

# M.C.A SYLLABUS

## Syllabus



**2026-2027**

**Programme Code: 2PSMCA**

**SENGAMALA THAYAR EDUCATIONAL  
TRUST WOMEN'S COLLEGE (AUTONOMOUS)**

(Affiliated to Bharathidasan University, Tiruchirappalli)  
(Accredited by NAAC)

**Sundarakkottai, Mannargudi-614016,  
Thiruvavarur(Dt.), Tamil Nadu, India.**

# **M.C.A**

## **LOCF SYLLABUS – 2026-2027**

### **CHOICE BASED CREDIT SYSTEM**

The credit based semester system provides flexibility in designing curriculum and Assigning credits based on the course content and hours of teaching. The choice based credit system provides a ‘cafeteria’ type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. Our College have has moved to CBCS and implemented the grading system.

### **OUTCOME-BASED EDUCATION (OBE)**

#### **LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)**

The fundamental premise underlying the learning outcomes-based approach to curriculum planning and development is that higher education qualifications are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes and values) and academic standards expected of graduates of a programme of study. Learning outcomes specify what graduates completing a particular programme of study are expected to know, understand and be able to do at the end of their programme of study. The expected learning outcomes are used as reference points that would help formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes which in turn will help in curriculum planning and development, and in the design, delivery and review of academic programmes. They provide general guidance for articulating the essential learnings associated with programmes of study and courses with in a programme, maintain national standards and international comparability of learning outcomes and academic standards to ensure global competitiveness, and to facilitate student/graduate mobility and provide higher education institutions an important point of reference for designing teaching- learning strategies, assessing student learning levels, and periodic review of programmes and academic standards.

#### **Some important aspects of the Outcome Based Education**

**Course:** is defined as a theory, practical or theory cum practical subject studied in a semester.

**Course Outcomes (COs):** are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally three or more course outcomes may be specified for each course based on its weightage.

**Programme:** is defined as the specialization or discipline of a Degree.

**Programme Outcomes (POs):** Programme outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.

**Programme Specific Outcomes (PSOs):** PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline.

**Some important terminologies repeatedly used in LOCF.**

**Core Courses (CC)** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. These are the courses which provide basic understanding of their main discipline. In order to maintain a requisite standard certain core courses must be included in an academic program. This helps in providing a universal recognition to the said academic program.

**Discipline Centric Elective Courses (DCEC)** Elective course may be offered by the main discipline/subject of study is referred to as Discipline Centric Elective (DCEC). These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature.

**Generic Elective Courses** An elective course chosen generally from an **unrelated discipline/subject**, with an intention to seek exposure is called a Generic Elective. Generic Elective courses are designed for the students of **other disciplines**. Thus, as per the CBCS policy, the students pursuing particular disciplines would have to opt Generic Elective courses offered by other disciplines, as per the basket of courses offered by the college. The scope of the Generic Elective (GE) Courses is positively related to the diversity of disciplines in which programmes are being offered by the college.

**Non Major Elective Course (NMEC):** A student shall choose at least two Non-major Elective Courses (NME) from outside his/her department.

**Skill Enhancement Courses (SECs)** These courses focus on developing skills or proficiencies in the student, and aim at providing hands-on training. Skill enhancement courses can be opted by the students of any other discipline, but are highly suitable for students pursuing their academic programme. These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

**Field Study /Industrial Visit /Case Study:** It has to be completed during the fifth semester of the degree programme. Credit for this course will be entered in the fifth semester's marks statement.

**Internship:** Students must complete internship during summer holidays after the fourth semester. They have to submit a report of internship training with the necessary documents and have to appear for a viva-voce examination during fifth semester. Credit for internship will be entered in the fifth semester's mark statement.

**Extra Credit Courses:** In order to facilitate the students, gaining knowledge/skills by attending online courses

MOOC, credits are awarded as extra credits, the extra credit are at three semesters after verifying the course completion certificates. According to the guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL etc.

## **EXAMINATION**

**Continuous Internal Assessment (CIA): PG - Distribution of CIA Marks**

**Passing Minimum: 50 %** Assignments – 3 = 30% Tests- 2= 50%

Seminar = 10 % Attendance = 10 %

## Question Paper Pattern

### Part A:

#### Part A 1 (10X1=10 marks)

One word question/ Fill in/ True or False/ Multiple Choice Questions Two Questions from Each unit

#### Part A 2 (5X2=10 marks)

Match the following/ Short Answers

One question from each unit

**Total Marks – 20**

#### Part B: (5X4=20 marks) Paragraph Answers

either/ or type, One Questions from each unit

#### Part C: (10X3=30)

Essay Type Answers

Answer 3 out of 5 Questions

One Question from each unit

**Part A:** K1 Level

**Part B:** K2, K3 and K4 Level

**Part C:** K5 and K6 Level

### Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

| S. No. | Level | Parameter                       | Description                                          |
|--------|-------|---------------------------------|------------------------------------------------------|
| 1      | K1    | Knowledge/Remembering           | It is the ability to remember the previously learned |
| 2      | K2    | Comprehension/<br>Understanding | The learner explains ideas or concepts               |
| 3      | K3    | Application/Applying            | The learner uses information in a new way            |
| 4      | K4    | Analysis/Analyzing              | The learner distinguishes among different parts      |
| 5      | K5    | Evaluation/Evaluating           | The learner justifies a stand or decision            |
| 6      | K6    | Synthesis /Creating             | The learner creates a new product or point of view   |

### WEIGHTAGE of K – LEVELS IN QUESTION PAPER

| (Cognitive Level)<br>K- LEVELS →            | Lower Order Thinking |    |    | Higher Order Thinking |    |    | Total     |
|---------------------------------------------|----------------------|----|----|-----------------------|----|----|-----------|
|                                             | K1                   | K2 | K3 | K4                    | K5 | K6 |           |
| <b>END SEMESTER EXAMINATIONS (ESE)</b>      | 20                   | 20 |    |                       | 30 |    | <b>70</b> |
| <b>Continuous Internal Assessment (CIA)</b> | 15                   | 10 |    |                       | 5  |    | <b>30</b> |

| <b>QUESTION PATTERN FOR SEMESTER EXAMINATION/ Continuous Internal Assessment</b>        |              |
|-----------------------------------------------------------------------------------------|--------------|
| <b>PART</b>                                                                             | <b>MARKS</b> |
| <b>PART –A I.</b> (No choice ,One Mark) <b>TWO</b> questions from each unit (10x1 =10)  | <b>20</b>    |
| <b>II.</b> (No choice ,Two Mark) <b>ONE</b> question from each unit (5x2 =10)           |              |
| <b>PART -B</b> (Either/ or type ,5-Marks) <b>ONE</b> questions from each unit (5x4 =20) | <b>20</b>    |
| <b>PART -C</b> (3 out of 5) (10 Marks) <b>ONE</b> question from each unit (3x10 =30)    | <b>30</b>    |
| <b>Total</b>                                                                            | <b>70</b>    |

| <b>BLUE PRINT OF QUESTION PAPER FOR SEMESTER EXAMINATION</b>                                                                   |           |           |           |                       |           |           |                    |
|--------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------------------|-----------|-----------|--------------------|
| <b>DURATION: 3. 00 Hours.</b>                                                                                                  |           |           |           | <b>Max Mark : 100</b> |           |           |                    |
| <b>K- LEVELS</b>                                                                                                               | <b>K1</b> | <b>K2</b> | <b>K3</b> | <b>K4</b>             | <b>K5</b> | <b>K6</b> | <b>Total Marks</b> |
| <b>PART</b>                                                                                                                    |           |           |           |                       |           |           |                    |
| <b>PART –A</b> (One Mark, No choice) (10x1 =10)                                                                                | 10        |           |           |                       |           |           | <b>10</b>          |
| (2-Marks, No choice) 5x2=10)                                                                                                   | 10        |           |           |                       |           |           | <b>10</b>          |
| <b>PART –B</b> (5- Marks) (Either/or type) (5x4=20)                                                                            |           | 5         | 10        | 5                     |           |           | <b>20</b>          |
| <b>PART -C</b> (10 Marks) (3 out of 5) (3x10=30)                                                                               |           |           |           |                       | 20        | 10        | <b>30</b>          |
| Courses having only <b>K5,K6</b> levels, K5 level- 3 Questions, K6 level- 2 Questions<br>(One K6 level question is compulsory) |           |           |           |                       |           |           |                    |
| <b>Total</b>                                                                                                                   | <b>20</b> | <b>05</b> | <b>10</b> | <b>10</b>             | <b>20</b> | <b>10</b> | <b>70</b>          |

## EVALUATION

### GRADING AYATEM

Once the marks of the CIA and the end-semester examination for each of the courses are available, they will be added and converted as final mark. The marks thus obtained will then be graded as per the scheme provided in Table-1.

Grade Point Average (GPA) will be calculated from the first semester onwards for all semester. From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA), respectively. These two are calculated by the following formulae:

|                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| $\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$                                                                                                                                                                                                                                                                                                                             | $\text{WAM (Weighted Average Marks)} = \frac{\sum_{i=1}^n C_i M_i}{\sum_{i=1}^n C_i}$ |
| <p>Where,</p> <p style="text-align: center;"> <math>C_i</math> is the Credit earned for the Course <math>i</math><br/> <math>G_i</math> is the Grade Point obtained by the student for the Course <math>i</math><br/> <math>M_i</math> is the marks obtained for the course <math>i</math> and<br/> <math>n</math> is the number of Courses <b>Passed</b> in that semester.         </p> |                                                                                       |

**CGPA:** Average GPA of all the Courses starting from the first semester to the current semester.

### CLASSIFICATION OF FINAL RESULTS:

- i) For each of the first three parts, there shall be separate classification on the basis of CGPA, as indicated in Table-2.
- ii) For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management as Outstanding/Excellent/Very Good/Good/Above Average/Average, the marks and the corresponding CGPA earned by the candidate in Part-III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in the all the Five parts of the Programme.
- iii) Grade in Part –IV and Part-V shall be shown separately and it shall not be taken into account for classification.
- iv) A Pass in PART- V will be mandatory although the marks will not count for the calculation of the CGPA.
- v) Absence from an examination shall not be taken an attempt.

**Table-1: Grading of the Courses - UG**

| <b>Marks Range</b>        | <b>Grade Point</b> | <b>Corresponding Grade</b> |
|---------------------------|--------------------|----------------------------|
| 90 and above              | <b>10</b>          | <b>O</b>                   |
| 80 and above and below 90 | <b>9</b>           | <b>A+</b>                  |
| 70 and above and below 80 | <b>8</b>           | <b>A</b>                   |
| 60 and above and below 70 | <b>7</b>           | <b>B+</b>                  |
| 50 and above and below 60 | <b>6</b>           | <b>B</b>                   |
| 40 and above and below 50 | <b>5</b>           | <b>C</b>                   |
| Below 40                  | <b>0</b>           | <b>RA</b>                  |

**Table- 2: Grading of the Courses - PG**

| <b>Marks Range</b>        | <b>Grade Point</b> | <b>Corresponding Grade</b> |
|---------------------------|--------------------|----------------------------|
| 90 and above              | <b>10</b>          | <b>O</b>                   |
| 80 and above and below 90 | <b>9</b>           | <b>A+</b>                  |
| 70 and above and below 80 | <b>8</b>           | <b>A</b>                   |
| 60 and above and below 70 | <b>7</b>           | <b>B+</b>                  |
| 50 and above and below 60 | <b>6</b>           | <b>B</b>                   |
|                           |                    |                            |
| Below 50                  | <b>0</b>           | <b>RA</b>                  |

**Table-3: Final Result**

| <b>CGPA</b>    | <b>Corresponding Grade</b> | <b>Classification of Final Result</b> |
|----------------|----------------------------|---------------------------------------|
| 9.00 and above | <b>O</b>                   | <b>Outstanding</b>                    |
| 8.00 to 8.99   | <b>A+</b>                  | <b>Excellent</b>                      |
| 7.00 to 7.99   | <b>A</b>                   | <b>Very Good</b>                      |
| 6.00 to 6.99   | <b>B+</b>                  | <b>Good</b>                           |
| 5.00 to 5.99   | <b>B</b>                   | <b>Above Average</b>                  |
| 4.00 to 4.99   | <b>C</b>                   | <b>Average</b>                        |
| Below 4.00     | <b>RA</b>                  | <b>Re-appearance</b>                  |

### **Vision**

- To empower the women students by providing excellent software engineering skills to meet the global needs of IT industry

### **Mission**

- providing quality education in computer science and its applications by updated knowledge through technology transfer
- Enhancing professional skills to satisfy the needs of the Software industries and Technical skills of the individual towards competitive world.

## PROGRAMME OUTCOMES FOR M.C.A., DEGREE PROGRAMMES

| PO.No | Programme Outcomes<br>(Upon completion of the M.C.A., Degree Programme, the Post Graduate will be able to)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PO-1  | <b>Disciplinary Knowledge:</b> demonstrate in-depth knowledge and understanding of theories, policies, practices in one or more disciplines that form a part of a Post Graduate program of study in Master of Computer Applications.                                                                                                                                                                                                                                                                                                                                                                   |
| PO-2  | <b>Critical Thinking and Problem Solving:</b> apply analytic thought to a body of knowledge, analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence, identify relevant assumptions or implications, formulate coherent arguments, critically evaluate practices, policies and theories by following scientific approach to knowledge development: solve problems and extrapolate the same to real life situation                                                                                                                                                 |
| PO-3  | <b>Information/digital literacy and Communication Skills:</b> use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources, and use appropriate software for analysis of data: communicate thoughts and ideas analytically and effectively in writing and orally using appropriate media, and present complex information in a clear and concise manner to different groups..                                                                                                                                               |
| PO-4  | <b>Research-related skills:</b> conduct independent inquiry in a chosen scientific discipline, demonstrate sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; plan, execute and report the results of an experiment or investigation.                                                                        |
| PO-5  | <b>Scientific reasoning and Reflective Thinking:</b> analyse, interpret and draw conclusions from quantitative/qualitative data and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective; critically and sensibly evaluate life experiences, with self-awareness and reflexivity of both self and society.                                                                                                                                                                                                                                                 |
| PO-6  | <b>Multidisciplinary Approach, Innovation and Entrepreneurship:</b> propose novel ideas of interdisciplinary approach in providing better solutions and new ideas for the sustainable developments; identify opportunities, entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.                                                                                                                                                                                                                                           |
| PO-7  | <b>Moral and ethical awareness/reasoning:</b> embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work, demonstrate the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights, appreciate environmental and sustainability issues, and adopt objective, unbiased and truthful actions in all aspects of work. |
| PO-8  | <b>Self-directed Learning:</b> work independently, identify appropriate resources required for a project till completion.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| PO-9  | <b>Lifelong Learning:</b> engage in continuous learning for professional growth and development, acquire knowledge and skills, adapt to changing environment and to changing trades and demands of work place through knowledge/skill development/reskilling.                                                                                                                                                                                                                                                                                                                                          |
| PO-10 | <b>Multicultural Competence, Social Interaction and Effective Citizenship:</b> understand the values and beliefs of multiple cultures, global perspectives, engage and interact respectfully with diverse groups and elicit views of others, mediate disagreements and help reach conclusions in group settings, and demonstrate empathetic social concern and equity centered national development                                                                                                                                                                                                    |

## PROGRAMME SPECIFIC OUTCOME (PSO)

| PSO No. | Program Specific Outcomes<br>( <u>M.C.A.,DEGREE</u> )                                                                                                                                               |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PSO1    | Design, Develop, Analyse, and implement systems and to deliver the application Software.                                                                                                            |
| PSO2    | Pursue the research in computer science and computer applications.                                                                                                                                  |
| PSO3    | Develop techniques for independent and lifelong learning in computer application.                                                                                                                   |
| PSO4    | Analyze and Plan systematic planning, development, testing and executing of complex computing applications in Social Media and Analytics, Web Application Development and Data Interpretations.     |
| PSO5    | Utilize current technologies, skills and models for computing practice                                                                                                                              |
| PSO6    | Formulate diverse software engineering practices , project management , work as a team leader/team member and communicate efficiently with team in developing software of multidisciplinary nature. |
| PSO7    | Appraise emerging technologies and provide innovative solutions to real time problems within the constraints such as financial, environmental, social and Ethical.                                  |

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE  
(AUTONOMOUS)**



**(Affiliated to Bharathidasan University)  
(Accredited by NAAC)**

**SUNDARAKKOTTAI, MANNARGUDI – 614 016,  
TAMILNADU, INDIA.**

**MASTER OF COMPUTER APPLICATIONS  
(For Students with a Computer Science Background)**

**CHOICE BASED CREDIT SYSTEM -  
LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)  
(Applicable to the candidates admitted from the academic year 2026 - 2027 onwards)  
I SEMESTER**

| Sem | Course                                               | Course Code                                 | Course Title                                                                                               | Ins.<br>Hr<br>s | Cred<br>it | Exa<br>m<br>Hrs | Mark<br>s |      | Total      |
|-----|------------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------|------------|-----------------|-----------|------|------------|
|     |                                                      |                                             |                                                                                                            |                 |            |                 | Int.      | Ext. |            |
| I   | Core Course - I(CC - I)                              | P26CA101                                    | Discrete Mathematics and Computational Foundations                                                         | 6               | 4          | 3               | 30        | 70   | 100        |
|     | Core Course - II(CC - II)                            | P26CA102                                    | Data Structures and Algorithms                                                                             | 6               | 4          | 3               | 30        | 70   | 100        |
|     | Core Practical - I (CP - I)                          | P26CA103P                                   | Data Structures and Algorithms Lab                                                                         | 4               | 4          | 3               | 40        | 60   | 100        |
|     | Discipline Centric Elective Course - I (DCEC-I)      | P26CADE11A/<br>P26CADE11B/<br>P26CADE11C    | Cyber Security / Data Analytics using Python / Soft Computing                                              | 5               | 4          | 3               | 30        | 70   | 100        |
|     | Discipline Centric Elective Practical - I (DCEP - I) | P26CADE12AP/<br>P26CADE12BP/<br>P26CADE12CP | Cyber Security Lab /Data Analytics using Python Lab./Soft Computing Lab                                    | 2               | 2          | 3               | 40        | 60   | 100        |
|     | Generic Elective Course - I(GEC - I)                 | P26CAGE11A/<br>P26CAGE11B/<br>P26CAGE11C    | Accounting and Financial Management / Computer Applications for Office Automation/ Organizational Behavior | 5               | 3          | 3               | 30        | 70   | 100        |
|     | Skill Enhancement Course-I (SEC-I)                   | P26SECA11                                   | Digital Marketing                                                                                          | 2               | 2          | 3               | 30        | 70   | 100        |
|     | Value Added Course - I (VAC - I) *                   | P26CAVA11                                   | Applied Artificial Intelligence and Emerging Technologies                                                  | -               | 2*         | 2               | 30        | 70   | 100*       |
|     |                                                      | <b>Total</b>                                |                                                                                                            | <b>30</b>       | <b>23</b>  | -               | -         | -    | <b>700</b> |

## II SEMESTER

| Sem | Course                                                 | Course Code                                                                            | Course Title                                                                             | Ins. Hrs  | Credit    | Exam Hrs | Marks    |          | Total      |
|-----|--------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------|-----------|----------|----------|----------|------------|
|     |                                                        |                                                                                        |                                                                                          |           |           |          | Int.     | Ext      |            |
| II  | Core Course - III (CC - III)                           | P26CA204                                                                               | Advanced Database Management Systems                                                     | 6         | 4         | 3        | 30       | 70       | 100        |
|     | Core Course - IV (CC - IV)                             | P26CA205                                                                               | Object Oriented Programming using Java                                                   | 6         | 4         | 3        | 30       | 70       | 100        |
|     | Core Practical - II (CP - II)                          | P26CA206P                                                                              | Java and Database Lab                                                                    | 4         | 4         | 3        | 40       | 60       | 100        |
|     | Discipline Centric Elective Course - II (DCEC - II)    | P26CADE23A/<br>P26CADE23B/<br>P26CADE23C                                               | Advanced Web Development/ Data Visualization / Mobile Application Development            | 4         | 4         | 3        | 30       | 70       | 100        |
|     | Discipline Centric Elective Practical - II (DCEP - II) | P26CADE24AP/<br>P26CADE24BP/<br>P26CADE24CP                                            | Advanced Web Development Lab/ Data Visualization Lab /Mobile Application Development Lab | 2         | 2         | 3        | 40       | 60       | 100        |
|     | Generic Elective Course - II(GEC - II)                 | P26CAGE22A/<br>P26CAGE22B/<br>P26CAGE22C                                               | Software Engineering / Software Development Technologies/Social Networking               | 4         | 3         | 3        | 30       | 70       | 100        |
|     | Skill Enhancement Course-II (SEC-II)                   | P26SECA22                                                                              | Data Mining and Warehousing                                                              | 2         | 2         | 3        | 30       | 70       | 100        |
|     | Non-Major Elective Course - I (NMEC -I)                |                                                                                        |                                                                                          | 2         | 2         | 3        | 30       | 70       | 100        |
|     |                                                        |                                                                                        | <b>Total</b>                                                                             | <b>30</b> | <b>25</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>800</b> |
|     |                                                        | <b>Summer Internship / Industrial Activity during the Summer Vacation after I Year</b> |                                                                                          |           |           |          |          |          |            |

### III SEMESTER

| Sem | Course                                                   | Course Code | Course Title                                                                                 | Ins. Hrs  | Credit    | Exam Hrs | Marks    |          | Total      |
|-----|----------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------|-----------|-----------|----------|----------|----------|------------|
|     |                                                          |             |                                                                                              |           |           |          | Int.     | Ext.     |            |
| III | Core Course - V (CC - V)                                 |             | Operating Systems and Linux Administration                                                   | 6         | 4         | 3        | 30       | 70       | 100        |
|     | Core Course - VI (CC - VI)                               |             | Blockchain Technologies                                                                      | 6         | 4         | 3        | 30       | 70       | 100        |
|     | Core Practical - III (CP - III)                          |             | Linux Operating system Lab                                                                   | 4         | 4         | 2        | 40       | 60       | 100        |
|     | Discipline Centric Elective Course - III (DCEC - III)    |             | Deep Learning and Generative AI/ Big Data Analytics/ Natural Language Processing             | 5         | 4         | 3        | 30       | 70       | 100        |
|     | Discipline Centric Elective Practical - III (DCEP - III) |             | Deep Learning and Generative AI Lab /Big Data Analytics Lab/ Natural Language Processing Lab | 2         | 2         | 2        | 40       | 60       | 100        |
|     | Generic Elective Course - III(GEC - III)                 |             | Research Methodology/ Data Engineering and Management / Network Protocols                    | 5         | 3         | 3        | 30       | 70       | 100        |
|     | Non-Major Elective - II (NME – II)                       |             |                                                                                              | 2         | 2         | 3        | 30       | 70       | 100        |
|     | Internship / Industrial Activity @                       |             | Internship / Industrial Activity with Viva -Voce                                             | -         | 2         | 3        | 20       | 80       | 100        |
|     | Value Added Course - II (VAC - II) *                     |             | Enterprise AI and Digital Transformation                                                     | -         | 2*        | 2        | 30       | 70       | 100*       |
|     |                                                          |             | <b>Total</b>                                                                                 | <b>30</b> | <b>25</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>800</b> |

#### IV Semester

| Sem | Course                                                    | Course Code        |              | Course Title                                                                     | Ins. Hrs  | Credit    | Exam Hrs | Marks    |          | Total       |
|-----|-----------------------------------------------------------|--------------------|--------------|----------------------------------------------------------------------------------|-----------|-----------|----------|----------|----------|-------------|
|     |                                                           |                    |              |                                                                                  |           |           |          | Int.     | Ext      |             |
| IV  | Core Course - VII<br>(CC - VII)                           |                    |              | Computer Networks                                                                | 5         | 4         | 3        | 30       | 70       | 100         |
|     | Core Course - VIII<br>(CC - VIII)                         |                    |              | Full Stack Development                                                           | 5         | 4         | 3        | 30       | 70       | 100         |
|     | Core Practical - IV<br>(CP- IV)                           |                    |              | Full Stack Development Lab                                                       | 4         | 4         | 3        | 40       | 60       | 100         |
|     | Discipline Centric<br>Elective Course - IV<br>(DCEC - IV) |                    |              | Cloud Computing and DevOps/<br>Smart Embedded Systems/ Fog<br>and Edge Computing | 5         | 4         | 3        | 30       | 70       | 100         |
|     | Entrepreneurship/<br>Industry Based<br>Course @           |                    |              | Internet of Things                                                               | 5         | 3         | 3        | 30       | 70       | 100         |
|     | Project Work @                                            |                    |              |                                                                                  | 6         | 5         | -        | 20       | 80       | 100         |
|     | Extra Credit Course**                                     |                    |              | Two Credit for each VAC and<br>MOOC -NPTEL/SWAYAM **                             |           | 2**       |          |          |          |             |
|     |                                                           |                    | <b>Total</b> |                                                                                  | <b>30</b> | <b>24</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>600</b>  |
|     |                                                           | <b>Grand Total</b> |              |                                                                                  |           | <b>97</b> |          |          |          | <b>2900</b> |

#### LIST OF DISCIPLINE CENTRIC ELECTIVE COURSE / PRACTICAL

| Discipline Centric Elective Course 1 |                                 | Discipline Centric Elective Practical 1 |                                     |
|--------------------------------------|---------------------------------|-----------------------------------------|-------------------------------------|
| 1.                                   | Cyber Security                  | 1.                                      | Cyber Security Lab                  |
| 2.                                   | Data Analytics using Python     | 2.                                      | Data Analytics using Python Lab     |
| 3.                                   | Soft Computing                  | 3.                                      | Soft Computing Lab                  |
| Discipline Centric Elective Course2  |                                 | Discipline Centric Elective Practical 2 |                                     |
| 1.                                   | Advanced Web Development        | 1.                                      | Advanced Web Development Lab        |
| 2.                                   | Data Visualization              | 2.                                      | Data Visualization Lab              |
| 3.                                   | Mobile Application Development  | 3.                                      | Mobile Application Development Lab  |
| Discipline Centric Elective Course3  |                                 | Discipline Centric Elective Practical 3 |                                     |
| 1.                                   | Deep Learning and Generative AI | 1.                                      | Deep Learning and Generative AI Lab |
| 2.                                   | Big Data Analytics              | 2.                                      | Big Data Analytics Lab              |
| 3.                                   | Natural Language Processing     | 3.                                      | Natural Language Processing Lab     |
| Discipline Centric Elective Course 4 |                                 |                                         |                                     |
| 1.                                   | Cloud Computing and DevOps      |                                         |                                     |
| 2.                                   | Smart Embedded Systems          |                                         |                                     |
| 3.                                   | Fog and Edge Computing          |                                         |                                     |

### **LIST OF GENERIC ELECTIVE COURSE**

| <b>Generic Elective Course 1</b> |                                             |
|----------------------------------|---------------------------------------------|
| 1.                               | Accounting and Financial Management         |
| 2.                               | Computer Applications for Office Automation |
| 3.                               | Organizational Behavior                     |
| <b>Generic Elective Course 2</b> |                                             |
| 1.                               | Software Engineering                        |
| 2.                               | Software Development Technologies           |
| 3.                               | Social Networking                           |
| <b>Generic Elective Course 3</b> |                                             |
| 1.                               | Research Methodology                        |
| 2.                               | Data Engineering and Management             |
| 3.                               | Network Protocols                           |

### **NON-MAJOR ELECTIVE COURSE**

| <b>S.no</b> | <b>Semester</b> | <b>Course Code</b> | <b>Title of the paper</b>                  |
|-------------|-----------------|--------------------|--------------------------------------------|
| 2           | II              | P26NMECA21         | Web Technologies for Business Applications |
| 3           | III             |                    | Entrepreneurship and Innovation            |

**SUMMARY OF CURRICULUM STRUCTURE OF PG PROGRAMMES  
MCA FOR COMPUTER SCIENCE STUDENTS**

| <b>Sl. No.</b>        | <b>Types of the Course</b>                   | <b>No. of Courses</b> | <b>Credits for each Course</b> | <b>Total Credits</b> | <b>Marks</b> |
|-----------------------|----------------------------------------------|-----------------------|--------------------------------|----------------------|--------------|
| 1.                    | Core Course (CC)                             | 8                     | 4                              | 32                   | 800          |
| 2.                    | Core Practical (CP)                          | 4                     | 4                              | 16                   | 400          |
| 3.                    | Discipline Centric Elective Course (DCEC)    | 4                     | 4                              | 16                   | 400          |
| 4.                    | Discipline Centric Elective Practical(DCEP)  | 3                     | 2                              | 6                    | 300          |
| 5.                    | Generic Elective Course (GEC)                | 3                     | 3                              | 9                    | 300          |
| 6.                    | Skill Enhancement Course (SEC)               | 2                     | 2                              | 4                    | 200          |
| 7.                    | Non-Major Elective Courses (NMEC)            | 2                     | 2                              | 4                    | 200          |
| 8.                    | Summer Internship/Industrial Activity @      | 1                     | 2                              | 2                    | 100          |
| 9.                    | Entrepreneurship/<br>Industry Based Course @ | 1                     | 3                              | 3                    | 100          |
| 10                    | Project Work @                               | 1                     | 5                              | 5                    | 100          |
| <b>Total</b>          |                                              | <b>29</b>             | <b>-</b>                       | <b>97</b>            | <b>2900</b>  |
| Value Added Courses * |                                              | 2*                    | 2                              | 4*                   | 200          |

- **The value added courses credit will not be included in the total CGPA these courses are extra-credit courses. Instruction hours for these courses are 30hours.**

**@ Summer Internship / Industrial Activity and Project Work**

- **Internship will be carried out during the summer vacation after the second year. Viva-Voce will be conducted by the college and Marks will be included in the 3rd semester Mark Statement.**

**Scheme of Evaluation:**

| <b>Description</b> | <b>Marks</b> |
|--------------------|--------------|
| Report             | 80           |
| Viva               | 20           |
| <b>Total</b>       | <b>100</b>   |

# **SEMESTER I**

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE  
(AUTONOMOUS)**



**SUNDARAKKOTTAI, MANNARGUDI- 614016.**  
*(For the Candidates admitted in the academic year 2026 – 2027)*

**DEPARTMENT OF COMPUTER APPLICATIONS**

**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: I - CC – I: Discrete Mathematics and Computational Foundations**

**Ins. Hrs. /Week: 6**

**Course Credit: 4**

**Course Code: P26CA101**

**Course Objectives**

1. Develop logical thinking and proof-writing skills using propositions, predicates, logical reasoning, and mathematical induction.
2. Understand and apply discrete mathematical structures such as sets, relations, functions, equivalence relations, and partial orders in computing.
3. Learn number theory and algebraic concepts including divisibility, modular arithmetic, and matrices, with applications in cryptography and computer security.
4. Study graphs and trees and apply graph algorithms to solve problems in networks, data structures, and computer systems.
5. Enhance problem-solving skills through counting techniques, recurrence relations, algorithm design, complexity analysis, and basic automata theory.

**UNIT – I : Mathematical Logic**

**(12 Hours)**

Statements and Notation-Connectives-Logical Capabilities of Programming languages-Conditional and Biconditional-Well Formed Formulas-Tautologies-Equivalence of Formulas-Duality Law-Tautological Implications.

**UNIT – II : Set Theory and Relations**

**(12 Hours)**

Introduction-Basic Concepts of Set Theory-Some Operations on Sets-Some Basic Set Identities-Representation of Discrete Structures-Relations and Ordering-Relation Matrix and the graph of a Relation.

**UNIT – III : Introduction to Graph Theory**

**(12 Hours)**

Graph Basic Concepts-Application of Graphs-Finite and Infinite Graphs-Incidence and Degree-Isolated vertex-Brief History of Graph Theory-Isomorphism-Subgraphs-Walks, Paths and Circuits.

**UNIT – IV: Trees and Fundamental Circuits**

**(12 Hours)**

Trees-Some Properties of Trees-Pendant Vertices in a Tree-Distance and centers in a Tree-Rooted and Binary Trees-On Counting Trees-Spanning Trees.-Fundamental Circuits-Finding all Spanning Trees of a Graph-Spanning Trees in a weighted graph.

## UNIT – V: Counting

(12 Hours)

The Basics of Counting-The Pigeonhole Principle-permutations and Combinations-Binomial Coefficients-Generalized Permutations and Combinations-Generating Permutations and Combinations.

## UNIT-VI: Current Contours (For Continuous Internal Assessment Only -self-study)

Properties of Trees-Circuits-Another Counting Principle-Fundamentals of Graph Theory.

**Total Lecture Hours-60**

## COURSE OUTCOMES

The Students will be able to

1. Develop propositional logic, predicate logic, set theory, relations, and functions.
2. Construct and evaluate mathematical proofs using various proof techniques, including direct proof, contradiction, contraposition, and mathematical induction.
3. Apply counting principles, permutations, combinations, and recurrence relations to solve discrete mathematical problems.
4. Analyze and solve problems using graph theory, trees, and network models relevant to computing applications.
5. Utilize Boolean algebra and algebraic structures to model and simplify computational and logical systems.
6. Develop mathematical models and computational solutions using discrete structures to support algorithm design, problem-solving, and computer science applications.

## TEXT BOOK

1. J.P. Tremblay and R. Manohar, *Discrete Mathematical Structures with Applications to Computer Science*, McGraw Hill Education, Latest Edition.
2. Kenneth H. Rosen, *Discrete Mathematics and Its Applications*, McGraw Hill, Latest Edition.
3. Narsingh Deo, *Graph Theory with Applications to Engineering and Computer Science*, Prentice Hall of India.

UNIT I: Chapter 1:Section 1-1 and Section 1-2.1 to 1-2.11 of [1]

UNIT II: Chapter 2:Section 2-1.1 to 2-1.6 and Section 2-2.1 to Section 2-2.5 of (2) and Section 2-3.1 to 2-3.2 of (2)

UNIT III: Chapter 1.1 to Chapter 1.6 of (3) and 2.1, 2.2, 2.4 of (3)

UNIT IV: Chapter 3.1 to 3.10 of (3)

UNIT V: Chapter 4.1 to Chapter 4.6 of (2)

## REFERENCE BOOK

1. Introduction to the Theory of Computation,Michael Sipser, 2019,Third Edition, Cengage Learning.
2. Mathematics for Competitive Examination, Eric Lehman, 2017, MIT Open Learning;
3. Discrete and Combinatorial Mathematics, Ralph P. Grimaldi, Fifth Edition, 2003, Pearson Education.
4. Elements of Discrete Mathematics, C. L. Liu and D. P. Mohapatra, Fourth Edition, 2017, McGraw Hill Education Ltd.  
Seymour Lipschutz and Marc Lipson, *Discrete Mathematics*, Schaum's Outline Series,
5. McGraw Hill.

## E-RESOURCES

1. [https://www.freebookcentre.net/Mathematics/Discrete Mathematics-Books-Download.html](https://www.freebookcentre.net/Mathematics/Discrete%20Mathematics-Books-Download.html)
2. [https://www.cs.yale.edu/homes/Tree properties/classes/202/notes](https://www.cs.yale.edu/homes/Tree%20properties/classes/202/notes)
3. [https://www.cs.yale.edu/homes/Computational maths/statistics/202/notes](https://www.cs.yale.edu/homes/Computational%20maths/statistics/202/notes).
4. [https://www.discrete.edu/basic concepts/html](https://www.discrete.edu/basic%20concepts/html)
5. [https://www.maths.edu/basic concepts/excel](https://www.maths.edu/basic%20concepts/excel)

## COURSE OUTCOME (FOR MAPPING WITH POS AND PSOS)

|     | Pos |   |   |   |   |   |   |   |   |    | PSOs |   |   |
|-----|-----|---|---|---|---|---|---|---|---|----|------|---|---|
|     | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 1    | 2 | 3 |
| CO1 | 3   | 1 | 1 | 2 | 2 | 3 | 3 | 1 | 2 | 1  | 3    | 2 | 1 |
| CO2 | 2   | 1 | 3 | 1 | 3 | 3 | 3 | 2 | 1 | 1  | 2    | 2 | 1 |
| CO3 | 3   | 2 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 2  | 3    | 1 | 1 |
| CO4 | 1   | 2 | 1 | 2 | 3 | 2 | 1 | 2 | 1 | 3  | 2    | 1 | 2 |
| CO5 | 3   | 1 | 2 | 3 | 3 | 3 | 1 | 2 | 2 | 1  | 3    | 2 | 1 |
| CO6 | 3   | 1 | 2 | 2 | 3 | 3 | 2 | 1 | 2 | 1  | 3    | 2 | 1 |

Strong:3      Medium:2      Low:1



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**DEPARTMENT OF COMPUTER APPLICATIONS**

**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: I - CC – II: Data Structures and Algorithms**

**Ins. Hrs. /Week: 6**

**Course Credit: 4**

**Course Code: P26CA102**

**Course Objectives**

1. To understand the fundamental concepts of data structures and algorithm analysis using Python programming.
2. To develop problem-solving skills through recursion, asymptotic analysis, and array-based sequence implementations.
3. To implement and analyze linear and non-linear data structures such as stacks, queues, linked lists, trees, and graphs.
4. To apply sorting, searching, pattern matching, greedy methods, and dynamic programming techniques for computational problem solving.
5. To design efficient algorithms and evaluate their performance using appropriate data structures and algorithmic paradigms

**UNIT-I: Algorithm Analysis**

**(12 Hours)**

Experimental Studies - The Seven Functions-Asymptotic Analysis - Simple Justification Techniques - Recursion - Illustrative Examples - The Factorial Function - Drawing an English Ruler - Binary Search - File - Analyzing Recursive Algorithms - Recursion Run Amok - Further Examples of Recursion - Linear Recursion - Binary Recursion - Multiple Recursion - Designing Recursive Algorithms - Eliminating Tail Recursion. Array-Based Sequences - Python's Sequence Types - Low-Level Arrays - Dynamic Arrays and Amortization - Efficiency of Python's Sequence Types -Using Array-Based Sequences -Multidimensional Data Sets .

**UNIT II: Stacks, Queues, and Deques**

**(12 Hours)**

Stacks - The Stack Abstract Data Type - - Simple Array-Based Stack Implementation - Reversing Data Using a Stack - Matching Parentheses and HTML Tags -Queues - The Queue Abstract Data Type - Array-Based Queue Implementation -Linked Lists - Singly Linked Lists - Implementing a Stack with a Singly Linked List - Implementing a Queue with a Singly Linked List - Circularly Linked Lists - Round-Robin Schedulers - Implementing a Queue with a Circularly Linked List - Doubly Linked Lists - Basic Implementation of a Doubly Linked List .

**UNIT III: Trees**

**(12 Hours)**

General Trees -Binary Trees - Tree Traversal Algorithms -Preorder and Postorder Traversals of General Trees - Breadth-First Tree Traversal -Inorder Traversal of a Binary Tree - Implementing Tree Traversals in Python-Applications of Tree Traversals - Euler Tours and the Template Method Pattern. Search Trees -Binary Search Trees - Balanced Search Trees - Python Framework for Balancing Search Trees - AVL Trees - Update Operations- Python Implementation - Multiway Search Trees -Tree Operations

#### **UNIT -IV: Sorting and Selection**

**(12 Hours)**

Merge-Sort - Divide-and-Conquer-Array-Based Implementation of Merge-Sort -The Running Time of Merge-Sort - Merge-Sort and Recurrence Equations - Alternative Implementations of Merge-Sort - Quick-Sort - Randomized Quick-Sort-Additional Optimizations for Quick-Sort - Studying Sorting through an Algorithmic Lens - Lower Bound for Sorting - Linear-Time Sorting: Bucket-Sort and Radix-Sort -Comparing Sorting Algorithms - Python's Built-In Sorting Functions - Sorting According to a Key Function - Selection - Prune-and-Search- Randomized Quick-Select - Analyzing Randomized Quick-Select-Pattern-Matching Algorithms-Brute Force -The Boyer-Moore Algorithm - The Knuth-Morris-Pratt -Dynamic Programming -Matrix Chain-Product -DNA and Text Sequence Alignment - Text Compression and the Greedy Method - The Huffman Coding - The Greedy Method.

#### **UNIT -V Graph Algorithms**

**(12 Hours)**

Graphs - The Graph ADT - Data Structures for Graphs - Edge List Structure - Adjacency List Structure -Adjacency Map Structure - Adjacency Matrix Structure-Python - Graph Traversals - Depth-First Search - DFS Implementation and Extensions - Breadth-First Search - Closure - Directed Acyclic Graphs -Topological Ordering - Shortest Paths - Weighted Graphs - Dijkstra's Algorithm -Minimum Spanning Trees - Prim-Jarn'ík Algorithm -Kruskal's Algorithm -Disjoint Partitions and Union-Find Structures

#### **UNIT – VI: Current Trends (For Continuous Internal Assessment only – Self Study)**

Recent trends in Data Structures include the application of algorithms in online shopping, banking systems, hospital management, and social media platforms for efficient data handling and processing. Real-time applications such as search engines, traffic navigation systems, and network routing use advanced data structures like graphs, trees, and shortest path algorithms.

**Total Lecture Hours: 60**

#### **Course Outcomes**

After completing this course, students will be able to:

1. Analyze the efficiency of algorithms using asymptotic notations, recursion techniques, and experimental studies.
2. Implement linear data structures including stacks, queues, deques, and linked lists using Python.
3. Design and apply tree-based data structures such as binary trees, AVL trees, and multiway search trees for efficient data organization.
4. Apply sorting, searching, selection, and pattern-matching algorithms to solve computational problems effectively.
5. Develop solutions using graph traversal and shortest path algorithms including DFS, BFS, Dijkstra's, Prim's, and Kruskal's algorithms.

#### **Text Book**

1. Goodrich, Michael T., Roberto Tamassia, and Michael H. Goldwasser. *Data Structures and Algorithms in Python*. Wiley, 2013.

### Reference Books

1. Miller, Bradley N., and David L. Ranum. *Problem Solving with Algorithms and Data Structures Using Python*. Franklin, Beedle & Associates, 2011.
2. Downey, Allen B. *Think Data Structures: Algorithms and Information Retrieval in Python*. O'Reilly Media, 2016.
3. Narasimha Karumanchi. *Data Structures and Algorithms Made Easy*. CareerMonk Publications, 2017.
4. Cormen, Thomas H., et al. *Introduction to Algorithms*. 3rd ed., MIT Press, 2009.
5. Kleinberg, Jon, and Éva Tardos. *Algorithm Design*. Pearson, 2006.

### E-Resources

1. <https://www.wiley.com/en-in/Data+Structures+and+Algorithms+in+Python-p-9781118290279>
2. <https://runestone.academy/ns/books/published/pythonds/index.html>
3. <https://greenteapress.com/thinkdast/html/index.html>
4. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science>
5. <https://www.geeksforgeeks.org/data-structures>

### MAPPING WITH PROGRAMME OUTCOMES

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 3   | 2   | 2   | 3   | 1   | 1   | 2   | 2   | 1    | 2    | 2    | 2    | 1    | 2    | 1    | 1    |
| CO2 | 3   | 3   | 3   | 2   | 2   | 1   | 1   | 2   | 2   | 1    | 3    | 1    | 2    | 2    | 3    | 2    | 1    |
| CO3 | 3   | 3   | 2   | 3   | 3   | 2   | 1   | 2   | 2   | 1    | 3    | 2    | 2    | 2    | 3    | 2    | 2    |
| CO4 | 3   | 3   | 2   | 3   | 3   | 2   | 1   | 2   | 2   | 1    | 3    | 2    | 2    | 3    | 3    | 2    | 2    |
| CO5 | 3   | 3   | 3   | 3   | 3   | 2   | 1   | 2   | 2   | 1    | 3    | 2    | 2    | 3    | 3    | 2    | 3    |
| CO6 | 3   | 3   | 3   | 3   | 3   | 3   | 2   | 3   | 3   | 2    | 3    | 3    | 3    | 3    | 3    | 3    | 3    |

S-Strong(3)

M-Medium(2)

L-Low(1)



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**DEPARTMENT OF COMPUTER APPLICATIONS**

**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: I - CP –I: Data Structures and Algorithms Lab**

**Ins. Hrs./Week: 4**

**Course Credit: 4**

**Course Code:P26CA103P**

**P**

**Course Objectives**

1. To understand and implement basic data structures and algorithms through practical programming exercises.
2. To develop problem-solving skills using searching, sorting, recursion, and linked data structures.
3. To design and implement linear and non-linear data structures for efficient data organization and processing.
4. To apply stack, queue, tree, and graph concepts in solving real-world computational problems.
5. To analyze the performance and efficiency of algorithms through practical implementation and testing

**List of Exercises**

1. Write Python programs to demonstrate the use of lists, tuples, and dictionaries, and perform operations such as insertion, deletion, updating, and traversal on these data structures.
2. Develop a Python program to implement a simple algorithm such as finding the sum of elements in a list, measure its execution time using the time module, and analyze its performance for different input sizes.
3. Write a Python program to implement a stack using a list and perform standard operations such as push, pop, and peek.
4. Develop Python programs to convert an infix expression into postfix form and evaluate the postfix expression using stack operations.
5. Write a Python program to implement a queue using a list and perform enqueue and dequeue operations.
6. Develop Python programs to implement a circular queue and a deque using appropriate data structures and perform insertion and deletion operations.
7. Write a Python program to create a singly linked list and perform operations such as insertion, deletion, and traversal.
8. Develop a Python program to implement a doubly linked list and demonstrate forward and backward traversal.
9. Write Python programs to implement linear search and binary search algorithms and compare their performance.
10. Develop Python programs to implement basic sorting algorithms such as Bubble Sort, Selection Sort, and Insertion Sort.
11. Write Python programs to implement advanced sorting algorithms such as Merge Sort and Quick Sort.

12. Develop a Python program to create a binary tree and perform inorder, preorder, and postorder traversal operations.
13. Write a Python program to implement a binary search tree and perform insertion, deletion, and search operations.
14. Develop Python programs to represent a graph using an adjacency list and perform Breadth First Search (BFS) and Depth First Search (DFS) traversal.

**Total Lab Hours: 60**

### **Course Outcomes**

**After completing this course, students will be able to:**

1. Implement basic data structures such as lists, tuples, dictionaries, stacks, and queues.
2. Apply algorithm analysis techniques and evaluate the performance of simple algorithms.
3. Develop programs using linked lists, circular queues, and deques for data management applications.
4. Implement searching and sorting algorithms for efficient data processing.
5. Design and implement tree and binary search tree operations for hierarchical data representation.

### **Text Book**

1. Goodrich, Michael T., Roberto Tamassia, and Michael H. Goldwasser. *Data Structures and Algorithms in Python*. Wiley, 2013.

### **Reference Books**

1. Miller, Bradley N., and David L. Ranum. *Problem Solving with Algorithms and Data Structures Using Python*. Franklin, Beedle & Associates, 2011.
2. Downey, Allen B. *Think Data Structures: Algorithms and Information Retrieval in Python*. O'Reilly Media, 2016.
3. Narasimha Karumanchi. *Data Structures and Algorithms Made Easy*. CareerMonk Publications, 2017.
4. Cormen, Thomas H., et al. *Introduction to Algorithms*. 3rd ed., MIT Press, 2009.
5. Kleinberg, Jon, and Éva Tardos. *Algorithm Design*. Pearson, 2006.

### **E-Resources**

1. <https://www.wiley.com/en-in/Data+Structures+and+Algorithms+in+Python-p-9781118290279>
2. <https://runestone.academy/ns/books/published/pythonds/index.html>
3. <https://greenteapress.com/thinkdast/html/index.html>
4. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science>
5. <https://www.geeksforgeeks.org/data-structures>

## MAPPING WITH PROGRAMME OUTCOMES

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 3   | 2   | 2   | 3   | 1   | 1   | 2   | 2   | 1    | 2    | 2    | 2    | 1    | 2    | 1    | 1    |
| CO2 | 3   | 3   | 3   | 2   | 2   | 1   | 1   | 2   | 2   | 1    | 3    | 1    | 2    | 2    | 3    | 2    | 1    |
| CO3 | 3   | 3   | 2   | 3   | 3   | 2   | 1   | 2   | 2   | 1    | 3    | 2    | 2    | 2    | 3    | 2    | 2    |
| CO4 | 3   | 3   | 2   | 3   | 3   | 2   | 1   | 2   | 2   | 1    | 3    | 2    | 2    | 3    | 3    | 2    | 2    |
| CO5 | 3   | 3   | 3   | 3   | 3   | 2   | 1   | 2   | 2   | 1    | 3    | 2    | 2    | 3    | 3    | 2    | 3    |
| CO6 | 3   | 3   | 3   | 3   | 3   | 3   | 2   | 3   | 3   | 2    | 3    | 3    | 3    | 3    | 3    | 3    | 3    |

S-Strong(3)      M-Medium(2)      L-Low(1)



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**DEPARTMENT OF COMPUTER APPLICATIONS**  
**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: I: DCEC-I: Cyber Security**

**Ins. Hrs./Week: 5**

**Course Credit: 4**

**Course Code: P26CADE11A**

**Course Objectives**

1. To provide fundamental knowledge of cyber security concepts, network security, and cryptographic techniques.
2. To understand attacker techniques, cyber threats, and fraud mechanisms used in modern computing systems.
3. To analyze exploitation methods, vulnerabilities, and web-based cyber-attacks.
4. To study malware analysis, malicious code behavior, and privilege escalation techniques.
5. To develop skills in cyber defense, intrusion detection, digital forensics, and emerging cyber security technologies.

**UNIT – I: Cyber Security Fundamentals**

**(12 Hours)**

Network and Security Concepts - Information Assurance Fundamentals - Authentication - Authorization - Nonrepudiation - Confidentiality - Integrity - Availability - Basic Cryptography - Symmetric Encryption - Public Key Encryption - Domain Name System (DNS) - Security and DNS - Firewalls - Packet Filtering - Stateful Firewalls - Application Gateway Firewalls - Virtualization - Radio Frequency Identification (RFID) - Microsoft Windows Security Principles - Windows Tokens - Access Control Lists - Window Messaging - Windows Program Execution - Windows Firewall.

**UNIT – II: Attacker Techniques and Motivations**

**(12 Hours)**

Antiforensics - Proxies and Proxy Detection - Tunneling Techniques - HTTP Tunneling - DNS Tunneling - ICMP Tunneling - Steganography Concepts - Fraud Techniques - Phishing - Smishing - Vishing - Mobile Malicious Code - Rogue Antivirus - Click Fraud - Threat Infrastructure - Botnets - Fast-Flux Networks - Advanced Fast-Flux Techniques.

**UNIT – III: Exploitation Techniques**

**(12 Hours)**

Shellcode - Integer Overflow Vulnerabilities - Stack-Based Buffer Overflow - Format String Vulnerabilities - SQL Injection - Malicious PDF Files - Race Conditions - Web Exploit Tools - Denial of Service (DoS) Conditions - Brute Force Attacks - Dictionary Attacks - Cross-Site Scripting (XSS) - Social Engineering - WarXing - DNS Amplification Attacks.

## **UNIT – IV: Malicious Code and Malware Analysis**

**(12 Hours)**

Worms - Viruses - Obfuscation Techniques - Virtual Machine Obfuscation - Persistent Software Techniques - BIOS and MBR Malicious Code - Hypervisors - Rootkits - User Mode Rootkits - Kernel Mode Rootkits - Spyware - Privilege Escalation Attacks - Token Kidnapping - Virtual Machine Detection - Form Grabbing - Man-in-the-Middle Attacks - DLL Injection - Browser Helper Objects.

## **UNIT – V: Defense and Analysis Techniques**

**(12 Hours)**

Memory Forensics - Memory Analysis Frameworks - Physical Memory Dumping - Volatility Framework - Hidden Process Detection - Honeypots - Malicious Code Naming - Automated Malicious Code Analysis Systems - Passive Analysis - Active Analysis - Physical and Virtual Machine Analysis - Intrusion Detection Systems.

## **UNIT – VI: Current Trends (For Continuous Internal Assessment only – Self Study)**

Artificial Intelligence in Cyber Security - Zero Trust Security Architecture - Cloud Security and Multi-Cloud Protection - Block chain Security - IoT Security Challenges - Ransom ware Detection and Prevention - Cyber Threat Intelligence - Security Operations Center (SOC) Automation

**Total Lecture Hours: 60**

### **Course Outcomes**

After completing this course, students will be able to:

1. Explain the fundamental concepts of cyber security, cryptography, and network security.
2. Analyze attacker techniques, cyber frauds, and modern cyber threats.
3. Demonstrate knowledge of exploitation methods and web-based vulnerabilities.
4. Examine malware behavior, malicious code analysis, and privilege escalation attacks.
5. Apply cyber defense mechanisms, intrusion detection, and forensic analysis techniques.
6. Evaluate recent trends, emerging technologies, and security challenges in cyber security.

### **Text Book**

1. Cyber Security Essentials Craigen, D., Diakun-Thibault, N., & Purse, R. (2011). Cyber Security Essentials. Taylor & Francis Group.

## Reference Books

1. Computer Security: Principles and Practice Stallings, W., & Brown, L. (2018). Computer Security: Principles and Practice (4th ed.). Pearson.
2. Cryptography and Network Security Stallings, W. (2017). Cryptography and Network Security: Principles and Practice (7th ed.). Pearson.
3. Network Security Essentials Stallings, W. (2017). Network Security Essentials (6th ed.). Pearson.
4. Cybersecurity Essentials Brooks, C., Grow, C., Craig, P., & Short, D. (2018). Cybersecurity Essentials. Cisco Press.
5. Principles of Information Security Whitman, M., & Mattord, H. (2021). Principles of Information Security (7th ed.). Cengage Learning.

## E-Resources

1. [https://www.ncsc.gov.uk/?utm\\_source=chatgpt.com](https://www.ncsc.gov.uk/?utm_source=chatgpt.com)
2. [https://www.cisco.com/c/en\\_in/products/security/index.html?utm\\_source=chatgpt.com](https://www.cisco.com/c/en_in/products/security/index.html?utm_source=chatgpt.com)
3. [https://owasp.org/?utm\\_source=chatgpt.com](https://owasp.org/?utm_source=chatgpt.com)
4. [https://www.eccouncil.org/cybersecurity-exchange/?utm\\_source=chatgpt.com](https://www.eccouncil.org/cybersecurity-exchange/?utm_source=chatgpt.com)
5. [https://www.sans.org/?utm\\_source=chatgpt.com](https://www.sans.org/?utm_source=chatgpt.com)

## MAPPING WITH PROGRAMME OUTCOMES

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 2   | 2   | 1   | 2   | 1   | 2   | 1   | 2   | 1    | 3    | 2    | 1    | 2    | 3    | 1    | 1    |
| CO2 | 3   | 3   | 2   | 2   | 2   | 1   | 2   | 1   | 2   | 1    | 3    | 2    | 1    | 2    | 3    | 2    | 2    |
| CO3 | 3   | 3   | 3   | 2   | 2   | 1   | 2   | 1   | 2   | 1    | 3    | 2    | 1    | 3    | 3    | 2    | 2    |
| CO4 | 2   | 3   | 2   | 2   | 3   | 1   | 2   | 1   | 2   | 1    | 3    | 3    | 1    | 3    | 3    | 2    | 2    |
| CO5 | 2   | 3   | 3   | 3   | 3   | 2   | 2   | 2   | 2   | 1    | 3    | 3    | 2    | 3    | 3    | 3    | 2    |
| CO6 | 2   | 2   | 2   | 2   | 3   | 3   | 2   | 2   | 3   | 2    | 2    | 3    | 3    | 3    | 3    | 2    | 3    |

S-Strong (3)

M-Medium (2)

L-Low (1)



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE  
(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016.

(For the Candidates admitted in the academic year 2026 – 2027) **DEPARTMENT**

**OF COMPUTER APPLICATIONS**

**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: I: DCEC-I: Data Analytics using Python**

**Ins. Hrs./Week: 5**

**Course Credit: 4**

**Course Code: P26CADE11B**

**Course Objectives**

1. To understand the fundamentals of Data Analytics and Python programming.
2. To develop skills in data collection, preprocessing, and visualization using Python libraries.
3. To apply statistical and analytical techniques for data interpretation.
4. To implement machine learning techniques for predictive analytics.
5. To analyze real-world datasets and generate meaningful insights using Python tools.

**UNIT I – Introduction to Python for Data Analytics**

**(12 Hours)**

Introduction to Data Analytics – Applications of Data Analytics – Introduction to Python – Features of Python – Installing Python and Anaconda – Python IDEs – Variables and Data Types – Operators – Conditional Statements – Looping Statements – Functions – Lists – Tuples – Dictionaries – Sets – File Handling in Python.

**UNIT II – Data Handling and Preprocessing**

**(12 Hours)**

Introduction to NumPy – Array Operations – Introduction to Pandas – DataFrames and Series – Importing CSV and Excel Files – Data Cleaning – Handling Missing Values – Data Transformation – Data Integration – Data Reduction – Data Aggregation – Descriptive Statistics.

**UNIT III – Data Visualization using Python**

**(12 Hours)**

Introduction to Data Visualization – Matplotlib Basics – Line Chart – Bar Chart – Pie Chart – Histogram – Scatter Plot – Seaborn Library – Heat Maps – Box Plot – Pair Plot – Data Dashboard Concepts – Visualization Techniques for Business Analytics.

**UNIT IV – Statistical Analysis and Predictive Analytics**

**(12 Hours)**

Measures of Central Tendency – Correlation and Regression – Hypothesis Testing – Probability Distributions – Introduction to Machine Learning – Supervised Learning – Unsupervised Learning – Classification – Clustering – Model Evaluation Techniques.

## **UNIT V – Advanced Analytics and Applications**

**(12 Hours)**

Time Series Analysis – Text Analytics – Sentiment Analysis – Introduction to Big Data Analytics – Data Analytics in Business – Healthcare Analytics – Financial Analytics – Social Media Analytics – Data Ethics and Privacy – Case Studies using Python.

## **UNIT VI – CURRENT CONTOURS (for Continuous Internal Assessment Only)**

Artificial Intelligence in Data Analytics – Generative AI and Predictive Analytics – AutoML Tools – Real-Time Data Analytics – Cloud-Based Analytics Platforms.

**Total Lecture Hours: 60**

### **Course Outcomes**

After completing this course, students will be able to:

1. Explain the fundamentals of Data Analytics and Python programming concepts.
2. Apply Python libraries for data collection, preprocessing, and transformation.
3. Create effective data visualizations using Python tools and techniques.
4. Analyze datasets using statistical and machine learning methods.
5. Develop analytical solutions for real-world business and research problems.
6. Evaluate recent trends and emerging technologies in Data Analytics and Artificial Intelligence.

### **Text Book**

1. Guzdial, M. (2024). Introduction to computing and programming in Python: A multimedia approach (6th ed.). Pearson.

### **Reference Books**

1. McKinney, W. (2022). Python for data analysis (3rd ed.). O'Reilly Media.
2. VanderPlas, J. (2023). Python data science handbook (2nd ed.). O'Reilly Media.
3. Géron, A. (2022). Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow (3rd ed.). O'Reilly Media.
4. Downey, A. (2024). Think Python: How to think like a computer scientist (3rd ed.). O'Reilly Media.
5. Provost, F., & Fawcett, T. (2023). Data science for business (2nd ed.). O'Reilly Media.

### **E-Resources**

1. [https://docs.python.org/3/?utm\\_source=chatgpt.com](https://docs.python.org/3/?utm_source=chatgpt.com)
2. [https://pandas.pydata.org/docs/?utm\\_source=chatgpt.com](https://pandas.pydata.org/docs/?utm_source=chatgpt.com)
3. [https://numpy.org/doc/?utm\\_source=chatgpt.com](https://numpy.org/doc/?utm_source=chatgpt.com)
4. [https://www.kaggle.com/learn?utm\\_source=chatgpt.com](https://www.kaggle.com/learn?utm_source=chatgpt.com)
5. [https://colab.research.google.com/?utm\\_source=chatgpt.com](https://colab.research.google.com/?utm_source=chatgpt.com)

## MAPPING WITH PROGRAMME OUTCOMES

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 2   | 2   | 1   | 2   | 1   | 1   | 2   | 2   | 1    | 2    | 1    | 2    | 2    | 2    | 1    | 1    |
| CO2 | 3   | 3   | 3   | 2   | 2   | 2   | 1   | 2   | 2   | 1    | 3    | 2    | 2    | 3    | 3    | 2    | 2    |
| CO3 | 2   | 3   | 3   | 2   | 3   | 2   | 1   | 2   | 2   | 1    | 3    | 1    | 2    | 3    | 3    | 2    | 2    |
| CO4 | 3   | 3   | 3   | 3   | 3   | 2   | 1   | 2   | 2   | 1    | 3    | 3    | 2    | 3    | 3    | 2    | 3    |
| CO5 | 3   | 3   | 3   | 3   | 3   | 3   | 2   | 2   | 2   | 2    | 3    | 2    | 3    | 3    | 3    | 3    | 3    |
| CO6 | 3   | 3   | 2   | 3   | 3   | 3   | 2   | 2   | 3   | 2    | 2    | 3    | 3    | 3    | 3    | 2    | 3    |

S-Strong(3)    M-Medium(2)    L-Low(1)



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**OF COMPUTER APPLICATIONS**

**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: I: DCEC-I: Soft Computing**

**Ins. Hrs./Week:5**

**Course Credit: 4**

**Course Code: P26CADE11C**

**Course Objectives**

1. To understand the fundamentals and importance of Soft Computing techniques.
2. To learn fuzzy logic concepts and their applications in decision-making systems.
3. To understand artificial neural networks and their learning mechanisms.
4. To apply genetic algorithms and evolutionary computing techniques for optimization problems.
5. To analyze hybrid soft computing techniques for solving real-world problems.

**UNIT I – Introduction to Soft Computing**

**(12 Hours)**

Introduction to Soft Computing – Characteristics of Soft Computing – Hard Computing vs Soft Computing – Components of Soft Computing – Applications of Soft Computing – Artificial Intelligence and Soft Computing – Knowledge Representation – Uncertainty in Computing – Soft Computing Techniques and Models.

**UNIT II – Fuzzy Logic Systems**

**(12 Hours)**

Introduction to Fuzzy Logic – Crisp Sets and Fuzzy Sets – Membership Functions – Fuzzy Operations – Fuzzy Relations – Fuzzy Rules – Fuzzy Inference Systems – Defuzzification Methods – Fuzzy Decision Making – Applications of Fuzzy Logic.

**UNIT III – Artificial Neural Networks**

**(12 Hours)**

Introduction to Neural Networks – Biological Neuron and Artificial Neuron – Architecture of Neural Networks – Types of Neural Networks – Learning Methods – Perceptron Model – Back Propagation Algorithm – Supervised and Unsupervised Learning – Applications of Neural Networks.

**UNIT IV – Genetic Algorithms and Evolutionary Computing**

**(12 Hours)**

Introduction to Genetic Algorithms – Genetic Operators – Selection Methods – Crossover Techniques – Mutation Techniques – Fitness Function – Evolutionary Strategies – Swarm Intelligence – Optimization Problems using Genetic Algorithms – Applications of Evolutionary Computing.

## **UNIT V – Hybrid Soft Computing Techniques and Applications (12 Hours)**

Neuro-Fuzzy Systems – Genetic Neuro Systems – Hybrid Intelligent Systems – Soft Computing for Data Mining – Pattern Recognition – Image Processing – Robotics – Expert Systems – Industrial Applications – Recent Trends in Soft Computing.

## **UNIT VI – CURRENT CONTOURS (for Continuous Internal Assessment Only)**

Deep Learning and Cognitive Computing – Explainable Artificial Intelligence (XAI) – Intelligent Automation Systems – AI in Healthcare and Smart Systems – Soft Computing for Cyber Security.

**Total Lecture Hours : 60**

### **Course Outcomes**

After completing this course, students will be able to:

1. Explain the concepts, components, and applications of Soft Computing techniques.
2. Apply fuzzy logic principles for uncertainty handling and decision-making problems.
3. Analyze artificial neural network models and learning algorithms.
4. Implement genetic algorithms and evolutionary techniques for optimization problems.
5. Develop hybrid soft computing models for real-world applications.
6. Evaluate emerging trends and modern applications of Soft Computing and Artificial Intelligence.

### **Text Book**

1. Rajasekaran, S., & Vijayalakshmi Pai, G. A. (2019). *Neural networks, fuzzy logic, and genetic algorithms: Synthesis and applications* (2nd ed.). PHI Learning.

### **Reference Books**

1. Negnevitsky, M. (2020). *Artificial intelligence: A guide to intelligent systems* (4th ed.). Pearson.
2. Sivanandam, S. N., & Deepa, S. N. (2018). *Principles of soft computing* (3rd ed.). Wiley India.
3. Jang, J. S. R., Sun, C. T., & Mizutani, E. (2017). *Neuro-fuzzy and soft computing*. Pearson Education.
4. Goldberg, D. E. (2019). *Genetic algorithms in search, optimization, and machine learning*. Pearson Education.
5. Haykin, S. (2021). *Neural networks and learning machines* (3rd ed.). Pearson.

## E-Resources

1. [MIT OpenCourseWare – Artificial Intelligence Courses](https://ocw.mit.edu?utm_source=chatgpt.com) - [https://ocw.mit.edu?utm\\_source=chatgpt.com](https://ocw.mit.edu?utm_source=chatgpt.com)
2. [TensorFlow Official Documentation](https://www.tensorflow.org/learn?utm_source=chatgpt.com) - [https://www.tensorflow.org/learn?utm\\_source=chatgpt.com](https://www.tensorflow.org/learn?utm_source=chatgpt.com)
3. [Scikit-Learn Documentation](https://www.coursera.org?utm_source=chatgpt.com) - [https://www.coursera.org?utm\\_source=chatgpt.com](https://www.coursera.org?utm_source=chatgpt.com)
4. [Coursera – Soft Computing Courses](https://www.coursera.org?utm_source=chatgpt.com) - [https://www.coursera.org?utm\\_source=chatgpt.com](https://www.coursera.org?utm_source=chatgpt.com)
5. [NPTEL – Soft Computing](https://nptel.ac.in?utm_source=chatgpt.com) - [https://nptel.ac.in?utm\\_source=chatgpt.com](https://nptel.ac.in?utm_source=chatgpt.com)

## MAPPING WITH PROGRAMME OUTCOMES

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 2   | 2   | 1   | 2   | 1   | 1   | 2   | 2   | 1    | 2    | 1    | 2    | 2    | 2    | 1    | 1    |
| CO2 | 3   | 3   | 3   | 2   | 2   | 2   | 1   | 2   | 2   | 1    | 3    | 2    | 2    | 3    | 3    | 2    | 2    |
| CO3 | 3   | 3   | 3   | 3   | 3   | 2   | 1   | 2   | 2   | 1    | 3    | 3    | 2    | 3    | 3    | 2    | 3    |
| CO4 | 3   | 3   | 2   | 3   | 3   | 3   | 1   | 2   | 2   | 1    | 3    | 3    | 2    | 3    | 3    | 3    | 3    |
| CO5 | 3   | 3   | 3   | 3   | 3   | 3   | 2   | 2   | 2   | 2    | 3    | 2    | 3    | 3    | 3    | 3    | 3    |
| CO6 | 3   | 3   | 2   | 3   | 3   | 3   | 2   | 2   | 3   | 2    | 2    | 3    | 3    | 3    | 3    | 2    | 3    |

S-Strong(3)

M-Medium(2)

L-Low(1)

SENGAMALA THAYAR EDUCATIONAL TRUST WOMEN'S COLLEGE  
(AUTONOMOUS)



SUNDARAKKOTTAI, MANNARGUDI- 614016.  
(For the Candidates admitted in the academic year 2026 – 2027)

**DEPARTMENT OF COMPUTER APPLICATIONS**  
**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: I: DCEP-I: Cyber Security Lab**

**Ins. Hrs./Week: 2**

**Course Credit: 2**

**Course Code: P26CADE12AP**

**Course Objectives**

1. To understand the fundamentals of cyber security concepts, authentication methods, and secure programming practices using Python.
2. To develop practical skills in implementing encryption, decryption, hashing, and password security mechanisms.
3. To design and implement secure user authentication and access control systems using Python programming.
4. To analyze cyber security threats, vulnerabilities, and ethical attack simulations for educational purposes.
5. To apply Python programming techniques in developing secure applications for data protection, validation, and cyber defense.

**List of Exercises**

1. Develop a Python program to implement a Password Strength Checker that evaluates the strength of a password based on criteria such as length, use of special characters, numbers, and uppercase/lowercase letters.
2. Write a Python program to perform Caesar Cipher Encryption by shifting characters in a given plaintext message using a specified key.
3. Develop a Python program to perform Caesar Cipher Decryption by reversing the encryption process to retrieve the original message.
4. Create a Simple Login System using Python that validates user credentials (username and password) against stored values.
5. Write a Python program to demonstrate Password Hashing using secure hashing algorithms to store passwords safely.
6. Develop a Python program to generate a secure One-Time Password (OTP) for user authentication purposes.
7. Create a Python program to simulate a Brute Force Attack by attempting multiple password combinations to crack a simple password (for educational purposes only).
8. Develop a Python-based File Access Permission System that restricts access to files based on user roles or permissions.
9. Write a Python program to perform Email Validation by checking whether an email address follows a valid format using regular expressions.

10. Develop a Python program for a URL Security Checker that verifies whether a given URL is safe or potentially malicious based on predefined rules.
11. Create a basic and ethical Keylogger Simulation program in Python to demonstrate how keystrokes can be recorded for learning purposes only.
12. Write a Python program to implement XOR Encryption and Decryption for securing and retrieving data.
13. Develop a Python program for Secure File Copy that ensures data integrity while copying files from one location to another.
14. Create a Python program for a Username Availability Checker that verifies whether a username is already taken or available.

**Total Lab hours-30**

### **Course Outcomes**

After completing this course, students will be able to:

1. Explain the fundamental concepts of cyber security, cryptography, and network security.
2. Analyze attacker techniques, cyber frauds, and modern cyber threats.
3. Demonstrate knowledge of exploitation methods and web-based vulnerabilities.
4. Examine malware behavior, malicious code analysis, and privilege escalation attacks.
5. Apply cyber defense mechanisms, intrusion detection, and forensic analysis techniques.

### **Text Book**

1. Cyber Security Essentials Craigen, D., Diakun-Thibault, N., & Purse, R. (2011). Cyber Security Essentials. Taylor & Francis Group.

### **Reference Books**

1. Computer Security: Principles and Practice Stallings, W., & Brown, L. (2018). Computer Security: Principles and Practice (4th ed.). Pearson.
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3. Network Security Essentials Stallings, W. (2017). Network Security Essentials (6th ed.). Pearson.
4. Cybersecurity Essentials Brooks, C., Grow, C., Craig, P., & Short, D. (2018). Cybersecurity Essentials. Cisco Press.
5. Principles of Information Security Whitman, M., & Mattord, H. (2021). Principles of Information Security (7th ed.). Cengage Learning.

## E-Resources

1. [https://www.ncsc.gov.uk/?utm\\_source=chatgpt.com](https://www.ncsc.gov.uk/?utm_source=chatgpt.com)
2. [https://www.cisco.com/c/en\\_in/products/security/index.html?utm\\_source=chatgpt.com](https://www.cisco.com/c/en_in/products/security/index.html?utm_source=chatgpt.com)
3. [https://owasp.org/?utm\\_source=chatgpt.com](https://owasp.org/?utm_source=chatgpt.com)
4. [https://www.eccouncil.org/cybersecurity-exchange/?utm\\_source=chatgpt.com](https://www.eccouncil.org/cybersecurity-exchange/?utm_source=chatgpt.com)
5. [https://www.sans.org/?utm\\_source=chatgpt.com](https://www.sans.org/?utm_source=chatgpt.com)

## MAPPING WITH PROGRAMME OUTCOMES

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 2   | 2   | 1   | 2   | 1   | 2   | 1   | 2   | 1    | 3    | 2    | 1    | 2    | 3    | 1    | 1    |
| CO2 | 3   | 3   | 2   | 2   | 2   | 1   | 2   | 1   | 2   | 1    | 3    | 2    | 1    | 2    | 3    | 2    | 2    |
| CO3 | 3   | 3   | 3   | 2   | 2   | 1   | 2   | 1   | 2   | 1    | 3    | 2    | 1    | 3    | 3    | 2    | 2    |
| CO4 | 2   | 3   | 2   | 2   | 3   | 1   | 2   | 1   | 2   | 1    | 3    | 3    | 1    | 3    | 3    | 2    | 2    |
| CO5 | 2   | 3   | 3   | 3   | 3   | 2   | 2   | 2   | 2   | 1    | 3    | 3    | 2    | 3    | 3    | 3    | 2    |
| CO6 | 2   | 2   | 2   | 2   | 3   | 3   | 2   | 2   | 3   | 2    | 2    | 3    | 3    | 3    | 3    | 2    | 3    |

S-Strong(3)

M-Medium(2)

L-Low(1)



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE  
(AUTONOMOUS)

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**DEPARTMENT OF COMPUTER APPLICATIONS**  
**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: I: DCEP-I: Data Analytics using Python Lab**

**Ins. Hrs./Week: 2**

**Course Credit: 2**

**Course Code: P26CADE12BP**

**Course Objectives**

1. To understand the fundamentals of Data Analytics and Python programming.
2. To develop skills in data collection, preprocessing, and visualization using Python libraries.
3. To apply statistical and analytical techniques for data interpretation.
4. To implement machine learning techniques for predictive analytics.
5. To analyze real-world datasets and generate meaningful insights using Python tools.

**List of Exercises**

1. Write a Python program to demonstrate the use of variables, data types, operators, conditional statements, and looping statements.
2. Develop a Python program to perform operations on lists, tuples, dictionaries, and sets.
3. Write a Python program to read and write data using file handling techniques.
4. Develop a Python program using NumPy for array creation, indexing, slicing, and mathematical operations.
5. Write a Python program using Pandas to create and manipulate DataFrames and Series.
6. Develop a Python program to import CSV and Excel datasets and perform data preprocessing operations.
7. Write a Python program to handle missing values, duplicate values, and data cleaning using Pandas.
8. Develop a Python program to perform descriptive statistical analysis on a dataset.
9. Write a Python program to create line charts, bar charts, pie charts, and histograms using Matplotlib.
10. Develop a Python program to generate heat maps, box plots, and pair plots using Seaborn.
11. Write a Python program to perform correlation and regression analysis on a dataset.

12. Develop a Python program to implement classification techniques using Scikit-Learn.
13. Write a Python program to perform clustering analysis using K-Means algorithm.
14. Develop a Python program for sentiment analysis using text analytics techniques.
15. Write a mini project using Python for real-world data analytics and visualization applications.

**Total Lab Hours : 30**

### **Course Outcomes**

After completing this course, students will be able to:

1. Explain the fundamentals of Data Analytics and Python programming concepts.
2. Apply Python libraries for data collection, preprocessing, and transformation.
3. Create effective data visualizations using Python tools and techniques.
4. Analyze datasets using statistical and machine learning methods.
5. Develop analytical solutions for real-world business and research problems.
6. Evaluate recent trends and emerging technologies in Data Analytics and Artificial Intelligence.

### **Text Book**

1. Guzdial, M. (2024). Introduction to computing and programming in Python: A multimedia approach (6th ed.). Pearson.

### **Reference Books**

1. McKinney, W. (2022). Python for data analysis (3rd ed.). O'Reilly Media.
2. VanderPlas, J. (2023). Python data science handbook (2nd ed.). O'Reilly Media.
3. Géron, A. (2022). Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow (3rd ed.). O'Reilly Media.
4. Downey, A. (2024). Think Python: How to think like a computer scientist (3rd ed.). O'Reilly Media.
5. Provost, F., & Fawcett, T. (2023). Data science for business (2nd ed.). O'Reilly Media.

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1. [https://docs.python.org/3/?utm\\_source=chatgpt.com](https://docs.python.org/3/?utm_source=chatgpt.com)
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3. [https://numpy.org/doc/?utm\\_source=chatgpt.com](https://numpy.org/doc/?utm_source=chatgpt.com)
4. [https://www.kaggle.com/learn?utm\\_source=chatgpt.com](https://www.kaggle.com/learn?utm_source=chatgpt.com)
5. [https://colab.research.google.com/?utm\\_source=chatgpt.com](https://colab.research.google.com/?utm_source=chatgpt.com)

## MAPPING WITH PROGRAMME OUTCOMES

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 2   | 2   | 1   | 2   | 1   | 1   | 2   | 2   | 1    | 2    | 1    | 2    | 2    | 2    | 1    | 1    |
| CO2 | 3   | 3   | 3   | 2   | 2   | 2   | 1   | 2   | 2   | 1    | 3    | 2    | 2    | 3    | 3    | 2    | 2    |
| CO3 | 2   | 3   | 3   | 2   | 3   | 2   | 1   | 2   | 2   | 1    | 3    | 1    | 2    | 3    | 3    | 2    | 2    |
| CO4 | 3   | 3   | 3   | 3   | 3   | 2   | 1   | 2   | 2   | 1    | 3    | 3    | 2    | 3    | 3    | 2    | 3    |
| CO5 | 3   | 3   | 3   | 3   | 3   | 3   | 2   | 2   | 2   | 2    | 3    | 2    | 3    | 3    | 3    | 3    | 3    |
| CO6 | 3   | 3   | 2   | 3   | 3   | 3   | 2   | 2   | 3   | 2    | 2    | 3    | 3    | 3    | 3    | 2    | 3    |

*S-Strong(3)      M-Medium(2)      L-Low(1)*



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE  
(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016.  
(For the Candidates admitted in the academic year 2026 – 2027)

**DEPARTMENT OF COMPUTER APPLICATIONS**  
**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: I: DCEP-I: Soft Computing Lab**

**Ins. Hrs./Week: 2**

**Course Credit: 2**

**Course Code: P26CADE12CP**

**Course Objectives**

1. To understand the fundamentals and importance of Soft Computing techniques.
2. To learn fuzzy logic concepts and their applications in decision-making systems.
3. To understand artificial neural networks and their learning mechanisms.
4. To apply genetic algorithms and evolutionary computing techniques for optimization problems.
5. To analyze hybrid soft computing techniques for solving real-world problems.

**List of Exercises**

1. Write a program to demonstrate basic Soft Computing concepts and operations.
2. Develop a program to perform fuzzy set operations such as union, intersection, and complement.
3. Write a program to generate and analyze membership functions for fuzzy variables.
4. Develop a program to implement fuzzy inference rules for decision-making systems.
5. Write a program to perform fuzzification and defuzzification processes.
6. Develop a program to simulate a simple fuzzy logic controller.
7. Write a program to model and analyze artificial neurons and neural network architecture.
8. Develop a program to implement perceptron learning algorithm for classification problems.
9. Write a program to implement supervised learning in artificial neural networks.
10. Develop a program to implement unsupervised learning techniques in neural networks.

11. Write a program to implement back propagation algorithm for multilayer neural networks.
12. Develop a program to perform genetic algorithm operations such as selection, crossover, and mutation.
13. Write a program to solve optimization problems using genetic algorithms.
14. Develop a program to implement swarm intelligence techniques for optimization applications.

**Total Lab Hours: 30**

## Course Outcomes

After completing this course, students will be able to:

1. Explain the concepts, components, and applications of Soft Computing techniques.
2. Apply fuzzy logic principles for uncertainty handling and decision-making problems.
3. Analyze artificial neural network models and learning algorithms.
4. Implement genetic algorithms and evolutionary techniques for optimization problems.
5. Develop hybrid soft computing models for real-world applications.

## Text Book

1. Rajasekaran, S., & Vijayalakshmi Pai, G. A. (2019). *Neural networks, fuzzy logic, and genetic algorithms: Synthesis and applications* (2nd ed.). PHI Learning.

## Reference Books

1. Negnevitsky, M. (2020). *Artificial intelligence: A guide to intelligent systems* (4th ed.). Pearson.
2. Sivanandam, S. N., & Deepa, S. N. (2018). *Principles of soft computing* (3rd ed.). Wiley India.
3. Jang, J. S. R., Sun, C. T., & Mizutani, E. (2017). *Neuro-fuzzy and soft computing*. Pearson Education.
4. Goldberg, D. E. (2019). *Genetic algorithms in search, optimization, and machine learning*. Pearson Education.
5. Haykin, S. (2021). *Neural networks and learning machines* (3rd ed.). Pearson.

## E-Resources

1. [MIT OpenCourseWare – Artificial Intelligence Courses](https://ocw.mit.edu?utm_source=chatgpt.com) - [https://ocw.mit.edu?utm\\_source=chatgpt.com](https://ocw.mit.edu?utm_source=chatgpt.com)
2. [TensorFlow Official Documentation](https://www.tensorflow.org/learn?utm_source=chatgpt.com) - [https://www.tensorflow.org/learn?utm\\_source=chatgpt.com](https://www.tensorflow.org/learn?utm_source=chatgpt.com)
3. [Scikit-Learn Documentation](https://www.coursera.org?utm_source=chatgpt.com) - [https://www.coursera.org?utm\\_source=chatgpt.com](https://www.coursera.org?utm_source=chatgpt.com)
4. [Coursera – Soft Computing Courses](https://www.coursera.org?utm_source=chatgpt.com) - [https://www.coursera.org?utm\\_source=chatgpt.com](https://www.coursera.org?utm_source=chatgpt.com)
5. [NPTEL – Soft Computing](https://nptel.ac.in?utm_source=chatgpt.com) - [https://nptel.ac.in?utm\\_source=chatgpt.com](https://nptel.ac.in?utm_source=chatgpt.com)

## MAPPING WITH PROGRAMME OUTCOMES

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 2   | 2   | 1   | 2   | 1   | 1   | 2   | 2   | 1    | 2    | 1    | 2    | 2    | 2    | 1    | 1    |
| CO2 | 3   | 3   | 3   | 2   | 2   | 2   | 1   | 2   | 2   | 1    | 3    | 2    | 2    | 3    | 3    | 2    | 2    |
| CO3 | 3   | 3   | 3   | 3   | 3   | 2   | 1   | 2   | 2   | 1    | 3    | 3    | 2    | 3    | 3    | 2    | 3    |
| CO4 | 3   | 3   | 2   | 3   | 3   | 3   | 1   | 2   | 2   | 1    | 3    | 3    | 2    | 3    | 3    | 3    | 3    |
| CO5 | 3   | 3   | 3   | 3   | 3   | 3   | 2   | 2   | 2   | 2    | 3    | 2    | 3    | 3    | 3    | 3    | 3    |
| CO6 | 3   | 3   | 2   | 3   | 3   | 3   | 2   | 2   | 3   | 2    | 2    | 3    | 3    | 3    | 3    | 2    | 3    |

S-Strong(3)      M-Medium(2)      L-Low(1)

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE  
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**Semester: I: GEC-I: Accounting and Financial Management**

**Ins. Hrs./Week: 5**

**Course Credit: 3**

**Course Code:P26CAGE11A**

**Course Objectives**

1. To understand the fundamental principles, concepts, and conventions of accounting and the double-entry bookkeeping system.
2. To develop skills in preparing accounting records, journals, ledgers, trial balances, and final accounts.
3. To analyze and interpret financial statements using accounting ratios and financial performance indicators.
4. To acquire knowledge of cost accounting methods, cost classification, and cost control techniques for managerial decision-making.
5. To understand budgeting concepts and prepare various budgets for effective planning and control in organizations.

**Unit- I: Basics of Accounting**

**(9 Hours)**

Accounting Principles and Concepts – Double entry book keeping - Journal – Ledger  
- Trial Balance- Depreciation, Depletion and Amortization - Accounting for depreciation.

**Unit- II: Profit And Loss**

**(9 Hours)**

Trading, Manufacturing and profit and Loss account – Income and expenditure-  
Accounting record and system- assets and liabilities.

**Unit- III: Financial Statement**

**(9 Hours)**

Analysis and interpretation of financial statements with ratios

**Unit- IV: Cost Accounting**

**(9 Hours)**

Cost Accounting- Methods and Techniques of Cost Accounting- classifications of cost - Material Cost- Labour Cost – Overhead- fixed and variable cost- Cost- volume – profit analysis - marginal costing and decision making.

**Unit- V: Budget****(9 Hours)**

Budgeting and budgetary control – types of budgets- Preparation of various functional budgets- Preparations of cash budgets- flexible budgets- Advantages of Budgeting and Budgetary control.

**Unit VI – CURRENT CONTOURS (for Continuous Internal Assessment Only)**

Digital Accounting and E-Accounting Systems – Cloud-Based Accounting Applications – Artificial Intelligence and Automation in Accounting – Data Analytics for Financial Decision Making – FinTech Innovations in Accounting and Finance – GST and E-Invoicing Systems – Blockchain Technology in Accounting and Auditing – Sustainable Accounting and ESG Reporting – Cybersecurity in Financial Information Systems – Emerging Trends in Financial Management.

**Total Lecture Hours- 45****Course Outcomes**

Upon successful completion of the course, students will be able to:

1. Explain the fundamental accounting principles, concepts, and the double-entry bookkeeping system.
2. Prepare journals, ledgers, trial balances, and account for depreciation, depletion, and amortization.
3. Prepare trading, manufacturing, profit and loss accounts and identify assets, liabilities, income, and expenditure.
4. Analyze and interpret financial statements using ratio analysis and other financial performance measures.
5. Apply cost accounting techniques, budgeting methods, and budgetary control measures for managerial decision-making.

**TEXT BOOK(S)**

1. T.S. Grewal. 2019. Double Entry Book Keeping. Sultan Chand, New Delhi.
2. S.N. Maheswari. 2018. Principles of Management Accounting. Sultan Chand, New Delhi.
3. Shukla, Grewal & Gupta. 2018. Advanced Accounts. Sultan Chand Publications, New Delhi.

## REFERENCE BOOK(S)

1. S.K. Gupta & R.K. Sharma. 2010. Practical Problems in Management Accounting, Kalyani publishers, Chennai.
2. Khan and Jain. 2007. Financial Management, Tata McGraw Hill Education, New Delhi.
3. R.L. Gupta and Radhaswamy. 2016. Financial Accounting. S. Chand Publishers, New Delhi.
4. T.S Reddy and A. Murthy. 2012. Financial Accounting. Margham Publications, Chennai.
5. P.C. Tulasian. 2016. Introduction to Accounting. Seventh Edition, Pearson, UK.

## E-RESOURCES

1. <https://www.pdfdrive.com/financial-and-management-accounting-d5126265.html>
2. [https://en.wikipedia.org/wiki/Financial\\_management](https://en.wikipedia.org/wiki/Financial_management)
3. <https://libguides.furman.edu/oer/subject/accounting-and-finance>
4. [https://www.youtube.com/watch?v=c\\_D8sgO8azA](https://www.youtube.com/watch?v=c_D8sgO8azA)
5. [https://www.tutorialspoint.com/accounting\\_basics/index.htm](https://www.tutorialspoint.com/accounting_basics/index.htm)

## MAPPING WITH PROGRAMME OUTCOMES

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 3   | 3   |     |     | 3   |     | 3   |     | 3    | 3    |      |      | 3    |      |      |      |
| CO2 | 3   | 3   |     |     | 3   |     |     | 3   | 3   |      | 3    | 3    |      |      | 3    |      |      |
| CO3 | 3   | 3   |     |     | 3   |     |     | 3   | 3   |      | 3    | 3    | 3    | 3    | 3    |      | 3    |
| CO4 | 3   | 3   |     | 2   |     | 3   |     |     |     | 2    | 3    |      |      | 3    |      | 3    | 3    |
| CO5 | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3    | 3    |      | 3    |      | 3    | 3    | 3    |

**S-Strong(3)      M-Medium(2)      L-Low(1)**



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**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: I: GEC-I: Computer Applications for Office Automation**

**Ins. Hrs./Week: 5**

**Course Credit: 3**

**Course Code: P26CAGE11B**

**Course Objectives**

1. To understand the fundamentals of computers and office automation systems.
2. To develop skills in creating and managing documents using word processing software.
3. To acquire proficiency in spreadsheet applications for data processing and analysis.
4. To learn presentation techniques using presentation software and multimedia tools.
5. To apply office automation tools for effective communication, collaboration, and productivity.

**Unit I – Fundamentals of Computers and Office Automation**

**(9 Hours)**

Introduction to Computers – Characteristics and Applications of Computers – Components of Computer Systems – Input and Output Devices – Storage Devices – Operating Systems – Windows Environment – File and Folder Management – Introduction to Office Automation – Office Productivity Tools and Their Applications.

**Unit II – Word Processing Applications**

**(9 Hours)**

Introduction to Word Processing – Creating, Editing, Saving and Opening Documents – Formatting Text and Paragraphs – Page Formatting – Headers and Footers – Tables – Columns – Mail Merge – Templates – Inserting Pictures, Shapes and Objects – Printing Documents – Document Protection and Review Features.

**Unit III – Spreadsheet Applications**

**(9 Hours)**

Introduction to Spreadsheets – Workbook and Worksheet Management – Data Entry and Editing – Cell Referencing – Formulas and Functions – Sorting and Filtering Data – Charts and Graphs – Conditional Formatting – Data Validation – Pivot Tables – Spreadsheet Applications in Business and Office Management.

#### **Unit IV – Presentation Applications**

**(9 Hours)**

Introduction to Presentation Software – Creating and Designing Presentations – Slide Layouts and Themes – Inserting Text, Images, Audio and Video – SmartArt and Charts – Animation and Transition Effects – Slide Show Settings – Presentation Delivery Techniques – Printing and Sharing Presentations.

#### **Unit V – Office Communication and Collaboration Tools**

**(9 Hours)**

Electronic Mail (E-Mail) – Managing Contacts and Calendars – Internet and Web Browsing – Cloud Computing Concepts – Online Collaboration Tools – Video Conferencing Applications – File Sharing and Storage – Digital Communication Etiquette – Cyber Security and Safe Computing Practices in Office Environments.

#### **Unit VI –CURRENT CONTOURS (for Continuous Internal Assessment Only)**

Artificial Intelligence in Office Automation – Generative AI Tools for Document Creation and Productivity – Cloud-Based Office Applications and Collaboration Platforms – Robotic Process Automation (RPA) in Business Operations – Smart Digital Workspaces – Internet of Things (IoT) in Office Management – Digital Transformation in Organizations – Cybersecurity and Data Privacy in Automated Office Systems – Paperless Office Concepts – Emerging Trends in Remote and Hybrid Work Environments.

**Total Lecture Hours- 45**

#### **Course Outcomes**

Upon successful completion of the course, students will be able to:

1. Explain the fundamentals of computers, operating systems, and office automation tools.
2. Create, edit, format, and manage professional documents using word processing software.
3. Apply spreadsheet techniques, formulas, functions, and charts for data analysis and reporting.
4. Design and deliver effective presentations using presentation software and multimedia elements.
5. Utilize office communication and collaboration tools for efficient workplace communication.
6. Examine emerging trends in office automation

#### **Text Books**

1. Vermaat, M. E., Sebok, S. L., Freund, S. M., Campbell, J. T., & Frydenberg, M. (2022). *Discovering Computers and Microsoft Office 365 & Office 2021*. Cengage Learning.
2. Lambert, J. (2022). *Microsoft Office 365 Step by Step*. Microsoft Press.

## Reference Books

1. Shelly, G. B., & Vermaat, M. E. (2021). *Microsoft Office 365: Introductory Concepts and Techniques*. Cengage Learning.
2. Rutkosky, N., Roggenkamp, A., & Rutkosky, I. (2020). *Microsoft Office Professional*. EMC Publishing.
3. Parsons, J. J., & Oja, D. (2021). *New Perspectives on Computer Concepts*. Cengage Learning.
4. Sinha, P. K., & Sinha, P. (2019). *Computer Fundamentals*. BPB Publications.
5. Rajaraman, V. (2021). *Fundamentals of Computers*. PHI Learning.

## E-Resources

1. [https://learn.microsoft.com?utm\\_source=chatgpt.com](https://learn.microsoft.com?utm_source=chatgpt.com)
2. [https://support.microsoft.com/training?utm\\_source=chatgpt.com](https://support.microsoft.com/training?utm_source=chatgpt.com)
3. [https://support.google.com/a/users?utm\\_source=chatgpt.com](https://support.google.com/a/users?utm_source=chatgpt.com)
4. [https://documentation.libreoffice.org?utm\\_source=chatgpt.com](https://documentation.libreoffice.org?utm_source=chatgpt.com)
5. [https://edu.gcfglobal.org/en/topics/computers/?utm\\_source=chatgpt.com](https://edu.gcfglobal.org/en/topics/computers/?utm_source=chatgpt.com)

## MAPPING WITH PROGRAMME OUTCOME

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 1   | 2   | -   | 1   | -   | -   | 1   | 1   | -    | 1    | -    | 1    | -    | 2    | -    | -    |
| CO2 | 2   | 1   | 3   | -   | -   | -   | 1   | 1   | 1   | 1    | 1    | -    | 1    | -    | 2    | -    | -    |
| CO3 | 2   | 3   | 3   | 1   | 2   | 1   | -   | 1   | 1   | -    | 2    | -    | 1    | 2    | 3    | -    | -    |
| CO4 | 1   | 2   | 3   | -   | 1   | 1   | 1   | 1   | 1   | 2    | 1    | -    | 1    | -    | 2    | 1    | -    |
| CO5 | 1   | 2   | 3   | -   | 1   | 2   | 2   | 1   | 2   | 3    | 1    | -    | 2    | -    | 2    | 2    | 1    |
| CO6 | 2   | 3   | 2   | 1   | 3   | 3   | 2   | 2   | 3   | 2    | 2    | 1    | 3    | 2    | 3    | 2    | 3    |

S-Strong(3)    M-Medium(2)    L-Low(1)



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**DEPARTMENT OF COMPUTER APPLICATIONS**  
**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: I: GEC-I: Organizational Behavior**

**Ins. Hrs./Week: 5**

**Course Credit: 3**

**Course Code: P26CAGE11C**

**Course Objectives**

1. To understand the fundamentals of organizations, organizational behavior, and their role in achieving organizational goals.
2. To analyze individual behavior, perception, attitudes, and personality and their influence on workplace effectiveness.
3. To examine various motivational theories and interpersonal behavior for improving employee performance and relationships.
4. To develop knowledge of group dynamics, leadership, and communication processes in organizational settings.
5. To understand organizational theories and organizational structure design for effective management and decision-making.

**Unit – I: Nature of Organization:**

**(9 Hours)**

Features – types – goals. Nature Of Organizational Behavior: Nature of OB – Role of OB – Foundations of OB.

**Unit – II: Nature of Human Behavior:**

**(9 Hours)**

Nature and causes of individual differences – models of man. Perception: concept – process – perceptual selectivity and distortion – Developing perceptual skills. Attitudes: Concept – Theories – Formation factors – measurements – Attitude change.

**Unit – III: Personality:**

**(9 Hours)**

Concept – theories – determinants of personality- Personality and behaviour. Motivation: Definition – Motivation & Behavior – Theories – approaches – incentives. Interpersonal Behavior: Transactional analysis – Ego states – life scripts – life positions – transactions – stroking – Psychological games – Benefits of TA.

**Unit – IV: Group Dynamics:****(9 Hours)**

Concepts & features of group – types of groups – group behaviour – group decision making – committee – task group – inter group behaviour. Leadership: Definitions – types – importance theories – styles. Communication: Basics of communication – Communication network – Factors affecting communication – Business writing – Office management – Presentation strategies.

**Unit – V: Organization Theory:****(9 Hours)**

Classical organizational theory – neoclassical organization theory. Designing Of Organizational Structure: need – planning and process – Departmentation: Span of management – delegation of authorities – centralization & decentralization. Forms of Organizational Structures: line and staff – functional – divisional – project – matrix – free form.

**Unit VI –CURRENT CONTOURS (for Continuous Internal Assessment Only)**

Digital Transformation and Organizational Behavior – Impact of digital technologies on organizational culture, employee engagement, and workplace productivity. Artificial Intelligence and Employee Management – Applications of AI in recruitment, performance evaluation, workforce planning, and decision-making processes. Remote Work and Hybrid Workplace Models.

**Total Lecture Hours- 45****Course Outcomes**

Upon successful completion of the course, students will be able to:

1. Explain the nature, types, and goals of organizations and the foundations of organizational behavior.
2. Analyze individual differences, perception processes, and attitude formation affecting workplace behavior.
3. Evaluate personality traits, motivation theories, and interpersonal behavior in organizational contexts.
4. Demonstrate understanding of group dynamics, leadership styles, and communication systems within organizations.
5. Apply principles of organizational theory and organizational structure design to real-world business situations.
6. Examine contemporary trends in organizational behavior, including digital transformation, artificial intelligence and remote work.

## Text Book

1. Prasad L.M., "Organisational Behavior", Sultan Chand and Sons, New Delhi, 2014. 46

## Reference Books

1. Robbins, S. P., & Judge, T. A. (2022). *Organizational behavior* (19th ed.). Pearson Education.
2. Luthans, F. (2021). *Organizational behavior: An evidence-based approach* (14th ed.). McGraw-Hill Education.
3. Newstrom, J. W. (2019). *Organizational behavior: Human behavior at work* (14th ed.). McGraw-Hill Education.
4. Greenberg, J., & Baron, R. A. (2018). *Behavior in organizations* (10th ed.). Pearson Education.
5. Aswathappa, K. (2021). *Organizational behavior* (13th ed.). Himalaya Publishing House.

## E-Resources

1. [https://nptel.ac.in?utm\\_source=chatgpt.com](https://nptel.ac.in?utm_source=chatgpt.com)
2. [https://swayam.gov.in?utm\\_source=chatgpt.com](https://swayam.gov.in?utm_source=chatgpt.com)
3. [https://ocw.mit.edu?utm\\_source=chatgpt.com](https://ocw.mit.edu?utm_source=chatgpt.com)
4. [https://www.coursera.org?utm\\_source=chatgpt.com](https://www.coursera.org?utm_source=chatgpt.com)
5. [https://www.open.edu/openlearn/management-leadership?utm\\_source=chatgpt.com](https://www.open.edu/openlearn/management-leadership?utm_source=chatgpt.com)

## MAPPING WITH PROGRAMME OUTCOME

| COs/POs & PSOs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1            | 3   | 1   | 2   | -   | -   | -   | 1   | 1   | 1   | 1    | -    | -    | -    | -    | -    | 1    | -    |
| CO2            | 2   | 3   | 2   | 1   | 2   | -   | 1   | 1   | 1   | 2    | -    | -    | -    | 1    | -    | 1    | -    |
| CO3            | 2   | 3   | 2   | 1   | 2   | 1   | 2   | 1   | 1   | 2    | -    | -    | 1    | 1    | -    | 2    | 1    |
| CO4            | 2   | 2   | 3   | 1   | 1   | 2   | 2   | 1   | 1   | 3    | -    | -    | 1    | -    | -    | 3    | 1    |
| CO5            | 3   | 3   | 2   | 1   | 2   | 2   | 1   | 1   | 1   | 1    | 1    | -    | -    | 2    | 1    | 2    | 2    |
| CO6            | 2   | 3   | 2   | 2   | 2   | 3   | 2   | 2   | 3   | 3    | 1    | 1    | 2    | 2    | 2    | 2    | 3    |

S-Strong(3)    M-Medium(2)    L-Low(1)

**SEC-I**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE  
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**DEPARTMENT OF COMPUTER APPLICATIONS**  
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**Semester: I: SEC-I: Digital Marketing**

**Ins. Hrs./Week: 2**

**Course Credit: 2**

**Course Code: P26SECA11**

**Course Objectives**

1. To understand the concepts, principles, and significance of Digital Marketing in modern business.
2. To learn various E-Mail Marketing techniques and promotional strategies.
3. To acquire knowledge of Display Advertising tools, techniques, and campaign management.
4. To understand Mobile Marketing, Search Engine Optimization, and content optimization methods.
5. To develop skills in Social Media Marketing, branding strategies, and emerging trends in Digital Marketing.

**Unit I – Introduction to Digital Marketing**

**(6 Hours)**

Digital Marketing – Digital Marketing and Online Marketing – Principles of Digital Marketing – Origin of Digital Marketing – Role of Internet – Types of E-Markets – Barriers for Digital Marketing – Advantages of Digital Marketing – Disadvantages of Digital Marketing – Reasons for the Growth of Digital Marketing.

**Unit II – E-Mail Marketing**

**(6 Hours)**

Concept of E-Mail Marketing – Forms of E-Mail Marketing – Welcome Email – Informative Message – Product Launch Email – Promotional Email – Weekly and Monthly Newsletter – Event or Webinar Invitation Email – Birthday and Anniversary Email – Feedback Request Email – Thank You Email – Implications of E-Mail Marketing – E-Mail Automation – Advantages of E-Mail Automation – E-Mail Oriented Promotional Programs – Sales Promotional Emails – Limited Time Offers – Subscriber-Special Offers – Seasonal Campaigns.

**Unit III – Display Advertising**

**(6 Hours)**

Introduction to Display Advertising – Types of Display Advertising – Traditional Display Advertisements – Animated Ads – Video Ads – Interactive Ads – Native Ads – Search Engine Marketing – Expandable Ads – Interstitial Ads – Retargeting and Remarketing Ads – Lightbox Ads – Tools of Display Advertising – Banner Creation Tools – Demand Side Platforms – Techniques of Display Advertising – Managing Display Advertising – Display Ad Network – Performance Improvement of Display Ad Campaigns – Advantages and Disadvantages of Display Advertising.

#### **Unit IV – Mobile Marketing and Search Engine Optimization**

**(6 Hours)**

Mobile Marketing – Concept and Implications – SMS Marketing – Marketing on Mobile Applications – Search Engine Optimization – Introduction to SEO – Keyword Planner Tools – On-Page SEO Techniques – Indexing and Keyword Placement – Content Optimization – Yoast SEO Plug-in – Off-Page SEO Techniques.

#### **Unit V – Social Media Marketing and Social Networks**

**(6 Hours)**

Social Media Marketing – Introduction and Significance – Facebook Marketing – Types of Ad Formats – Setting up Facebook Advertising Account – Facebook Audience and its Types – Designing Facebook Advertising Campaigns – Facebook Pixel – Twitter Marketing – LinkedIn Marketing – Digital Marketing Strategy – Social Networks – Instagram – YouTube – WhatsApp – Features and Mechanism – Metrics – Reach and Users – Virtual Marketing – Content Marketing – Branding Strategy – Sales Strategy – Data Safety and Privacy Concerns.

#### **UNIT VI – CURRENT CONTOURS (*for Continuous Internal Assessment Only*):**

Artificial Intelligence in Digital Marketing - Influencer and Social Media Marketing - Voice Search and Mobile Marketing - Video Marketing and Short-Form Content - Personalized and Data-Driven Marketing.

**Total Lecture Hours: 30**

#### **Course Outcomes**

After successful completion of the course, students will be able to:

1. Explain the fundamentals, advantages, and growth of Digital Marketing and online marketing platforms.
2. Design and analyze effective E-Mail Marketing campaigns and automated promotional programs.
3. Apply Display Advertising techniques and evaluate the performance of digital ad campaigns.
4. Implement Mobile Marketing and SEO strategies using keyword planning and optimization techniques.
5. Develop Social Media Marketing campaigns using platforms such as Facebook, Instagram, LinkedIn, and YouTube.
6. Analyze recent trends and emerging technologies in Digital Marketing, including AI, influencer marketing, and data-driven marketing strategies.

## Text Books

1. JGND PSOU. (2023). Digital Marketing. Jagat Guru Nanak Dev Punjab State Open University.
2. Chaffey, D., & Ellis-Chadwick, F. (2023). Digital marketing: Strategy, implementation and practice (9th ed.). Pearson Education.
3. Ryan, D. (2024). Understanding digital marketing: Marketing strategies for engaging the digital generation (5th ed.). Kogan Page.
4. Kapoor, N. (2022). Fundamentals of digital marketing. Pinnacle Learning.
5. Gupta, S. (2021). Digital marketing. McGraw Hill Education.

## Reference Books

1. Tuten, T. L., & Solomon, M. R. (2023). Social media marketing (5th ed.). Sage Publications.
2. Dodson, I. (2021). The art of digital marketing (2nd ed.). Wiley.
3. Charlesworth, A. (2022). Digital marketing: A practical approach (4th ed.). Routledge.
4. Strauss, J., & Frost, R. (2021). E-marketing (8th ed.). Pearson Education.
5. Pulizzi, J. (2023). Epic content marketing (2nd ed.). McGraw Hill.

## E-Resources

1. [https://grow.google/intl/en\\_in/digitalgarage/?utm\\_source=chatgpt.com](https://grow.google/intl/en_in/digitalgarage/?utm_source=chatgpt.com)
2. [https://blog.hubspot.com/marketing?utm\\_source=chatgpt.com](https://blog.hubspot.com/marketing?utm_source=chatgpt.com)
3. [https://support.google.com/google-ads?utm\\_source=chatgpt.com](https://support.google.com/google-ads?utm_source=chatgpt.com)
4. [https://www.facebook.com/business/learn?utm\\_source=chatgpt.com](https://www.facebook.com/business/learn?utm_source=chatgpt.com)
5. [https://mailchimp.com/resources/?utm\\_source=chatgpt.com](https://mailchimp.com/resources/?utm_source=chatgpt.com)

## MAPPING WITH PROGRAMME OUTCOMES

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 2   | 2   | 1   | 2   | 1   | 1   | 1   | 2   | 1    | 2    | 1    | 1    | 2    | 2    | 1    | 1    |
| CO2 | 2   | 3   | 3   | 2   | 2   | 2   | 1   | 2   | 2   | 1    | 3    | 1    | 2    | 3    | 3    | 2    | 2    |
| CO3 | 2   | 3   | 3   | 2   | 3   | 2   | 1   | 2   | 2   | 1    | 3    | 1    | 2    | 3    | 3    | 2    | 2    |
| CO4 | 3   | 3   | 3   | 2   | 3   | 2   | 1   | 2   | 2   | 1    | 3    | 1    | 2    | 3    | 3    | 2    | 2    |
| CO5 | 2   | 3   | 3   | 2   | 2   | 3   | 1   | 2   | 2   | 2    | 3    | 1    | 2    | 3    | 3    | 3    | 2    |
| CO6 | 3   | 3   | 2   | 3   | 3   | 3   | 2   | 2   | 3   | 2    | 2    | 2    | 3    | 3    | 3    | 2    | 3    |

S-Strong(3)    M-Medium(2)    L-Low(1)

VAC - I

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE  
(AUTONOMOUS)



SUNDARAKKOTTAI, MANNARGUDI- 614016.  
(For the Candidates admitted in the academic year 2026 – 2027)  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: I: VAC-I: Applied Artificial Intelligence and Emerging Technologies**

**Ins. Hrs./Week:2**

**Course Credit: 2**

**Course Code: P26CAVA11**

**Course Objectives**

1. To understand the fundamental concepts, techniques, and applications of Artificial Intelligence.
2. To explore machine learning, deep learning, and intelligent decision-making systems.
3. To examine emerging AI technologies and their applications across various domains.
4. To develop knowledge of AI-driven automation, intelligent agents, and smart systems.
5. To analyze ethical, social, and security challenges associated with AI and emerging technologies.

**Unit I – Foundations of Artificial Intelligence**

**(6 hours)**

Introduction to Artificial Intelligence – History and Evolution of AI – Characteristics of Intelligent Systems – AI Problem Solving Techniques – Knowledge Representation – Search Strategies – Reasoning and Inference – Applications of AI – AI Development Tools and Platforms.

**Unit II – Machine Learning and Data-Driven Intelligence**

**(6 hours)**

Introduction to Machine Learning – Types of Machine Learning (Supervised, Unsupervised, Reinforcement Learning) – Data Preprocessing – Feature Engineering – Classification and Regression Techniques – Clustering Methods – Model Evaluation and Performance Metrics – Applications of Machine Learning.

**Unit III – Deep Learning and Intelligent Systems**

**(6 hours)**

Introduction to Deep Learning – Artificial Neural Networks – Deep Neural Networks – Convolutional Neural Networks (CNN) – Recurrent Neural Networks (RNN) – Natural Language Processing – Computer Vision – Speech Recognition Systems – AI-Powered Intelligent Assistants.

**Unit IV – Emerging Technologies in Artificial Intelligence**

**(6 hours)**

Internet of Things (IoT) and AI Integration – Edge AI and Fog Computing – Blockchain and AI – Explainable AI (XAI) – Generative AI – Large Language Models – Autonomous Systems – AI in Smart Cities, Healthcare, Education, and Industry 4.0.

## **Unit V – AI Applications, Ethics and Future Trends**

**(6 hours)**

AI in Business Analytics – AI in Cybersecurity – Robotic Process Automation – AI for Sustainable Development – Ethical AI – Bias and Fairness in AI Systems – Privacy and Security Issues – AI Governance and Regulations – Future Scope of Artificial Intelligence.

## **Unit VI – CURRENT CONTOURS (for Continuous Internal Assessment Only):**

Quantum Artificial Intelligence – Neuromorphic Computing – Digital Twins and AI – Federated Learning – Explainable and Trustworthy AI – AI for Climate Intelligence – Human-AI Collaboration – Autonomous Robotics – Multimodal AI Systems – AI in Metaverse and Extended Reality (XR) Environments.

**Total Lecture Hours: 30**

## **Course Outcomes**

Upon successful completion of the course, students will be able to:

1. Explain the fundamental concepts, principles, and applications of Artificial Intelligence.
2. Apply machine learning techniques for solving real-world data-driven problems.
3. Analyze deep learning models and intelligent systems for advanced AI applications.
4. Evaluate emerging technologies and their integration with AI-based solutions.
5. Assess ethical, legal, privacy, and security challenges associated with AI deployment.
6. Design innovative AI-enabled solutions using contemporary and emerging technologies.

## **Text Books**

1. Russell, S., & Norvig, P. (2021). *Artificial intelligence: A modern approach* (4th ed.). Pearson.
2. Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep learning*. MIT Press.
3. Ethem Alpaydin. (2021). *Machine learning* (Revised ed.). MIT Press.

## **Reference Books**

1. Mitchell, T. M. (2017). *Machine learning*. McGraw-Hill Education.
2. Bishop, C. M. (2006). *Pattern recognition and machine learning*. Springer.
3. Marr, B. (2023). *Artificial intelligence in practice* (2nd ed.). Wiley.
4. Geron, A. (2022). *Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow* (3rd ed.). O'Reilly Media.
5. Kaplan, J. (2016). *Artificial intelligence: What everyone needs to know*. Oxford University Press.

## **E-Resources**

1. [https://www.ibm.com/artificial-intelligence?utm\\_source=chatgpt.com](https://www.ibm.com/artificial-intelligence?utm_source=chatgpt.com)
2. [https://ai.google?utm\\_source=chatgpt.com](https://ai.google?utm_source=chatgpt.com)
3. [https://www.microsoft.com/en-us/ai?utm\\_source=chatgpt.com](https://www.microsoft.com/en-us/ai?utm_source=chatgpt.com)
4. [https://ai.google?utm\\_source=chatgpt.com](https://ai.google?utm_source=chatgpt.com)
5. [https://ocw.mit.edu?utm\\_source=chatgpt.com](https://ocw.mit.edu?utm_source=chatgpt.com)

## MAPPING WITH PROGRAMME OUTCOME

| COs        | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| <b>CO1</b> | 3   | 2   | 2   | 1   | 2   | 1   | 1   | 1   | 2   | 1    | 2    | 1    | 1    | 1    | 2    | —    | 1    |
| <b>CO2</b> | 3   | 3   | 2   | 2   | 2   | 2   | 1   | 2   | 2   | 1    | 3    | 2    | 2    | 3    | 3    | 1    | 2    |
| <b>CO3</b> | 3   | 3   | 2   | 3   | 3   | 2   | 1   | 2   | 2   | 1    | 3    | 3    | 2    | 3    | 3    | 1    | 2    |
| <b>CO4</b> | 2   | 3   | 2   | 2   | 2   | 3   | 1   | 2   | 3   | 2    | 2    | 2    | 2    | 3    | 3    | 2    | 3    |
| <b>CO5</b> | 2   | 3   | 2   | 2   | 3   | 2   | 3   | 2   | 2   | 2    | 1    | 1    | 1    | 2    | 2    | 2    | 3    |
| <b>CO6</b> | 3   | 3   | 3   | 2   | 2   | 3   | 2   | 3   | 3   | 2    | 3    | 2    | 3    | 3    | 3    | 3    | 3    |

S-Strong(3)    M-Medium(2)    L-Low(1)

## **SEMESTER II**

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE**  
**(AUTONOMOUS)**



**SUNDARAKKOTTAI, MANNARGUDI- 614016.**  
*(For the Candidates admitted in the academic year 2026 – 2027)*

**DEPARTMENT OF COMPUTER APPLICATIONS**  
**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: II-CC-III: Advanced Database Management Systems**

**Ins. Hrs./Week: 6**

**Course Credit: 4**

**Course Code: P26CA204**

**Course Objectives**

1. To understand advanced concepts and architecture of database management systems.
2. To study transaction processing, SQL, PL/SQL, and concurrency control mechanisms.
3. To analyze distributed, object-oriented, and NoSQL database systems.
4. To apply data warehousing and data mining techniques for real-time applications.
5. To familiarize students with recent trends and emerging technologies in advanced database systems.

**UNIT – I: Database Concepts and Architecture ( 12 Hours)**

Introduction to DBMS - Database System Applications - Database Architecture - Data Models - Entity Relationship Model - Relational Model - Relational Algebra - SQL Fundamentals - Integrity Constraints - Functional Dependencies - Normalization - Transaction Concepts and ACID Properties.

**UNIT – II: Transaction Processing, SQL and PL/SQL ( 12 Hours)**

Transaction Management - Transaction States - Serializability - Concurrency Control Techniques - Lock-Based Protocols - Timestamp-Based Protocols - Deadlock Handling - Recovery System - Log-Based Recovery - Checkpoints - Shadow Paging - Database Backup and Recovery Techniques - Advanced SQL Queries - Joins and Nested Queries - Views and Indexes - PL/SQL Fundamentals - Cursors and Triggers - Stored Procedures and Functions - Exception Handling in PL/SQL.

**UNIT – III: Distributed and Object-Oriented Databases ( 12 Hours)**

Distributed Database Concepts - Distributed Database Architecture - Fragmentation and Replication - Distributed Query Processing - Distributed Transactions - Object-Oriented Database Concepts - Object Identity - Object Structure - Object Query Language - Object Relational Databases.

#### **UNIT – IV: Data Warehousing and Data Mining ( 12 Hours)**

Introduction to Data Warehousing - Data Warehouse Architecture - ETL Process - OLAP Operations - Data Cube Technology - Data Mining Concepts - Association Rule Mining - Classification and Clustering - Web Mining - Applications of Data Mining.

#### **UNIT – V: NoSQL and Big Data Databases ( 12 Hours)**

Introduction to NoSQL Databases - Types of NoSQL Databases - Key-Value Databases - Document Databases - Column Family Databases - Graph Databases - Big Data Fundamentals - Hadoop Ecosystem - HDFS - MapReduce - Introduction to MongoDB and Cassandra.

#### **UNIT-VI CURRENT CONTOURS (for Continuous Internal Assessment Only):**

Cloud Databases and Database as a Service (DBaaS) - Artificial Intelligence in Database Management - Blockchain Databases - Real-Time Data Analytics - In-Memory Databases - Edge and Fog Databases - Internet of Things (IoT) Data Management - Data Security and Privacy Techniques - Green Data Centers - Quantum Database Concepts - Autonomous Databases - Modern Trends in Big Data Technologies.

**Total Lecture Hours- 60**

#### **COURSE OUTCOME**

After the completion of the Course, the Students will be able to

1. Explain advanced database concepts, architecture, and relational database design principles.
2. Apply SQL and PL/SQL techniques for database programming and transaction management.
3. Analyze distributed, object-oriented, and NoSQL database systems.
4. Demonstrate data warehousing and data mining techniques for knowledge discovery.
5. Evaluate big data technologies and modern database management tools.
6. Analyze recent developments and emerging trends in advanced database technologies.

#### **TEXT BOOK(S)**

1. Elmasri, R., & Navathe, S. B. (2017). *Fundamentals of database systems* (7th ed.). Pearson Education.

2. Silberschatz, A., Korth, H. F., & Sudarshan, S. (2020). *Database system concepts* (7th ed.). McGraw Hill.
3. Connolly, T., & Begg, C. (2015). *Database systems: A practical approach to design, implementation, and management* (6th ed.). Pearson.
4. Han, J., Kamber, M., & Pei, J. (2011). *Data mining: Concepts and techniques* (3rd ed.). Morgan Kaufmann.
5. White, T. (2015). *Hadoop: The definitive guide* (4th ed.). O'Reilly Media.

## REFERENCE BOOK(S)

1. Ramakrishnan, R., & Gehrke, J. (2003). *Database management systems* (3rd ed.). McGraw Hill.
2. Date, C. J. (2004). *An introduction to database systems* (8th ed.). Pearson Education.
3. Coronel, C., & Morris, S. (2016). *Database systems: Design, implementation, and management* (12th ed.). Cengage Learning.
4. Sadalage, P. J., & Fowler, M. (2012). *NoSQL distilled: A brief guide to the emerging world of polyglot persistence*. Addison-Wesley.
5. Garcia-Molina, H., Ullman, J. D., & Widom, J. (2008). *Database systems: The complete book* (2nd ed.). Pearson.

## E-Resources

1. <https://www.oracle.com/database/>
2. <https://www.mongodb.com/>
3. <https://hadoop.apache.org/>
4. <https://www.postgresql.org/>
5. <https://www.ibm.com/topics/database-management-system>

## MAPPING WITH PROGRAMME OUTCOME

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 2   | 2   | 1   | 1   | -   | -   | 1   | 1   | -    | 3    | 1    | 1    | 2    | 2    | 1    | 1    |
| CO2 | 3   | 3   | 3   | 2   | 2   | 1   | -   | 1   | 1   | -    | 3    | 2    | 1    | 2    | 3    | 2    | 1    |
| CO3 | 3   | 3   | 2   | 2   | 2   | 1   | -   | 1   | 1   | -    | 3    | 2    | 1    | 3    | 3    | 2    | 1    |
| CO4 | 3   | 3   | 3   | 3   | 2   | 2   | 1   | 1   | 1   | -    | 3    | 2    | 1    | 3    | 3    | 2    | 2    |
| CO5 | 3   | 3   | 3   | 3   | 3   | 2   | 1   | 1   | 2   | -    | 3    | 2    | 2    | 3    | 3    | 2    | 2    |
| CO6 | 2   | 2   | 2   | 3   | 3   | 3   | 2   | 1   | 2   | 1    | 2    | 3    | 2    | 2    | 3    | 2    | 3    |

S-Strong(3)      M-Medium(2)      L-Low(1)

# SENGAMALA THAYAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016.

(For the Candidates admitted in the academic year 2026 – 2027)



## DEPARTMENT OF COMPUTER APPLICATIONS

MASTER OF COMPUTER APPLICATIONS (MCA)

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Semester: II-CC-IV: Object Oriented Programming using Java

Ins. Hrs./Week: 6

Course Credit: 4

Course Code: P26CA205

### Course Objectives

1. To understand the concepts of Object-Oriented Programming and Java programming fundamentals.
2. To develop Java programs using classes, objects, inheritance, packages, and interfaces.
3. To apply exception handling and multithreading techniques in software development.
4. To implement file handling and input/output stream operations in Java applications.
5. To design and develop Java-based applications using applets and modern programming practices.

### UNIT-I: Introduction of OOP

(12 Hours)

Object Oriented Programming: Introduction to OOP– Objects and Classes–Characteristics of OOP – Difference between OOP and Procedure Oriented Language –Introduction to java Programming: Introduction–Features of Java –Comparing java and Other Languages – Applications and Applets – Java Development Kit – Complex Programs – Java Source File Structure–Prerequisites for Compiling and Running Java Program.

### UNIT- II: Java Language Fundamentals

(12 Hours)

The Building Blocks of Java – Lexical Tokens –Data Types– Variable Declarations – Object Reference Variable – Default Members For Member Variables – Initializing Local Reference Variables – Wrapper Classes – Operators and Assignment – Control Structures – Branching Statement –Arrays – One Dimensional Arrays – Two Dimensional Array –Strings– String BufferClasses.

### UNIT- III: Packages and Interfaces

(12 Hours)

Java as an OOP Language: Defining Classes– Passing Arguments to Methods –Overloading Methods – Overriding Methods –Finalizer Methods –Modifiers–Method Protection and Inheritance – Finalizing Classes –Packages– The import Command –Creating Packages – Packages and Class Protection –Interfaces – Defining an Interface – Extending Interface – Implementing Interface – Other Uses of Interface.

### UNIT- IV: Exception Handling and Thread

(12 Hours)

Exception Handling: Introduction–Basics of Exception Handling–Exception Hierarchy– Constructors and Methods in Throwable Class- Unchecked and Checked Exceptions – Handling Exceptions in Java – Exception and Inheritance – Throwing User-defined Exceptions – Redirecting and Rethrowing Exceptions – Advantages of Exception

Handling Mechanism – Multithreading: Introduction –Creating Threads –Thread Life-cycle– Thread Priorities and Thread Scheduling– Thread Synchronization.

### **UNIT-V: Files, I/O Streams and Applet (12 Hours)**

Overview – Java I/O – File Streams – File Input Stream and File Output Stream–Filter Streams–Random Access File–Serialization–Applets: Introduction– Java Applications versus Java Applets –Applet Life cycle – Working with Applets–The HTML APPLET Tag– Attributes in Applet Tag –Passing Parameter to Applets – Running Applet Using Applet Viewer– Running Applet Using WebBrowser.

### **UNIT-VI CURRENT CONTOURS (for Continuous Internal Assessment Only):**

Collections Framework – Generics – Lambda Expressions – Functional Programming Concepts – Java Streams API – JDBC and Database Connectivity – GUI Development using JavaFX – Network Programming – Web Services – Introduction to Spring Framework – Microservices Architecture – Cloud-Based Java Applications.

**Total Lecture Hours 60**

### **COURSE OUTCOMES**

Upon successful completion of the course, students will be able to:

1. Explain the principles of Object-Oriented Programming and Java architecture.
2. Develop Java programs using data types, control structures, arrays, and string handling techniques.
3. Apply classes, inheritance, packages, and interfaces to design reusable software components.
4. Implement robust exception handling and multithreading mechanisms in Java applications.
5. Develop file-processing applications using Java I/O streams and applet-based programs.
6. Utilize advanced Java technologies and modern frameworks for enterprise application development.

### **TEXT BOOK(S)**

1. Radha Krishna, P.2007. Object Oriented Programming through Java.First Edition,UniversityPress.
2. Rizwan Ahmed .P. 2017. Java Programming. Margham Publications, Chennai.

### **REFERENCE BOOK(S)**

1. Cay S.Horstmann. 2020. Core Java Volume-I Fundamental. Eleventh Edition, PearsonPublication.
2. Ken Arnold ,James Gosling, David Holmes. 2007. The Java Programming Language. ThirdEdition, Pearson Publication.
3. Muthu C. 2006. Essential of Java Programming. Second Edition, Vijay Nicole imprintsPrivate Limited, Chennai.
4. Soma sundaram K. 2006. Programming in Java. First Edition, Jaico Publications House,Chennai.
5. Steven Haines. 2001. Java 2 from Scratch. First Edition, Prentice Hall of India, New Delhi.

## E-RESOURCES

1. <https://www.tutorialspoint.com>
2. <https://www.codecademy.com/learn/learn-java>
3. <https://www.learnjavaonline.org>
4. <https://examples.javacodegeeks.com/core-java/net/url/java-net-url-example>
5. <https://docs.oracle.com/javase/7/docs/api/java/net/URL.html>

## MAPPING WITH PROGRAMME OUTCOME

| POs<br>&<br>PSOs | PO<br>1 | PO<br>2 | PO<br>3 | PO<br>4 | PO<br>5 | PO<br>6 | PO<br>7 | PO<br>8 | PO<br>9 | PO1<br>0 | PSO<br>1 | PSO<br>2 | PSO<br>3 | PSO<br>4 | PSO<br>5 | PSO<br>6 | PSO<br>7 |
|------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|----------|
| CO1              | 3       | 2       | 2       | 1       | 2       | 1       | 1       | 1       | 2       | 1        | 2        | 1        | 1        | 1        | 2        | 1        | 1        |
| CO2              | 3       | 3       | 2       | 2       | 2       | 2       | 1       | 2       | 2       | 1        | 3        | 1        | 2        | 2        | 3        | 2        | 1        |
| CO3              | 3       | 3       | 2       | 2       | 2       | 2       | 1       | 2       | 2       | 1        | 3        | 2        | 2        | 3        | 3        | 3        | 2        |
| CO4              | 3       | 3       | 2       | 2       | 3       | 2       | 1       | 2       | 2       | 1        | 3        | 2        | 2        | 3        | 3        | 2        | 2        |
| CO5              | 3       | 3       | 3       | 2       | 2       | 2       | 1       | 2       | 2       | 1        | 3        | 1        | 2        | 3        | 3        | 2        | 2        |
| CO6              | 3       | 3       | 3       | 2       | 2       | 3       | 2       | 3       | 3       | 2        | 3        | 2        | 3        | 3        | 3        | 3        | 3        |

S-Strong(3)

M-Medium(2)

L-Low(1)

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE**  
(AUTONOMOUS)



SUNDARAKKOTTAI, MANNARGUDI- 614016.  
(For the Candidates admitted in the academic year 2026 – 2027)

**DEPARTMENT OF COMPUTER APPLICATIONS**

MASTER OF COMPUTER APPLICATIONS (MCA)

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**Semester: II-CP-II: Java and Database Lab**

**Ins. Hrs./Week :4**

**Course Credit: 4**

**Course Code: P26CA206P**

**Java lab**

**Course Objectives**

1. To understand the concepts of Object-Oriented Programming and Java programming fundamentals.
2. To develop Java programs using classes, objects, inheritance, packages, and interfaces.
3. To apply exception handling and multithreading techniques in software development.
4. To implement file handling and input/output stream operations in Java applications.
5. To design and develop Java-based applications using applets and modern programming practices.

**LIST OF PROGRAMS**

1. Develop a Simple Banking Calculator Application to perform basic arithmetic operations such as addition, subtraction, multiplication, and division for customer transactions.
2. Create a Construction Cost Estimation System to calculate the area of a rectangle using constructor concepts in Java.
3. Develop a Student Result Processing System to calculate percentage and grade using command line arguments.
4. Design a Shape Drawing Application for drawing circle, triangle, and square using polymorphism and inheritance concepts.
5. Develop an Employee Management System or College Management System to demonstrate multiple inheritance concepts using Java interfaces.
6. Create a Railway Reservation or Online Ticket Booking System using multithreading concepts and assign priorities to different threads.
7. Develop a Multimedia Advertisement Applet to insert images and create animation effects using Java Applets.

8. Design a Color Selection Applet with Red, Green, and Blue check boxes to dynamically change background colors based on user selection.
9. Develop a Library Management System using classes and objects to maintain book records and user details.
10. Create a Hospital Patient Record Management System using inheritance and method overriding concepts.

## **COURSE OUTCOMES**

Upon successful completion of the course, students will be able to:

1. Explain the principles of Object-Oriented Programming and Java architecture.
2. Develop Java programs using data types, control structures, arrays, and string handling techniques.
3. Apply classes, inheritance, packages, and interfaces to design reusable software components.
4. Implement robust exception handling and multithreading mechanisms in Java applications.
5. Develop file-processing applications using Java I/O streams and applet-based programs.
6. Utilize advanced Java technologies and modern frameworks for enterprise application development.

## **TEXT BOOK(S)**

1. Radha Krishna, P.2007. Object Oriented Programming through Java.First Edition,UniversityPress.
2. Rizwan Ahmed .P. 2017. Java Programming. Margham Publications, Chennai.

## **REFERENCE BOOK(S)**

1. Cay S.Horstmann. 2020. Core Java Volume-I Fundamental. Eleventh Edition, Pearson Publication.
2. Ken Arnold ,James Gosling, David Holmes. 2007. The Java Programming Language. ThirdEdition, Pearson Publication.
3. Muthu C. 2006. Essential of Java Programming. Second Edition, Vijay Nicole imprintsPrivate Limited, Chennai.
4. Soma sundaram K. 2006. Programming in Java. First Edition, Jaico Publications House,Chennai.
5. Steven Haines. 2001. Java 2 from Scratch. First Edition, Prentice Hall of India, New Delhi.

## **E-RESOURCES**

1. <https://www.tutorialspoint.com>
2. <https://www.codecademy.com/learn/learn-java>
3. <https://www.learnjavaonline.org>
4. <https://examples.javacodegeeks.com/core-java/net/url/java-net-url-example>
5. <https://docs.oracle.com/javase/7/docs/api/java/net/URL.html>

## MAPPING WITH PROGRAMME OUTCOME

| POs & PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |
|------------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|
| CO1        | 3    | 2    | 2    | 1    | 2    | 1    | 1    | 1    | 2    | 1    | 2     | 1     | 1     | 1     | 2     | 1     | 1     |
| CO2        | 3    | 3    | 2    | 2    | 2    | 2    | 1    | 2    | 2    | 1    | 3     | 1     | 2     | 2     | 3     | 2     | 1     |
| CO3        | 3    | 3    | 2    | 2    | 2    | 2    | 1    | 2    | 2    | 1    | 3     | 2     | 2     | 3     | 3     | 3     | 2     |
| CO4        | 3    | 3    | 2    | 2    | 3    | 2    | 1    | 2    | 2    | 1    | 3     | 2     | 2     | 3     | 3     | 2     | 2     |
| CO5        | 3    | 3    | 3    | 2    | 2    | 2    | 1    | 2    | 2    | 1    | 3     | 1     | 2     | 3     | 3     | 2     | 2     |
| CO6        | 3    | 3    | 3    | 2    | 2    | 3    | 2    | 3    | 3    | 2    | 3     | 2     | 3     | 3     | 3     | 3     | 3     |

S-Strong(3)      M-Medium(2)      L-Low(1)

## Database Lab

### Course Objectives

1. To understand advanced concepts and architecture of database management systems.
2. To study transaction processing, SQL, PL/SQL, and concurrency control mechanisms.
3. To analyze distributed, object-oriented, and NoSQL database systems.
4. To apply data warehousing and data mining techniques for real-time applications.
5. To familiarize students with recent trends and emerging technologies in advanced database systems.

### LIST OF PROGRAMS

1. Create a Student Admission Management System database and perform table creation, alteration, insertion, deletion, selection, and table removal operations using SQL commands.
2. Develop SQL queries for an Employee Payroll Processing System to implement UNION, UNION ALL, INTERSECT, and INTERSECT ALL operations.

3. Design a Sales and Inventory Analysis System and implement aggregate functions such as SUM, COUNT, AVG, MAX, MIN, GROUP BY, and HAVING clauses.
4. Create a Hospital Management System database and implement NATURAL JOIN, INNER JOIN, LEFT OUTER JOIN, RIGHT OUTER JOIN, FULL OUTER JOIN, and conditional join operations.
5. Develop an Online Shopping Portal database and implement nested subqueries using IN, NOT IN, SOME, ALL, EXISTS, NOT EXISTS, UNIQUE, and NOT UNIQUE operations.
6. Create and manage views in a Library Information System database and generate reports using SQL view operations.
7. Develop SQL queries for a Railway Reservation System to perform string operations using %, \_, and sorting using ASC and DESC clauses.
8. Design and implement a Banking Enterprise Management System database with proper primary and foreign key constraints and generate suitable banking reports.
9. Develop PL/SQL programs for an Insurance Claim Processing System using conditional statements, loops, stored procedures, functions, and exception handling.
10. Create PL/SQL applications for an E-Commerce Order Processing System using triggers, cursors, packages, and transaction control statements.

**Total Lab Hours- 60**

## **COURSE OUTCOMES**

After the completion of the Course, the Students will be able to

1. Explain advanced database concepts, architecture, and relational database design principles.
2. Apply SQL and PL/SQL techniques for database programming and transaction management.
3. Analyze distributed, object-oriented, and NoSQL database systems.
4. Demonstrate data warehousing and data mining techniques for knowledge discovery.
5. Evaluate big data technologies and modern database management tools.
6. Analyze recent developments and emerging trends in advanced database technologies.

## TEXT BOOK(S)

1. Elmasri, R., & Navathe, S. B. (2017). *Fundamentals of database systems* (7th ed.). Pearson Education.
2. Silberschatz, A., Korth, H. F., & Sudarshan, S. (2020). *Database system concepts* (7th ed.). McGraw Hill.
3. Connolly, T., & Begg, C. (2015). *Database systems: A practical approach to design, implementation, and management* (6th ed.). Pearson.
4. Han, J., Kamber, M., & Pei, J. (2011). *Data mining: Concepts and techniques* (3rd ed.). Morgan Kaufmann.
5. White, T. (2015). *Hadoop: The definitive guide* (4th ed.). O'Reilly Media.

## REFERENCE BOOK(S)

1. Ramakrishnan, R., & Gehrke, J. (2003). *Database management systems* (3rd ed.). McGraw Hill.
2. Date, C. J. (2004). *An introduction to database systems* (8th ed.). Pearson Education.
3. Coronel, C., & Morris, S. (2016). *Database systems: Design, implementation, and management* (12th ed.). Cengage Learning.
4. Sadalage, P. J., & Fowler, M. (2012). *NoSQL distilled: A brief guide to the emerging world of polyglot persistence*. Addison-Wesley.
5. Garcia-Molina, H., Ullman, J. D., & Widom, J. (2008). *Database systems: The complete book* (2nd ed.). Pearson.

## E-Resources

1. <https://www.oracle.com/database/>
2. <https://www.mongodb.com/>
3. <https://hadoop.apache.org/>
4. <https://www.postgresql.org/>
5. <https://www.ibm.com/topics/database-management-system>

## MAPPING WITH PROGRAMME OUTCOME

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 2   | 2   | 1   | 1   | -   | -   | 1   | 1   | -    | 3    | 1    | 1    | 2    | 2    | 1    | 1    |
| CO2 | 3   | 3   | 3   | 2   | 2   | 1   | -   | 1   | 1   | -    | 3    | 2    | 1    | 2    | 3    | 2    | 1    |
| CO3 | 3   | 3   | 2   | 2   | 2   | 1   | -   | 1   | 1   | -    | 3    | 2    | 1    | 3    | 3    | 2    | 1    |
| CO4 | 3   | 3   | 3   | 3   | 2   | 2   | 1   | 1   | 1   | -    | 3    | 2    | 1    | 3    | 3    | 2    | 2    |
| CO5 | 3   | 3   | 3   | 3   | 3   | 2   | 1   | 1   | 2   | -    | 3    | 2    | 2    | 3    | 3    | 2    | 2    |
| CO6 | 2   | 2   | 2   | 3   | 3   | 3   | 2   | 1   | 2   | 1    | 2    | 3    | 2    | 2    | 3    | 2    | 3    |

**S-Strong(3)**

**M-Medium(2)**

**L-Low(1)**

# SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)



SUNDARAKKOTTAI, MANNARGUDI- 614016.

*(For the Candidates admitted in the academic year 2026 – 2027)*

## DEPARTMENT OF COMPUTER APPLICATIONS

MASTER OF COMPUTER APPLICATIONS (MCA)

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**Semester: II-DCEC-II: Advanced Web Development**

**Ins. Hrs./Week: 4**

**Course Credit: 4**

**Course Code: P26CADE23A**

### Course Objectives

1. Understand the fundamentals of web technologies, Internet architecture, and the structure of modern web applications.
2. Design and develop responsive and visually appealing web pages using HTML5 and CSS3.
3. Apply JavaScript to create interactive, dynamic, and event-driven web applications.
4. Develop modern client-side applications using React JS and manage source code using Git and GitHub.
5. Build database-driven web applications using PHP and deploy web solutions using contemporary hosting and deployment platforms.

### UNIT-I: HTML5 Fundamentals and Web Technologies

**(12 Hours)**

Introduction to the Internet and World Wide Web – Web Browsers and Web Servers – URLs, HTTP and HTTPS – Website Architecture – Introduction to HTML5 – HTML Document Structure – Text Formatting – Hyperlinks – Images – Lists – Tables – Forms – Semantic HTML5 Elements – Audio and Video Elements – Time and Organization Elements – Best Practices in HTML5.

### UNIT-II: CSS3 and Responsive Web Design

**(12 Hours)**

Introduction to CSS3 – Types of Style Sheets – Selectors and Specificity – Colors and Backgrounds – Fonts and Typography – Box Model – Positioning and Layout Techniques – Flexbox – CSS Grid – Responsive Web Design – Media Queries – Animations and Transitions – CSS Framework Overview.

### UNIT-III: JavaScript Programming and DOM Manipulation

**(12 Hours)**

Introduction to JavaScript – Variables, Data Types and Operators – Control Statements – Functions – Arrays and Objects – ES6 Features – Event Handling – Document Object Model (DOM) – Form Validation – Error Handling – Regular Expressions – Browser Storage – Introduction to AJAX and JSON.

### UNIT-IV: React JS and Version Control with Git & GitHub

**(12 Hours)**

Introduction to React JS – Components – JSX – Props and State – Event Handling in React – React Hooks – Forms in React – Routing Basics – Introduction to Git – Git Installation and Configuration – Git Commands – Branching and Merging – Repository Management – GitHub and Collaborative Development – Deploying React Applications using GitHub Pages.

## **UNIT–V: Dynamic Web Development with PHP**

**(12 Hours)**

Introduction to Server-Side Programming – PHP Basics – Variables and Data Types – Operators and Expressions – Control Statements – Arrays and Functions – Form Handling – Cookies and Sessions – Database Connectivity using MySQL – CRUD Operations – Introduction to REST APIs – Hosting and Deployment Concepts – Deploying Web Applications – Security Basics – Introduction to Cloud Hosting Platforms.

## **UNIT VI – CURRENT CONTOURS (For Continuous Internal Assessment Only)**

Introduction to Progressive Web Applications (PWA) – Single Page Applications (SPA) – Serverless Computing – JAMstack Architecture – TypeScript Fundamentals – Node.js Overview – Artificial Intelligence in Web Applications – Chatbots and Generative AI Integration – Low-Code/No-Code Development Platforms – Web Security Trends – Modern Deployment Practices using CI/CD.

**Total Lecturer Hours: 60**

## **Course Outcomes**

Upon successful completion of the course, students will be able to:

1. Explain the concepts of Internet technologies, web standards, HTML5 elements, and website architecture.
2. Create responsive and user-friendly web interfaces using CSS3 layouts, Flexbox, Grid, and media queries.
3. Develop interactive web pages using JavaScript, DOM manipulation, event handling, and asynchronous communication techniques.
4. Design and implement single-page web applications using React JS components, hooks, and routing mechanisms.
5. Develop server-side web applications using PHP, integrate databases, and implement CRUD operations and web services.
6. Deploy secure web applications using version control systems, hosting platforms, and modern web development practices while adapting to emerging web technologies.

## **TEXTBOOK(S):**

1. Duckett, J. (2022). *HTML and CSS: Design and Build Websites*. Wiley.
2. Duckett, J. (2024). *JavaScript and JQuery: Interactive Front-End Web Development*. Wiley.
3. Banks, A., & Porcello, E. (2023). *Learning React: Modern Patterns for Developing React Apps* (3rd ed.). O'Reilly Media.
4. Nixon, R. (2024). *Learning PHP, MySQL & JavaScript* (7th ed.). O'Reilly Media.
5. Chacon, S., & Straub, B. (2023). *Pro Git* (3rd ed.). Apress.

## REFERENCEBOOK(S):

1. Freeman, E., & Robson, E. (2019). *Head first HTML and CSS* (2nd ed.). O'Reilly Media.
2. Flanagan, D. (2020). *JavaScript: The definitive guide* (7th ed.). O'Reilly Media.
3. Welling, L., & Thomson, L. (2017). *PHP and MySQL web development* (5th ed.). Addison-Wesley Professional.
4. Osmani, A. (2012). *Learning JavaScript design patterns*. O'Reilly Media.
5. Schwarzmüller, M. (2023). *React: The complete guide*. Packt Publishing.

## E-RESOURCE(S):

1. [https://developer.mozilla.org/?utm\\_source=chatgpt.com](https://developer.mozilla.org/?utm_source=chatgpt.com)
2. [https://react.dev/?utm\\_source=chatgpt.com](https://react.dev/?utm_source=chatgpt.com)
3. [https://www.php.net/docs.php?utm\\_source=chatgpt.com](https://www.php.net/docs.php?utm_source=chatgpt.com)
4. [https://git-scm.com/doc?utm\\_source=chatgpt.com](https://git-scm.com/doc?utm_source=chatgpt.com)
5. [https://www.w3schools.com/whatis/?utm\\_source=chatgpt.com](https://www.w3schools.com/whatis/?utm_source=chatgpt.com)

## MAPPING WITH PROGRAMME OUTCOME

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | -   | 2   | -   | -   | -   | -   | 2   | 1   | -    | 3    | -    | 2    | -    | 2    | -    | -    |
| CO2 | 3   | 2   | 2   | -   | 3   | -   | -   | 2   | -   | -    | 3    | -    | -    | 2    | 3    | -    | -    |
| CO3 | 3   | 3   | 2   | 2   | 3   | -   | -   | 2   | -   | -    | 3    | 2    | -    | 3    | 3    | -    | -    |
| CO4 | 3   | 2   | 2   | -   | 3   | 2   | -   | 2   | 1   | -    | 3    | -    | 2    | 3    | 3    | 2    | -    |
| CO5 | 3   | 3   | 2   | 2   | 3   | 2   | 2   | 2   | -   | -    | 3    | 2    | -    | 3    | 3    | 2    | 2    |
| CO6 | 3   | 2   | 2   | -   | 3   | 2   | 2   | 2   | 2   | 1    | 3    | -    | 2    | 3    | 3    | 2    | 2    |

S-Strong(3)      M-Medium(2)      L-Low(1)

# SENGAMALA THAYAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016.

(For the Candidates admitted in the academic year 2026 – 2027)



## DEPARTMENT OF COMPUTER APPLICATIONS

### MASTER OF COMPUTER APPLICATIONS (MCA)

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#### Semester: II-DCEC II : Data Visualization

Ins. Hrs./Week: 4

Course Credit:4

Course Code: P26CADE23B

#### Course Objectives

1. Understand the fundamental concepts, principles, and importance of data visualization in data-driven decision making.
2. Apply data preparation techniques and visualization tools to transform raw data into meaningful visual representations.
3. Analyze datasets using statistical and analytical visualization techniques to identify trends, patterns, and relationships.
4. Design interactive and advanced visualizations using modern tools and technologies for effective user engagement.
5. Develop visualization solutions for real-world applications across business, healthcare, education, finance, and scientific domains.

#### Unit I – Introduction To Data Visualization

(12 Hours)

Introduction to Data Visualization – Importance of Visualization – Types of Data – Visual Perception – Principles of Effective Visualization – Charts and Graphs – Data Storytelling – Visualization Ethics – Overview of Visualization Tools and Libraries – Applications of Data Visualization.

#### Unit II – Data Preparation And Visualization Tools

(12 Hours)

Data Collection – Data Cleaning – Data Transformation – Handling Missing Values – Data Formatting – Spreadsheet-Based Visualization – Tableau Fundamentals – Microsoft Power BI – Google Data Studio – Python Libraries for Visualization – Matplotlib – Seaborn – Creating Dashboards and Reports.

#### Unit III– Statistical And Analytical Visualization

(12 Hours)

Exploratory Data Analysis – Histograms – Scatter Plots – Box Plots – Heat Maps – Correlation Analysis – Regression Visualization – Distribution Analysis – Multivariate Visualization – Trend Analysis – Pattern Identification – Anomaly Detection Using Visualization.

## **Unit IV – Interactive and Advanced Visualization**

**(12 Hours)**

Interactive Dashboards – Dynamic Charts – Geospatial Visualization – Network Visualization – Real-Time Data Visualization – Animation Techniques – Web-Based Visualization – D3.js – Plotly – Dashboard Design Principles – User Interaction Techniques – Performance Optimization.

## **UNIT V – Applications of Data Visualization**

**(12 Hours)**

Business Data Visualization – Healthcare Analytics – Educational Data Visualization – Financial Data Analysis – Marketing Analytics – Scientific Visualization – Big Data Visualization – Social Media Analytics – Predictive Analytics Visualization – Case Studies – Real-World Visualization Projects.

## **UNIT VI – CURRENT CONTOURS (for Continuous Internal Assessment Only):**

Artificial Intelligence for Data Visualization – Automated Insights and Visual Analytics Augmented Analytics – Explainable AI Visualization – Visual Analytics for Big Data Cloud-Based Visualization Platforms – Immersive Visualization using AR/VR – Generative AI for Dashboard Creation – Data Visualization in IoT Applications – Ethical Issues and Future Directions in Data Visualization.

**Total Lecturer Hours: 60**

## **Course Outcomes**

Upon successful completion of the course, the students will be able to:

1. Explain the concepts, principles, and ethical considerations of data visualization.
2. Prepare, clean, and transform data for visualization using appropriate tools and techniques.
3. Apply statistical and analytical visualization methods to explore and interpret data effectively.
4. Design and develop interactive dashboards and advanced visualizations using modern visualization platforms.
5. Create domain-specific visualization solutions to support data-driven decision making.
6. Evaluate emerging trends and technologies in data visualization and apply them to real-world analytical problems.

## **Text Book**

1. Knafllic, C. N. (2021). *Storytelling with data: A data visualization guide for business professionals* (2nd ed.). Wiley.
2. Murray, S. (2023). *Interactive data visualization for the web* (3rd ed.). O'Reilly Media.
3. Wilke, C. O. (2020). *Fundamentals of data visualization: A primer on making informative and compelling figures*. O'Reilly Media.
4. Cairo, A. (2019). *How charts lie: Getting smarter about visual information*. W. W. Norton & Company.
5. Nelli, F. (2023). *Python data analytics with Pandas, NumPy, and Matplotlib* (3rd ed.). Apress.

## Reference Books

1. Few, S. (2020). *Information dashboard design* (3rd ed.). Analytics Press.
2. Kirk, A. (2019). *Data visualization: A handbook for data driven design* (2nd ed.). Sage Publications.
3. Munzner, T. (2018). *Visualization analysis and design*. CRC Press.
4. Yau, N. (2021). *Data points: Visualization that means something*. Wiley.
5. Fry, B. (2018). *Visualizing data: Exploring and explaining data with the processing environment*. O'Reilly Media.

## E-Resources

1. [https://www.tableau.com/learn?utm\\_source=chatgpt.com](https://www.tableau.com/learn?utm_source=chatgpt.com)
2. [https://learn.microsoft.com/en-us/power-bi/?utm\\_source=chatgpt.com](https://learn.microsoft.com/en-us/power-bi/?utm_source=chatgpt.com)
3. [https://matplotlib.org/stable/index.html?utm\\_source=chatgpt.com](https://matplotlib.org/stable/index.html?utm_source=chatgpt.com)
4. [https://seaborn.pydata.org/?utm\\_source=chatgpt.com](https://seaborn.pydata.org/?utm_source=chatgpt.com)
5. [https://d3js.org/?utm\\_source=chatgpt.com](https://d3js.org/?utm_source=chatgpt.com)

## MAPPING WITH PROGRAMME OUTCOME

| COs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |
|-----|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|
| CO1 | 3    | 2    | 2    | -    | -    | -    | 2    | 1    | 1    | -    | 2     | -     | 2     | -     | 2     | -     | -     |
| CO2 | 3    | 3    | 2    | 2    | 2    | -    | -    | 2    | -    | -    | 3     | -     | 2     | 2     | 3     | -     | -     |
| CO3 | 3    | 3    | 2    | 2    | 3    | -    | -    | 2    | -    | -    | 3     | 2     | -     | 3     | 3     | -     | -     |
| CO4 | 3    | 3    | 3    | 2    | 3    | 2    | -    | 2    | 1    | -    | 3     | -     | 2     | 3     | 3     | 2     | -     |
| CO5 | 3    | 3    | 2    | 2    | 3    | 3    | 2    | 2    | -    | 1    | 3     | 2     | -     | 3     | 3     | 2     | 2     |
| CO6 | 3    | 2    | 2    | 3    | 3    | 3    | 2    | 2    | 3    | 1    | 2     | 2     | 3     | 3     | 3     | 2     | 3     |

**S-Strong(3)**

**M-Medium(2)**

**L-Low(1)**

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE**  
(AUTONOMOUS)



SUNDARAKKOTTAI, MANNARGUDI- 614016.  
(For the Candidates admitted in the academic year 2026 – 2027)

**DEPARTMENT OF COMPUTER APPLICATIONS**

MASTER OF COMPUTER APPLICATIONS (MCA)

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**Semester: II-DCEC-II: Mobile Application Development**

**Ins. Hrs./Week: 4**

**Course Credit: 4**

**Course Code: P26CADE23C**

**Course Objectives**

1. To understand the concepts, architecture, and components of mobile application development platforms.
2. To acquire knowledge of Android and iOS mobile operating systems and development environments.
3. To design and develop Android applications using activities, intents, services, and content providers.
4. To create interactive user interfaces and manage data using SQLite databases in mobile applications.
5. To develop, deploy, and evaluate mobile applications using contemporary tools and emerging technologies.

**UNIT – I INTRODUCTION TO MOBILE APPLICATIONS**

**(12 Hours)**

Native and web applications - Mobile OS and Databases. Introduction to Android: History - Features – OSS – OHA - Versions - Android devices - Setting up software – IDE. Introduction to iOS – iOS features – user interface - Using Wifi – iPhone marketplace.

**UNIT – II ANDROID ARCHITECTURE**

**(12 Hours)**

Android Stack - Linux Kernel - Android Runtime - Dalvik VM - Application Framework - Android emulator - Android applications development - Virtualization – APIs – Android File system – A Basic Android Application - Deployment. Android Activities: The Activity Lifecycle – Lifecycle methods – Creating Activity.

**UNIT – III INTENTS**

**(12 Hours)**

Intent Filters – Activity stack. Android Services: Simple services – Binding and querying the service – Executing services. Broadcast Receivers: Creating and managing receivers – Receiver intents. Content Providers: Creating and using content providers – Content resolver.

**UNIT – IV ANDROID UI**

**(12 Hours)**

Android Layouts – Attributes – Layout styles - Linear – Relative – Table – Grid – Frame – Menus - Lists and Notifications - Input Controls: Buttons - Text Fields – Checkboxes - alert dialogs – Spinners - rating bar - progress bar.

**UNIT – V WORKING WITH DATABASES****(12 Hours)**

SQLite – coding for SQLite using Android - Publishing and internationalizing mobile applications - mobile application deployment: Game, Clock, Calendar, Converter, Phone book.

**UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):**

Cross-Platform Mobile Development using Flutter and React Native – Progressive Web Applications (PWA) – Artificial Intelligence and Machine Learning in Mobile Apps – Internet of Things (IoT) Enabled Mobile Applications – Cloud-Based Mobile Services – Mobile Application Security and Privacy – Augmented Reality (AR) and Virtual Reality (VR) Applications – Emerging Trends in Mobile Computing.

**Total Lecturer Hours: 60****Course Outcomes**

Upon successful completion of the course, the students will be able to:

1. Explain the fundamentals of mobile computing, mobile operating systems, and mobile application development platforms.
2. Develop Android applications using activities, intents, services, broadcast receivers, and content providers.
3. Design and implement user-friendly mobile application interfaces using Android UI components and layouts.
4. Create mobile applications with persistent data storage using SQLite databases.
5. Deploy, test, and maintain mobile applications for real-world environments.
6. Evaluate recent trends and emerging technologies in mobile application development and apply them in practical scenarios.

**Text Books**

1. Meier, R. (2018). Professional Android (4th ed.). Wrox Press.
2. Phillips, B., Stewart, C., Hardy, K., & Marsicano, K. (2019). Android programming: The big nerd ranch guide (4th ed.). Big Nerd Ranch.
3. Griffiths, D., & Griffiths, D. (2021). Head first Android development (3rd ed.). O'Reilly Media.
4. Darcey, L., & Conder, S. (2020). Android wireless application development (5th ed.). Addison-Wesley Professional.
5. Wei-Meng, L. (2019). Beginning Android application development. Wiley.

## Reference Books

1. Burnette, E. (2015). *Hello, Android: Introducing Google's mobile development platform* (4th ed.). Pragmatic Bookshelf.
2. Mednieks, Z., Dornin, L., Nakamura, G., & Meike, B. (2012). *Programming Android*. O'Reilly Media.
3. Deitel, P., Deitel, H., & Deitel, A. (2015). *Android for programmers: An app-driven approach* (3rd ed.). Pearson.
4. Horton, J. (2021). *Android programming for beginners* (3rd ed.). Packt Publishing.
5. Neuburg, M. (2021). *Programming iOS* (14th ed.). O'Reilly Media.

## E-Resources

1. [https://developer.mozilla.org/?utm\\_source=chatgpt.com](https://developer.mozilla.org/?utm_source=chatgpt.com)
2. [https://www.php.net/docs.php?utm\\_source=chatgpt.com](https://www.php.net/docs.php?utm_source=chatgpt.com)
3. [https://dev.mysql.com/doc/?utm\\_source=chatgpt.com](https://dev.mysql.com/doc/?utm_source=chatgpt.com)
4. [https://www.w3schools.com/?utm\\_source=chatgpt.com](https://www.w3schools.com/?utm_source=chatgpt.com)
5. [https://www.tutorialspoint.com/web\\_development\\_tutorials.htm?utm\\_source=chatgpt.com](https://www.tutorialspoint.com/web_development_tutorials.htm?utm_source=chatgpt.com)

## MAPPING WITH PROGRAMME OUTCOME

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 2   | 2   | -   | -   | -   | -   | 2   | 2   | -    | 2    | -    | 2    | -    | 2    | -    | -    |
| CO2 | 3   | 3   | 2   | 2   | 2   | -   | -   | 2   | -   | -    | 3    | -    | -    | 2    | 3    | 2    | -    |
| CO3 | 3   | 3   | 3   | -   | 2   | -   | -   | 2   | -   | -    | 3    | -    | -    | 2    | 3    | 2    | -    |
| CO4 | 3   | 3   | 2   | 2   | 3   | -   | -   | 2   | -   | -    | 3    | 2    | -    | 3    | 3    | -    | -    |
| CO5 | 3   | 3   | 2   | 2   | 3   | 2   | 2   | 2   | 1   | -    | 3    | 2    | -    | 3    | 3    | 2    | 2    |
| CO6 | 3   | 2   | 2   | 2   | 3   | 3   | 2   | 2   | 3   | 1    | 2    | 2    | 3    | 3    | 3    | 2    | 3    |

S-Strong(3)

M-Medium(2)

L-Low(1)

**SENGAMALA THAYAR EDUCATIONAL TRUST WOMEN'S COLLEGE**  
(AUTONOMOUS)



SUNDARAKKOTTAI, MANNARGUDI- 614016.

*(For the Candidates admitted in the academic year 2026 – 2027)*

**DEPARTMENT OF COMPUTER APPLICATIONS**

**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: II-DCEP-II: Advanced Web Development Lab**

**Ins. Hrs./Week: 2**

**Course Credit:2**

**Course Code: P26CADE24AP**

**Course Objectives**

1. Understand the fundamentals of web technologies, Internet architecture, and the structure of modern web applications.
2. Design and develop responsive and visually appealing web pages using HTML5 and CSS3.
3. Apply JavaScript to create interactive, dynamic, and event-driven web applications.
4. Develop modern client-side applications using React JS and manage source code using Git and GitHub.
5. Build database-driven web applications using PHP and deploy web solutions using contemporary hosting and deployment platforms.

**LIST OF EXPERIMENTS:**

1. Develop a personal portfolio website using HTML5 semantic elements, multimedia content, hyperlinks, tables, and forms.
2. Design and implement an online student admission form with appropriate HTML5 input controls and client-side validation.
3. Create a responsive college or company website using CSS3, Flexbox, Grid, and Media Queries.
4. Develop a product landing page with CSS animations, transitions, and responsive design features.
5. Build a JavaScript-based student grade calculator to compute total marks, percentage, and grade.
6. Develop an event registration system using JavaScript to perform form validation and error handling.
7. Create a dynamic image gallery using JavaScript DOM manipulation and event handling techniques.

8. Design and implement a product catalog application using JavaScript objects, arrays, and DOM operations.
9. Develop a weather information dashboard using AJAX and JSON data retrieved from a public API.
10. Create a React-based Student Management System to perform add, update, delete, and display operations.
11. Develop a React-based To-Do List application using components, hooks, forms, and browser storage.
12. Create a GitHub repository for a web application project and demonstrate version control using branching and merging techniques.
13. Develop a PHP-based user authentication system with registration, login, logout, sessions, and cookies.
14. Design and implement a database-driven web application using PHP and MySQL to perform CRUD operations.
15. Develop and deploy a full-stack web application integrating HTML5, CSS3, JavaScript, React JS, PHP, MySQL, GitHub, and cloud/web hosting services.

**Total Lab Hours: 30**

### **Course Outcomes (CO)**

Upon successful completion of the course, students will be able to:

1. Explain the concepts of Internet technologies, web standards, HTML5 elements, and website architecture.
2. Create responsive and user-friendly web interfaces using CSS3 layouts, Flexbox, Grid, and media queries.
3. Develop interactive web pages using JavaScript, DOM manipulation, event handling, and asynchronous communication techniques.
4. Design and implement single-page web applications using React JS components, hooks, and routing mechanisms.
5. Develop server-side web applications using PHP, integrate databases, and implement CRUD operations and web services.
6. Deploy secure web applications using version control systems, hosting platforms, and modern web development practices while adapting to emerging web technologies.

**TEXTBOOK(S):**

1. Duckett, J. (2022). *HTML and CSS: Design and Build Websites*. Wiley.
2. Duckett, J. (2024). *JavaScript and JQuery: Interactive Front-End Web Development*. Wiley.
3. Banks, A., & Porcello, E. (2023). *Learning React: Modern Patterns for Developing React Apps* (3rd ed.). O'Reilly Media.
4. Nixon, R. (2024). *Learning PHP, MySQL & JavaScript* (7th ed.). O'Reilly Media.
5. Chacon, S., & Straub, B. (2023). *Pro Git* (3rd ed.). Apress.

**REFERENCEBOOK(S):**

1. Freeman, E., & Robson, E. (2019). *Head first HTML and CSS* (2nd ed.). O'Reilly Media.
2. Flanagan, D. (2020). *JavaScript: The definitive guide* (7th ed.). O'Reilly Media.
3. Welling, L., & Thomson, L. (2017). *PHP and MySQL web development* (5th ed.). Addison-Wesley Professional.
4. Osmani, A. (2012). *Learning JavaScript design patterns*. O'Reilly Media.
5. Schwarzmüller, M. (2023). *React: The complete guide*. Packt Publishing.

**E-RESOURCE(S):**

1. [https://developer.mozilla.org/?utm\\_source=chatgpt.com](https://developer.mozilla.org/?utm_source=chatgpt.com)
2. [https://react.dev/?utm\\_source=chatgpt.com](https://react.dev/?utm_source=chatgpt.com)
3. [https://www.php.net/docs.php?utm\\_source=chatgpt.com](https://www.php.net/docs.php?utm_source=chatgpt.com)
4. [https://git-scm.com/doc?utm\\_source=chatgpt.com](https://git-scm.com/doc?utm_source=chatgpt.com)
5. [https://www.w3schools.com/whatis/?utm\\_source=chatgpt.com](https://www.w3schools.com/whatis/?utm_source=chatgpt.com)

**MAPPING WITH PROGRAMME OUTCOME**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | -   | 2   | -   | -   | -   | -   | 2   | 1   | -    | 3    | -    | 2    | -    | 2    | -    | -    |
| CO2 | 3   | 2   | 2   | -   | 3   | -   | -   | 2   | -   | -    | 3    | -    | -    | 2    | 3    | -    | -    |
| CO3 | 3   | 3   | 2   | 2   | 3   | -   | -   | 2   | -   | -    | 3    | 2    | -    | 3    | 3    | -    | -    |
| CO4 | 3   | 2   | 2   | -   | 3   | 2   | -   | 2   | 1   | -    | 3    | -    | 2    | 3    | 3    | 2    | -    |
| CO5 | 3   | 3   | 2   | 2   | 3   | 2   | 2   | 2   | -   | -    | 3    | 2    | -    | 3    | 3    | 2    | 2    |
| CO6 | 3   | 2   | 2   | -   | 3   | 2   | 2   | 2   | 2   | 1    | 3    | -    | 2    | 3    | 3    | 2    | 2    |

S-Strong(3)

M-Medium(2)

L-Low(1)

# SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016.

(For the Candidates admitted in the academic year 2024– 2025)



## DEPARTMENT OF COMPUTER APPLICATIONS

### MASTER OF COMPUTER APPLICATIONS (MCA)

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**Semester: II-DCEP -II: Data Visualization Lab**

**Ins. Hrs./Week: 2**

**Course Credit: 2**

**Course Code: P26CADE24BP**

#### Course Objectives

1. Understand the fundamental concepts, principles, and importance of data visualization in data-driven decision making.
2. Apply data preparation techniques and visualization tools to transform raw data into meaningful visual representations.
3. Analyze datasets using statistical and analytical visualization techniques to identify trends, patterns, and relationships.
4. Design interactive and advanced visualizations using modern tools and technologies for effective user engagement.
5. Develop visualization solutions for real-world applications across business, healthcare, education, finance, and scientific domains.

#### List of experiments

1. A retail company wants to understand monthly sales performance. Create suitable charts and graphs to visualize sales trends and identify high-performing products.
2. A university has collected student academic records with missing values. Perform data cleaning, transformation, and prepare the dataset for visualization.
3. A supermarket chain wants to compare sales across different regions. Create visualizations using spreadsheets, Tableau, or Power BI to support decision-making.
4. A healthcare organization needs to analyze patient admission data. Develop dashboards to visualize patient demographics, disease distribution, and treatment outcomes.
5. An e-commerce company wants to identify customer purchasing patterns. Perform exploratory data analysis using histograms, scatter plots, and box plots.
6. A financial institution needs to study relationships between investment variables. Create correlation matrices and heat maps to identify significant patterns.
7. A manufacturing company wants to detect abnormal machine behavior. Use visualization techniques to identify anomalies and unusual trends in operational data.
8. A social media platform needs insights into user engagement metrics. Create visualizations to analyze likes, shares, comments, and audience growth trends.

9. A weather monitoring agency wants to analyze temperature and rainfall patterns over time. Develop trend and regression visualizations to interpret climate data.
10. A logistics company requires an interactive dashboard to monitor delivery performance across multiple locations. Design a dashboard with filters and dynamic charts.
11. A tourism department wants to visualize visitor distribution across geographic locations. Create geospatial visualizations using mapping tools and libraries.
12. A telecommunications company seeks to analyze network connections between users. Develop network visualizations to represent communication patterns and relationships.
13. A stock market analyst requires real-time monitoring of market performance. Create dynamic and real-time visualizations using Plotly or similar tools.
14. A marketing agency wants to evaluate campaign effectiveness across different channels. Design an interactive dashboard displaying key performance indicators and predictive insights.
15. A business organization requires a comprehensive executive dashboard integrating sales, finance, customer, and operational data. Develop a complete visualization solution using Tableau, Power BI, or Python visualization libraries

**Total Lab Hours- 30**

## **Course Outcomes**

Upon successful completion of the course, the students will be able to:

1. Explain the concepts, principles, and ethical considerations of data visualization.
2. Prepare, clean, and transform data for visualization using appropriate tools and techniques.
3. Apply statistical and analytical visualization methods to explore and interpret data effectively.
4. Design and develop interactive dashboards and advanced visualizations using modern visualization platforms.
5. Create domain-specific visualization solutions to support data-driven decision making.
6. Evaluate emerging trends and technologies in data visualization and apply them to real-world analytical problems.

## **Text Book**

1. *Knafllic, C. N. (2021). Storytelling with data: A data visualization guide for business professionals (2nd ed.). Wiley.*
2. *Murray, S. (2023). Interactive data visualization for the web (3rd ed.). O'Reilly Media.*
3. *Wilke, C. O. (2020). Fundamentals of data visualization: A primer on making informative and compelling figures. O'Reilly Media.*

4. Cairo, A. (2019). How charts lie: Getting smarter about visual information. W. W. Norton & Company.
5. Nelli, F. (2023). Python data analytics with Pandas, NumPy, and Matplotlib (3rd ed.). Apress.

## Reference Books

1. Few, S. (2020). Information dashboard design (3rd ed.). Analytics Press.
2. Kirk, A. (2019). Data visualization: A handbook for data driven design (2nd ed.). Sage Publications.
3. Munzner, T. (2018). Visualization analysis and design. CRC Press.
4. Yau, N. (2021). Data points: Visualization that means something. Wiley.
5. Fry, B. (2018). Visualizing data: Exploring and explaining data with the processing environment. O'Reilly Media.

## E-Resources

1. [https://www.tableau.com/learn?utm\\_source=chatgpt.com](https://www.tableau.com/learn?utm_source=chatgpt.com)
2. [https://learn.microsoft.com/en-us/power-bi/?utm\\_source=chatgpt.com](https://learn.microsoft.com/en-us/power-bi/?utm_source=chatgpt.com)
3. [https://matplotlib.org/stable/index.html?utm\\_source=chatgpt.com](https://matplotlib.org/stable/index.html?utm_source=chatgpt.com)
4. [https://seaborn.pydata.org/?utm\\_source=chatgpt.com](https://seaborn.pydata.org/?utm_source=chatgpt.com)
5. [https://d3js.org/?utm\\_source=chatgpt.com](https://d3js.org/?utm_source=chatgpt.com)

## MAPPING WITH PROGRAMME OUTCOME

| CO<br>s | PO<br>1 | PO<br>2 | PO<br>3 | PO<br>4 | PO<br>5 | PO<br>6 | PO<br>7 | PO<br>8 | PO<br>9 | PO<br>10 | PSO<br>1 | PSO<br>2 | PSO<br>3 | PSO<br>4 | PSO<br>5 | PSO<br>6 | PSO<br>7 |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|----------|
| CO1     | 3       | 2       | 2       | -       | -       | -       | 2       | 1       | 1       | -        | 2        | -        | 2        | -        | 2        | -        | -        |
| CO2     | 3       | 3       | 2       | 2       | 2       | -       | -       | 2       | -       | -        | 3        | -        | 2        | 2        | 3        | -        | -        |
| CO3     | 3       | 3       | 2       | 2       | 3       | -       | -       | 2       | -       | -        | 3        | 2        | -        | 3        | 3        | -        | -        |
| CO4     | 3       | 3       | 3       | 2       | 3       | 2       | -       | 2       | 1       | -        | 3        | -        | 2        | 3        | 3        | 2        | -        |
| CO5     | 3       | 3       | 2       | 2       | 3       | 3       | 2       | 2       | -       | 1        | 3        | 2        | -        | 3        | 3        | 2        | 2        |
| CO6     | 3       | 2       | 2       | 3       | 3       | 3       | 2       | 2       | 3       | 1        | 2        | 2        | 3        | 3        | 3        | 2        | 3        |

**S-Strong(3)**

**M-Medium(2)**

**L-Low(1)**

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE**  
(AUTONOMOUS)



SUNDARAKKOTTAI, MANNARGUDI- 614016.  
(For the Candidates admitted in the academic year 2026 – 2027)

**DEPARTMENT OF COMPUTER APPLICATIONS**

MASTER OF COMPUTER APPLICATIONS (MCA)

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**Semester: II-DCEC-II: Mobile Application Development lab**

**Ins. Hrs./Week:2**

**Course Credit: 2**

**Course Code: P26CADE24CP**

**Course Objectives**

1. To understand the concepts, architecture, and components of mobile application development platforms.
2. To acquire knowledge of Android and iOS mobile operating systems and development environments.
3. To design and develop Android applications using activities, intents, services, and content providers.
4. To create interactive user interfaces and manage data using SQLite databases in mobile applications.
5. To develop, deploy, and evaluate mobile applications using contemporary tools and emerging technologies.

**List of Experiments**

1. Develop a simple Android application to display student profile information using basic UI components.
2. Create a mobile application that displays college information using multiple activities and activity navigation.
3. Design an Android application to demonstrate the Activity Life Cycle methods.
4. Develop an application to navigate between screens using explicit and implicit intents.
5. Create a mobile application that opens web pages, maps, and phone dialer using intents.
6. Develop a simple background music player using Android Services.
7. Create an application to demonstrate Broadcast Receivers for battery status or airplane mode changes.
8. Develop a mobile application to store and retrieve contact information using Content Providers.

9. Design a login screen using Linear Layout and Relative Layout with appropriate input controls.
10. Create a restaurant menu application using ListView, Menus, and Notifications.
11. Develop a feedback application using CheckBoxes, Radio Buttons, Rating Bar, and Alert Dialogs.
12. Design a student registration form using Text Fields, Spinners, Buttons, and Progress Bar controls.
13. Develop a Phone Book application using SQLite database for storing and retrieving contact details.
14. Create a Currency Converter or Unit Converter application with database support and user-friendly interfaces.
15. Develop and deploy a complete Android application such as a Clock, Calendar, Game, Phone Book, or To-Do Manager using SQLite and Android UI components.

**Total Lab Hours- 30**

## **Course Outcomes**

Upon successful completion of the course, the students will be able to:

1. Explain the fundamentals of mobile computing, mobile operating systems, and mobile application development platforms.
2. Develop Android applications using activities, intents, services, broadcast receivers, and content providers.
3. Design and implement user-friendly mobile application interfaces using Android UI components and layouts.
4. Create mobile applications with persistent data storage using SQLite databases.
5. Deploy, test, and maintain mobile applications for real-world environments.
6. Evaluate recent trends and emerging technologies in mobile application development and apply them in practical scenarios.

## **Text Books**

1. Meier, R. (2018). Professional Android (4th ed.). Wrox Press.
2. Phillips, B., Stewart, C., Hardy, K., & Marsicano, K. (2019). Android programming: The big nerd ranch guide (4th ed.). Big Nerd Ranch.
3. Griffiths, D., & Griffiths, D. (2021). Head first Android development (3rd ed.). O'Reilly Media.
4. Darcey, L., & Conder, S. (2020). Android wireless application development (5th ed.). Addison-Wesley Professional.

- Wei-Meng, L. (2019). *Beginning Android application development*. Wiley.

## Reference Books

- Burnette, E. (2015). *Hello, Android: Introducing Google's mobile development platform* (4th ed.). Pragmatic Bookshelf.
- Mednieks, Z., Dornin, L., Nakamura, G., & Meike, B. (2012). *Programming Android*. O'Reilly Media.
- Deitel, P., Deitel, H., & Deitel, A. (2015). *Android for programmers: An app-driven approach* (3rd ed.). Pearson.
- Horton, J. (2021). *Android programming for beginners* (3rd ed.). Packt Publishing.
- Neuburg, M. (2021). *Programming iOS* (14th ed.). O'Reilly Media.

## E-Resources

- [https://developer.mozilla.org/?utm\\_source=chatgpt.com](https://developer.mozilla.org/?utm_source=chatgpt.com)
- [https://www.php.net/docs.php?utm\\_source=chatgpt.com](https://www.php.net/docs.php?utm_source=chatgpt.com)
- [https://dev.mysql.com/doc/?utm\\_source=chatgpt.com](https://dev.mysql.com/doc/?utm_source=chatgpt.com)
- [https://www.w3schools.com/?utm\\_source=chatgpt.com](https://www.w3schools.com/?utm_source=chatgpt.com)
- [https://www.tutorialspoint.com/web\\_development\\_tutorials.htm?utm\\_source=chatgpt.com](https://www.tutorialspoint.com/web_development_tutorials.htm?utm_source=chatgpt.com)

## MAPPING WITH PROGRAM OUTCOMES

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 2   | 2   | -   | -   | -   | -   | 2   | 2   | -    | 2    | -    | 2    | -    | 2    | -    | -    |
| CO2 | 3   | 3   | 2   | 2   | 2   | -   | -   | 2   | -   | -    | 3    | -    | -    | 2    | 3    | 2    | -    |
| CO3 | 3   | 3   | 3   | -   | 2   | -   | -   | 2   | -   | -    | 3    | -    | -    | 2    | 3    | 2    | -    |
| CO4 | 3   | 3   | 2   | 2   | 3   | -   | -   | 2   | -   | -    | 3    | 2    | -    | 3    | 3    | -    | -    |
| CO5 | 3   | 3   | 2   | 2   | 3   | 2   | 2   | 2   | 1   | -    | 3    | 2    | -    | 3    | 3    | 2    | 2    |
| CO6 | 3   | 2   | 2   | 2   | 3   | 3   | 2   | 2   | 3   | 1    | 2    | 2    | 3    | 3    | 3    | 2    | 3    |

S-Strong(3)      M-Medium(2)      L-Low(1)

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE  
(AUTONOMOUS)**



**SUNDARAKKOTTAI, MANNARGUDI- 614016.**

*(For the Candidates admitted in the academic year 2026 – 2027)*

**DEPARTMENT OF COMPUTER APPLICATIONS**

**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: II-GEC-II- Software Engineering**

**Ins. Hrs./Week:4**

**Course Credit:3**

**Course Code:P26CAGE22A**

**Course Objectives**

1. To understand the fundamental concepts of software engineering, software processes, and various process models used in software development.
2. To acquire skills in requirements engineering, software requirement specification, and modeling techniques for developing quality software systems.
3. To explore agile software development methodologies, agile practices, and principles that support adaptive and iterative software development.
4. To develop knowledge of software project management techniques, including project planning, estimation, risk assessment, and project evaluation.
5. To understand software quality management concepts, quality models, and estimation techniques for delivering reliable and maintainable software products.

**Unit –I: Software Engineering and Process Models**

**(9 hours)**

Software and Software Engineering: The nature of Software, The unique nature of WebApps, Software Engineering, The software Process, Software Engineering Practice, Software Myths. Process Models: A generic process model, Process assessment and improvement, Prescriptive process models: Waterfall model, Incremental process models, Evolutionary process models, Concurrent models, specialized process models. Unified Process, Personal and Team process models

**Unit –II: Software Requirement Specification and Modeli**

**(9 hours)**

Requirements Engineering, Establishing the ground work, Eliciting Requirements, Developing use cases, Building the requirements model, Negotiating Requirements, Validating Requirements. Requirements Modeling Scenarios, Information and Analysis classes: Requirement Analysis, Scenario based modeling, UML models that supplement the Use Case, Data modeling Concepts, Class Based Modeling. Requirement Modeling Strategies: Flow oriented Modeling, Behavioral Modeling

### **Unit – III: Agile Development**

**(9 hours)**

Introduction to Agility- Agility and Cost of Change - Agile Process Concepts-Extreme Programming (XP), Other Agile Process Models, A tool set for Agile process. Principles that guide practice: Software Engineering Knowledge, Core principles, Principles that guide each framework activity.

### **Unit IV: Project Management**

**(9 hours)**

Introduction to Project Management: Introduction, Project and Importance of Project Management, Contract Management, Activities Covered by Software Project Management, Plans, Methods and Methodologies, Some ways of categorizing Software Projects, Stakeholders, Setting Objectives, Business Case, Project Success and Failure, Management and Management Control, Project Management life cycle, Traditional versus Modern Project Management Practices. Project Evaluation: Evaluation of Individual projects, Cost–benefit Evaluation Techniques, Risk Evaluation.

### **Unit V: Software Quality**

**(9 hours)**

Introduction, The place of software quality in project planning, Importance of software quality, Defining software **quality**, Software quality models, product versus process quality management. Software Project Estimation: Observations on Estimation, Decomposition Techniques, Empirical Estimation Models.

### **UNIT-VI CURRENT CONTOURS (for Continuous Internal Assessment Only):**

Recent Trends in Software Engineering: DevOps and DevSecOps – Continuous Integration and Continuous Deployment (CI/CD– Artificial Intelligence and Machine Learning in Software Engineering – Low-Code and No-Code Development Platforms – Software Engineering for Internet of Things (IoT) Applications – Blockchain-Based Software Systems

**Total Lecturer Hours: 45**

### **Course Outcomes (CO)**

Upon successful completion of the course, students will be able to:

1. Explain software engineering principles, software processes, and the characteristics of various software development life cycle models.
2. Analyze and model software requirements using requirement engineering techniques, use cases, UML models, and other modeling approaches.
3. Apply agile methodologies and software engineering best practices to support iterative and customer-focused software development.
4. Demonstrate the ability to plan, manage, and evaluate software projects using project management principles, cost-benefit analysis, and risk assessment techniques.
5. Evaluate software quality using quality models, process improvement strategies, and quality management practices.
6. Identify and explain recent technologies, tools, and trends in software engineering and their impact on modern software development practices.

## Textbooks

1. Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill.
2. Bob Hughes, Mike Cotterell, Rajib Mall: Software Project Management, 6th Edition, McGraw Hill Education, 2018.

## Reference books:

1. Ian Sommerville, Software Engineering, Pearson Education, 10th Edition, 2017.
2. Rajib Mall, Fundamentals of Software Engineering, PHI Learning, 5th Edition, 2018.
3. Pankaj Jalote, An Integrated Approach to Software Engineering, Springer / Narosa Publishing, 3rd Edition, 2005.
4. Hans van Vliet, Software Engineering: Principles and Practice, Wiley India, 3rd Edition, 2010.
5. Richard Fairley, *Software Engineering Concepts*, McGraw Hill, 2nd Edition, 2009.

## E-Resources

1. [Software Engineering – Ian Sommerville](#)
2. [https://www.mheducation.com/highered/product/software-engineering-concepts-fairley/M9780075549239.html?utm\\_source=chatgpt.com](https://www.mheducation.com/highered/product/software-engineering-concepts-fairley/M9780075549239.html?utm_source=chatgpt.com)
3. [https://link.springer.com/book/10.1007/978-0-387-28132-0?utm\\_source=chatgpt.com](https://link.springer.com/book/10.1007/978-0-387-28132-0?utm_source=chatgpt.com)
4. [https://www.mheducation.com/highered/product/software-engineering-concepts-fairley/M9780075549239.html?utm\\_source=chatgpt.com](https://www.mheducation.com/highered/product/software-engineering-concepts-fairley/M9780075549239.html?utm_source=chatgpt.com)
5. [https://www.routledge.com/Software-Testing-A-Craftsmans-Approach/Jorgensen/p/book/9781466560680?utm\\_source=chatgpt.com](https://www.routledge.com/Software-Testing-A-Craftsmans-Approach/Jorgensen/p/book/9781466560680?utm_source=chatgpt.com)

## MAPPING WITH PROGRAM OUTCOMES

| COs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |
|-----|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|
| CO1 | 3    | 2    | 1    | 1    | 2    | 1    | 1    | 1    | 2    | 1    | 3     | 1     | 1     | 2     | 2     | 2     | 1     |
| CO2 | 3    | 3    | 2    | 2    | 3    | 1    | 1    | 2    | 1    | 1    | 3     | 2     | 1     | 3     | 3     | 2     | 1     |
| CO3 | 2    | 3    | 2    | 1    | 2    | 2    | 1    | 2    | 2    | 1    | 3     | 1     | 2     | 2     | 3     | 3     | 2     |
| CO4 | 2    | 3    | 2    | 2    | 2    | 3    | 2    | 2    | 1    | 2    | 2     | 1     | 1     | 3     | 2     | 3     | 2     |
| CO5 | 3    | 3    | 2    | 2    | 3    | 2    | 2    | 1    | 2    | 1    | 3     | 2     | 1     | 2     | 3     | 2     | 2     |
| CO6 | 2    | 3    | 2    | 2    | 2    | 2    | 1    | 2    | 2    | 1    | 2     | 2     | 1     | 3     | 2     | 3     | 2     |

S-Strong(3)

M-Medium(2)

L-Low(1)



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S  
COLLEGE (AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016.

(For the Candidates admitted in the academic year 2026 – 2027)

**DEPARTMENT OF COMPUTER APPLICATIONS**

**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: I-EC-I: Software Development Technologies**

**Ins. Hrs./Week: 4**

**Course Credit: 3**

**Course Code: P26CAGE22B**

**Course Objectives**

1. To understand the principles, architecture, and deployment models of microservices in cloud environments.
2. To develop and deploy microservices using Azure Service Fabric and Azure Kubernetes Service (AKS).
3. To apply DevOps practices, tools, and workflows for continuous integration and continuous deployment.
4. To design secure, scalable, and monitored cloud-native applications using modern API and database strategies.
5. To implement API management, security mechanisms, and emerging cloud technologies for enterprise applications.

**UNIT –I: Implementing Microservices:**

**(9 Hours)**

Client to micro services communication, Interservice communication, data considerations, security, monitoring, micro services hosting platform options. Azure Service Fabric: Introduction, core concepts, supported programming models, service fabric clusters, develop and deploy applications of service fabric. Monitoring Azure Service Fabric Clusters: Azure application, resource manager template, Adding Application Monitoring to a Stateless Service Using Application Insights, Cluster monitoring, Infrastructure monitoring.

**UNIT-II-Azure Kubernetes Service (AKS):**

**(9 Hours)**

Introduction to kubernetes and AKS, AKS development tools, Deploy applications on AKS. Monitoring AKS: Monitoring, Azure monitor and analytics, monitoring AKS clusters, native kubernetes dashboard, Prometheus and Grafana. Securing Micro services: Authentication in micro services, Implementing security using API gateway pattern, Creating application using Ocrlo and securing APIs with Azure AD. Database Design for Microservices: Data stores, monolithic approach, Micro services approach, harnessing cloud computing, database options on MS Azure, overcoming application development challenges. Building Microservices on Azure Stack: Azure stack, Offering IaaS, PaaS on-premises simplified, SaaS on Azure stack.

**UNIT-III-.NET DevOps for Azure:****(9 Hours)**

DevOps introduction, Problem and solution. Professional Grade DevOps Environment: The state of DevOps, professional grade DevOps vision, DevOps architecture, tools for professional DevOps environment, DevOps centered application. Tracking work: Process template, Types of work items, Customizing the process, Working with the process. Tracking code: Number of repositories, Git repository, structure, branching pattern, Azure repos configuration, Git and Azure.

**UNIT-IV: Building the code:****(9 Hours)**

Structure of build, using builds with .NET core and Azure pipelines, Validating the code: Strategy for defect detection, Implementing defect detection. Release candidate creation: Designing release candidate architecture, Azure artifacts workflow for release candidates, Deploying the release: Designing deployment pipeline, Implementing deployment in Azure pipelines. Operating and monitoring release: Principles, Architectures for observability, Jumpstarting observability.

**UNIT-V-Introduction to APIs:****(9 Hours)**

Introduction, API economy, APIs in public sector. API Strategy and Architecture: API Strategy, API value chain, API architecture, API management. API Development: Considerations, Standards, kick-start API development, team orientation. API Gateways: API Gateways in public cloud, Azure API management, AWS API gateway. API Security: Request-based security, Authentication and authorization.

**UNIT-VI CURRENT CONTOURS (For Continuous Internal Assessment Only):**

Serverless Microservices – Container Orchestration with Kubernetes – Service Mesh Architecture (Istio) – AI-Assisted DevOps (AIOps) – GitOps and Infrastructure as Code (IaC) – Event-Driven Microservices – API-First Development – Zero Trust Security for Cloud Applications – Emerging Trends in Cloud-Native Application Development.

**Total Lecture Hours-45**

### **Course Outcomes**

Upon successful completion of the course, students will be able to:

1. Explain microservices architecture, communication patterns, hosting platforms, and cloud-native application concepts.
2. Develop, deploy, and monitor microservices using Azure Service Fabric and Azure Kubernetes Service.
3. Apply DevOps methodologies, version control systems, and Azure Pipelines for software development and deployment.
4. Design scalable database solutions and secure cloud-based microservices using authentication and API gateway mechanisms.
5. Develop and manage APIs using industry standards, API gateways, and cloud-based API management platforms.
6. Evaluate and apply emerging trends in cloud-native computing, DevOps automation, and API ecosystems to solve real-world problems.

### **TEXT BOOK (S)**

1. Harsh Chawla and Hemant Kathuria, Building Microservices Applications on Microsoft Azure- Designing, Developing, Deploying, and Monitoring, Apress, 2019.
2. Jeffrey Palermo , NET DevOps for Azure A Developer's Guide to DevOps Architecture the Right Way, Apress, 2019.
3. Thurupathan and Vijayakumar, Practical API Architecture and Development with Azure and AWS - Design and Implementation of APIs for the Cloud, Apress, 2018.

### **REFERENCE BOOK(S)**

1. Karl Matthias and Sean P. Kane, Docker: Up and Running, O'Reilly Publication, Second Edition 2018.
2. Len Bass, Ingo Weber, Liming Zhu, "DevOps, A Software Architects Perspective", Addison Wesley-Pearson Publication, First Edition 2015.
3. John Ferguson Smart, "Jenkins, The Definitive Guide", O'Reilly Publication, First Edition 2011.

### **E-RESOURCES:**

1. [https://www.startechup.com/en\\_au/blog/software-development-technologies/](https://www.startechup.com/en_au/blog/software-development-technologies/)
2. <https://invozone.com/blog/top-8-trending-software-development-technologies-in-2021/>
3. <https://www.orientsoftware.com/technologies/>
4. <https://www.artsoft-consult.ro/areas-of-application/tools-and-technologies>

## MAPPING WITH PROGRAM OUTCOMES

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 2   | 2   | -   | 2   | -   | -   | 2   | 1   | -    | 2    | -    | 2    | 2    | 3    | -    | -    |
| CO2 | 3   | 3   | 2   | 2   | 3   | -   | -   | 2   | -   | -    | 3    | 2    | -    | 3    | 3    | 2    | -    |
| CO3 | 3   | 3   | 3   | 2   | 3   | 2   | -   | 2   | 1   | -    | 3    | -    | 2    | 3    | 3    | 3    | -    |
| CO4 | 3   | 3   | 2   | 2   | 3   | 2   | 3   | 2   | -   | -    | 3    | 2    | -    | 3    | 3    | 2    | 3    |
| CO5 | 3   | 3   | 2   | 2   | 3   | 2   | 3   | 2   | -   | 1    | 3    | -    | -    | 3    | 3    | 2    | 3    |
| CO6 | 3   | 2   | 2   | 3   | 3   | 3   | 2   | 2   | 3   | 1    | 2    | 2    | 3    | 3    | 3    | 2    | 3    |

S-Strong(3)      M-Medium(2)      L-Low(1)

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S  
COLLEGE (AUTONOMOUS)**



**SUNDARAKKOTTAI,  
MANNARGUDI-614016.**

*(For the Candidates admitted in the academic year 2026–2027)*

**DEPARTMENT OF COMPUTER APPLICATIONS**

**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: II-GEC-II- Social Networking**

**Ins. Hrs./Week:4**

**CourseCredit:3**

**Course Code: P26CAGE22C**

**Course Objectives**

1. To understand the concepts, strategies, and tools used in social media and digital communication platforms.
2. To develop skills in creating and managing blogs, RSS feeds, websites, and WordPress-based content.
3. To explore social networking, social bookmarking, media-sharing, and crowd-sourcing platforms for online engagement.
4. To apply social media tools, widgets, and optimization techniques for enhancing digital presence and communication.
5. To evaluate emerging trends and technologies in social media, digital marketing, and online communities.

**UNIT I: Introduction**

**(9 Hours)**

Social Media Strategy-Important First Decisions -Websites, Blogs - RSS Feeds Mapping -Preparation - Multimedia Items Gathering Content for Blog Posts RSS Feeds & Blogs- RSS Feeds-The Feed Reader-The Feed-Options for Creating an RSS Feed-Planning Feed -Blogs-Options for Starting. Blog and RSS Feed- Feed or Blog Content-Search Engine Optimization (SEO)-Feed Burner-RSS Feed and Blog Directories-An Optimization Plan for Blog or RSS Feed

**UNIT II: Building a Word Press Powered Website**

**(9 Hours)**

Word Press as A CMS - Diversity of Word Press Sites-The Anatomy of a Word Press Site -a Brief Look at the Word Press Dashboard Planning - Site Themes Plug-ins setting up Sidebars Building Pages- Posting Blog Entries . Podcasting, Vidcasting, & Webcasting- Publishing Options for Podcast- Creating and Uploading Podcast Episodes-Publishing Podcast Optimizing Podcast- Webcasting

**UNIT III: Social Networking & Micro-Blogging**

**(9 Hours)**

Facebook-The Facebook Profile -Myspace LinkedIn-Twitter-Niche Social Networking Sites-Creating Own Social Network-Promoting Social Networking Presence- Social Bookmarking & Crowd-Sourcing - Social Bookmarking-A Social Bookmarking Strategy- Crowd-Sourced News Sites- Preparation And Tracking

Progress Media Communities-Image Sharing Sites-Image Sharing Strategy-Video Sharing Sites- Video Sharing Strategy-Searching And Search Engine Placement-Connecting With Others.

#### **UNIT IV: Widgets & Badges**

**(9 Hours)**

Highlighting Social Web Presence-Sharing And Syndicating Content Making Site More Interactive- Promoting Products And Making Money-Using Widgets In Word Press-Widget Communities And Directories-Working Widgets Into Strategy Social Media Newsrooms-Building Social Media Newsroom - Populating The Newsroom-Social Media News Releases-Social Media Newsroom Examples. More Social Tools-Social Calendars-Social Pages Wikis-Social Search Portals-Virtual Worlds.

#### **Unit V: Website optimization**

**(9 Hours)**

A Website Optimization Plan-Streamlining Web Presence-An Integration Plan- Looking to the Future-Life streaming: The Future of Blogging-Distributed Social Networking-Social Ranking, Relevancy, and—Defriending-Web 3.0 or The Semantic Web-Mobile Technology-Measuring Your Success-A Qualitative Framework-A Quantitative Framework-Tools to Help You Measure-Come To Your Own Conclusions.

#### **UNIT-VI CURRENT CONTOURS (For Continuous Internal Assessment Only):**

Artificial Intelligence in Social Media Marketing – Influencer Marketing and Creator Economy – Social Commerce and Live Shopping – Short-Form Video Platforms – Chatbots and Conversational Marketing – Web 3.0 and Decentralized Social Networks – Data Privacy and Ethical Issues in Social Media – Analytics-Driven Content Personalization.

**Total Lecture Hours:45**

#### **Course Outcomes**

Upon successful completion of the course, students will be able to:

1. Explain the fundamentals of social media, blogging, RSS feeds, and online communication strategies.
2. Develop and manage WordPress-based websites, blogs, podcasts, and webcasting applications.
3. Utilize social networking, bookmarking, and media-sharing platforms for communication and audience engagement.
4. Apply widgets, badges, social newsrooms, and collaborative tools to enhance web presence and content distribution.
5. Analyze and optimize websites and social media platforms using qualitative and quantitative performance metrics.
6. Evaluate emerging trends in social media technologies and formulate effective digital communication strategies.

**TEXT BOOK(S):**

1. Deltina hay —A Survival Guide To social Media and Web 2.0 Optimization, Dalton Publishing, 2009

**REFERENCE BOOK(S):**

1. **Boyd, Danah, and Nicole B. Ellison, editors.** *Social Network Sites: Definition, History, and Scholarship*. MIT Press, 2007.
2. **Safko, Lon.** *The Social Media Bible: Tactics, Tools, and Strategies for Business Success*. 3rd ed., Wiley, 2012.
3. **Carrington, Peter J., and John Scott, editors.** *The SAGE Handbook of Social Network Analysis*. SAGE Publications, 2011.
4. 1. Miriam Salpeter —Social networking for Career Success, Learning Express, 2011.
5. 2. Miles, Peggy, —Internet world guide to webcasting, Wiley, 2008 Professionals, Wiley Publication, 2015.

**E-RESOURCES**

1. <https://www.techtarget.com/whatis/definition/social-networking#:~:text=Social%20networks%20are%20websites%20and,uses%20of%20the%20inter%20net%20today>.
2. [https://en.wikipedia.org/wiki/Social\\_networking\\_service](https://en.wikipedia.org/wiki/Social_networking_service)
3. <https://www.psychologytoday.com/us/basics/social-networking>
4. <https://www.britannica.com/technology/social-network>
5. <https://www.investopedia.com/terms/s/social-networking.asp>

**MAPPING WITH PROGRAM OUTCOMES**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 3   | 2   | 3   | -   | -   | -   | -   | 2   | 1   | 2    | 2    | -    | 2    | -    | 2    |
| CO2 | 3   | 2   | 3   | 2   | 2   | -   | -   | 2   | -   | -    | 3    | -    | -    | 2    | 3    |
| CO3 | 3   | 3   | 3   | -   | 2   | 2   | -   | 2   | -   | 2    | 2    | -    | -    | 3    | 3    |
| CO4 | 3   | 3   | 3   | 2   | 2   | 2   | -   | 2   | -   | 2    | 3    | -    | -    | 3    | 3    |
| CO5 | 3   | 3   | 2   | 2   | 3   | 2   | 2   | 2   | 1   | -    | 3    | 2    | -    | 3    | 3    |
| CO6 | 3   | 2   | 2   | 2   | 3   | 3   | 2   | 2   | 3   | 2    | 2    | 2    | 3    | 3    | 3    |

**S-Strong (3)****M-Medium (2)****L-Low (1)**

SEC-II

SENGAMALA THAYAR EDUCATIONAL TRUST WOMEN'S  
COLLEGE (AUTONOMOUS)



SUNDARAKKOTTAI, MANNARGUDI- 614016.

(For the Candidates admitted in the academic year 2026 – 2027)

**DEPARTMENT OF COMPUTER APPLICATIONS**

**MASTER OF COMPUTER APPLICATIONS (MCA)**

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**Semester: II-SEC-II: Data Mining And Warehousing**

**Ins. Hrs./Week: 2**

**Course Credit: 2**

**Course Code: P26SECA22**

**Course Objectives**

1. To understand the fundamental concepts, techniques, and applications of data mining and data warehousing.
2. To acquire knowledge of data preprocessing methods and multidimensional data models for efficient data analysis.
3. To apply association rule mining techniques for discovering meaningful patterns and relationships in large datasets.
4. To develop classification and clustering models for knowledge discovery and predictive analysis.
5. To evaluate emerging trends and advanced techniques in data mining for real-world decision-making applications.

**UNIT-I Introduction**

**(6 Hours)**

Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major issues in Data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration & Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

**UNIT-II Data warehouse**

**(6 Hours)**

Introduction to Data warehouse, Difference between operational database systems and data warehouses, Data warehouse Characteristics, Data warehouse Architecture and its Components, Extraction-Transformation-Loading, Logical(Multi-Dimensional), Data Modeling, Schema Design, Star and Snow-Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi-Addictive, Non Addictive Measures; Fact-Less-Facts, Dimension Table Characteristics; OLAP Cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

**UNIT-III Association Rules**

**(6 Hours)**

Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIORI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.

**UNIT-IV Classification****(6 Hours)**

Problem Definition, General Approaches to solving a classification problem, Evaluation of Classifiers , Classification techniques, Decision Trees-Decision tree Construction, Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction ; Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics. Prediction: Accuracy and Error measures, Evaluating the accuracy of classifier or a predictor, Ensemble methods

**UNIT-V Clustering****(6 Hours)**

Clustering Overview, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, , Partitioning Clustering-K-Means Algorithm, PAM Algorithm; Hierarchical Clustering-Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Key Issues in Hierarchical Clustering, Strengths and Weakness, Outlier Detection.

**UNIT-VI CURRENT CONTOURS (For Continuous Internal Assessment Only):**

Big Data Mining – Web and Social Media Mining – Stream Data Mining – Deep Learning for Data Mining – Text and Sentiment Mining – Graph and Network Mining – Cloud-Based Data Mining – Explainable Artificial Intelligence (XAI) – Privacy-Preserving Data Mining – Applications of Data Mining in Business Intelligence and Smart Systems.

**Total Lecture Hours:30****Course Outcomes**

Upon successful completion of the course, students will be able to:

1. Explain the concepts, functionalities, and preprocessing techniques involved in data mining and data warehousing.
2. Design and analyze data warehouse architectures, multidimensional models, and OLAP operations.
3. Apply association rule mining algorithms to discover frequent patterns and relationships in datasets.
4. Develop and evaluate classification models using decision trees, Bayesian methods, and nearest-neighbor techniques.
5. Implement clustering techniques and outlier detection methods for unsupervised data analysis.
6. Analyze emerging trends and advanced data mining approaches for solving complex business and research problems.

**TEXT BOOKS:**

1. Data Mining- Concepts and -l.chniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2 Edition, 2006.
2. Introduction to Data Mining, Psng-Ning Tan, Vipin Kumar, Michael Steinbach, Pearson Education.

## REFERENCE BOOKS:

1. Data Mining Techniques, Arun KPujari, 3rd Edition, Universities Press.
2. Data Warehousing Fundament's, Pualraj Ponnaiah, Wiley Student Edition.
3. The Data Warehouse Life CycleToolkit — Ralph Kimball, Wiley Student Edition.
4. Data Mining, Vikaram Pudi, P Rddha Krishna, Oxford University Press

## E-RESOURCES

1. [https://www.ibm.com/topics/data-warehouse?utm\\_source=chatgpt.com](https://www.ibm.com/topics/data-warehouse?utm_source=chatgpt.com)
2. [https://www.ibm.com/topics/data-warehouse?utm\\_source=chatgpt.com](https://www.ibm.com/topics/data-warehouse?utm_source=chatgpt.com)
3. [https://learn.microsoft.com/en-us/sql/?utm\\_source=chatgpt.com](https://learn.microsoft.com/en-us/sql/?utm_source=chatgpt.com)
4. [https://www.kdnuggets.com/?utm\\_source=chatgpt.com](https://www.kdnuggets.com/?utm_source=chatgpt.com)
5. [https://www.tutorialspoint.com/data\\_mining/index.htm?utm\\_source=chatgpt.com](https://www.tutorialspoint.com/data_mining/index.htm?utm_source=chatgpt.com)

## MAPPING WITH PROGRAM OUTCOMES

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | 3   | 2   | 2   | -   | 2   | -   | -   | 2   | 1   | -    | 2    | -    | 2    | 2    | 3    | -    | -    |
| CO2 | 3   | 3   | 2   | 2   | 3   | -   | -   | 2   | -   | -    | 3    | 2    | -    | 3    | 3    | -    | -    |
| CO3 | 3   | 3   | 2   | 2   | 3   | -   | -   | 2   | -   | -    | 3    | 2    | -    | 3    | 3    | -    | -    |
| CO4 | 3   | 3   | 3   | 2   | 3   | 2   | -   | 2   | -   | -    | 3    | 2    | -    | 3    | 3    | 2    | -    |
| CO5 | 3   | 3   | 2   | 2   | 3   | 2   | -   | 2   | -   | -    | 3    | 2    | -    | 3    | 3    | 2    | 2    |
| CO6 | 3   | 2   | 2   | 3   | 3   | 3   | 2   | 2   | 3   | 1    | 2    | 3    | 3    | 3    | 3    | 2    | 3    |

**S-Strong (3)**

**M-Medium (2)**

**L-Low (1)**

NMEC-1

**SENGAMALA THAYAR EDUCATIONAL TRUST WOMEN'S COLLEGE**  
(AUTONOMOUS)



SUNDARAKKOTTAI, MANNARGUDI- 614016.  
(For the Candidates admitted in the academic year 2026 – 2027)

**DEPARTMENT OF COMPUTER APPLICATIONS**

MASTER OF COMPUTER APPLICATIONS (MCA)

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**Semester: II - NMEC-I - Web Technologies for Business Applications**

**Ins. Hrs./Week: 2**

**Course Credit: 2**

**Course Code: P26NMECA21**

**Course Objectives**

1. To understand the fundamentals of web technologies and client-side web page development using HTML.
2. To develop interactive web applications using forms, tables, frames, and JavaScript.
3. To acquire programming skills in PHP for server-side web application development.
4. To design and implement database-driven web applications using PHP and MySQL.
5. To explore emerging web technologies and modern trends in web application development.

**UNIT – I : Introduction to HTML**

(6 Hours)

Structuring Documents for the Web: Introducing HTML and XHTML, Basic Text Formatting, Presentational Elements, Lists, Editing Text, Core Elements and Attributes, Attribute Groups. Links and Navigation: Basic Links, Creating Links with the <a>Element, Advanced E- mail Links. Images, Audio, and Video: Adding Images Using the <img>Element, Using Images as Links, Image Maps, Choosing the Right Image Format.

**UNIT – II :Tables, Forms, Frames**

(6 Hours)

Tables: Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables. Forms: Introducing Forms, Form Controls, Sending Form Data to the Server. Frames: Introducing Frameset, Element, Creating Links Between Frames, setting a Default Target Frame Using Element, Nested Framesets, Inline or Floating Frames with <iframe>.

**UNIT – III: Java Script**

(6 Hours)

Java Script: How to Add Script to Your Pages, Variables and Data Types , Operators, Conditional Statements, Looping ,Function, Events. Working with JavaScript: Practical tips for writing Scripts, Form Validation , Form Enhancement.

**UNIT- IV: Essential PHP**

(6 Hours)

Variables, Constants, Understanding Internal Data types in PHP – Operators and Flow Control- Strings and Arrays: The String Functions, PHP Array Functions, Handling Multi-Dimensional Arrays. Creating Functions – Reading Data in Web pages: Setting up Web Pages to communicate with PHP, Handling Form Input Elements– PHP Browser – Handling Power.

**UNIT-V: Handling File and Databases****(6 Hours)**

File Handling: Opening, looping, writing, reading, closing, checking, parsing, Copying, appending, locking and deleting a file – Working with Databases and Using PHP with MYSQL: Connecting to MYSQL – Executing and retrieving Simple Queries.

**UNIT VI – CURRENT CONTOURS (For Continuous Internal Assessment Only)**

HTML5 Advanced Features – Responsive Web Design Frameworks – PHP Frameworks (Laravel) – RESTful Web Services – Progressive Web Applications (PWA) – Cloud-Based Web Hosting – Web Application Security and OWASP Practices – Artificial Intelligence Enabled Web Applications – Modern Database Technologies and Future Trends in Web Development.

**Total Lecture Hours- 30****COURSE OUTCOME**

Upon successful completion of the course, students will be able to:

1. Explain the concepts of HTML, hyperlinks, multimedia elements, and web page structures.
2. Design web pages using tables, forms, frames, and navigation techniques.
3. Develop interactive client-side applications using JavaScript, event handling, and form validation.
4. Create server-side web applications using PHP programming constructs and functions.
5. Design and implement database-driven web applications using PHP and MySQL.
6. Evaluate modern web development technologies and apply them to build secure and scalable web applications.

**TEXT BOOK(S)**

1. Jon Duckett, Beginning HTML, XHTML, CSS and Java script , Wiley Publishing
2. Steven Holzner.2007. PHP: The Complete Reference .First Edition, McGraw Hill India,New Delhi.

**REFERENCE BOOK(S)**

1. Chris Bates, “Web Programming”, Wiley Publishing 3d Edition.
2. M. Srinivasan, “Web Technology: Theory and Practice”, Pearson Publication
3. Larry Ullman. 2017. PHP 6 and MySQL 5 for Dynamic websites: Visual Quick Pro Guide. Third Edition, Peachpit Press, San Francisco, USA.
4. Bruce Dou. 2020. Mastering Swoole PHP: Build High Performance Concurrent System with Async and Coroutines”.First Edition, Transfon Ltd, UK.
5. Doug Bierer.2016. PHP 7 Programming Cookbook.First Edition, Packt Publishing, Mumbai.
6. Gunnard Engebret.2021. PHP 8 Revealed.First Edition, First Edition, Apress Publications, USA.
7. Mikael Olsson. 2020. PHP 8 Quick Scripting Reference.Third Edition, Apress

Publications, USA.

8. Vikram Vaswani. 2008. PHP: A Beginner's Guide. First Edition, McGraw Hill Education, New Delhi.

## E- RESOURCES

1. <https://www.w3schools.com/js/>
2. <https://www.geeksforgeeks.org/html-introduction/>
3. [http://www.nptelvideos.com/php/php\\_video\\_tutorials.php](http://www.nptelvideos.com/php/php_video_tutorials.php)
4. <https://www.tutorialspoint.com/php/index.htm>
5. <https://www.phptpoint.com>

## MAPPING WITH PROGRAM OUTCOMES

| CO<br>s | PO<br>1 | PO<br>2 | PO<br>3 | PO<br>4 | PO<br>5 | PO<br>6 | PO<br>7 | PO<br>8 | PO<br>9 | PO<br>10 | PSO<br>1 | PSO<br>2 | PSO<br>3 | PSO<br>4 | PSO<br>5 | PSO<br>6 | PSO<br>7 |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|----------|
| CO1     | 3       | 2       | 2       | -       | -       | -       | -       | 2       | 1       | -        | 2        | -        | 2        | -        | 3        | -        | -        |
| CO2     | 3       | 2       | 3       | -       | 2       | -       | -       | 2       | -       | -        | 3        | -        | -        | 2        | 3        | -        | -        |
| CO3     | 3       | 3       | 3       | 2       | 2       | -       | -       | 2       | -       | -        | 3        | -        | -        | 3        | 3        | 2        | -        |
| CO4     | 3       | 3       | 2       | 2       | 3       | -       | -       | 2       | -       | -        | 3        | 2        | -        | 3        | 3        | 2        | -        |
| CO5     | 3       | 3       | 2       | 2       | 3       | 2       | -       | 2       | -       | -        | 3        | 2        | -        | 3        | 3        | 2        | 2        |
| CO6     | 3       | 2       | 2       | 3       | 3       | 3       | 2       | 2       | 3       | 1        | 2        | 2        | 3        | 3        | 3        | 2        | 3        |

S-Strong (3) M-Medium (2) L-Low (1)