# B.C.A Computer Applications

## LOCF SYLLABUS – 2024-2025

## 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 Specific Elective Courses (DSE)** Elective course may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective (DSE). 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.

**Ability Enhancement Compulsory Courses (AECC)**

"AECC" are the courses based upon the content that leads to Knowledge enhancement especially in Communicative English and other soft skills.

**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.

**Undergraduate Programme:**

**Programme Pattern:** The Under Graduate degree programme consists of **FIVE** vital components. They are as follows:

Part -I : Languages (Tamil / Hindi / French / Sanskrit)

Part-II : General English

Part-III: Core Course (Theory, Practical's, Generic Elective courses , Discipline Specific Elective courses , Compulsory and Optional Allied courses, Project )

Part-IV: Non Major Elective, Foundation Course, Ability Enhancement Compulsory Course, Value Education, Environmental studies, Skill Enhancement Courses/ Soft Skills, Internship / field visit / industrial visit/ Case Study), Professional Competency Course

**Part –V**

Extension activity, Gender studies

**EXAMINATION**

**Continuous Internal Assessment (CIA):**

**UG - Distribution of CIA Marks**

**Passing Minimum: 40 %**

Assignments – 3 = 30%

Tests- 3(Best 2 out of 3) = 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**: (5X5=25 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/ 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) K- LEVELS → | Lower Order Thinking | | | Higher Order Thinking | | | Total |
|---|---|---|---|---|---|---|---|
| | K1 | K2 | K3 | K4 | K5 | K6 | |
| **END SEMESTER EXAMINATIONS (ESE)** | 20 | 25 | | | 30 | | **75** |
| **Continuous Internal Assessment (CIA)** | 20 | 25 | | | 30 | | **75** |

| **QUESTION PATTERN FOR SEMESTER EXAMINATION/ Continuous Internal Assessment** | | |
|---|---|---|
| **PART** | | **MARKS** |
| **PART –A I.** (No choice ,One Mark) **TWO** questions from each unit<br>**II.** (No choice ,Two Mark) **ONE** question from each unit | (10x1 =10)<br>(5x2 =10) | **20** |
| **PART -B** (Either/ or type ,5-Marks) **ONE** questions from each unit | (5x5 =25) | **25** |
| **PART -C** (3 out of 5) (10 Marks) **ONE** question from each unit | (3x10 =30) | **30** |
| | **Total** | **75** |

| **BLUE PRINT OF QUESTION PAPER FOR SEMESTER EXAMINATION** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **DURATION: 3. 00 Hours.** | | | | | | | **Max Mark : 100** |
| **K- LEVELS** | **K1** | **K2** | **K3** | **K4** | **K5** | **K 6** | **Total Marks** |
| **PART** | | | | | | | |
| **PART –A** (One Mark, No choice) (10x1 =10) | 10 | | | | | | **10** |
| (2-Marks, No choice) (10x2=20) | 10 | | | | | | **10** |
| **PART –B** (5- Marks) (Either/or type) (5x5=25) | | 5 | 10 | 10 | | | **25** |
| **PART -C** (10 Marks) (3 out of 5) (3x10=30) Courses having only **K5,K6** levels, K5 level- 3 Questions, K6 level- 2 Questions **(One K6 level question is compulsory)** | | | | | 20 | 10 | **30** |
| **Total** | **20** | **05** | **10** | **10** | 20 | 10 | **75** |

## EVALUATION

### GRADING SYSTEM

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 twoare calculated by the following formulae:

| | |
|---|---|
| $GPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{I=1}^{n} C_i}$ | $WAM\,(Weighted\ Average\ Marks) = \frac{\sum_{i=1}^{n} C_i M_i}{\sum_{I=1}^{n} C_i}$ |
| Where,<br>$C_i$ is the Credit earned for the Course i<br>$G_i$ is the Grade Point obtained by the student for the Course i<br>$M_i$ is the marks obtained for the course i and<br>n is the number of Courses **Passed** in that semester. | |

**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**

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

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

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

**Table-3: Final Result**

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

## Vision

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

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## 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 B.C.A.,DEGREE PROGRAMMES

| PO No. | Programme Outcomes<br>(*Upon completion of the B.C.A. Degree Programme, the Undergraduate will be able to)* |
|---|---|
| **PO-1** | **Disciplinary knowledge**: Demonstrate comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate program of study in Bachelor of Computer Applications. |
| **PO-2** | **Critical thinking, Problem Solving and Reflective thinking:** think critically about the issues and identify, critically analyze and solve problems from the disciplines of concern using appropriate tools and techniques and the knowledge, skills and attitudes acquired and extrapolate the same to real life situations; show critical sensibility to life experiences, with self-awareness and reflexivity of both self and society. |
| **PO-3** | **Analytical & Scientific Reasoning:** evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints; critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective. |
| **PO-4** | **Research-related Skills:** develop a sense of capability for relevant/appropriate inquiry and asking questions, synthesize, articulate and report results and to recognize and predict cause and effect relationships, define problems, formulate and establish hypothesis, analyze and interpret and draw conclusions from data, execute and report the results of an experiment or investigation. |
| **PO-5** | **Digital literacy and Effective Communication:** use ICT in a variety of learning situations and speak, read, write and listen clearly in person and through electronic media in English and in one or more Indian languages, and make meaning of the world by connecting people, ideas, books, media and technology; efficiently communicate thoughts and ideas in a clear and concise manner. |
| **PO-6** | **Individual and Team Work:** effectively accomplish tasks individually as well as work effectively and respectfully as member or leader with diverse teams, facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interest so for a common cause and work efficiently as a member of a team. |
| **PO-7** | **Multicultural Competence and Social Interaction:** 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. |
| **PO-8** | **Awareness of Ethical issues, Human values and Gender Issues:** 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 and understand the value of relationship between self and the community and aware of the various issues concerning women and society. |
| **PO-9** | **Awareness of Environment and Sustainability:** understand the impacts of technology and business practices in societal and environmental contexts, and sustainable development. |
| **PO-10** | **Self directed and Lifelong learning:** acquire knowledge and skills, including learning "how to learn", that are necessary for participating in learning activities throughout life and to engage in independent and life-long learning in the broadest context of socio-technological changes. |

**PROGRAMME SPECIFIC OUTCOME (PSO)**

| PSO No. | Program Specific Outcomes<br><br>(B.C.A.,DEGREE) |
|---|---|
| **PSO1** | Think in a critical and logical based manner |
| **PSO2** | Familiarize the students with suitable software tools of computer science and industrial applications to handle issues and solve problems in mathematics or statistics and real time application related sciences. |
| **PSO3** | Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand . |
| **PSO4** | Understand, formulate, develop programming model with logical approaches to a Address issues arising in social science, business and other contexts. |
| **PSO5** | Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and Industrial statistics. |

# B.C.A SYLLABUS

**Syllabus**

**2024-2025**

## Programme Code: 3USBCA


**SENGAMALA THAYAAR EDUCATIONALTRUST**
**WOMEN'S COLLEGE (AUTONOMOUS)**

(Affiliated to Bharathidasan University, Tiruchirappalli)
(Accredited by NAAC)|(An ISO 9001:2015 Certified Institution)

**Sundarakkottai,**
**Mannargudi – 614016,**

**Thiruvarur(Dt.),TamilNadu,India.**

# SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

*(AUTONOMOUS)*

*(Affiliated to Bharathidasan University)*

**(Accredited by NAAC | An ISO 9001:2015 Certified Institution)**

**SUNDARAKKOTTAI, MANNARGUDI – 614 016,**

*TAMILNADU, INDIA.*

## BACHELOR OF COMPUTER APPLICATIONS COURSE STRUCTURE UNDER CBCS

*LEARNINIG OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)*

***(For the candidates admitted in the academic year 2024-2025)***

**ELIGIBILITY:** Those who have completed +2 examinations with Mathematics as one of the core subject

| Semester | Part | Nature of the Course | Course Code | Title of the Course | Inst. Hours/ Week | L | T | P | O | Credit | Exam Hours | Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Int. | Ext. | |
| I | I | Language Course (LC)-I | U24LC101 | Podhu Tamil I Tamil Elakkiya Varalaru-I | 6 | 5 | 1 | - | - | 3 | 3 | 25 | 75 | 100 |
| | II | English Language Course (ELC)-I | U24ELC101 | General English-I | 6 | 5 | 1 | - | - | 3 | 3 | 25 | 75 | 100 |
| | III | Core Course (CC) - I | U24CA101 | Python Programming | 5 | 4 | 1 | - | - | 5 | 3 | 25 | 75 | 100 |
| | | Core Practical (CP) - I | U24CA102P | Python Programming Lab | 4 | - | 1 | 3 | - | 4 | 3 | 25 | 75 | 100 |
| | | Allied Course (AC) – I | U24AMA101 | Statistics | 3 | 3 | - | - | - | 2 | 3 | 25 | 75 | 100 |
| | | Allied Course (AC)-II | U24AMA102 | Numerical Analysis | 2 | 2 | - | - | - | - | - | - | - | - |
| | IV | Non Major Elective I | | | 2 | 2 | - | - | - | 2 | 3 | 25 | 75 | 100 |
| | | Foundation Course – FC | U24FCCA11 | Fundamentals of Computers and Programming in C | 2 | 2 | - | - | - | 2 | 3 | 25 | 75 | 100 |
| | | **Total** | | | **30** | **23** | **4** | **3** | - | **21** | - | - | - | **700** |
| II | I | Language Course (LC)-II-Tamil | U24LC202 | Podhu Tamil II Tamil Elakkiya Varalaru –II | 6 | 5 | 1 | - | - | 3 | 3 | 25 | 75 | 100 |
| | II | English Language Course(ELC) – II | U24ELC202 | General English-II | 6 | 5 | 1 | - | - | 3 | 3 | 25 | 75 | 100 |
| | III | Core Course (CC) – II | U24CA203 | Object Oriented Programming Concepts Using C++ | 5 | 4 | 1 | - | - | 5 | 3 | 25 | 75 | 100 |
| | | Core Practical (CP)– II | U24CA204P | C++ Programming Lab | 4 | - | 1 | 3 | - | 4 | 3 | 25 | 75 | 100 |
| | | Allied Course (AC) – II | U24AMA102 | Numerical Analysis | 2 | 2 | - | - | - | 2 | 3 | 25 | 75 | 100 |
| | | Allied Course (AC) – III | U24AMA203 | Operations Research | 3 | 3 | - | - | - | 2 | 3 | 25 | 75 | 100 |
| | IV | Non-Major Elective-II | U24NMECA22 | | 2 | 2 | - | - | - | 2 | 3 | 25 | 75 | 100 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Skill Enhancement Course(SEC)- I | U24SECA21 | Office Automation | 2 | 2 | - | - | - | 2 | 3 | 25 | 75 | 100 |
| | | **Total** | | | **30** | **23** | **4** | **3** | **-** | **23** | - | - | - | **800** |
| III | I | Language Course (LC)-III | | Podhu Tamil III | 6 | 5 | 1 | - | - | 3 | 3 | 25 | 75 | 100 |
| | II | English Language Course(ELC) –III | | General English-III | 6 | 5 | 1 | - | - | 3 | 3 | 25 | 75 | 100 |
| | III | Core Course (CC) – III | | Data Structures and Algorithms | 5 | 4 | 1 | - | - | 5 | 3 | 25 | 75 | 100 |
| | | Core Practical (CP) – III | | Data Structures and Algorithms lab | 4 | - | 2 | 2 | - | 4 | 3 | 25 | 75 | 100 |
| | | Allied Course (AC) – IV | | Financial Accounting | 3 | 3 | - | - | - | 2 | 3 | 25 | 75 | 100 |
| | | Allied Practical (AP) – I | | Accounting Package Lab | 2 | - | - | 2 | - | - | - | - | - | - |
| | IV | Skill Enhancement Course(SEC)-II | | Multimedia Systems | 2 | 2 | - | - | - | 2 | 3 | 25 | 75 | 100 |
| | | Skill Enhancement Course(SEC)-III | | Web Designing | 2 | 2 | - | - | - | 2 | 3 | 25 | 75 | 100 |
| | | **Total** | | | **30** | **21** | **5** | **4** | **-** | **21** | **-** | **-** | **-** | **700** |
| IV | II | Language Course (LC)-IV | | Podhu Tamil IV | 6 | 5 | 1 | - | - | 3 | 3 | 25 | 75 | 100 |
| | II | English Language Course(ELC) –IV | | General English-IV | 6 | 5 | 1 | - | - | 3 | 3 | 25 | 75 | 100 |
| | III | Core Course (CC) – IV | | Programming in Java | 5 | 4 | 1 | - | - | 5 | 3 | 25 | 75 | 100 |
| | | Core Practical (CP) –IV | | Programming in Java Lab | 4 | - | 2 | 2 | - | 4 | 3 | 25 | 75 | 100 |
| | | Allied Course (AC)– V | | Cost and Management Accounting | 3 | 3 | - | - | - | 2 | 3 | 25 | 75 | 100 |
| | | Allied Practical (AP)– I | | Accounting Package Lab | 2 | - | - | 2 | - | 2 | 3 | 25 | 75 | 100 |
| | IV | Skill Enhancement Course(SEC)-IV | | Problem Solving Techniques | 2 | 2 | - | - | - | 2 | 3 | 25 | 75 | 100 |
| | | Skill Enhancement Course(SEC)-V | | Biometrics | 2 | 2 | - | - | - | 2 | 3 | 25 | 75 | 100 |
| | | **Total** | | | **30** | **21** | **5** | **4** | **-** | **23** | **-** | **-** | **-** | **800** |
| V | III | Core Course (CC) –V | | Operating Systems | 5 | 4 | 1 | - | - | 5 | 3 | 25 | 75 | 100 |
| | | Core Course (CC) – VI | | ASP.Net Programming | 5 | 4 | 1 | - | - | 4 | 3 | 25 | 75 | 100 |
| | | Core Course (CC) –VII | | Computer Networks | 6 | 4 | 2 | - | - | 5 | 3 | 25 | 75 | 100 |
| | | Core Practical (CP) –V | | ASP.Net Programming Lab | 4 | - | 2 | 2 | - | 4 | 3 | 25 | 75 | 100 |
| | | Elective Course (EC)–I | | Software Engineering/Cyber Security/Big Data | 4 | 4 | - | - | - | 3 | 3 | 25 | 75 | 100 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Analytics | | | | | | | | | | |
| | | Elective Course (EC)–II | | Software Project Management/Natural Language Processing/IOT and its Applications | 4 | 4 | - | - | - | 3 | 3 | 25 | 75 | 100 |
| | IV | Environmental Studies | | Environmental Studies | 2 | 2 | - | - | - | 2 | 3 | 25 | 75 | 100 |
| | | Internship/ Industrial visit/ Field visit | | Internship/ Industrial visit/ Field visit | - | - | - | - | - | 2 | - | - | - | - |
| | | | | **Total** | **30** | **22** | **6** | **2** | **-** | **28** | **-** | **-** | **-** | **700** |
| VI | III | Core Course -VIII | | Big data Analytics using R Programming | 6 | 4 | 1 | 1 | - | 4 | 3 | 25 | 75 | 100 |
| | | Core Practical (CP)-VI | | R Programming Lab | 6 | - | 1 | 5 | - | 4 | 3 | 25 | 75 | 100 |
| | | Core Project | | Project with Viva-Voce / Group Project | **5** | **5** | **-** | **-** | **-** | 5 | 3 | 25 | 75 | 100 |
| | | Elective Course (EC)–III | | Software Metrics /Machine Learning/Cloud Computing/ | 4 | 3 | 1 | - | - | 3 | 3 | 25 | 75 | 100 |
| | | Elective Course (EC)–IV | | Agile Project Management / Human Computer Interaction/ Grid Computing | 4 | 3 | 1 | - | - | 3 | 3 | 25 | 75 | 100 |
| | IV | Value Education | | Value Education | 2 | 2 | - | - | - | 2 | 3 | 25 | 75 | 100 |
| | | Professional competency skill | | Mobile Application Development | 2 | 2 | - | - | - | 2 | 3 | 25 | 75 | 100 |
| | V | Gender Studies | | Gender Studies | 1 | 1 | - | - | - | 1 | 3 | 25 | 75 | 100 |
| | | Extension activity | | Extension activity | - | - | - | - | - | 1 | - | - | - | - |
| **Total** | | | | | **30** | **20** | **4** | **6** | **-** | **25** | **-** | **-** | **-** | **800** |
| | | ***Extra credit** | | **MOOC / SWAYAM/NPTEL** | - | - | - | - | - | 2 | - | - | - | - |
| | | | | **Value Added Course (At least one per year)** | - | - | - | - | - | 3*2 | - | - | - | - |
| | | | | **GRAND TOTAL** | **180** | **-** | **-** | **-** | **-** | **141** | **-** | **-** | **-** | **4500** |

**Credit Distribution for UG PROGRAMME-BCA**

| S.No | Part | Subject | No. of Courses | Total Credits |
|---|---|---|---|---|
| 1 | I | Language Course | 4 | 12 |
| 2 | II | English Language Course | 4 | 12 |
| 3 | III | Core Course Theory | 8 | 38 |
| 4 | | Core Practical | 6 | 24 |
| 5 | | Core Project | 1 | 05 |
| 6 | | Allied Course Theory | 5 | 10 |
| 7 | | Allied Course Practical | 1 | 02 |
| 8 | | Elective Course | 4 | 12 |
| 9 | IV | Non-Major Elective | 2 | 04 |
| 10 | | Foundation Course | 1 | 02 |
| 12 | | Skill Enhancement Course | 5 | 10 |
| 13 | | Internship/ Industrial Visit/ Field Visit | 1 | 02 |
| 14 | | Environmental Studies | 1 | 02 |
| 15 | | Value Education | 1 | 02 |
| 16 | | Professional competency Course | 1 | 02 |
| 17 | V | Gender Studies | 1 | 01 |
| | | Extension Activity | 1 | 01 |
| **Total** | | | **47** | **141** |

| **Note:** | | | |
|---|---|---|---|
| **S.NO** | **PARTICULARS** | **CIA** | **ESE** |
| 1. | Theory | 25 | 75 |
| 2. | Practical | 25 | 75 |
| 3.Separate passing minimum is prescribed for Internal and External marks | | | |

***FOR THEORY***

1. The passing minimum for CIA shall be 40% out of 25 marks [i.e.10marks]
2. The passing minimum for ESE shall be 40% out of 75marks [i.e.30marks]

***FOR PRACTICAL***

1. The passing minimum for CIA shall be 40% out of 25 marks [i.e.16marks]
2. The passing minimum for ESE shall be 40% out of 75marks [i.e.24marks]

## NON-MAJOR ELECTIVE (NME) OFFERED BY THE DEPARTMENT

| Semester | Part | Course Code | Course | Course Title |
|---|---|---|---|---|
| **I** | **IV** | U24NMECA11 | NME-I | Fundamentals of Computerand Applications |
| **II** | | U24NMECA22 | NME-II | Web Designing |

## SKILL ENHANCEMENT COURSE (SEC) OFFERED BY THE DEPARTMENT

| Semester | Part | Course Code | Course | Course Title |
|---|---|---|---|---|
| **II** | **IV** | U24SECA21 | SEC-I | Office Automation |
| **III** | | | SEC -II | Multimedia systems |
| | | | SEC -III | Web Designing |
| **IV** | | | SEC -IV | Problem Solving Techniques |
| | | | SEC -V | Biometrics |

## VALUE ADDED COURSE (VAC) OFFERED BY THE DEPARTMENT

| S.No | SEMESTER | COURSE CODE | Course Title |
|---|---|---|---|
| 1 | II | U24CAVA21 | Multimedia and Animation |

# 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**

**BACHELOR OF COMPUTER APPLICATIONS (BCA)**

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**Semester: I-CC-I:** Python Programming

**Ins. Hrs./Week:** 5 **Course Credit:** 5 **Course Code: U24CA101**

**UNIT-I: Introduction** **(18 Hours)**

Introduction: The essence of computational problem solving – Limits of computational problem solving-Computer algorithms-Computer Hardware-Computer Software-The process of computational problem solving-Python programming language - Literals - Variables and Identifiers - Operators - Expressions and Data types, Input / output.

**UNIT- II: Control Structures** **(18 Hours)**

Control Structures: Boolean Expressions - Selection Control - If Statement- Indentation in Python- Multi-Way Selection -- Iterative Control- While Statement- Infinite loops- Definite vs. Indefinite Loops- Boolean Flag. String, List and Dictionary, Manipulations Building blocks of python programs, Understanding and using ranges.

**UNIT- III: Functions** **(18 Hours)**

Functions: Program Routines- Defining Functions- More on Functions: Calling Value-Returning Functions-Calling Non-Value-Returning Functions- Parameter Passing - Keyword Arguments in Python - Default Arguments in Python-Variable Scope. Recursion: Recursive Functions.

**UNIT- IV: Object and Database** **(18 Hours)**

Objects and their use: Software Objects - Turtle Graphics – Turtle attributes-Modular Design: Modules - Top-Down Design - Python Modules - Text Files: Opening, reading and writing text files – Database Programming: Connecting to a database, Creating Tables, INSERT, UPDATE, DELETE and READ operations, Transaction Control, Disconnecting from a database, String Processing - Exception Handling.

**UNIT-V: Dictionaries and packages** **(18 Hours)**

Dictionaries and Sets: Dictionary type in Python - Set Data type. Object Oriented Programming using Python: Encapsulation - Inheritance – Polymorphism. Python packages: Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc.

**Total Lecture Hours: 90**

**COURSE OUTCOME**

On completion of this course, students will

1. Develop and execute simple Python programs
2. Write simple Python programs using conditionals and looping for solving problems
3. Decompose a Python program into functions.
4. Represent compound data using Python lists, tuples, dictionaries etc.
5. Read and write data from/to files in Python programs.

**TEXT BOOK(S)**

1. Charles Dierbach, "Introduction to Computer Science using Python - A computational Problem solving Focus", Wiley India Edition, 2015.
2. Wesley J. Chun, "Core Python Applications Programming", 3rd Edition , Pearson Education, 2016

**REFERENCE BOOK(S)**

1. Mark Lutz, "Learning Python Powerful Object Oriented Programming", O'reilly Media 2018, 5th Edition.
2. Timothy A. Budd, "Exploring Python", Tata MCGraw Hill Education Private Limited 2011, 1st Edition.
3. John Zelle, "Python Programming: An Introduction to Computer Science", Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410
4. Michel Dawson, "Python Programming for Absolute Beginers" , Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1435455009

**WEB RESOURCES**

1. http://interactivepython.org/courselib/static/pythonds2
2. *http://www.ibiblio.org/g2swap/byteofpython/read/*
3. *http://www.diveintopython3.net/http://greenteapress.com/wp/think-python-2e/*

**MAPPING WITH PROGRAM OUTCOMES**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 3 | 3 | 3 | | 2 | | 2 | 3 | 2 | 2 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 3 | 3 | | 2 | | 3 | 3 | 2 | 2 | 3 | 2 |
| **CO3** | 3 | 3 | 3 | 3 | 3 | 3 | | 2 | | 3 | 3 | 2 | 2 | 3 | 2 |
| **CO4** | 3 | 3 | 3 | 3 | 3 | 3 | | 2 | | 3 | 3 | 2 | 2 | 3 | 2 |
| **CO5** | 3 | 3 | 3 | 3 | 3 | 3 | | 3 | | 2 | 3 | 2 | 2 | 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 2024 – 2025)**

**DEPARTMENT OF COMPUTER APPLICATIONS**

**BACHELOR OF COMPUTER APPLICATIONS (BCA)**

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**Semester : II CP-II:** Python Programming Lab

**Ins. Hrs./Week:** 4 **Course Credit:** 3 **Course Code: U24CA102P**

**LIST OF PROGRAMS**

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria:
   - Grade A: Percentage >=80 Grade B: Percentage >=70 and <80
   - Grade C: Percentage >=60 and <70 Grade D: Percentage >=40 and <60
   - Grade E: Percentage <40
3. Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. Program to display the first n terms of Fibonacci series.
5. Program to find factorial of the given number using recursive function.
6. Write a Python program to count the number of even and odd numbers from array of N numbers.
7. Python function that accepts a string and calculate the number of upper case letters and lower case letters.
8. Python program to reverse a given string and check whether the give string is palindrome or not.
9. Write a program to find sum of all items in a dictionary.
10. Write a Python program to construct the following pattern, using a nested loop

    1
    22
    333
    4444
    55555
    666666
    7777777
    88888888
    999999999

11. Read a file content and copy only the contents at odd lines into a new file.
12. Create a Turtle graphics window with specific size.
13. Write a Python program for Towers of Hanoi using recursion
14. Create a menu driven Python program with a dictionary for words and their meanings.
15. Devise a Python program to implement the Hangman Game**.**

**Total Lab Hours: 60**

**COURSE OUTCOME**

On completion of this course, students will

1. To understand the problem solving approaches
2. To learn the basic programming constructs in Python
3. To practice various computing strategies for Python-based solutions to real world problems
4. To use Python data structures - lists, tuples, dictionaries.
5. To do input/output with files in Python.

**TEXT BOOK(S)**


1. Charles Dierbach, "Introduction to Computer Science using Python - A computational Problem solving Focus", Wiley India Edition, 2015.


**REFERENCE BOOK(S)**


1. Mark Lutz, "Learning Python Powerful Object Oriented Programming", O'reilly Media 2018, 5th Edition.
2. Timothy A. Budd, "Exploring Python", Tata MCGraw Hill Education Private Limited 2011, 1st Edition.
3. John Zelle, "Python Programming: An Introduction to Computer Science", Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410
4. Michel Dawson, "Python Programming for Absolute Beginers" , Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1435455009


**WEB RESOURCES**

1. http://interactivepython.org/courselib/static/pythonds2
2. *http://www.ibiblio.org/g2swap/byteofpython/read/*
3. *http://www.diveintopython3.net/http://greenteapress.com/wp/think-python-2e/*

**MAPPING WITH PROGRAM OUTCOMES**

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

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

# SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

**SUNDARAKKOTTAI, MANNARGUDI- 614016.**

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**DEPARTMENT OF COMPUTER APPLICATIONS**

**BACHELOR OF COMPUTER APPLICATIONS (BCA)**

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**Semester: I-FC:** Fundamentals of Computer and Programming in C

**Ins. Hrs./Week:** 2 **Course Credit:** 2 **Course Code: U24FCCA11**

**UNIT- I: Introduction to Computers (6 Hours)**

Introduction to Computers – Generation of Computers – Classification of Digital Computer – Computer Memory.

**UNIT- II: Input and Output Devices (6 Hours)**

Central Processing Unit (CPU) and Main Memory – Secondary Storage Devices – Input Devices – Output Devices. Binary arithmetic.

**UNIT – III: Fundamentals of C (6 Hours)**

Overview of C: Introduction to C, Importance of C, Basic Structure of C Programs – Constants, Variables, Data types, Declaration of variables, Symbolic constants – Operators and Expressions: Arithmetic, Relational, Logical, Assignment, increment, decrement, conditional, Bitwise and special operators, Arithmetic, Relational, Logical expressions.

**UNIT- IV: Control and Looping Statements (6 Hours)**

Managing Input and Output operations: Reading and Writing a Character, Formatted input and Formatted output – Decision Making and Branching: Various if statements, Switch Statement, ?: Operator, GOTO statement – Decision making and Looping: while, do and for statements, Jumps in loops.

**UNIT- V: Arrays and Functions (6 Hours)**

Arrays: one-dimensional array, two-dimensional array, multi-dimensional array – Character Strings handling: Declaring and initializing string variables, Reading and writing strings, String operations,

**Total Lecture Hours- 30**

**COURSE OUTCOME**

Students will be able to

1. Understand the programming concepts
2. Write programs using C programming language constructs
3. Use Built-in and user-defined functions, Arrays
4. Implement advance concepts such as pointers and file
5. Learn and implement the concept of linked lists and memory allocation

**TEXT BOOK(S)**

1. AlexisLeonandMathewsLeon.2009.FundamentalsofInformationTechnology. VikasPublishing House Pvt. Ltd., India.
2. E. Balagurusamy. 2017. Programming in ANSI C. Seventh Edition, Tata McGraw-Hill, New Delhi.

**REFERENCE BOOK(S)**

1. Fundamentals of Computers: Rajaraman 4th Edition
2. Schildt H. 1989. C: The Complete Reference. McGraw-Hill, New Delhi.
3. R.S.Bichkar. 2012.Programming with C. University Press.
4. B.W. Kernighan, D.M.Ritchie. 1997. The C Programming Language. Prentice Hall, New Jersey, USA.
5. Barker L. 1989. C Tools for Scientists and Engineers. McGraw Hill, New Delhi.
6. Barkakari N. 1990. Microsoft C Bible. SAMS, USA.

**E-RESOURCES**

- https://www.pdfdrive.com/learn-to-program-with-c-learn-to-program-using-the-popular-c-programming-language-e166650744.html
- https://www.learn-c.org/
- https://www.tutorialspoint.com/cprogramming/c_useful_resources.htm
- www.ideone.com
- http://www.iso-9899.info/wiki/Web_resources

**MAPPING WITH PROGRAM OUTCOMES**

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

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**DEPARTMENT OF COMPUTER APPLICATIONS**

**BACHELOR OF COMPUTER APPLICATIONS (BCA)**

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**Semester: II-CC-III:** Object Oriented Programming Concepts Using C++

**Ins. Hrs./Week:** 5 **Course Credit:** 5 **Course Code: U24CA203**

**UNIT-I:Introduction (18 Hours)**

Introduction to C++ - key concepts of Object-Oriented Programming –Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures: - Decision Making and Statements: If ..else, jump, goto, break, continue, Switch case statements – Loops in C++ :for, while, do – functions in C++ - inline functions – Function Overloading.

**UNIT- II: Classes and Objects (18 Hours)**

Classes and Objects: Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.

**UNIT- III: Operating Overloading and Inheritance (18 Hours)**

Operator Overloading: Overloading unary, binary operators – Overloading Friend functions –type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.

**UNIT- IV: Pointers and Arrays (18 Hours)**

Pointers – Declaration – Pointer to Class , Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding, Polymorphism and Virtual Functions.

**UNIT-V:Files and Exception Handling (18 Hours)**

Files – File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling – String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions .

**Total Lecture Hours: 90**

**COURSE OUTCOME**

Upon completion of the course the students would be able to:

1. Remember the program structure of C with its syntax and semantics
2. Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)
3. Apply the programming principles learnt in real-time problems
4. Implement the concept of File Stream
5. Code, debug and test the programs with appropriate test cases

**TEXT BOOK(S)**

1. E. Balagurusamy, "Object-Oriented Programming with C++", TMH 2013, 7th Edition.

**REFERENCE BOOK(S)**


1. Ashok N Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", Pearson Education 2003.
2. Maria Litvin& Gray Litvin, "C++ for you", Vikas publication 2002.
3. Object-Oriented Programming Using C++ by Alok Kumar Jagadev , Amiya Kumar Rath , Satchidananda Dehuri , PHI Learning, 2017


**Web Resources**

1. https://alison.com/course/introduction-to-c-plus-plus-programming
2. https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/
3. https://www.w3schools.com/cpp/cpp_oop.asp

**MAPPING WITH PROGRAM OUTCOMES**

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

**BACHELOR OF COMPUTER APPLICATIONS (BCA)**

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**Semester : II CP-II: C++** Programming Lab

**Ins. Hrs./Week:** 4 **Course Credit:** 3 **Course Code: U24CA204P**

## LIST OF PROGRAMS

1. Write a C++ program to demonstrate function overloading, Default Arguments and Inline function.
2. Write a C++ program to demonstrate Class and Objects.
3. //Write a C++ program to demonstrate the concept of Passing Objects to Functions.
4. Write a C++ program to demonstrate the Friend Functions.
5. Write a C++ program to demonstrate Constructor and Destructor.
6. Write a C++ program to demonstrate Unary Operator Overloading
7. Write a C++ program to demonstrate Binary Operator Overloading
8. Write a C++ program to demonstrate:
    - Single Inheritance
    - Multilevel Inheritance
    - Multiple Inheritance
    - Hierarchical Inheritance
    - Hybrid Inheritance
9. Write a C++ program to demonstrate Virtual Functions.
10. Write a C++ program to manipulate a Text File.
11. Write a C++ program to perform Sequential I/O Operations on a file.
12. Write a C++ program to find the Biggest Number using Command Line Arguments.
13. Write a C++ program to demonstrate Class Template
14. Write a C++ program to demonstrate Function Template.
15. Write a C++ program to demonstrate Exception Handling.

**Total Lecture Hours: 60**

## COURSE OUTCOME

Upon completion of the course the students would be able to:

1. Remember the program structure of C with its syntax and semantics
2. Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)
3. Apply the programming principles learnt in real-time problems
4. Analyze the various methods of solving a problem and choose the best method
5. Code, debug and test the programs with appropriate test cases.

## TEXT BOOK(S)

1. E. Balagurusamy, "Object-Oriented Programming with C++", TMH 2013, 7th Edition.

**REFERENCE BOOK(S)**

1.Ashok N Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", Pearson Education 2003.

2. Maria Litvin& Gray Litvin, "C++ for you", Vikas publication 2002.
3. Object-Oriented Programming Using C++ by Alok Kumar Jagadev , Amiya Kumar Rath Satchidananda Dehuri , PHI Learning, 2017

**WEB RESOURCES**

1. https://alison.com/course/introduction-to-c-plus-plus-programming
2. https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/
3. https://www.w3schools.com/cpp/cpp_oop.asp

**MAPPING WITH PROGRAM OUTCOMES**

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

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

# SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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**DEPARTMENT OF COMPUTER APPLICATIONS**

**BACHELOR OF COMPUTER APPLICATIONS (BCA)**

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**Semester: II SEC-I:** Office Automation

**Ins. Hrs./Week:** 2 **Course Credit:** 2 **Course Code: U24SECA21**

**UNIT I INTRODUCTION** **6 hours**

Introduction to computers: What is Computer-What's so special about computer- History of Computers: Evolution – The first Computer-Next Generations- Basic Anatomy of Computers: The Basic Components – Functioning of the Component.

**UNIT II MS-WORD** **6 hours**

Word Basics: Starting Word - Creating document - Parts of Word window- # Mouse and Keyboard Operations # – The Most important Keys – Formatting Features –Menus – Toolbars and their Icons.

**UNIT III MS-EXCEL** **6 hours**

Excel Basics: Introduction: Navigating - Selecting cells - Selecting cells with mouse -# Entering and editing text # -Entering numbers Entering Formulas -Entering dates - Alignment -Menus –Toolbars – Icons.

**UNIT IV- MS-POWERPOINT** **6 hours**

Navigating in PowerPoint: Creating a new Presentation - Opening a Presentation –Creating a New Slide - Saving and Closing a Presentation - Working with PowerPoint: Inserting Picture – Inserting Text – # Design Template # – Saving the Presentation-Closing a Presentation.

**UNIT V - MS-ACCESS** **6 hours**

Introduction: What is Database – Parts of an Access Window – Starting MS - Access – Creating a New Database – Creating a database through table Wizard - Creating a new table – # Rename Columns # -Saving the Database – Relationships

\ **Total Lecture Hours- 30**

**COURSE OUTCOME**

Students will be able to

1. Understand the basic knowledge of computer and components of computer in education.
2. Perform common functional operations in Windows and apply the menus in MS-Word.
3. Understand the menus and Toolbars in MS-Excel.
4. Understand the components of MS-PowerPoint.
5. Understand the Database Create and usage of MS-Access.

**TEXTBOOK**

1. Sanjay Saxena, MS Office 2000 for Everyone, Vikas Publishing, 2001.

**REFERENCE BOOK(S)**


1. Archana Kumar, Computer Basics with Office Automation, First Edition, 2010
2. Arnold S Berger. 2005. Hardware and Computer Organization. First Edition, Newnes, London, UK.
3. Edward K.Blum, Alfred V.Aho. 2011. Computer Science: The Hardware,Software and Heart of it.Springer Publication, New York, USA.
4. Govindarajulu.B. 2002. IBM PCandclones:Hardware,Troubleshooting and Maintenance",Secondedition,Tata-McGrawHill, New Delhi.
5. MirceaVladutiu. 2012. Computer Arithmetic: Algorithms and Hardware Implementations. Springer Publication, New York.
6. WinnLRosch, 2001. HardwareBible. Sixth Edition, Que publishers, Indiana, UK.


**E-RESOURCES**

1. https://www.springer.com/gp/book/9783319667744
2. https://www.kopykitab.com/Computer-Science-PC-Assembling-Troubleshooting-by-Vinra-Publication
3. https://ncert.nic.in/textbook/pdf/kecs101.pdf
4. https://www.unf.edu/public/cop4610/ree/Notes/PPT/PPT8E/CH%2001%20-OS8e.pdf
5. https://freecomputerbooks.com/compscArchitectureBooks.html

**MAPPING WITH PROGRAM OUTCOMES**

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

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

# *NON MAJOR ELECTIVE*

# SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

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**DEPARTMENT OF COMPUTER APPLICATIONS**

**BACHELOR OF COMPUTER APPLICATIONS (BCA)**

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**Semester: I NME-I:** Fundamentals of Computer and Applications

**Ins. Hrs./Week:** 2 **Course Credit:** 2 **Course Code: U24NMECA11**

**UNIT-I: Introduction to Computers** **(6 Hours)**

Introduction to Computers - Generations of Computer – Data and Information – Components of Computer – Software – Hardware – Input Devices - Output Devices — Types of Operating System.

**UNIT-II: MS Word** **(6 Hours)**

Introduction – Elements of Window – Files, Folders and Directories – Text Manipulating: Cut, Copy, Paste, Drag and Drop – Text Formatting: Font – Style, Size, Face and Colors (Both foreground and background) – Alignment - Bullets and Numbering - Header and footer- watermark – inserting objects (images, other application document) – Table creation – Mail merge.

**UNIT-III: Ms Excel** **(6 Hours)**

Introduction – Inserting rows and columns – Sizing rows and columns – Implementing formulas – Generating series - Functions in excel – Creation of Chart – Inserting objects – Filter – Sorting – Inserting worksheet.

**UNIT-IV: MS PowerPoint** **(6 Hours)**

Introduction – Slides Manipulation (Inserting new, Copy, paste, delete and duplicate slides) – Slide show– Types of Views – Types of Animations – Inserting Objects – Implementing multimedia (Video and Audio) – Templates (Built-in and User-Defined).

**UNIT-V: Internet** **(6 Hours)**

Introduction to Internet and Intranet – Services of Internet - Domain Name – URL – Browser – Types of Browsers – Search Engine - E-Mail – Basic Components of E-Mail –.How to send group mail. **E-Commerce**: Digital Signature – Digital Currency – Online shopping and transaction.

**Total Lecture Hours- 30**

**COURSE OUTCOMES**

On completion of this course, students will

1. Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.
2. Develop organizational structure using for the devices present currently under input or output unit.
3. Concept of storing data in computer using two header namely RAM and ROM with different types of ROM with advancement in storage basis.
4. Work with different software, Write program in the software and applications of software.
5. Usage of Operating system in information technology which really acts as a interpreter between software and hardware.

**TEXTBOOK(S)**


1. Anoop Mathew, S. Kavitha Murugeshan (2009), " Fundamental of Information Technology", Majestic Books.
2. Alexis Leon, Mathews Leon," Fundamental of Information Technology", 2nd Edition.

3. S. K Bansal, “Fundamental of Information Technology”.

**REFERENCEBOOK(S)**

1. Bhardwaj Sushil Puneet Kumar, “Fundamental of Information Technology
2. GG WILKINSON, “Fundamentals of Information Technology”, Wiley-Blackwell
3. A Ravichandran , “Fundamentals of Information Technology”, Khanna Book Publishing

**E-RESOURCES**

1. https://testbook.com/learn/computer-fundamentals
2. https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html
3. https://www.javatpoint.com/computer-fundamentals-tutorial
4. https://www.tutorialspoint.com/computer_fundamentals/index.htm
5. https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf

**MAPPING WITH PROGRAM OUTCOMES**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 3 | | 2 | | | | 3 | 3 | 3 | 3 | 3 |
| **CO2** | 3 | 2 | 3 | 2 | 3 | | 2 | | | | | 3 | | 2 | 3 |
| **CO3** | 3 | 2 | 3 | 3 | 3 | | 2 | | | | 2 | | 2 | 2 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 3 | | 2 | | | | | 3 | | 2 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 3 | | 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 2024 – 2025)*

**DEPARTMENT OF COMPUTER APPLICATIONS**

**BACHELOR OF COMPUTER APPLICATIONS (BCA)**

**Semester: II-NME-II: Web Designing**

**Ins. Hrs./Week: 2** **Course Credit: 2** **Course Code:U24NMECA22**

**UNIT-I Introduction** **(6-Hours)**

HTML: HTML – Introduction – tag basics – page structure-adding comments working with texts, paragraphs and line break. Emphasizing test- heading and horizontal rules - list-font size, face and color – alignment links – tables - frames.

**UNIT-II Forms and Images** **(6-Hours)**

Forms & Images Using Html: Graphics: Introduction-How to work efficiently with images in webpages, image maps, GIFanimation, adding multimedia, data collection with html forms textbox, password, listbox, combobox, textarea, tools for Building webpage front page.

**UNIT-III- XML & DHTML** **(6-Hours)**

XML & DHTML: Cascading style sheet (CSS)-what is CSS-Why we use CSS-adding CSS to your web pages-Grouping styles-extensible markup language(XML).

**UNIT-IV- Dynamic HTML** **(6-Hours)**

Dynamic HTML: Document object model (DCOM)-Accessing HTML & CSS through DCOM Dynamic Content styles & positioning – Event bubbling –data binding. JavaScript: Client-side scripting, What is JavaScript, How to develop JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition.

**UNIT-V-Advance script** **(6-Hours)**

Advance script, JavaScript and objects, Java Scrip town objects, the DOM and web browser environments, forms and validations.

**Total Lecture Hours- 30**

**COURSE OUTCOME**

On completion of this course, students will

1. Develop working knowledge of HTML
2. Ability to Develop and publish Web pages using Hypertext Markup Language(HTML).
3. Ability to optimize page styles and layout with Cascading Style Sheets(CSS).
4. Ability to develop a java script
5. An ability to develop web application using Ajax.

**TEXTBOOK(S)**

1. PankajSharma,–WebTechnology,SkKataria&SonsBangalore2011.
2. MikeMcgrath,–JavaScript,DreamTechPress2006,1stEdition.

3. AchyutSGodbole & AtulKahate,–WebTechnologies,2002,2ndEdition

**REFERENCEBOOK(S)**


1. LauraLemay,RafeColburn,JenniferKyrnin,–MasteringHTML,CSS&JavascriptWeb Publishing‖,2016.
2. DT Editorial Services(Author),–HTML5 BlackBook (CoversCSS3,JavaScript,XML, XHTML,AJAX,PHP,jQuery),Paperback2016,2ndEdition.


**E-RESOURCES**

1. *https://www.geeksforgeeks.org*
2. *www.cssjava.org*
3. *https://www.xml.org*
4. *http://www.php.org*
5. *http://www.javascript.org*

**MAPPING WITH PROGRAM OUTCOMES**

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

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

# SENGAMALA THAYAAR EDUCATIONALTRUST WOMEN'S COLLEGE

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## DEPARTMENT OF MATHEMATICS

**ALLIED MATHEMATICS - I**

(For B.Sc., CS & AI & BCA)

**Semester: I- AC-I :** Statistics

**Ins. Hrs./Week: 3** **Course Credit: 2** **Course Code:** U24AMA101

### UNIT-I : Introduction on Statistics (8 Hours)

Origin and development of statistics- Scope of statistics- Limitations of statistics- Frequency distribution in statistics - Graphical representation of statistical data.

### UNIT-II : Measures of central tendency (10 Hours)

Introduction on Measures of central tendency-Arithmetic Mean – Median – Mode – Definitions – Properties – Merits and Demerits of Mean, Median and Mode – Problems to find Mean, Median and Mode.

### UNIT-III : Measures of central tendency Continued... (6 Hours)

Geometric Mean – Harmonic Mean - Geometric Mean of the combined group – Merits & Demerits of Geometric mean - Merits & Demerits of Harmonic mean – Solved Problems.

### UNIT-IV : Measures of Dispersion (11 Hours)

Introduction on Measures of Dispersion- Definition- Objectives- Properties- Methods of measuring dispersion- Range- Quartile deviation- Mean deviation- Standard deviation and Root mean square deviation.

### UNIT-V : Correlation and Regression (10 Hours)

Introduction on Correlation – Definition-Properties of Simple Correlation – Karl Pearson's Correlation Coefficients – Limits of Correlation Coefficients - Simple Problems – Regression: Definition - Regression coefficients – Properties of regression coefficient - Simple Problems only.

**Total Lecture Hours- 45**

## COURSE OUTCOME

The students should be able to

1. Describe the concepts, principles, tools and techniques in statistics.
2. Gain knowledge on the determination of measures of central tendency.
3. Determine the measures of dispersion.
4. Compute correlation coefficient and the regression coefficient.
5. Understand the basic concept, properties and moments of binomial distribution.

## TEXT BOOK(S)

1. Gupta S.C and Kapoor V.K. 2002, Fundamentals of Mathematical Statistics. Sultan Chand & Sons, New Delhi.

| | | | |
|---|---|---|---|
| UNIT- I | Chapter 1 | : | Sec.1.1 to 1.4 |
| | Chapter 2 | : | Sec. 2.1 to 2.3 |
| UNIT- II | Chapter 2 | : | Sec. 2.4 to 2.7 |
| UNIT -III | Chapter 2 | : | Sec. 2.8, 2.9 |
| UNIT -IV | Chapter 2 | : | Sec. 2.12 to 2.13 |
| UNIT -V | Chapter 10 | : | Sec. 10.1 to 10.4 (10.4.1) |
| | Chapter 11 | : | Sec. 11.1, 11.2 (11.2.1 & 11.2.2) |

## REFERENCE BOOK(S)


1. Freund J.E. 2001. Mathematical Statistics. Prentice Hall of India., New Delhi.
2. Goon A.M. Gupta M.K. and Dos Gupta B. 1991. Fundamentals of Statistics, Volume I. World Press, Calcutta.
3. Gupta S.P. 1994. Statistical Methods. Sultan Chand & Sons, New Delhi.
4. Kapil Sharma. 2011. Statistical Methods. ABO Publishers, Jaipur, India.
5. Pillai R.S.N and Bagavathi. 2003. Practical Statistics. S Chand & Company Ltd. New Delhi.


## E- RESOURCES

1. https://www.math.arizona.edu/~jwatkins/statbook.pdf
2. http://www.cimt.org.uk/cmmss/S1/Text.pdf
3. https://stat.ethz.ch/~geer/mathstat.pdf
4. https://mason.gmu.edu/~jgentle/books/MathStat.pdf
5. http://fstroj.uniza.sk/kam/orsansky/pdf/eng/basicsofstatisticalmethods.pdf

# SENGAMALA THAYAAR EDUCATIONALTRUST WOMEN'S COLLEGE

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

## DEPARTMENT OF MATHEMATICS

**ALLIED MATHEMATICS - II**

(For B.Sc., CS & AI & BCA)

**Semester: I- AC-II:** Numerical Analysis

**Ins. Hrs./Week: 3** **Course Credit: 2** **Course Code:** U24AMA102

**UNIT-I: Solutions of Algebraic and Transcendental Equations** **(8 Hours)**

Introduction on Algebraic and Transcendental Equations - The Solution of Algebraic and Transcendental Equations -Bisection method, Steps for finding roots of equations using bisection method-Newton Raphson method-Theory and problems.

**UNIT-II: Interpolation** **(10 Hours)**

Introduction on Interpolation - Finite differences - Formula for finding Forward differences-Formula for finding Backward differences -Some basic problems-Formula for finding Newton's forward and backward Interpolation -Problems based on Newton forward and backward interpolation -Lagrange's Interpolation formula -Theory and problems.

**UNIT-III: Numerical Integration** **(11 Hours)**

Basic Formulae on Integration-Numerical Integration: Trapezoidal Rule - Simpson's 1/3 Rule, Simpson's 3/8-Rule.

**UNIT-IV: Solutions of Linear Systems** **(10 Hours)**

Solutions of linear systems- Theory and problems of linear systems using Gauss Elimination Method – Theory and problems of linear systems using Gauss Jacobi Method –Theory and problems of linear systems using Gauss Seidel Method.

**UNIT-V: Numerical Solution of Ordinary Differential Equations** **(6 Hours)**

Formation of Ordinary Differential Equations - Method of finding Solution of ordinary differential equations by Taylor's Series -Formula for Euler's method- Runge Kutta Second and Fourth order method, Theory and Problems.

**Total Lecture Hours- 45**

## COURSE OUTCOME

The students should be able to

1. Gain knowledge about Algebraic and Transcendental Equations.
2. Analyze the Polynomial interpolation problems.
3. Understand the concepts of numerical differentiation and integration.
4. Develop the knowledge on the theory, problems and solutions of linear systems.
5. Integrate the concept of numerical solutions of ordinary differential equations.

## TEXT BOOK(S)

1. Sastry S.S. 2006. A First Course in Introductory Methods of Numerical Analysis, Fourth Edition, PHI Learning Private Limited, New Delhi.

| | | |
|---|---|---|
| UNIT- I | Chapter 2 | : Sec. 2.1, 2.2 , 2.5 |
| UNIT- II | Chapter 3 | : Sec. 3.1, 3.3(3.3.1&3.3.2), 3.6, 3.9.1 |
| UNIT -III | Chapter 5 | : Sec. 5.4 (5.4.1, 5.4.2, 5.4.3) |
| UNIT -IV | Chapter 6 | : Sec. 6.3(6.3.2), 6.4 |
| UNIT- V | Chapter 7 | : Sec. 7.1, 7.2, 7.4, 7.5 |

**REFERENCE BOOK(S)**


1. Arumugam S, Thangapandi issac and Somasundaram A. 2012. Numerical Methods. Scitech Publications, Chennai.
2. David Kincaid, Ward Cheney. 1991. Numerical Analysis. Brooks/Cole Publishing Company, USA.
3. Jain M.K, Iyengar S.R.K and Jain R.K. 2001. Numerical Methods for Scientific and Engineering Computation. New Age International Private Limited, Bangalore.
4. Mathew J.H. 1992. Numerical Methods for Mathematics, Science and Engineering. Prentice Hall, New Delhi.
5. Veerarajan T and Ramachandran T. 2008. Numerical Methods with programming in C. MC Graw Hill Education, New York.


**E- RESOURCES**

1. http://www.math.iitb.ac.in/~baskar/book.pdf
2. http://spartan.ac.brocku.ca/~jvrbik/MATH2P20/notes.pdf
3. https://www.math.ust.hk/~machas/numerical-methods.pdf
4. https://rahulpatel121.files.wordpress.com/2018/07/s-s-sastry-introductory-methods-o-numerical-analysis-2012-phi-learning-pvt-ltd.pdf
5. https://authors.library.caltech.edu/25061/1/NumMethChE84.pdf

**SENGAMALA THAYAAR EDUCATIONALTRUST WOMEN'S COLLEGE**

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**DEPARTMENT OF MATHEMATICS**

**ALLIED MATHEMATICS -III**

(For B.Sc., CS & AI & BCA)

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**Semester: II- AC – III : Operations Research**

**Ins. Hrs./Week: 3** **Course Credit: 2** **Course Code:** U24AMA203

## UNIT–I : Operations Research (10 Hours)

Introduction of Operations Research - Scope of Operations Research – Phases of Operations Research-Models in Operations Research-Advantages of a Model-Characteristics of a Good model –Classification of Models-Uses and limitations of Operations Research-Operation Research and Decision Making-Linear Programming-General Formulation of Linear Programming Problem - Graphical solution of two variables – Matrix form of linear programming problem.

## UNIT – II : Simplex Method (9 Hours)

Simplex Method– Basic Definitions - Simplex Method Algorithm - Simplex Method for less than or equal to (<=), equal to (=) and greater than or equal to (>=) constraints – Big M Method - Big M Method Algorithm – Problems.

## UNIT –III : Transportation Problem and Assignment problem (9 Hours)

Transportation Problem –Introduction and mathematical formulation of Transportation Problem – To find the initial basic feasible solution using (i) North West Corner Method (ii) Least Cost Method (iii) Vogel's Approximation Method - Unbalanced Transportation problem-Assignment Algorithm – Formulation of Assignment Problem - Unbalanced Assignment problem.

## UNIT –IV : Sequencing Problem (8 Hours)

Sequencing Problem– Definition - Processing of n jobs through two machines – Processing of n jobs through two machines algorithm - Processing of n jobs through three machines – Processing of two jobs through n machines – Processing of two jobs through n machines algorithm - Related Problems in all the above.

## UNIT –V : Networks (9 Hours)

Networks – Immediate Predecessor -Immediate Successor– Dummy activity – Critical Path - Fulkerson's rule - Measure of activity – PERT computation – Earliest Time – Latest Time - Total Float – Free Float – Independent Float - CPM computation - Resource scheduling.

**Total Lecture Hours – 45**

## COURSE OUTCOME

The students should be able to

1. Understand the advantages and limitations of operation research.
2. Gain knowledge on the simplex method and algorithms.
3. Solve the transportation and assignment problems.
4. Describe the sequencing problems.
5. Summarize the concept of Network scheduling by CPM and PERT.

## TEXT BOOKS

1. Kalavathy S. 2013. Operations Research, Fourth Edition. Vikas Publishing House Pvt. Ltd, Chennai.

| | | |
|---|---|---|
| UNIT -I | Chapter 1 | : Full |
| | Chapter 2 | : Sec. 2.1, 2.2 |
| | Chapter 3 | : Sec 3.1 to 3.3 |
| UNIT -II | Chapter 4 | : Full |
| | Chapter 5 | : Sec. 5.1, 5.2 |
| UNIT –III | Chapter 8 | : Sec. 8.1 to 8.4 |
| | Chapter 9 | : Sec. 9.3 to 9.5 |
| UNIT –IV | Chapter 14 | : Sec. 14.1 to 14.3, 14.5 |
| UNIT –V | Chapter15 | : Sec. 15.1 to 15.8 |

## REFERENCE BOOK(S)


1. Hamdy A. Taha. 2005. Operations Research, 7$^{th}$Edition. Prentice Hall of India Private Limited, New Delhi.
2. Kanti Swarup, Gupta P.K, Man Mohan. 2014. Operations Research, Fourteenth Edition. Sultan Chand & Sons, New Delhi.
3. Prem Kumar Gupta and Hira D.S. 1976. Operations Research - An Introduction. Sultan Chand, New Delhi.
4. Sharma J.K. 2001. Operations Research. MacMillan India Ltd, New Delhi.
5. Sundaresan V, Ganapathy Subramanian. K.S and Ganesan K. 2002. Resource Management Techniques. A.R.Publications, Chennai.


## E_RESOURCES

1. http://ebooks.lpude.in/commerce/bcom/term_5/DCOM303_DMGT504_OPERATION_RESEARCH.pdf
2. http://www.ggu.ac.in/download/class-note14/operation%20research07.04.14.pdf
3. file:///C:/Users/Commerce2/Downloads/Operations%20Research%20(%20PDFDrive%20).pdf
4. https://www.google.co.in/books/edition/_/6khDDAAAQBAJ?hl=en
5. https://www.researchgate.net/publication/333748649_Chapter_-1_Operations_Research