics of Bayesian network - Exact inference in Bayesian network- Approximate inference in Bayesian network - Probabilistic reasoning over time – Inference in temporal models - Hidden Markov Models – Dynamic Bayesian Networks  | 18 |
| <b>Unit IV</b>  | <b>DECISION-MAKING:</b> Basics of utility theory, Utility functions - Sequential decision problems - Markov decision process - Value iteration - Policy iteration - Decisions in Multi agent system: Multi agent decision theory - Group decision making  | 18 |
| <b>Unit V</b>   | <b>Machine learning:</b> Introduction- Probability distributions: Binary variables, Multinomial variables. Neural networks –feed forward network function-Error propagation. Kernel methods- radial bias function networks .Graphical models- Bayesian networks-Discrete variables, linear Gaussian model. Mixture models and EM-K means clustering-.Combining models-Boosting Algorithm. | 18 |
|                 | <b>Total Contact Hrs</b>  | 90 |

### Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

### Text Books

| S.NO | AUTHOR                          | TITLE OF THE BOOK  | PUBLISHER / EDITION         | YEAR OF PUBLICATION |
|------|---------------------------------|--|-----------------------------|---------------------|
| 1.   | Stuart Russell and Peter Norvig | Artificial Intelligence: A Modern Approach                   | Pearson Education           | 2014                |
| 2.   | David Pool and Alan Mackworth,  | Artificial Intelligence: Foundations of Computational agents | Cambridge University Press, | 2017                |
| 3    | Christopher M.Bishop            | Pattern Recognition and Machine Learning                     | Springer                    | 2013.               |

### Reference Books

| S.NO | AUTHOR                         | TITLE OF THE BOOK  | PUBLISHER / EDITION                          | YEAR OF PUBLICATION |
|------|--------------------------------|--|--|---------------------|
| 1    | C. S. Krishnamoorthy, S.Rajeev | Artificial Intelligence and Expert Systemsfor Engineers                    | CRC Press,                                   | 1996                |
| 2    | Nils J. Nilsson                | The Quest for Artificial Intelligence: A History of Ideas and achievements | Cambridge University press                   | 2010.               |
| 3.   | Alpaydin Ethem,                | Introduction to Machine Learning   | Massachusetts Institute of Technology Press, | 2009.               |





|  |          |                                    |   |   |   |           |
|--|----------|------------------------------------|---|---|---|-----------|
| <b>Programme code:</b>                                     | B.Sc     |                                    |   | <b>Programme Title :</b>                                | Bachelor of Science<br>(Computer Science) |           |
| <b>Course Code:</b>  | 23UCS6E5 |                                    |   | <b>Title:</b>   | <b>Batch :</b>                            | 2023-2026 |
|  |          |                                    |   | <b>DSE-II: Front-End<br/>Development with<br/>React</b> | <b>Semester:</b>                          | VI        |
| <b>Lecture Hrs./Week<br/>&amp;<br/>Practical Hrs./Week</b> | 4&2      | <b>Tutorial<br/>Hrs./<br/>Sem.</b> | - |   | <b>Credits:</b>                           | 5         |

### Course Objective

On successful completion of the course the students are able to build a real world application along the way in plain react without complicated tooling.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | To remember the concepts of front end design.   | K1              |
| CO2       | To understand the idea of designing and scripting web pages                                       | K2              |
| CO3       | To Apply essential hacks and simple techniques to solve React application development challenges. | K3              |
| CO4       | To Analyze the to wield complex topics such as Web pack and server-siderendering..                | K4              |
| CO5       | To Learn to maximize the performance of React applications  | K5              |

### Mapping

| PO  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO  |     |     |     |     |     |     |     |     |     |      |      |      |
| CO1 | H   | H   | H   | H   | H   | H   | H   | H   | H   | H    | H    | H    |
| CO2 | H   | M   | H   | H   | H   | M   | H   | H   | M   | H    | M    | H    |
| CO3 | H   | H   | H   | H   | H   | H   | H   | H   | H   | H    | H    | H    |
| CO4 | M   | H   | M   | M   | M   | H   | M   | M   | H   | H    | H    | M    |
| CO5 | H   | H   | M   | H   | H   | H   | M   | H   | H   | M    | H    | M    |

H – High; M- Medium L: Low

**Syllabus**

| Units           | Contents  | Hrs |
|-----------------|---|-----|
| <b>Unit I</b>   | Introduction to React101: Structure-Objective-React is Component based-React is declarative-Quick JS version-Classes-Closures-More JavaScript.            | 18  |
| <b>Unit II</b>  | Setting up react: Structure-objective-choosing an text editor-Setting up nNode and NPM-Setting up React projects-JSX-Moving to type script.               | 18  |
| <b>Unit III</b> | Components: Structure-Objective-About the Component-class versus functional component-Functional Component-Class Component-Life cycle management.         | 18  |
| <b>Unit IV</b>  | Introduction to Next.JS-Structure-Objective-what is Next.JS- Istallation-Next.JSdefault-pages-routing-Next.JS Component-Important of CSS files.           | 18  |
| <b>Unit V</b>   | Bleeding edge React: Structure-Objective-How does React work- Concurrent mode-Opting in Concurrent mode-suspense (code fetching)-Suspense(Data fetching). | 18  |
|                 | <b>Total Contact Hrs</b>  | 90  |

**Pedagogy and Assessment Methods:**

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

**Text Books**

| S.No. | AUTHOR      | TITLE OF THE BOOK   | PUBLISHER / EDITION | YEAR OF PUBLICATION |
|-------|-------------|---|---------------------|---------------------|
| 1.    | Mehul Mohan | Advanced Web Development with React: SSR and PWA with Next.js using Reactwith advanced concepts | First Edition       | 2020                |

**Reference Books**

| S.NO. | AUTHOR                | TITLE OF THE BOOK  | PUBLISHER / EDITION                  | YEAR OF PUBLICATION |
|-------|-----------------------|--|--------------------------------------|---------------------|
| 1.    | Robin Wieruch         | The Road to Learn React: Your Journey toMaster Plain Yet Pragmatic React.Js                  | BPB Publications, FirstEdition       | 2018.               |
| 2     | Carlos Santana Roldán | React Cookbook: Createdynamic web apps with React using Redux, Webpack, Node.js, and GraphQL | Packt Publishing Ltd.,Kindle Edition | 2018.               |

| <b>Course Designed by</b>                                | <b>Verified by HOD</b>                          | <b>Checked by</b>                       | <b>Approved by</b>                              |
|--|---|---|---|
| <b>Name and Signature</b>                                | <b>Name with Signature</b>                      | <b>CDC</b>                              | <b>COE</b>                                      |
| Dr.R.Manicka<br>Chezian<br><br>P.Jayapriya<br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: | Name: Mr.K.Srinivasan<br><br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: |

|  |          |                              |   |                            |   |            |
|--|----------|------------------------------|---|----------------------------|---|------------|
| <b>Programme Code:</b>                                     | B.Sc.    |                              |   | <b>Programme Title:</b>    | Bachelor of Science<br>(Computer Science) |            |
| <b>Course Code:</b>  | 23UCS6E6 |                              |   | <b>Title</b>               | <b>Batch:</b>                             | 2023 -2026 |
|  |          |                              |   | <b>DSE II:<br/>MongoDB</b> | <b>Semester:</b>                          | VI         |
| <b>Lecture Hrs./Week<br/>&amp;<br/>Practical Hrs./Week</b> | 4&2      | <b>Tutorial<br/>Hrs./Sem</b> | - |                            | <b>Credits:</b>                           | 5          |

### Course Objective

To understand fundamentals of NoSQL and apply MongoDB (NoSQL) for Data Analysis using CURD and User Management.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Understand NoSQL database Design multiple tables, and using group queries. | K3              |
| CO2       | Design a database based on a data model normalization to a specified level | K4              |
| CO3       | Understand and apply various operators and queries in Mongo DB             | K3              |
| CO4       | Develop a text processing skill set and able to apply in creation of       | K4,K5           |
| CO5       | Design a secure database and analyze with security protocols               | K4, K6          |

### Mapping

| PO<br>/PSO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1              | H   | H   | H   | L   | M   | M   | M   | M   | H   | M    | H    | H    |
| CO2              | H   | M   | H   | L   | H   | M   | M   | H   | H   | M    | H    | H    |
| CO3              | H   | M   | H   | L   | H   | H   | M   | H   | H   | L    | H    | H    |
| CO4              | H   | M   | H   | L   | H   | H   | M   | H   | H   | H    | H    | H    |
| CO5              | H   | M   | H   | L   | H   | M   | H   | M   | H   | H    | H    | H    |

H-High; M-Medium; L-Low

| Units           | Content   | Hrs |
|-----------------|---|-----|
| <b>Unit I</b>   | <b>NoSQL</b> : Indexing and Hashing – Query Processing – Transaction Processing – Concurrency Control and Recovery - Advanced Database Concepts and Emerging Applications: Distributed Databases – Object Oriented Databases - Object Relational Databases- Data mining and Data Warehousing – Big Data - Big Databases- SQL–NoSQL Tradeoffs–CAP Theorem–Eventual Consistency - NoSQL–database types – Document Oriented – Columnar – Graph – Key Value Pair - NoSQL database, design for performance / quality parameters, documents and information retrieval . | 18  |
| <b>Unit II</b>  | <b>MongoDB Introduction</b> : MongoDB- Introduction - MongoDb – Need – MongoDBVs RDBMS – MongoDB- Driver Installation – Configuration – Import and Export – MongoDB Server Configuration - Data Extraction Fundamentals - Intro to Tabular Formats - Parsing CSV -Parsing XLS with XLRD- Parsing XML - Intro to JSON - Getting Data into MongoDB - MongoDB- CURD – Database Creation – Update – Read – Delete   | 18  |
| <b>Unit III</b> | <b>MongoDB Operators</b> : Using mongoimport -Operators like \$gt, \$lt, \$exists, \$regex -Querying Arrays and using \$in and \$all Operators -Changing entries: \$update, \$set, \$unset - Data Analysis - Field Queries - Projection Queries- Limiting – Sorting - Aggregation - Examples of Aggregation Framework - The Aggregation Pipeline - Aggregation Operators: \$match, \$project, \$unwind, \$group   | 18  |
| <b>Unit IV</b>  | <b>Indexes and Advanced MongoDB:</b> Indexes – Create – Find – Drop – Backup – MongoDB – Relationships – Analyzing Queries – MongoDB Objectid MapReduce – MongoDB - Text Processing - Regular Expression – Case Studies – Text processing of large datasets, Map Reduce using MongoDB - Data Security – Performance – Data Safety – Resource Utility – High – Advanced MongoDB: Map Reduce – MongoDB - Text Processing  | 18  |
| <b>Unit V</b>   | <b>Contemporary Issues:</b> Availability User Management – MongoDb Data Replication in Servers – Data Sharding – MongoDB Data Security – Performance – Data Safety – Resource Utility – High Availability Expert lectures, online seminars - webinars   | 18  |
|                 | <b>Total Contact Hrs</b>  | 90  |

### Pedagogy and Assessment Methods:

Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk(APS)

### Text Book

| S.NO | AUTHOR            | TITLE OF THE BOOK                                      | PUBLISHERS \ EDITION               | YEAR OF PUBLICATION |
|------|-------------------|--|------------------------------------|---------------------|
| 1    | Kristina Chodorow | The Definitive Guide-Mongo DB                          | 'O'Reilly Media, Reilly Media/ 3rd | 2013                |
| 2    | Guy Harrison      | Next Generation Databases: NoSQL, New SQL and Big Data | Apress /2nd                        | 2016                |



|                          |          |                           |   |  |   |           |
|--------------------------|----------|---------------------------|---|--|---|-----------|
| <b>Programme code:</b>   | B.Sc     |                           |   | <b>Programme Title :</b>                 | Bachelor of Science<br>(Computer Science) |           |
| <b>Course Code:</b>      | 23UCS6E7 |                           |   | <b>Title:</b>                            | <b>Batch :</b>                            | 2023-2026 |
| <b>Lecture Hrs/Week:</b> | 4&2      | Tutorial<br>Hrs./<br>Sem. | - | <b>DSE-III:</b><br>Information Retrieval | <b>Semester:</b>                          | VI        |
|                          |          |                           |   |  | <b>Credits:</b>                           | 5         |

### Course Objective

On successful completion of the course the students are able to understand the concepts of problem solving logics, reasoning knowledge, Decision making, Learning with searches and algorithms.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To remember the concepts of artificial intelligence and Information retrieval systems. | K1              |
| CO2       | To understand the idea of retrieval models with similarity measures and ranking        | K2              |
| CO3       | To Apply Queries using categorization and clustering                                   | K3              |
| CO4       | To Analyze the filtering techniques using web search.                                  | K4              |
| CO5       | To evaluate the extraction and integration of data with many applications.             | K5              |

### Mapping

| POs,PSO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P010 | PSO1 | PSO2 |
|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>CO1</b>    | H   | H   | H   | L   | M   | M   | M   | M   | H   | M    | H    | H    |
| <b>CO2</b>    | H   | M   | H   | L   | H   | M   | M   | H   | H   | M    | H    | H    |
| <b>CO3</b>    | H   | M   | H   | L   | H   | H   | M   | H   | H   | L    | H    | H    |
| <b>CO4</b>    | H   | M   | H   | L   | H   | H   | M   | H   | H   | H    | H    | H    |
| <b>CO5</b>    | H   | M   | H   | L   | H   | M   | H   | M   | H   | H    | H    | H    |

H-High; M-Medium; L-Low

### Syllabus

| Units          | Contents  | Hrs |
|----------------|---|-----|
| <b>Unit I</b>  | <b>INTRODUCTION:</b> Overview of IR Systems - Historical Perspectives - Goals of IR - The impact of the web on IR - The role of artificial intelligence (AI) in IR.<br><b>TEXT REPRESENTATION:</b> Statistical Characteristics of Text: Zipf's law; Porter stemmer; morphology; index term selection; using thesauri.<br><b>Basic Tokenizing, Indexing:</b> Simple tokenizing, stop-word removal, and stemming; inverted indices; Data Structure and File Organization for IR - efficient processing with sparse vectors. | 18  |
| <b>Unit II</b> | <b>RETRIEVAL MODELS:</b> Similarity Measures and Ranking - Boolean Matching - Extended Boolean models - Ranked retrieval - Vector Space Models -, text-similarity metrics - TF-IDF (term frequency/inverse document frequency) weighting - cosine similarity, Probabilistic Models, Evaluations on benchmark text collections.  | 18  |



|                 |  |    |
|-----------------|--|----|
| <b>Unit III</b> | <b>QUERY PROCESSING: Query Operations and Languages-</b> Query expansion; Experimental Evaluation of IR: Performance metrics: recall, precision, and F-measure. <b>TEXT CATEGORIZATION AND CLUSTERING:</b> Categorization :Rocchio; Naive Bayes, KNN; Clustering: Agglomerative clustering; k-means; Expectation Maximization (EM); Dimension Reduction: LSI, PCA  | 18 |
| <b>Unit IV</b>  | <b>INFORMATION FILTERING TECHNIQUES:</b> Introduction to Information Filtering, Relevance Feedback-Applications of Information Filtering; <b>RECOMMENDER SYSTEMS:</b> Collaborative filtering and Content-Based recommendation of documents and products. <b>WEB SEARCH:</b> IR Systems and the WWW - Search Engines: Spidering, Meta Crawlers; Link analysis : Hubs and Authorities, Google PageRank, Duplicate Detection | 18 |
| <b>Unit V</b>   | <b>INFORMATION EXTRACTION AND INTEGRATION:</b> Extracting data from text; Basic Techniques: NE Recognition, Co-reference Resolution, Relation Extraction, Event Extraction; Extracting and Integrating specialized information on the web, Web Mining and Its Applications.  | 18 |
|                 | <b>Total Contact Hrs</b>   | 90 |

### Pedagogy and Assessment Methods:

Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk(APS)

### Text Books

| S.NO. | AUTHOR   | TITLE OF THE BOOK                     | PUBLISHER / EDITION        | YEAR OF PUBLICATION |
|-------|--|---------------------------------------|----------------------------|---------------------|
| 1.    | Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze | Introduction to Information Retrieval | Cambridge University Press | 2012.               |
| 2     | Ricardo Baeza-Yates and Berthier Ribeiro-Neto                  | Modern Information Retrieval          | Pearson Education,         | 2010.               |
| 3     | Croft B., Metzler D., Strohman T                               | Information Retrieval in Practice     | Pearson Education,         | 2010                |

### Reference Books

| S.NO. | AUTHOR   | TITLE OF THE BOOK  | PUBLISHER / EDITION         | YEAR OF PUBLICATION |
|-------|--|--|-----------------------------|---------------------|
| 1.    | Stephan Buttcher, Charles L. A. Clarke and Gordon Gormack,.  | Information Retrieval Implementing and Evaluating Search Engines | MIT Press                   | 2010.               |
| 2     | Francesco Ricci, Lior Rokach, Bracha Shapira, Paul B. Kantor | Recommender Systems –  | Handbook                    | 2011.               |
| 3     | Anand Rajaraman and Jeffrey Ullman                           | Mining Massive Data sets   | Cambridge University Press, | 2014.               |



|  |          |                                    |   |  |   |           |
|--|----------|------------------------------------|---|--|---|-----------|
| <b>Programme code:</b>                                     | B.Sc     |                                    |   | <b>Programme Title :</b>   | Bachelor of Science<br>(Computer Science) |           |
| <b>Course Code:</b>  | 23UCS6E8 |                                    |   | <b>Title:</b>  | <b>Batch :</b>                            | 2023-2026 |
| <b>Lecture Hrs./Week<br/>&amp;<br/>Practical Hrs./Week</b> | 4&2      | <b>Tutorial<br/>Hrs./<br/>Sem.</b> | - | <b>DSE-III :HTML,<br/>JavaScriptand<br/>JQuery For Web<br/>Designing</b> | <b>Semester:</b>                          | VI        |
|  |          |                                    |   |  | <b>Credits:</b>                           | 5         |

### Course Objective

On successful completion of the course the students are able to understand the concepts of problem solving logics, reasoning knowledge, Decision making, Learning with searches and algorithms.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To remember the concepts of basic web designing languages.                     | K1              |
| CO2       | To understand the idea of designing and scripting web pages                    | K2              |
| CO3       | To Apply Queries using categorization and clustering                           | K3              |
| CO4       | To Analyze the validation and querying techniques using Javascript and jQuery. | K4              |
| CO5       | To evaluate the web forms for different applications.                          | K5              |

### Mapping

| PO<br>/PSO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P010 | PSO1 | PSO2 |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1              | H   | H   | H   | L   | M   | M   | M   | M   | H   | M    | H    | H    |
| CO2              | H   | M   | H   | L   | H   | M   | M   | H   | H   | M    | H    | H    |
| CO3              | H   | M   | H   | L   | H   | H   | M   | H   | H   | L    | H    | H    |
| CO4              | H   | M   | H   | L   | H   | H   | M   | H   | H   | H    | H    | H    |
| CO5              | H   | M   | H   | L   | H   | M   | H   | M   | H   | H    | H    | H    |

H-High; M-Medium; L-Low

### Syllabus

| Units         | Contents  | Hrs |
|---------------|---|-----|
| <b>Unit I</b> | <b>HTML :</b> Introduction – Getting started – Creating and saving an HTML document – Document Layout of HTML Page – HTML elements – Some other formatting Styles – Hypertext Links. <b>CSS:</b> CSS syntax and Style-Class Selectors-Id –Selectors-Cascading-Style attribute-Style Container-CSS Properties-Color-Font-Text-Border-Element Box-Padding Property-Margin Property. | 18  |

|                 |  |    |
|-----------------|--|----|
| <b>Unit II</b>  | HTML Tables and CSS Layout: Table Elements-Formatting a Data Table-CSS Pseudo class Selectors- thead and tbody elements-Cell spanning-Web Accessibility – CSS Display properties with Table values- Links and Images: Introduction- a Element-Relative URLs-index.html file-webdesign-Navigation within a Webpage-CSS for Links-img element. | 18 |
| <b>Unit III</b> | <b>Javascript:</b> Introduction-History of Javascript-Hello World Webpage-Buttons-Funtions –DOMs-Forms and Event Handlers-window object-if Statement-Strings-Numbers and Input Validation. Loops-Additional Controls-Manipulating CSS with Javascript.   | 18 |
| <b>Unit IV</b>  | JS Arrays-JS Array Methods-JS Array Sort-JS Date-JS Switch-JS Type Conversion-Java Script Arrays-Math,Number,Date objects- Strings-Form Validation.  | 18 |
| <b>Unit V</b>   | jQuery Overview-Basics-Selectors-Attributes-jQuery Traversing-Events-jQuery Ajax-jQuery UI: Interactions-Widgets-Theming   | 18 |
|                 | <b>Total Contact Hrs</b>   | 90 |

**Pedagogy and Assessment Methods:**

|   |
|---|
| Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk(APS) |
|---|

**Text Books**

| S.NO. | AUTHOR                          | TITLE OF THE BOOK                               | PUBLISHER / EDITION                      | YEAR OF PUBLICATION |
|-------|---------------------------------|---|--|---------------------|
| 1.    | John Dean                       | Web Programming with HTML5, CSS, and JavaScript | Jones & Bartlett Learning, Fifth Edition | 2018                |
| 2     | John Pullock                    | Java Script-A Beginners Guide                   | Tata McgrawHill, Fifth Edition           | 2020                |
| 3     | Jonathan Chaffer, Karl Swedberg | jQuery  | Packt, Fourth Edition                    | 2010                |

**Reference Books**

| S.NO. | AUTHOR                                     | TITLE OF THE BOOK                                    | PUBLISHER / EDITION             | YEAR OF PUBLICATION |
|-------|--|--|---------------------------------|---------------------|
| 1.    | Jon Duckett                                | Web Design with HTML, CSS, JavaScript and jQuery Set | Wiley Publications              | 2014.               |
| 2     | Laura Lemay, Rafe Colburn, Jennifer Kyrnin | Mastering HTML, CSS, and Java Script Web Publishing  | BPB Publications                | 2016.               |
| 3     | Mary Delamater, ZukRuvalcaba               | Java Script and jQuery                               | Mike Murach and Associates Inc. | 2020.               |

| <b>Course Designed by</b>                         | <b>Verified by HOD</b>                          | <b>Checked by</b>                        | <b>Approved by</b>                              |
|---|---|--|---|
| <b>Name and Signature</b>                         | <b>Name with Signature</b>                      | <b>CDC</b>                               | <b>COE</b>                                      |
| Dr.M.Malathi<br><br>M.Meenakrithika<br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: | Name: Mr. K.Srinivasan<br><br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: |

|  |          |                           |   |  |                              |             |  |
|--|----------|---------------------------|---|--|------------------------------|-------------|--|
| <b>Programme Code:</b>                             | B.Sc. CS |                           |   | <b>Programme Title:</b>                | Bachelor of Computer Science |             |  |
| <b>Course Code:</b>                                | 23UCS6E9 |                           |   | <b>Title</b>                           | <b>Batch:</b>                | 2023 - 2026 |  |
| <b>Lecture Hrs./Week &amp; Practical Hrs./Week</b> | 4&2      | <b>Tutorial Hrs./Sem.</b> | - | <b>DSE III:</b><br>Angular and Node JS | <b>Semester:</b>             | VI          |  |
|  |          |                           |   |  | <b>Credits:</b>              | 5           |  |

### Course Objective

Able to understand the theory and practical front end tools of web full stack developments: Angular and Node JS

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Understand Client Side MVC and SPA                                   | K2              |
| CO2       | Explore AngularJS Component and develop an Angular JS                | K3,K4           |
| CO3       | Develop an AngularJS Single Page Application from scratch            | K3,K6           |
| CO4       | Demonstrate an Understanding of the use of and Node.js core modules  | K1,K3           |
| CO5       | Apply MongoDB ,Middleware and make connectivity with front end tools | K3,K6           |

### Mapping

| PO, PSO | PO1 | PO2 | PO3 | PO4 | PO 5 | PO6 | PO7 | PO 8 | PO9 | PO10 | PSO1 | PSO2 |
|---------|-----|-----|-----|-----|------|-----|-----|------|-----|------|------|------|
| CO1     | H   | M   | H   | L   | M    | M   | L   | L    | M   | L    | H    | H    |
| CO2     | H   | H   | H   | L   | H    | H   | M   | M    | H   | L    | H    | H    |
| CO3     | H   | H   | H   | L   | H    | H   | H   | M    | H   | M    | H    | H    |
| CO4     | H   | H   | H   | L   | M    | M   | M   | M    | H   | M    | H    | H    |
| CO5     | H   | M   | H   | L   | H    | H   | L   | M    | H   | L    | H    | H    |

H-High; M-Medium; L-Low

| Units         | Content   | Hrs       |
|---------------|---|-----------|
| <b>Unit I</b> | <b>AngularJS Core Concepts:</b> Introduction AngularJS, Advantages of Angular, AngularJS MVC ,Introduction to SPA, Setting up the environment, First App using MVC architecture, Understanding ng attributes, Expression and Data Binding, Working with directives, Angular Modules,Controller, Scope and View ,Create Controller and Module, \$scope hierarchy | <b>18</b> |

|                          |  |           |
|--------------------------|--|-----------|
| <b>Unit II</b>           | <b>Filter, Forms and Ajax</b><br>Filters - Built-in filters - upper case and lower case filters, date ,currency and number formatting ,orderBy, filter ,custom filter, Angular JS Forms – Working with AngularJS forms, model binding, form controller ,Using CSS classes, form events ,custom model update triggers ,custom validation ,,\$http service ,Ajax implementation using \$http                         | <b>18</b> |
| <b>Unit III</b>          | <b>Dependency Injection, Services ,Routing and Navigation</b><br>What is dependency injection?, Using dependency injection, Angular JS service – Understanding services , Using built-in service, Creating custom service, Injecting dependency in service, Routing – What is Routing?, Routing using ngRoute and UIRouter, ngView Directive, Configuring \$routeProvider ,,\$stateProvider, Animating Angular App | <b>18</b> |
| <b>Unit IV</b>           | <b>Introduction to Node.js</b><br>What is Node.js?, Features of Node.js, Setup Development Environment- Installing Node.js, Working with REPL, Node.js Console, Node.js Module, Node Package Manager, Node.js Basics, File System ,HTTP and HTTPS, Creating Web Server- Handling http request, Node.js Callbacks, Node.js Events   | <b>18</b> |
| <b>Unit V</b>            | <b>Database Connectivity</b><br>Promises, Express.js, Database Connectivity – Connecting to RDBMS and NoSQL database, Performing CRUD operations   | <b>18</b> |
| <b>Total Contact Hrs</b> |  | <b>90</b> |

### Pedagogy and Assessment Methods:

Direct Instruction, Flipped Class, Digital Presentation, Seminar, Online Quiz, Digital Assignments, Group task: APS

### Text Book

| S.NO | AUTHOR      | TITLE OF THE BOOK                              | PUBLISHERS \ EDITION                      | YEAR OF PUBLICATION |
|------|-------------|--|---|---------------------|
| 1    | Brad Dayley | Node.js, MongoDB and AngularJS Web Development | Addison-Wesley<br>2 <sup>nd</sup> Edition | 2018                |

### Reference Books

| S.NO | AUTHOR         | TITLE OF THE BOOK                | PUBLISHERS \ EDITION             | YEAR OF PUBLICATION |
|------|----------------|----------------------------------|----------------------------------|---------------------|
| 1    | Adam Freeman   | Pro Angular JS                   | Apress 1 <sup>ST</sup> Edition   | 2014                |
| 2    | Agus Kurniawan | AngularJS Programming by Example | PE Press 1 <sup>ST</sup> Edition | 2014                |





|                            |          |                           |   |  |  |             |
|----------------------------|----------|---------------------------|---|--|--|-------------|
| <b>Programme Code:</b>     | B.Sc.    |                           |   | <b>Programme Title:</b>                | Bachelor of Science (Computer Science) |             |
| <b>Course Code:</b>        | 23UCS620 |                           |   | <b>Title</b>                           | <b>Batch:</b>                          | 2023 - 2026 |
| <b>Practical Hrs./Week</b> | 4        | <b>Tutorial Hrs./Sem.</b> | - | <b>CC Lab IX:</b><br>R Programming Lab | <b>Semester:</b>                       | VI          |
|                            |          |                           |   |  | <b>Credits:</b>                        | 2           |

**Course Objective**

On successful completion of the course the students learn the practical aspects of the R programming language

**Course Outcomes (CO)**

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | To implement Vector R operations                          | K3              |
| CO2       | To review and analyze data frames and objects             | K4              |
| CO3       | To validate how Bar charts and Pie charts are implemented | K5              |

**Mapping**

| POs, PSOs<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1              | H   | H   | M   | H   | H   | H   | M   | H   | M   | H    | H    | M    |
| CO2              | H   | M   | M   | H   | H   | M   | M   | H   | M   | H    | M    | M    |
| CO3              | M   | H   | H   | M   | M   | H   | H   | M   | H   | M    | H    | H    |

H - High; M-Medium; L-Low

**Syllabus**

| Units | Contents  | Hrs       |
|-------|---|-----------|
|       | 1. R Program for Vector operations.<br>2. Create a R- list.<br>3. Implement matrices addition, subtraction and Multiplication.<br>4. Create a Data frame.<br>5. Create a factor object.<br>6. Import data, copy data from CSV file to R.<br>7. Create a R program for Mean median and mode.<br>8. Draw Bar charts and Pie charts in R.<br>9. Make visual representations of data for plotting functions in R.<br>10. Create a R program for Regression Model.<br>.<br><b>INTERNAL MARK (20 Marks)</b> | <b>60</b> |
|       | <b>EXTERNAL MARK (30 Marks)</b>   |           |

| <b>Course Designed by</b>                                | <b>Verified by HOD</b>                          | <b>Checked by</b>                        | <b>Approved by</b>                              |
|--|---|--|---|
| <b>Name and Signature</b>                                | <b>Name with Signature</b>                      | <b>CDC</b>                               | <b>COE</b>                                      |
| Dr.Aruchamy Rajini<br><br>Dr.R.Nandhakumar<br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: | Name: Mr. K.Srinivasan<br><br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: |

|                        |          |                              |   |   |   |           |  |
|------------------------|----------|------------------------------|---|---|---|-----------|--|
| <b>Programme code:</b> | B.Sc     |                              |   | <b>Programme Title :</b>                        | Bachelor of Science<br>(Computer Science) |           |  |
| <b>Course Code:</b>    | 23UCS621 |                              |   | <b>Title :</b>                                  | <b>Batch :</b>                            | 2023-2026 |  |
| <b>Hrs/Week:</b>       | 5        | <b>Tutorial<br/>Hrs./Sem</b> | - | <b>CC Lab X: Programming<br/>Lab in Android</b> | <b>Semester:</b>                          | VI        |  |
|                        |          | .                            |   |   | <b>Credits:</b>                           | 2         |  |

### Course Objective

The objective of this course is to make the students to understand the Android platform's organization, patterns and programming mechanisms and be able to use them effectively to develop their own Android applications.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| <b>CO Number</b> | <b>CO Statement</b>                                      | <b>Knowledge Level</b> |
|------------------|--|------------------------|
| CO1              | Understand Android OS, gradle, Android Studio            | K3                     |
| CO2              | Design and develop an application using Database         | K4                     |
| CO3              | Develop UI based Mobile Application using Android Studio | K5                     |

### Mapping

| <b>POs, PSOs<br/>COs</b> | <b>PO1</b> | <b>PO2</b> | <b>PO3</b> | <b>PO4</b> | <b>PO5</b> | <b>PO6</b> | <b>PO7</b> | <b>PO8</b> | <b>PO9</b> | <b>PO10</b> | <b>PSO1</b> | <b>PSO2</b> |
|--------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|
| <b>CO1</b>               | H          | H          | H          | M          | H          | L          | H          | H          | M          | H           | M           | H           |
| <b>CO2</b>               | H          | H          | M          | H          | H          | H          | H          | M          | M          | M           | H           | H           |
| <b>CO3</b>               | M          | H          | H          | H          | H          | H          | H          | H          | H          | M           | H           | H           |

H - High; M-Medium; L-Low



|   |          |                           |   |                         |  |             |
|---|----------|---------------------------|---|-------------------------|--|-------------|
| <b>Programme Code:</b>                          | B.Sc.    |                           |   | <b>Programme Title:</b> | Bachelor of Science (Computer Science) |             |
| <b>Course Code:</b>                             | 23UCS622 |                           |   | <b>Title</b>            | <b>Batch:</b>                          | 2023 – 2026 |
| <b>Lecture Hrs./Week or Practical Hrs./Week</b> | -        | <b>Tutorial Hrs./Sem.</b> | - | Project                 | <b>Semester:</b>                       | VI          |
|   |          |                           |   |                         | <b>Credits:</b>                        | 2           |

**Components for CIA: 25 Marks**

| Criterion | Mode of Evaluation  | Marks | Total |
|-----------|---|-------|-------|
| I         | Synopsis, Company Profile, System Specification, Existing System, Proposed System<br>OR<br>(For Android Developments)<br>Planning Stage         | 05    | 25    |
| II        | Supporting Diagrams like system flowchart, ER, DFD, Usecase and Table Design<br>OR<br>UI and UX Design Application<br>Architect and Prototyping | 05    |       |
| III       | Coding, Input forms, Output format, Testing<br>OR<br>Development, Testing   | 05    |       |
| IV        | Preparation of Report & Submission  | 10    |       |

**Components for CEE: 75 Marks**

| Components for CEE                        | Marks | Total | Grand Total |
|---|-------|-------|-------------|
| <b>Evaluation</b>                         |       |       | 75          |
| Title Relevance of the Industry/Institute | 10    | 50    |             |
| Technology                                | 10    |       |             |
| Design and Development Publishing         | 10    |       |             |
| Testing, Report                           | 20    |       |             |
| <b>Viva Voce</b>                          |       |       | 75          |
| Project Presentation                      | 10    | 25    |             |
| Q&A Performance                           | 15    |       |             |

## **COMPUTER SCIENCE PROJECT and VIVA VOCE**

### **Guidelines**

#### **Introduction**

The title of the project work and the organization will be finalized at the end of fifth Semester. Each student will be assigned with a Faculty for guidance. The Project work and coding will be carried by using the facility of computer science lab as well as in the organization. Periodical review will be conducted to monitor the progress of the project work. Project report will be prepared and submitted at the end of the semester. External examiner appointed by the Controller of Examination will conduct the viva voce examination along with respective guide.

#### **Area of Work**

- Web Based Development
- Mobile app development
- Website development
- IoT Projects
- Big Data and Data Mining Projects
- Cloud Computing Projects
- Networking Projects
- Artificial Intelligence and Machine learning Projects
- Data Analytics Projects using Python, R, Tableau etc..
- System Software
- Web Security Projects
- Image Processing

## **Methodology**

### **Arrangement of Contents:**

The sequence in which the project report material should be arranged and bound as follows:

1. Cover Page & Title Page
2. Bonafide Certificates
3. Declaration
4. Acknowledgement
5. Synopsis
6. Table of Contents
7. Chapters
8. Appendix
9. References

**Format of Table of Contents****TABLE OF CONTENTS**

| <b>Chapter No.</b> | <b>Title</b>                              | <b>Page No.</b> |
|--------------------|---|-----------------|
| <b>i</b>           | <b>Certificates</b>                       |                 |
| <b>ii</b>          | <b>Declaration</b>                        |                 |
| <b>iii</b>         | <b>Acknowledgement</b>                    |                 |
| <b>iv</b>          | <b>Synopsis</b>                           |                 |
| <b>1.</b>          | <b>Introduction</b>                       |                 |
|                    | 1.1 Introduction                          |                 |
|                    | 1.2 Objective of the Project              |                 |
|                    | 1.3 Company Profile                       |                 |
|                    | 1.4 System Specification                  |                 |
|                    | 1.4.1 Hardware Specification              |                 |
|                    | 1.4.2 Software Specification              |                 |
| <b>2</b>           | <b>System Study</b>                       |                 |
|                    | 2.1 Existing System                       |                 |
|                    | 2.1.2 Drawbacks                           |                 |
|                    | 2.2 Proposed System                       |                 |
|                    | 2.3 Planning and Scheduling               |                 |
| <b>3</b>           | <b>System Design</b>                      |                 |
|                    | <b>3.1 Overview of the Project</b>        |                 |
|                    | 3.2 Modules of the Project                |                 |
|                    | 3.3 Input Design Format                   |                 |
|                    | 3.4 Output Design                         |                 |
|                    | 3.5 Table Design                          |                 |
|                    | 3.6 Supporting Diagrams (ER/DFD/Use Case) |                 |
| <b>4</b>           | <b>Implementation and Testing</b>         |                 |
|                    | 4.1 Coding Methods                        |                 |
|                    | 4.2 Testing Approach                      |                 |
|                    | 4.3 Implementation and Maintenance        |                 |
| <b>5</b>           | <b>Project Evaluation</b>                 |                 |
|                    | 5.1 Project Outcome                       |                 |
|                    | 5.2 Limitations of the Project            |                 |
|                    | 5.3 Further Scope of the Project          |                 |
| <b>6</b>           | <b>Conclusion</b>                         |                 |
| <b>7</b>           | <b>Appendix</b>                           |                 |
|                    | <b>7.1 Source Code</b>                    |                 |
|                    | <b>7.2 Screenshots and Reports</b>        |                 |
| <b>8</b>           | <b>References</b>                         |                 |



**Size of the Project**

The Project Report contents should be maximum of not exceeding 70 pages.

|                            |          |                           |   |   |                        |
|----------------------------|----------|---------------------------|---|---|------------------------|
| <b>Programme code:</b>     | B.Sc     | <b>Programme Title :</b>  |   | Bachelor of Science<br>(Computer Science)   |                        |
| <b>Course Code:</b>        | 23UCS6S1 | <b>Title :</b>            |   | <b>Batch :</b>  | 2023-2026              |
| <b>Practical Hrs./Week</b> | 3        | <b>Tutorial Hrs./ Sem</b> | - | <b>SEC IV: Naan</b><br>Mudhalvan:<br>Programming, Data Structures and Algorithms using Python | <b>Semester:</b><br>VI |
|                            |          |                           |   |   | <b>Credits:</b><br>2   |

### Course Objective

The objective of this course is to enable the student to understand in-depth data structures and to know how to apply them to resolve practical issues using Python.

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Remember the fundamentals of writing Python scripts                              | K1              |
| CO2       | Understand Lists, Dictionaries and Regular expressions in Python.                | K2              |
| CO3       | Apply linear and non-linear data structures using Python                         | K3              |
| CO4       | Analyze searching and sorting techniques   | K4              |
| CO5       | Create, run and manipulate Python Programs using core data structures like Lists | K5              |

### Mapping

| POs, PSOs<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1             | H   | M   | M   | H   | H   | H   | M   | M   | H   | H    | M    | H    |
| CO2             | H   | H   | M   | M   | M   | H   | H   | M   | M   | M    | M    | M    |
| CO3             | M   | H   | M   | H   | M   | H   | H   | M   | H   | M    | M    | H    |
| CO4             | H   | M   | M   | H   | H   | H   | M   | M   | H   | H    | M    | H    |
| CO5             | H   | H   | M   | M   | M   | H   | H   | M   | M   | M    | M    | M    |

H - High; M-Medium; L-Low

### Syllabus

| Units    | Contents   | Hrs |
|----------|--|-----|
| Unit I   | <b>Oops Concepts</b> - class, object, constructors, types of variables, types of methods. Inheritance: single, multiple, multi-level, hierarchical, hybrid, <b>Polymorphism</b> : with functions and objects, with class methods, with inheritance, <b>Abstraction</b> : abstract classes.   | 9   |
| Unit II  | <b>Data Structures</b> – Definition, Linear Data Structures, Non-Linear Data Structures<br><b>Python Specific Data Structures</b> : List, Tuples, Set, Dictionaries, Comprehensions and its Types, Strings, slicing.   | 9   |
| Unit III | <b>Arrays</b> - Overview, Types of Arrays, Operations on Arrays, Arrays vs List.<br><b>Searching</b> -Linear Search and Binary Search. <b>Sorting</b> - Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort.   | 9   |
| Unit IV  | <b>Linked Lists</b> – Implementation of Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists. <b>Stacks</b> - Overview of Stack, Implementation of Stack (List & Linked list), Applications of Stack. <b>Queues</b> : Overview of Queue, Implementation of Queue (List & Linked list), Applications of Queues, Priority Queues  | 9   |
| Unit V   | <b>Graphs</b> -Introduction, Directed vs Undirected Graphs, Weighted vs Unweighted Graphs, Representations, Breadth First Search, Depth First Search. <b>Trees</b> - Overview of Trees, Tree Terminology, Binary Trees: Introduction, Implementation, Applications. Tree Traversals, Binary Search Trees: Introduction, Implementation, AVL Trees: Introduction, Rotations, Implementation | 9   |
|          | Total Contact Hrs  | 45  |

### Pedagogy and Assessment

#### Methods:

Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk (APS)

### Text Books

| S.NO. | AUTHOR               | TITLE OF THE BOOK                                    | PUBLISHER/EDITION       | YEAR OF PUBLICATION |
|-------|----------------------|--|-------------------------|---------------------|
| 1.    | Michael T. Goodrich  | Data structures and algorithms in Python             | Wiley                   | 2013                |
| 2     | Narasimha Karumanchi | Data Structures and Algorithmic Thinking with Python | Careermonk Publications | 2016                |

### REFERENCE BOOKS

| S.NO. | AUTHOR           | TITLE OF THE BOOK       | PUBLISHER/EDITION | YEAR OF PUBLICATION |
|-------|------------------|-------------------------|-------------------|---------------------|
| 1.    | R. Nageswara Rao | Core Python Programming | Dreamtech Press   | 2016                |

| <b>Course Designed by</b>                      | <b>Verified by HOD</b>                         | <b>Checked by</b>                       | <b>Approved by</b>                              |
|--|--|---|---|
| <b>Name and Signature</b>                      | <b>Name with Signature</b>                     | <b>CDC</b>                              | <b>COE</b>                                      |
| Dr.M.Malathi<br><br>N. Arulkumar<br>Signature: | Name:Dr.R.Manicka<br>Chezian<br><br>Signature: | Name:Mr.K. Srinivasan<br><br>Signature: | Name: Dr.R.Manicka<br>Chezian<br><br>Signature: |

|                            |          |                           |                          |   |                     |
|----------------------------|----------|---------------------------|--------------------------|---|---------------------|
| <b>Programme code:</b>     | B.Sc     |                           | <b>Programme Title :</b> | Bachelor of Science<br>(Computer Science) |                     |
| <b>Course Code:</b>        | 23UCS6S2 |                           | <b>Title :</b>           | <b>Batch :</b>                            | 2023-2026           |
| <b>Practical Hrs/Week:</b> | 3        | <b>Tutorial Hrs./ Sem</b> | -                        | <b>SEC IV: Naan Mudhalvan:</b>            | <b>Semester:</b> VI |
|                            |          |                           |                          | <b>Data Science Foundation</b>            | <b>Credits:</b> 2   |

### Course Objective

The Objective is to explore, sort and analyze mega data from various sources in order to take advantage of them and reach conclusions to optimize business processes or for decision support

### Course Outcomes (CO)

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | To understand the importance of data science and to discover patterns in data. | K1              |
| CO2       | To makes sense of the data through a variety of statistical techniques.        | K2              |
| CO3       | To discuss the data extraction, wrangling, and pre-processing,                 | K3              |
| CO4       | To understand the various ML technologies                                      | K4              |
| CO5       | To explore and visualizing data.   | K5              |

### Mapping

| POs, PSOs<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1             | H   | M   | M   | H   | H   | H   | M   | M   | H   | H    | M    | H    |
| CO2             | H   | H   | M   | M   | M   | H   | H   | M   | M   | M    | M    | M    |
| CO3             | M   | H   | M   | H   | M   | H   | H   | M   | H   | M    | M    | H    |
| CO4             | H   | M   | M   | H   | H   | H   | M   | M   | H   | H    | M    | H    |
| CO5             | H   | H   | M   | M   | M   | H   | H   | M   | M   | M    | M    | M    |

H - High; M-Medium; L-Low

**Syllabus**

| Units    | Contents  | Hrs |
|----------|---|-----|
| Unit I   | <b>Introduction:</b> Definition - Basic terminology of data science - Need for data science – Components of data science-Data science process- Data Science Venn Diagram –Application of Data Science.  | 9   |
| Unit II  | <b>Life Cycle of Data Science:</b> Discovery - Understanding data - Data preparation - Data analysis - Model planning - Model building and deployment - Communication of results - Challenges of Data Science Technology.   | 9   |
| Unit III | <b>Data Analytics:</b> Descriptive – Diagnostic – Predictive – Prescriptive – What is Big data – Characteristic of Big Data -Quantitative versus qualitative data- Structured data - Semi-structured data - Unstructured data –Benefits of Big Data and Data Science. | 9   |
| Unit IV  | <b>Machine Learning:</b> What is machine learning - Types of Machine Learning– Role of Machine learning in the data science process - Machine learning Vs Data Science.   | 9   |
| Unit V   | <b>Tools and Techniques:</b> Solving Data Problems using data science - Tools for Data Science - Data Visualization in data science - Data Science Jobs Roles.  | 9   |
|          | Total Contact Hrs   | 45  |

**Pedagogy and Assessment Methods:**

|   |
|---|
| Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk(APS) |
|---|

**Text Books**

| S.NO. | AUTHOR             | TITLE OF THE BOOK  | PUBLISHER/EDITION                              | YEAR OF PUBLICATION                             |
|-------|--------------------|--|--|---|
| 1.    | Kaliraj P, Devi T, | Artificial Intelligence Theory, Models, and Applications | CRC Press, Taylor & Francis Group, Boca Raton, | 2021, ISBN 9781032008097 Auerbach Publications. |

**REFERENCEBOOKS**

| S.NO. | AUTHOR               | TITLE OF THE BOOK                     | PUBLISHER/EDITION            | YEAR OF PUBLICATION |
|-------|----------------------|---------------------------------------|------------------------------|---------------------|
| 1.    | Kaliraj, P. Devi, T. | Big Data Applications in Industry 4.0 | (P. Kaliraj, Ed.) (1st ed.). |                     |

