



B.Sc. INFORMATION TECHNOLOGY

SYLLABUS

**THOSE WHO JOINED FROM THE ACADEMIC
YEAR**

2026 – 2027 onwards

MANONMANIAM SUNDARANAR UNIVERSITY
THIRUNELVELI – 627 012

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI
UG COURSES–AFFILIATED COLLEGES
B.Sc. INFORMATION TECHNOLOGY
OUTCOME BASED EDUCATION - CHOICE BASED CREDIT SYSTEM
(with effect from the academic year 2026-2027)

1. VISION

"To provide quality education to reach the un-reached"

2. MISSION

- ❖ To conduct research, teaching and outreach programmes to improve conditions of human living
- ❖ To offer a wide variety of off-campus educational and training programs, including the use of information technology, to individuals and groups.
- ❖ To develop partnership with industries and government so as to improve the quality of the workplace and to serve as catalyst for economic and cultural development
- ❖ To provide quality / inclusive education, especially for the rural and un-reached segments of economically down-trodden students including women, socially oppressed and differently abled

3. PREAMBLE

Outcome Based Education (OBE) is the order of the day in all Higher Education Institutions to emphasize quality mandate. Curriculum tailored with Choice Based Credit System (CBCS) for ensuring flexibility; Exposure to learning opportunities using the latest technological advancements to the learners for continuous lifelong learning; and Adoption of Revised Bloom's Taxonomy (RBT) in the assessment mechanism are essential to add value to the existing OBE. The current revision is aimed at providing scope for effective implementation of OBE by including Programme Educational Outcomes, Programme Outcomes, and Programme Specific Outcomes in alignment to the vision and mission of the University. Courses need to be framed and mapped such that the compilation of the Outcomes of all Courses in the programme ensures the attainment of the programme outcomes in terms of RBT.

The Bachelor of Science in Information Technology (B.Sc. IT) programme is designed to equip students with a strong foundation in computing, information systems, and emerging digital technologies. In an era driven by rapid technological advancements, the programme aims to develop competent professionals capable of designing, implementing, managing, and securing information systems that support organizational and societal needs. The curriculum integrates theoretical knowledge with practical skills in areas such as programming, database management, networking, web technologies, cybersecurity, cloud computing, data

analytics, and software development. It encourages critical thinking, problem-solving, innovation, and ethical practices, preparing graduates to meet the challenges of the dynamic IT industry. The programme also emphasizes lifelong learning, professional responsibility, and adaptability to evolving technologies. Through project-based learning, industry exposure, and hands-on training, students gain the technical expertise and soft skills necessary for successful careers in information technology, entrepreneurship, higher education, and research.

By fostering academic excellence and technological competence, the B.Sc. Information Technology programme contributes to the development of skilled professionals who can effectively participate in the digital transformation of businesses, government, and society.

4. PROGRAMME EDUCATIONAL OUTCOMES (PEOs)

In alignment with the Vision and Mission of the University, the following have been defined as the PEO for the graduates.

PEO1: Developing strong positive attitude to learn independently the concepts in the field of study

PEO2: Ensuring confidence among the learners to apply the knowledge and skills gained to solve real life issues

PEO3: Habituating ethical values among the learners to succeed in personal and professional life

5. PROGRAMME OUTCOMES (POs)

After the successful completion of Undergraduate Programme from the University, the learner should be able to

PO1: Comprehend the knowledge acquired and communicate the same to others.

PO2: Analyze and compare the factual data / situation to comprehend and to critically evaluate to find solution to the problem ahead.

PO3: Apply theories and philosophies learned in solving the problem in scientific manner. PO4: Think reflectively on the earlier activities and attempt for self directed lifelong learning process.

PO5: Understand multicultural existence and identify the means to prolong moral/ethical values in personal and professional life.

PO6: Explore through multiple sources and get exposed to the digital technology.

PO7: Act as a responsible member in teams and practice leadership qualities.

6. PROGRAMME SPECIFIC OUTCOMES (PSOs)

7.

PSO1: Technical Communication & Knowledge Transfer

Able to articulate complex technical concepts, document software requirements, and deliver effective presentations on emerging IT trends to both technical and non-technical stakeholders.

PSO2: Analytical Problem Solving & Data Evaluation

Demonstrate the ability to analyze computational data and compare algorithmic efficiencies to design optimized solutions for real-world business and industrial challenges.

PSO3: Scientific Application of IT Frameworks

Apply mathematical foundations, algorithmic principles, and computer science theory in the modelling and design of computer-based systems in a scientifically rigorous manner.

PSO4: Reflective Practice & Continuous Evolution

Engage in reflective post-implementation reviews of IT projects and exhibit a commitment to independent, lifelong learning to keep pace with the rapid evolution of the technology landscape.

PSO5: Ethical Tech & Multicultural Collaboration

Design and implement IT solutions that respect global cultural diversity while adhering to professional ethics, data privacy laws, and cyber-security moral standards.

PSO6: Digital Literacy & Multi-source Research

Leverage diverse digital platforms, cloud environments, and open-source repositories to conduct research and integrate information from multiple technical sources into a cohesive project.

PSO7: Collaborative Leadership & Team Dynamics

Function effectively as a member or leader in diverse development teams, managing software lifecycles through collaborative tools and demonstrating accountability for collective project goals.

8. PROGRAMME DETAILS

Eligibility Criteria:

Candidates who have studied Mathematics as one of the subjects in HSC are eligible for this programme (as specified in the admission guidelines given by the Directorate of Collegiate Education 2026-2027 www.tndce.tn.gov.in)

Duration of the Course:

B.Sc. Information Technology is a 3 years full time programme spread over six semesters.

9. EXAMINATION SCHEME

Scheme of Evaluation (THEORY): Core/Elective/ Skill Enhancement Courses *Total Marks:100 (Internal:25Marks, External:75Marks)*

There is no Passing Minimum for the CIA component. But overall(CIA+ External), the student should get 40% or more to get a pass	
CIA-Internal Marks	External Marks
Average of best two tests from three: 20 Marks Assignment: 05 Marks	End Semester Examination
Total: 25 Marks	Total : 75 Marks

Scheme of Evaluation (PRACTICAL): Core / Skill Enhancement Course *Total Marks:100 (Internal:50Marks, External:50Marks)*

There is no Passing Minimum for the CIA component. But overall(CIA+ External), the student should get 40% or more to get a pass	
CIA-Internal Marks	External Marks
Completion of Practical in time : 20Marks Model Practical Test : 20Marks Completion of Record work : 10 Marks	End Semester Practical Examination
Total: 50 Marks	Total: 50 Marks

Scheme of Evaluation (PROJECT) *Total Marks:100 (Internal:50Marks, External:50 Marks)*

There is no Passing Minimum for the CIA component. But overall(CIA+ External), the student should get 40% or more to get a pass	
CIA-Internal Marks	External Marks
Completion of Project in time : 20Marks Model Test with Viva-voce : 20Marks Completion of Report work : 10 Marks	End Semester Practical Examination
Total: 50 Marks	Total: 50 Marks

10. QUESTION PAPER PATTERN

External (End Semester) Examination Question Pattern

Time : 3 Hrs

Max.Marks: 75

Part – A (10x1 = 10 Marks)

Answer all the questions

Ten Questions, two objective type questions from each unit.

[Two questions from K1 category

Two questions from K2 category

Two questions from K3 category

Two questions from K4 category

One question from K5 category

One question from K6 category]

Part – B (5x5 = 25 Marks)

Answer all the questions

Five Questions, two short answer type questions from each unit with internal choice (Either.. or .. type)

[Unit -I questions from K1 category

Unit -II questions from K2 category

Unit -III questions from K3 category

Unit -IV questions from K4 or K5 category

Unit-V questions from K6 category]

Part – C (5x8 = 40 Marks)

Answer all the questions

Five Questions, two descriptive type questions from each unit with internal choice (Either.. or .. type)

[Unit -I questions from K1 category

Unit -II questions from K2 category

Unit -III questions from K3 category

Unit -IV questions from K4 or K5 category

Unit-V questions from K6 category]

NOTE:

In both Internal and External (End Semester) Examinations

60% of the questions should be from the Lower Order Thinking (K1, K2 & K3) category

40% of the questions should be from the Higher Order Thinking (K4, K5 & K6) category

11.MODEL QUESTION PAPER

Course: Programming in C

Time: 3 Hours

Max. Marks: 75

PART – A ($10 \times 1 = 10$ Marks)

Answer ALL the questions. Each question carries 1 mark.

1. Which programming language implementation method translates high-level source code into machine language instructions completely before execution begins? **(K1)**
 - a) Pure Interpretation
 - b) Compilation
 - c) Hybrid Implementation
 - d) Just-In-Time Translation
2. What will be the exact mathematical result of the evaluation expression $5 + 4 * 3 \% 2$ when executed inside a standard C environment? **(K2)**
 - a) 5
 - b) 11
 - c) 0
 - d) 17
3. Which of the conditional branching or looping statements in C is designed to execute its internal block statement at least once before testing its loop condition? **(K1)**
 - a) while
 - b) for
 - c) do-while
 - d) nested-for
4. If a character array is defined as `char str[10] = "Hello";`, what data value is structurally held within the index location `str[5]`? **(K3)**
 - a) Character constant 'o'
 - b) Escape sequence `\0` (Null Character)
 - c) Random compilation garbage
 - d) Empty blank space character ' '
5. What property is demonstrated when a user-defined function directly or indirectly calls upon itself from within its own execution block? **(K2)**
 - a) Inline Expansion
 - b) Library Abstraction
 - c) Recursion
 - d) Function Nesting

6. Analyze the following function declaration prototype: `int processing(float, char);`. What does the leading keyword token `int` specify? **(K4)**
- a) It forces the incoming parameters to cast into integers.
 - b) It alerts the compiler to initialize an internal integer tracker.
 - c) It determines the data type of the value returned to the calling program.
 - d) It sets the memory optimization priority level for the processor.
7. Which operator syntax must be used to access specific fields or members of a structure when utilizing a standard structure variable name? **(K3)**
- a) Indirect Arrow pointer operator (`->`)
 - b) Direct Member access dot operator (`.`)
 - c) Indirection asterisk operator (`*`)
 - d) Address-of ampersand operator (`&`)
8. Evaluate the specific architectural memory layouts for the declarations below on a standard system where an integer takes 4 bytes and a character takes 1 byte: **(K5)**
- ```
struct Block1 { int a; char b; };
union Block2 { int a; char b; };
```
- Determine which state correctly reflects the memory size footprints of these two custom layouts.
- a) struct = 5 bytes, union = 4 bytes
  - b) struct = 4 bytes, union = 1 byte
  - c) struct = 8 bytes, union = 8 bytes
  - d) struct = 5 bytes, union = 5 bytes
9. Inspect the following advanced declaration configuration: `int (*ptr)[5];`. Differentiate its structural behavior from standard pointer references. **(K4)**
- a) `ptr` is an array containing 5 distinct integer pointer memory positions.
  - b) `ptr` is a single pointer addressing a complete array block of 5 integers.
  - c) `ptr` is a custom function address pointer passing 5 integer variables.
  - d) `ptr` is a data reference bound to five continuous system constants.
10. Design an optimal architectural approach for a developer who needs to permanently save application execution runtime logs directly to a physical storage disk. Which mechanism in the C programming environment must be synthesized to accomplish this goal? **(K6)**
- a) Memory address manipulation using a Pointer Scale Factor
  - b) Managing multi-dimensional structures via an Array of Pointers
  - c) Implementation of File Management routines (`fopen`, `fprintf`)
  - d) Nested pointer variables using a Chain of Pointers configuration

**PART – B ( $5 \times 5 = 25$  Marks)**

**Answer ALL the questions. Internal choice is provided (Either a or b). Each question carries 5 marks.**

11. a) Define the term language evaluation criteria. Write a brief overview on the Readability and Writability criteria. **(K1)**  
**OR**  
b) List out the basic primitive data types available in the C programming language along with their respective keywords and format specifiers. **(K1)**
12. a) Explain the working flow of a multi-way selection switch-case statement along with its structural syntax layout. **(K2)**  
**OR**  
b) Contrast the structural differences between initializing a single-dimensional array and a multi-dimensional array. **(K2)**
13. a) Demonstrate the process of declaring, defining, and invoking a user-defined function block that takes a numeric argument and calculates its cubic value. **(K3)**  
**OR**  
b) Write a functional C program segment that applies a recursive function to successfully compute the factorial value of a user-provided integer. **(K3)**
14. a) Analyze the key structural differences between Structures and Unions based on their physical memory allocation, declaration syntax, and member field access traits. **(K4)**  
**OR**  
b) Appraise the necessity of using an "Array of Structures". Provide a code layout template capable of structuring records for a collection of data profiles. **(K5)**
15. a) Formulate a complete, compilation-ready C program utilizing pointer mechanics to exchange/swap the values of two variables inside a custom function using Call-by-Reference. **(K6)**  
**OR**  
b) Develop a functional file handling C application script that creates a new external text document, populates it with text records, and safely closes the file stream pipeline. **(K6)**

**PART – C ( $5 \times 8 = 40$  Marks)**

**Answer ALL the questions. Internal choice is provided (Either a or b). Each question carries 8 marks.**

16. a) Thoroughly describe the three primary language implementation methods (Compilation, Pure Interpretation, and Hybrid Implementation) using clear conceptual step diagrams. **(K1)**  
**OR**  
b) Enumerate the distinct operational categories of operators present in C, and discuss their evaluation behaviors with respect to precedence and associativity. **(K1)**

17. a) Discuss the design variations of the iterative loop structures available in C (while, do-while, and for). Contrast them in terms of entry and exit check evaluations. **(K2)**

**OR**

- b) Explain how character arrays are structured to handle strings. Provide the working syntax and operational descriptions for any four standard built-in string manipulation functions (strlen, strcpy, strcat, strcmp). **(K2)**

18. a) Illustrate the four distinct categories of user-defined functions classified by their parameter-passing structures and return values. Provide clean code skeletons for each category. **(K3)**

**OR**

- b) Apply your knowledge of functions and array processing to write a complete C program that passes an entire data array into a dedicated search function to verify if a target element is present. **(K3)**

19. a) Analyze the detailed mechanism of defining a structure, declaring its active variables, and using structural pointer references (-> operator) to access internal attributes. **(K4)**

**OR**

- b) Critique the structural layout strategies of placing "Arrays within Structures" versus establishing "Arrays of Structures" from a data management and memory usage perspective. **(K5)**

20. a) Synthesize a complete C language application that tracks an input text string using pointer expressions. The logic must step through the string by updating pointer address scale factors to count the frequency of vowels. **(K6)**

**OR**

- b) Formulate an integrated file management utility script in C that checks and opens an existing text file in read-only mode, parses the data stream sequentially until the end-of-file indicator is encountered, and echoes the data directly to the display stream. **(K6)**

## 11.ENTIRE PROGRAMME STRUCTURE

### FIRST YEAR

#### Semester-I

| Part     | Specification                      | Courses                                | Credit | Hours per week (L/T/P) |
|----------|------------------------------------|----------------------------------------|--------|------------------------|
| Part-I   |                                    | Language – Tamil                       | 3      | 6                      |
| Part-II  |                                    | English                                | 3      | 6                      |
| Part-III | Core-I                             | Programming in C                       | 4      | 4                      |
|          | Core-II [LAB]                      | C Programming Practical                | 3      | 4                      |
|          | Elective-I                         | Numerical Methods/Discrete Mathematics | 4      | 4                      |
| Part-IV  | Skill Enhancement Course – I [LAB] | Office Automation - Practical          | 3      | 3                      |
|          | Foundation Course                  | Fundamentals of Computers              | 3      | 3                      |
|          |                                    |                                        | 23     | 30                     |

#### Semester-II

| Part     | Specification                       | Courses                                   | Credit | Hours per week (L/T/P) |
|----------|-------------------------------------|-------------------------------------------|--------|------------------------|
| Part-I   |                                     | Language – Tamil                          | 3      | 6                      |
| Part-II  |                                     | English                                   | 3      | 4                      |
| Part-III | Core-III                            | Java Programming                          | 4      | 4                      |
|          | Core-IV [LAB]                       | Java Programming Practical                | 3      | 4                      |
|          | Elective-II                         | Optimization Techniques / Data Structures | 4      | 4                      |
| Part-IV  | Skill Enhancement Course – II [LAB] | PHP Scripting Practical                   | 2      | 3                      |
|          | Skill Enhancement Course – III      | Introduction to Internet                  | 2      | 3                      |
|          |                                     | Naan Mudhalvan(Soft Skill)                | 2      | 2                      |
|          |                                     |                                           | 23     | 30                     |

## SECOND YEAR

### Semester-III

| Part     | Specification                       | Courses                                            | Credit    | Hours per week (L/T/P) |
|----------|-------------------------------------|----------------------------------------------------|-----------|------------------------|
| Part-I   |                                     | Language – Tamil                                   | 3         | 6                      |
| Part-II  |                                     | English                                            | 3         | 6                      |
| Part-III | Core-V                              | Python Programming                                 | 4         | 4                      |
|          | Core-VI [LAB]                       | Python Programming - Practical                     | 3         | 4                      |
|          | Elective-III                        | Digital Logic Fundamentals / Computer Architecture | 4         | 4                      |
| Part-IV  | Skill Enhancement Course – IV [LAB] | HTML & Web Designing - Practical                   | 2         | 2                      |
|          |                                     | Naan Mudhalvan                                     | 2         | 2                      |
|          |                                     | Environmental Studies                              | 2         | 2                      |
|          |                                     |                                                    | <b>23</b> | <b>30</b>              |

### Semester-IV

| Part     | Specification                      | Courses                                                         | Credit    | Hours per week (L/T/P) |
|----------|------------------------------------|-----------------------------------------------------------------|-----------|------------------------|
| Part-I   |                                    | Language – Tamil                                                | 3         | 6                      |
| Part-II  |                                    | English                                                         | 3         | 6                      |
| Part-III | Core-VII                           | Operating System                                                | 4         | 4                      |
|          | Core-VIII [LAB]                    | Mobile Application Development - Practical                      | 3         | 4                      |
|          | Elective-IV                        | Internet of Things and its Applications/ Multimedia using React | 4         | 4                      |
| Part-IV  | Skill Enhancement Course – V [LAB] | Multimedia using React - Practical                              | 2         | 2                      |
|          |                                    | Naan Mudhalvan                                                  | 2         | 2                      |
|          |                                    | Value Education                                                 | 2         | 2                      |
|          |                                    |                                                                 | <b>23</b> | <b>30</b>              |

### THIRD YEAR

#### Semester-V

| Part     | Specification  | Courses                                                             | Credit | Hours per week (L/T/P) |
|----------|----------------|---------------------------------------------------------------------|--------|------------------------|
| Part-III | Core-IX        | Database Systems                                                    | 4      | 4                      |
|          | Core-X         | Machine Learning                                                    | 4      | 4                      |
|          | Core-XI [LAB]  | Database Systems - Practical                                        | 3      | 6                      |
|          | Core-XII [LAB] | Machine Learning - Practical                                        | 3      | 6                      |
|          | Elective-V     | Computer Networks/ Data Mining                                      | 4      | 4                      |
|          | Elective-VI    | Cryptography & Network Security/<br>Artificial Intelligence         | 4      | 4                      |
| Part-IV  |                | Naan Mudhalvan                                                      | 2      | 2                      |
|          |                | Internship/Industrial Visit/Field Visit/Knowledge updation activity | 1      | -                      |
|          |                |                                                                     | 25     | 30                     |

#### Semester-VI

| Part     | Specification  | Courses                                      | Credit | Hours per week (L/T/P) |
|----------|----------------|----------------------------------------------|--------|------------------------|
| Part-III | Core-XIII      | Software Engineering                         | 4      | 4                      |
|          | Core-XIV       | Digital Image Processing                     | 4      | 4                      |
|          | Core-XV [LAB]  | Image Processing using Scilab - Practical    | 3      | 6                      |
|          | Core-XVI [PRJ] | Project with Viva voce                       | 3      | 6                      |
|          | Elective-VII   | Trends in Computing /Big Data Analytics      | 4      | 4                      |
|          | Elective-VIII  | Natural Language Processing / Cyber Security | 4      | 4                      |
| Part IV  |                | Naan Mudhalvan                               | 2      | 2                      |
| Part-V   |                | Extension Activity (Outside college hours)   | 1      | -                      |
|          |                |                                              | 25     | 30                     |

**Total Credits: 142**

**Part I – Tamil / Other Languages**

**Part II - English**

**Part III – Core Papers, Electives and Project**

**Part IV – Environmental Studies, Value Based Education, Naan Mudhalvan, Skill Enhancement Courses, Foundation Course and Internship**

**Part V – Extension Activity**

**Internship/Industrial visit/Field visit/Knowledge Updation Activity:**

- A report should be submitted at the end of V semester and evaluated by external examiners.
- Internal – 50 Marks, External – 50 Marks (Total : 100 Marks)
- Internship students should submit certificate of attendance from the industry along with report.

**Extension Activity :**

- NSS/NCC/YRC/RRC/Sports and Games/Youth Welfare Activity/Outreach Programmes/ Migration Awareness in the Tamil Nadu Education System
- External examination will be conducted at the end of VI semester.
- Internal – 50 Marks, External – 50 Marks (Total : 100 Marks)

**Naan Mudhalvan :** If a student is unable to appear for Naan Mudhalvan course in a particular semester or who have failed the same should clear the respective self-study courses specified here (External Exam : 100 Marks [no internals])

|              |   |                                  |
|--------------|---|----------------------------------|
| II Semester  | : | Soft skills for Employability    |
| III Semester | : | Digital skills for Employability |
| IV Semester  | : | Introduction to Industry 4.0     |
| V Semester   | : | Social Network                   |
| VI Semester  | : | Software Testing                 |

**Project :** Group (maximum 3 members) OR individual Project. The project report should be submitted at the end of VI semester for external evaluation. Internal – 50 Marks, External – 50 Marks (Total : 100 Marks)

## 12.COURSE – PSO MAPPING

| Title of the course                        | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | Total score |
|--------------------------------------------|------|------|------|------|------|------|------|-------------|
| Programming in C                           | 2    | 3    | 3    | 1    | 1    | 2    | 1    | 13          |
| C Programming Practical                    | 2    | 3    | 3    | 2    | 1    | 2    | 1    | 14          |
| Numerical Methods                          | 1    | 3    | 3    | 1    | 0    | 2    | 0    | 10          |
| Discrete Mathematics                       | 2    | 3    | 3    | 1    | 0    | 1    | 0    | 10          |
| Office Automation - Practical              | 3    | 2    | 1    | 1    | 0    | 3    | 1    | 11          |
| Fundamentals of Computers                  | 2    | 3    | 2    | 1    | 0    | 1    | 0    | 9           |
| Java Programming                           | 1    | 3    | 3    | 1    | 0    | 2    | 1    | 11          |
| Java Programming Practical                 | 1    | 3    | 3    | 1    | 0    | 2    | 0    | 10          |
| Optimization Techniques                    | 1    | 3    | 3    | 1    | 0    | 1    | 2    | 11          |
| Data Structures                            | 1    | 3    | 3    | 1    | 0    | 2    | 0    | 10          |
| PHP Scripting Practical                    | 1    | 3    | 2    | 1    | 1    | 3    | 0    | 11          |
| Introduction to Internet                   | 2    | 1    | 1    | 1    | 0    | 3    | 1    | 9           |
| Python Programming                         | 1    | 3    | 3    | 1    | 0    | 2    | 0    | 10          |
| Python Programming - Practical             | 1    | 3    | 3    | 2    | 0    | 2    | 0    | 11          |
| Digital Logic Fundamentals                 | 1    | 3    | 3    | 0    | 0    | 1    | 0    | 8           |
| Computer Architecture                      | 1    | 3    | 3    | 1    | 0    | 2    | 0    | 10          |
| HTML & Web Designing - Practical           | 3    | 1    | 1    | 1    | 1    | 2    | 0    | 9           |
| Operating System                           | 1    | 3    | 3    | 1    | 2    | 2    | 1    | 13          |
| Mobile Application Development - Practical | 2    | 3    | 2    | 2    | 1    | 3    | 1    | 14          |
| Internet of Things and its Applications    | 2    | 3    | 3    | 2    | 3    | 3    | 1    | 17          |
| Multimedia using React                     | 2    | 2    | 3    | 1    | 1    | 3    | 1    | 13          |
| Multimedia using React - Practical         | 1    | 2    | 3    | 1    | 1    | 3    | 0    | 11          |
| Database Systems                           | 2    | 3    | 3    | 1    | 1    | 2    | 1    | 13          |
| Machine Learning                           | 1    | 3    | 3    | 2    | 1    | 3    | 0    | 13          |
| Database Systems - Practical               | 1    | 3    | 2    | 1    | 2    | 2    | 0    | 11          |

|                                                |    |     |     |    |    |    |    |     |
|------------------------------------------------|----|-----|-----|----|----|----|----|-----|
| Machine Learning - Practical                   | 1  | 3   | 3   | 2  | 0  | 3  | 0  | 12  |
| Computer Networks                              | 2  | 3   | 3   | 2  | 1  | 3  | 1  | 15  |
| Data Mining                                    | 2  | 3   | 3   | 2  | 1  | 3  | 0  | 14  |
| Cryptography & Network Security                | 2  | 3   | 3   | 2  | 3  | 3  | 0  | 16  |
| Artificial Intelligence                        | 1  | 3   | 3   | 2  | 1  | 2  | 0  | 12  |
| Software Engineering                           | 3  | 3   | 2   | 3  | 1  | 2  | 3  | 17  |
| Digital Image Processing                       | 1  | 3   | 3   | 2  | 1  | 2  | 0  | 12  |
| Image Processing using Scilab - Practical      | 1  | 3   | 3   | 2  | 0  | 3  | 0  | 12  |
| Project with Viva voce                         | 3  | 3   | 3   | 3  | 2  | 3  | 3  | 20  |
| Trends in Computing                            | 2  | 3   | 2   | 2  | 2  | 3  | 1  | 15  |
| Big Data Analytics                             | 2  | 3   | 3   | 2  | 1  | 3  | 1  | 15  |
| Natural Language Processing                    | 2  | 3   | 3   | 2  | 3  | 3  | 0  | 16  |
| Cyber Security                                 | 2  | 3   | 2   | 2  | 3  | 3  | 2  | 17  |
| Total score of all courses contributing to PSO | 62 | 108 | 101 | 58 | 36 | 90 | 24 | 479 |

Each Course has to address a minimum of 4 PSOs

Level of contribution of the Course towards attaining PSOs

0 – No Contribution

1 – Low Level

2 – Medium Level

3 – High Level

### 13.DETAILED SYLLABUS

#### CORE COURSE-I: PROGRAMMING IN C

| Subject Code | L                                                                                                                                                                                                                                                                                                                                                                                                                                        | T | P                                                                                                                                                      | Semester | Credits | Inst. Hours | Marks |          |              |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------|-------------|-------|----------|--------------|
|              |                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |                                                                                                                                                        |          |         |             | CIA   | External | Total        |
|              | 4                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0 | 0                                                                                                                                                      | I        | 4       | 4           | 25    | 75       | 100          |
| Unit         | Contents                                                                                                                                                                                                                                                                                                                                                                                                                                 |   |                                                                                                                                                        |          |         |             |       |          | No. of Hours |
| I            | <b>Studying Concepts of Programming Languages-</b> Language Evaluation Criteria – Language design - Language Categories -Implementation Methods – Programming Environments - Overview of C: History of C-Importance of C- Basic Structure of C Programs-Executing a C Program-Constants, Variables and Data types- Operators and Expressions-Managing Input and Output Operations                                                        |   |                                                                                                                                                        |          |         |             |       |          | 12           |
| II           | <b>Decision Making and Branching:</b> Decision Making and Looping-Arrays-Character Arrays and Strings                                                                                                                                                                                                                                                                                                                                    |   |                                                                                                                                                        |          |         |             |       |          | 12           |
| III          | <b>User Defined Functions:</b> Elements of User Defined Functions-Definition of Functions- Return Values and their Types- Function Call-Function Declaration – Categories of Functions – Nesting of Functions- Recursion                                                                                                                                                                                                                 |   |                                                                                                                                                        |          |         |             |       |          | 12           |
| IV           | <b>Structures and Unions:</b> Introduction- Defining a Structure- Declaring Structure Variables Accessing Structure Members- Structure Initialization – Arrays of Structures – Arrays within Structures - Unions- Size of Structures.                                                                                                                                                                                                    |   |                                                                                                                                                        |          |         |             |       |          | 12           |
| V            | <b>Pointers:</b> Understanding Pointers- Accessing the Address of a Variable - Declaring Pointer Variables- Initializing of Pointer Variables - Accessing a Variable through its Pointer- Chain of Pointers- Pointer Expressions-Pointer and Scale Factor- Pointer and Arrays- Pointers and Character Strings- Array of Pointers- Pointer as Function Arguments-Functions Returning Pointers-Pointers to Functions -File Management in C |   |                                                                                                                                                        |          |         |             |       |          | 12           |
| <b>TOTAL</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |                                                                                                                                                        |          |         |             |       |          | <b>60</b>    |
| CO           | Bloom's Level                                                                                                                                                                                                                                                                                                                                                                                                                            |   | Course Outcome Statement                                                                                                                               |          |         |             |       |          |              |
| CO1          | K1 & K2                                                                                                                                                                                                                                                                                                                                                                                                                                  |   | Recall and explain the fundamental concepts of programming languages, C syntax, data types, operators, and the basic structure of a C program.         |          |         |             |       |          |              |
| CO2          | K3                                                                                                                                                                                                                                                                                                                                                                                                                                       |   | Apply the knowledge of control structures, arrays, strings, and functions to develop programs for solving specific computational problems.             |          |         |             |       |          |              |
| CO3          | K4                                                                                                                                                                                                                                                                                                                                                                                                                                       |   | Analyze the efficiency and organization of data using structures, unions, and pointers to examine how memory is managed and accessed within a program. |          |         |             |       |          |              |

|                                                       |                                                                                                                               |                                                                                                                                                                    |
|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO4                                                   | K5 & K6                                                                                                                       | Evaluate and design robust applications using advanced concepts like recursion, pointer manipulation, and file management to create integrated software solutions. |
| <b>Textbooks</b>                                      |                                                                                                                               |                                                                                                                                                                    |
| 1.                                                    | Robert W. Sebesta, (2012), — Concepts of Programming Languages, Fourth Edition, Addison Wesley.                               |                                                                                                                                                                    |
| 2.                                                    | E.Balaguruswamy, (2010), — Programming in ANSI C, Fifth Edition, Tata Mc Graw Hill Publications                               |                                                                                                                                                                    |
| <b>Reference Books</b>                                |                                                                                                                               |                                                                                                                                                                    |
| 1.                                                    | Ashok Kamthane, (2009), — Programming with ANSI & Turbo C, Pearson Education                                                  |                                                                                                                                                                    |
| 2.                                                    | Byron Gottfried, (2010),— Programming with C, Schaums Outline Series, Tata Mc Graw Hill Publications                          |                                                                                                                                                                    |
| <b>NOTE: Latest Edition of Text books May be Used</b> |                                                                                                                               |                                                                                                                                                                    |
| <b>Web Resources</b>                                  |                                                                                                                               |                                                                                                                                                                    |
| 1.                                                    | <a href="http://www.tutorialspoint.com/cprogramming/">http://www.tutorialspoint.com/cprogramming/</a>                         |                                                                                                                                                                    |
| 2.                                                    | <a href="http://www.cprogramming.com/">http://www.cprogramming.com/</a>                                                       |                                                                                                                                                                    |
| 3.                                                    | <a href="http://www.programmingsimplified.com/c-program-examples">http://www.programmingsimplified.com/c-program-examples</a> |                                                                                                                                                                    |
| 4.                                                    | <a href="http://www.programiz.com/c-programming">http://www.programiz.com/c-programming</a>                                   |                                                                                                                                                                    |
| 5.                                                    | <a href="http://www.cs.cf.ac.uk/Dave/C/CE.html">http://www.cs.cf.ac.uk/Dave/C/CE.html</a>                                     |                                                                                                                                                                    |
| 6.                                                    | <a href="http://fresh2refresh.com/c-programming/c-function/">http://fresh2refresh.com/c-programming/c-function/</a>           |                                                                                                                                                                    |

#### CO-PO Mapping

| CO          | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|-------------|-----|-----|-----|-----|-----|-----|-----|
| CO1         | 3   | 1   | 1   | 1   | -   | 1   | -   |
| CO2         | 2   | 2   | 3   | 2   | -   | 2   | 1   |
| CO3         | 2   | 3   | 3   | 2   | 1   | 2   | 1   |
| CO4         | 3   | 3   | 3   | 3   | 2   | 3   | 3   |
| Total Score | 10  | 9   | 10  | 8   | 3   | 8   | 5   |

#### CO-PSO Mapping

| CO          | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-------------|------|------|------|------|------|------|------|
| CO1         | 2    | 1    | 1    | 1    | -    | 1    | -    |
| CO2         | 1    | 2    | 3    | 2    | -    | 1    | 1    |
| CO3         | 2    | 3    | 3    | 2    | 1    | 2    | 1    |
| CO4         | 3    | 3    | 3    | 3    | 2    | 3    | 3    |
| Total Score | 8    | 9    | 10   | 8    | 3    | 7    | 5    |

### CORE COURSE II: C PROGRAMMING PRACTICAL

| Subject Code                                                                                                                                                                                                                                                                                                       | L             | T | P                                                                                                                                                     | Semester | Credits | Inst. Hours | Marks |          |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------|-------------|-------|----------|-------|
|                                                                                                                                                                                                                                                                                                                    |               |   |                                                                                                                                                       |          |         |             | CIA   | External | Total |
|                                                                                                                                                                                                                                                                                                                    | 0             | 0 | 4                                                                                                                                                     | I        | 3       | 4           | 50    | 50       | 100   |
| <b>Exercises</b>                                                                                                                                                                                                                                                                                                   |               |   |                                                                                                                                                       |          |         |             |       |          |       |
| 1. Programs using Input/Output functions<br>2. Programs on conditional structures<br>3. Command Line Arguments<br>4. Programs using Arrays<br>5. String Manipulations<br>6. Programs using Functions<br>7. Recursive Functions<br>8. Programs using Pointers<br>9. Files<br>10. Programs using Structures & Unions |               |   |                                                                                                                                                       |          |         |             |       |          |       |
| CO                                                                                                                                                                                                                                                                                                                 | Bloom's Level |   | Course Outcome Statement                                                                                                                              |          |         |             |       |          |       |
| CO1                                                                                                                                                                                                                                                                                                                | K1 & K2       |   | Recall and explain the fundamental syntax of C, including input/output functions, data types, and the basic structure of a C program..                |          |         |             |       |          |       |
| CO2                                                                                                                                                                                                                                                                                                                | K3            |   | Apply conditional structures, arrays, strings, and functions to implement logical solutions for specific computational tasks.                         |          |         |             |       |          |       |
| CO3                                                                                                                                                                                                                                                                                                                | K4            |   | Analyze the behavior of programs using pointers, structures, and unions to examine how data is organized and managed within memory.                   |          |         |             |       |          |       |
| CO4                                                                                                                                                                                                                                                                                                                | K5 & K6       |   | Evaluate and design robust applications incorporating recursion, command-line arguments, and file management to create integrated software solutions. |          |         |             |       |          |       |

#### CO-PO Mapping

| CO/PO       | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|-------------|-----|-----|-----|-----|-----|-----|-----|
| CO1         | 3   | 1   | 1   | 1   | -   | 1   | -   |
| CO2         | 2   | 2   | 3   | 2   | -   | 2   | 1   |
| CO3         | 2   | 3   | 3   | 2   | 1   | 2   | 1   |
| CO4         | 3   | 3   | 3   | 3   | 2   | 3   | 3   |
| Total Score | 10  | 9   | 10  | 8   | 3   | 8   | 5   |

#### CO-PSO Mapping

| CO/PSO      | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-------------|------|------|------|------|------|------|------|
| CO1         | 2    | 1    | 1    | 1    | -    | 1    | -    |
| CO2         | 1    | 2    | 3    | 2    | -    | 1    | 1    |
| CO3         | 2    | 3    | 3    | 2    | 1    | 2    | 1    |
| CO4         | 3    | 3    | 3    | 3    | 2    | 3    | 3    |
| Total Score | 8    | 9    | 10   | 8    | 3    | 7    | 5    |

### ELECTIVE COURSE– I A : NUMERICAL METHODS

| Subject Code | L                                                                                                                                                                                                                                             | T | P                                                                                                                                                                                                                                               | Semester | Credits | Inst. Hours | Marks |          |              |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------|-------------|-------|----------|--------------|
|              |                                                                                                                                                                                                                                               |   |                                                                                                                                                                                                                                                 |          |         |             | CIA   | External | Total        |
|              | 4                                                                                                                                                                                                                                             | 0 | 0                                                                                                                                                                                                                                               | I        | 4       | 4           | 25    | 75       | 100          |
| Unit         | Contents                                                                                                                                                                                                                                      |   |                                                                                                                                                                                                                                                 |          |         |             |       |          | No. of Hours |
| I            | Curve Fitting: Introduction, Method of Least squares, Curve Fitting, Fitting a Straight Line                                                                                                                                                  |   |                                                                                                                                                                                                                                                 |          |         |             |       |          | 12           |
| II           | Solution of Algebraic and Transcendental Equations: Bisection method, Regula Falsi method, Newton Raphson Method                                                                                                                              |   |                                                                                                                                                                                                                                                 |          |         |             |       |          | 12           |
| III          | Solution of Simultaneous Linear Equations: Gauss Elimination method, Gauss-Jordan method, Gauss Seidel Method, Jacobi's method                                                                                                                |   |                                                                                                                                                                                                                                                 |          |         |             |       |          | 12           |
| IV           | Numerical Differentiation & Integration: Newton's Forward Difference, Newton's Backward Difference, Newton's Divided Difference (First Order Differentiation only)<br>Integration: Using Trapezoidal rule, Simpson's 1/3 & Simpson's 3/8rules |   |                                                                                                                                                                                                                                                 |          |         |             |       |          | 12           |
| V            | Solution of Ordinary Differential Equations: Euler's method - Runge-Kutta 2 <sup>nd</sup> Order and 4 <sup>th</sup> Order methods                                                                                                             |   |                                                                                                                                                                                                                                                 |          |         |             |       |          | 12           |
| TOTAL        |                                                                                                                                                                                                                                               |   |                                                                                                                                                                                                                                                 |          |         |             |       | 60       |              |
| CO           | Bloom's Level                                                                                                                                                                                                                                 |   | Course Outcome Statement                                                                                                                                                                                                                        |          |         |             |       |          |              |
| CO1          | K1 & K2                                                                                                                                                                                                                                       |   | Recall fundamental definitions and explain the underlying principles of curve fitting, numerical differentiation, integration, and methods for solving algebraic, linear, and differential equations.                                           |          |         |             |       |          |              |
| CO2          | K3                                                                                                                                                                                                                                            |   | Apply numerical algorithms such as Newton-Raphson, Gauss-Seidel, Simpson's rules, and Runge-Kutta methods to solve specific mathematical problems and fit data to linear models.                                                                |          |         |             |       |          |              |
| CO3          | K4                                                                                                                                                                                                                                            |   | Analyze and compare the efficiency and convergence of various numerical techniques, such as distinguishing between Jacobi and Gauss-Seidel iterations or identifying the appropriate interpolation formula for given data intervals.            |          |         |             |       |          |              |
| CO4          | K5 & K6                                                                                                                                                                                                                                       |   | Evaluate the accuracy of numerical solutions against exact values and design comprehensive computational strategies to solve complex engineering problems involving ordinary differential equations and multi-step predictor-corrector methods. |          |         |             |       |          |              |
| Textbooks    |                                                                                                                                                                                                                                               |   |                                                                                                                                                                                                                                                 |          |         |             |       |          |              |
| 1.           | B.S.Grewal, "Numerical Methods in Engineering & Science", Khanna Publishers, Fifth Edition, April 1999                                                                                                                                        |   |                                                                                                                                                                                                                                                 |          |         |             |       |          |              |
| 2.           | M.K.Venkataraman,— “Numerical Methods in Science & Engineering”, National Publishing Co., 2005                                                                                                                                                |   |                                                                                                                                                                                                                                                 |          |         |             |       |          |              |

#### CO-PO Mapping

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|-------|-----|-----|-----|-----|-----|-----|-----|
| CO1   | 3   | 1   | 1   | 2   | -   | 1   | -   |

|             |   |   |   |   |   |   |   |
|-------------|---|---|---|---|---|---|---|
| CO2         | 2 | 2 | 3 | 2 | - | 2 | 1 |
| CO3         | 2 | 3 | 2 | 2 | - | 2 | 1 |
| CO4         | 2 | 3 | 3 | 3 | 1 | 3 | 2 |
| Total Score | 9 | 9 | 9 | 9 | 1 | 8 | 4 |

### CO-PSO Mapping

| CO/POS      | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-------------|------|------|------|------|------|------|------|
| CO1         | 3    | 1    | 2    | 1    | -    | 1    | -    |
| CO2         | 2    | 2    | 3    | 1    | -    | 2    | 1    |
| CO3         | 2    | 3    | 3    | 2    | -    | 2    | 1    |
| CO4         | 2    | 3    | 3    | 3    | 1    | 3    | 2    |
| Total Score | 9    | 9    | 11   | 7    | 1    | 8    | 4    |

### ELECTIVE COURSE-I B : DISCRETE MATHEMATICS

| Subject Code | L                                                                                                                                                                                                                                                                                                                                                                                                                         | T | P                        | Semester | Credits | Inst. Hours | Marks |              |       |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--------------------------|----------|---------|-------------|-------|--------------|-------|
|              |                                                                                                                                                                                                                                                                                                                                                                                                                           |   |                          |          |         |             | CIA   | External     | Total |
|              | 4                                                                                                                                                                                                                                                                                                                                                                                                                         | 0 | 0                        | I        | 4       | 4           | 25    | 75           | 100   |
| Unit         | Contents                                                                                                                                                                                                                                                                                                                                                                                                                  |   |                          |          |         |             |       | No. of Hours |       |
| I            | Introduction to Relations – Binary relation – Classification of Relations – Composition of Relations–Inverse of Relation – Closure operation on Relations – Matrix representation of Relation - digraphs                                                                                                                                                                                                                  |   |                          |          |         |             |       | 12           |       |
| II           | Introduction to Functions – Addition and Multiplication of Functions - Classifications of Functions – Composition of Function – Inverse Function                                                                                                                                                                                                                                                                          |   |                          |          |         |             |       | 12           |       |
| III          | Introduction – Statement (Propositions) – Laws of Formal Logic –Basic Set of Logical operators/operations – Propositions and Truth Tables– Algebra Propositions - Tautologies and Contradictions – Logical Equivalence – Logical Implication – Normal Forms.                                                                                                                                                              |   |                          |          |         |             |       | 12           |       |
| IV           | Introduction–Definition of a Matrix -Types of Matrices Operations on Matrices–Related Matrices–Transpose of a Matrix–Symmetric and Skew-symmetric Matrices–Complex Matrix–Conjugate of a Matrix– Determinant of a Matrix–Typical Square Matrices–Adjoint and Inverse of a Matrix – Singular and Non-singular Matrices –Adjoint of a Square Matrix – Properties of Adjoint of a Matrix –Properties of Inverse of a Matrix. |   |                          |          |         |             |       | 12           |       |
| V            | Introduction–Graph and Basic Terminologies–Types of Graphs–Sub Graph and Isomorphic Graph – Operations on Graphs – Representation of Graph                                                                                                                                                                                                                                                                                |   |                          |          |         |             |       | 12           |       |
| TOTAL        |                                                                                                                                                                                                                                                                                                                                                                                                                           |   |                          |          |         |             |       | 60           |       |
| CO           | Bloom's Level                                                                                                                                                                                                                                                                                                                                                                                                             |   | Course Outcome Statement |          |         |             |       |              |       |

|                 |                                                                                                                         |                                                                                                                                                                                        |
|-----------------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO1             | K1 & K2                                                                                                                 | Recall fundamental definitions and describe the properties of relations, functions, logical operators, matrix types, and graph terminologies.                                          |
| CO2             | K3                                                                                                                      | Apply logical laws, matrix operations, and functional compositions to solve problems involving truth tables, inverse matrices, and graph representations.                              |
| CO3             | K4                                                                                                                      | Analyze the characteristics of mathematical structures to classify relations (equivalence, closures), simplify logical propositions into normal forms, and identify isomorphic graphs. |
| CO4             | K5 & K6                                                                                                                 | Evaluate the validity of logical implications and matrix properties, and construct formal proofs or optimized graph-based models to represent complex relational data.                 |
| Textbook        |                                                                                                                         |                                                                                                                                                                                        |
|                 | DISCRETE MATHEMATICS, Swapan Kumar Chakraborty and Bikash Kanti Sarkar, OXFORD University Press                         |                                                                                                                                                                                        |
| Reference books |                                                                                                                         |                                                                                                                                                                                        |
| 1               | DISCRETE MATHEMATICS, Third Edition, Seymour Lipschutz and Marc Lars Lipson, Tata McGraw Hill Education Private Limited |                                                                                                                                                                                        |
| 2               | Discrete Mathematical Structures with Applications to Computer Science by J.P.Tremblay, R.Manohar TMH edition           |                                                                                                                                                                                        |
| Web Reference   |                                                                                                                         |                                                                                                                                                                                        |
|                 | <a href="https://www.tutorialspoint.com/discrete_mathematics">https://www.tutorialspoint.com/discrete_mathematics</a>   |                                                                                                                                                                                        |

### CO-PO Mapping

| CO/PO       | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|-------------|-----|-----|-----|-----|-----|-----|-----|
| CO1         | 3   | 1   | 1   | 1   | -   | 2   | 1   |
| CO2         | 2   | 2   | 3   | 1   | -   | 2   | 1   |
| CO3         | 2   | 3   | 2   | 2   | -   | 2   | 1   |
| CO4         | 3   | 3   | 3   | 3   | 1   | 2   | 2   |
| Total Score | 10  | 9   | 9   | 7   | 1   | 8   | 5   |

### CO-PSO Mapping

| CO/PSO      | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-------------|------|------|------|------|------|------|------|
| CO1         | 3    | 1    | 2    | 1    | -    | 1    | 1    |
| CO2         | 2    | 2    | 3    | 1    | -    | 1    | 1    |
| CO3         | 2    | 3    | 3    | 2    | -    | 2    | 1    |
| CO4         | 3    | 3    | 3    | 3    | 1    | 2    | 2    |
| Total Score | 10   | 9    | 11   | 7    | 1    | 6    | 5    |

## SKILL ENHANCEMENT COURSE I : OFFICE AUTOMATION PRACTICAL

| Subject Code | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | T | P | Semester                                                                                                                                                                                            | Credits | Inst. Hours | Marks |          |       |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------|-------|----------|-------|
|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |   |   |                                                                                                                                                                                                     |         |             | CIA   | External | Total |
|              | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0 | 3 | I                                                                                                                                                                                                   | 3       | 3           | 50    | 50       | 100   |
|              | <p style="text-align: center;"><b>Exercises</b></p> <p><b>MS-Word</b></p> <ol style="list-style-type: none"><li>1. Prepare a word document for spell checking and Thesaurus.</li><li>2. Apply Cut, Copy and Paste operations in a document.</li><li>3. Find a word and Replace with another in a document.</li><li>4. Insert Header with College Name, Footer with Page No., and Footnote in a document.</li><li>5. Insert mathematical symbols using Microsoft equation 3.0.</li><li>6. Preparing Newspaper format (Apply Alignment, Font, Property, Line spacing, Picture Format).</li><li>7. Prepare a Bio-Data and insert the contents of qualification within the table.</li><li>8. Mail Merge</li><li>9. Macro.</li></ol> <p><b>MS-Excel</b></p> <ol style="list-style-type: none"><li>1. Apply formulas and functions</li><li>2. Prepare a chart for population growth.</li><li>3. Create a Pivot table.</li><li>4. Apply ascending and descending order</li><li>5. Apply auto format</li></ol> <p><b>MS-PowerPoint</b></p> <ol style="list-style-type: none"><li>1. Create a power point presentation with 3 slides.</li><li>2. Create a design template with 3 slides.</li><li>3. Create a presentation with animation.</li><li>4. Create a power point presentation with 4 slides. Set slide transition time of 3 seconds and Display your presentation.</li><li>5. Create a presentation with auto content wizard.</li></ol> <p><b>MS-Access</b></p> <ol style="list-style-type: none"><li>1. Create an employee database.</li><li>2. Create a student database. Set primary key.</li><li>3. Prepare salary list.</li><li>4. Create a report.</li><li>5. Create Mailing labels</li></ol> |   |   |                                                                                                                                                                                                     |         |             |       |          |       |
| <b>CO</b>    | <b>Bloom's Level</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |   | <b>Course Outcome Statement</b>                                                                                                                                                                     |         |             |       |          |       |
| CO1          | K1 & K2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |   | Explain the basic concepts and features of MS–Word, MS–Excel, MS–PowerPoint, and MS–Access, including document editing, formatting, formulas, presentations, and database operations.               |         |             |       |          |       |
| CO2          | K3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |   |   | Apply various operations and tools in MS Office applications such as document formatting, formulas and functions, chart preparation, presentation design, database creation, and report generation. |         |             |       |          |       |
| CO3          | K4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |   |   | Analyze and organize data, documents, presentations, and databases using advanced features such as Pivot Tables, Mail Merge, Macros, animations, sorting, and reporting techniques.                 |         |             |       |          |       |

|                      |                                                                                                                                                     |                                                                                                                                                                                                                 |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO4                  | K5 & K6                                                                                                                                             | Evaluate and create professional documents, spreadsheets, presentations, and databases by integrating advanced formatting, automation, data management, and presentation techniques for real-time applications. |
| <b>Web Resources</b> |                                                                                                                                                     |                                                                                                                                                                                                                 |
| 1.                   | <a href="https://www.udemy.com/course/office-automation-certificate-course/">https://www.udemy.com/course/office-automation-certificate-course/</a> |                                                                                                                                                                                                                 |
| 2.                   | <a href="https://www.javatpoint.com/automation-tools">https://www.javatpoint.com/automation-tools</a>                                               |                                                                                                                                                                                                                 |

### CO-PO Mapping

| CO/PO       | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|-------------|-----|-----|-----|-----|-----|-----|-----|
| CO1         | 3   | 1   | 1   | 1   | 1   | 3   | 1   |
| CO2         | 2   | 2   | 3   | 1   | 1   | 3   | 1   |
| CO3         | 2   | 3   | 2   | 2   | 1   | 3   | 2   |
| CO4         | 3   | 3   | 3   | 3   | 2   | 3   | 3   |
| Total Score | 10  | 9   | 9   | 7   | 5   | 12  | 7   |

### CO-PSO Mapping

| CO/PSO      | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-------------|------|------|------|------|------|------|------|
| CO1         | 3    | 1    | 1    | 1    | 1    | 3    | 1    |
| CO2         | 2    | 2    | 3    | 1    | 1    | 3    | 2    |
| CO3         | 2    | 3    | 2    | 2    | 1    | 3    | 2    |
| CO4         | 3    | 3    | 3    | 3    | 2    | 3    | 3    |
| Total Score | 10   | 9    | 9    | 7    | 5    | 12   | 8    |

### FOUNDATION COURSE: FUNDAMENTALS OF COMPUTERS

| Subject Code | L                                                                                                                                                                                                          | T | P | Semester | Credits | Inst. Hours | Marks |          |              |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|----------|---------|-------------|-------|----------|--------------|
|              |                                                                                                                                                                                                            |   |   |          |         |             | CIA   | External | Total        |
|              | 3                                                                                                                                                                                                          | 0 | 0 | I        | 3       | 3           | 25    | 75       | 100          |
| Unit         | Contents                                                                                                                                                                                                   |   |   |          |         |             |       |          | No. of Hours |
| I            | <b>Introduction:</b> Characteristics of Computers – Evolution of Computers<br><b>Basic Computer Organization:</b> I/O Unit - Storage Unit – Arithmetic Logic Unit - Control Unit - Central Processing Unit |   |   |          |         |             |       |          | 9            |
| II           | <b>Computer Software:</b> Types of Software – System Architecture<br><b>Computer Languages:</b> Machine Language – Assembly Language - High Level Language - Object Oriented Languages                     |   |   |          |         |             |       |          | 9            |

|                                               |                                                                                                                                                                                                                                       |                                                                                                                                                                                               |    |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| III                                           | <b>Problem Solving Concepts:</b> Problem Solving in Everyday life - Types of Problems - Problem solving with computers - Difficulties with Problem Solving                                                                            |                                                                                                                                                                                               | 9  |
| IV                                            | <b>Problem Solving concepts for the computer:</b> Constant Variables - Data Types - Functions-Operators - Expressions and Equations - <b>Organizing the Solution:</b> Analyzing the problem – Algorithm- Flow chart - Pseudocode      |                                                                                                                                                                                               | 9  |
| V                                             | <b>Programming Structure:</b> Structuring a solution - Modules and their function - Local and Global variables - Parameters - Return values - Sequential Logic Structure – Problem solving with Decision - Problem Solving with Loops |                                                                                                                                                                                               | 9  |
| TOTAL                                         |                                                                                                                                                                                                                                       |                                                                                                                                                                                               | 45 |
| CO                                            | Bloom's Level                                                                                                                                                                                                                         | Course Outcome Statement                                                                                                                                                                      |    |
| CO1                                           | K1 & K2                                                                                                                                                                                                                               | Explain the fundamental concepts of computers, computer organization, software types, programming languages, and problem-solving techniques including algorithms, flowcharts, and pseudocode. |    |
| CO2                                           | K3                                                                                                                                                                                                                                    | Apply problem-solving concepts, data types, operators, expressions, and programming structures to develop solutions for simple computational problems.                                        |    |
| CO3                                           | K4                                                                                                                                                                                                                                    | Analyze problems and organize logical solutions using modular programming, variables, functions, decision-making statements, and looping structures.                                          |    |
| CO4                                           | K5 & K6                                                                                                                                                                                                                               | Evaluate and create structured computer-based solutions by integrating algorithms, flowcharts, pseudocode, and programming constructs for real-world problem solving.                         |    |
| Text books                                    |                                                                                                                                                                                                                                       |                                                                                                                                                                                               |    |
| 1.                                            | Pradeep K.Sinha and Priti Sinha, (2004)—Computer Fundamentals, Sixth Edition, BPB Publications. (Unit I: Chapter 1 & 2, Unit II: Chapter 10 & 12)                                                                                     |                                                                                                                                                                                               |    |
| 2.                                            | Maureen Sprinkle and Jim Hubbard, (2009) —Problem Solving and Programming Concept, Ninth Edition, Prentice Hall. (Unit III: Chapter 1, 2 & 3) Unit IV: Chapter 3, Unit V: Chapter 4, 5, 6, 7 & 8)                                     |                                                                                                                                                                                               |    |
| Reference Books                               |                                                                                                                                                                                                                                       |                                                                                                                                                                                               |    |
| 1.                                            | R.G.Dromey, (2007), — How to Solve it by Computer, Prentice Hall International Series in Computer Science.                                                                                                                            |                                                                                                                                                                                               |    |
| 2.                                            | C.S.V.Murthy, (2009), — Fundamentals of Computers, Third Edition, Himalaya Publishing House.                                                                                                                                          |                                                                                                                                                                                               |    |
| NOTE: Latest Edition of Textbooks May be Used |                                                                                                                                                                                                                                       |                                                                                                                                                                                               |    |
| Web Resources                                 |                                                                                                                                                                                                                                       |                                                                                                                                                                                               |    |
| 1.                                            | <a href="http://www.tutorialspoint.com/computer_fundamentals/">http://www.tutorialspoint.com/computer_fundamentals/</a>                                                                                                               |                                                                                                                                                                                               |    |

|    |                                                                                                                                                         |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2. | <a href="http://www.comptechdoc.org/basic/basicut/">http://www.comptechdoc.org/basic/basicut/</a>                                                       |
| 3. | <a href="http://www.homeandlearn.co.uk/">http://www.homeandlearn.co.uk/</a>                                                                             |
| 4. | <a href="http://www.top-windows-tutorials.com/computer-basics/">http://www.top-windows-tutorials.com/computer-basics/</a>                               |
| 5. | <a href="https://www.programiz.com/article/flowchart-programming">https://www.programiz.com/article/flowchart-programming</a> (Algorithm and flowchart) |

#### CO-PO Mapping

| CO/PO       | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|-------------|-----|-----|-----|-----|-----|-----|-----|
| CO1         | 3   | 1   | 1   | 1   | -   | 3   | 1   |
| CO2         | 2   | 2   | 3   | 1   | -   | 3   | 1   |
| CO3         | 2   | 3   | 2   | 2   | -   | 3   | 2   |
| CO4         | 3   | 3   | 3   | 3   | 1   | 3   | 3   |
| Total Score | 10  | 9   | 9   | 7   | 1   | 12  | 7   |

#### CO-PSO Mapping

| CO/PSO      | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-------------|------|------|------|------|------|------|------|
| CO1         | 3    | 1    | 2    | 1    | -    | 3    | 1    |
| CO2         | 2    | 2    | 3    | 1    | -    | 2    | 1    |
| CO3         | 2    | 3    | 2    | 2    | -    | 2    | 2    |
| CO4         | 3    | 3    | 3    | 3    | 1    | 3    | 3    |
| Total Score | 10   | 9    | 10   | 7    | 1    | 10   | 7    |

### CORE COURSE III: JAVA PROGRAMMING

| Subject Code | L                                                                                                                                                                                                                                                                                                                                             | T | P | Semester | Credits | Inst. Hours | Marks |              |       |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|----------|---------|-------------|-------|--------------|-------|
|              |                                                                                                                                                                                                                                                                                                                                               |   |   |          |         |             | CIA   | External     | Total |
|              | 4                                                                                                                                                                                                                                                                                                                                             | 0 | 0 | II       | 4       | 4           | 25    | 75           | 100   |
| Unit         | Contents                                                                                                                                                                                                                                                                                                                                      |   |   |          |         |             |       | No. of Hours |       |
| I            | Fundamentals of Object-Oriented Programming: Introduction–Object-Oriented Paradigm – Concepts of Object–Oriented Programming – Benefits of OOP – Evolution: Java History-Java Features – Differs from C and C++- Overview of Java Language: Java Program-Structure – Tokens – Java Statements – Java Virtual Machine - Command Line Arguments |   |   |          |         |             |       | 12           |       |
| II           | Constants, Variables and Data Types – Operators and Expressions– Decision making and Branching – Looping – Arrays – Strings – Collection-Interfaces and classes                                                                                                                                                                               |   |   |          |         |             |       | 12           |       |

|                 |                                                                                                                                                                                                                                                  |                                                                                                                                                                                               |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| II I            | Classes objects and methods: Introduction – Defining a class – Method Declaration –Constructors - Method Overloading – Static Members – Nesting of methods – Inheritance – Overriding–Final variables and methods – Abstract methods and classes | 12                                                                                                                                                                                            |
| IV              | Multiple Inheritance: Defining Interfaces – Extending Interfaces– Implementing Interfaces – Packages: Creating Packages-Accessing Packages – Using a Package - Managing Errors and Exceptions – Multithreaded Programming                        | 12                                                                                                                                                                                            |
| V               | Layout Managers – JDBC – Java Servlet: Servlet Environment Role Servlet API – Servlet Life Cycle – Servlet Context – HTTP Support– HTML to Servlet Communication                                                                                 | 12                                                                                                                                                                                            |
| TOTAL           |                                                                                                                                                                                                                                                  | 60                                                                                                                                                                                            |
| CO              | Bloom's Level                                                                                                                                                                                                                                    | Course Outcome Statement                                                                                                                                                                      |
| CO1             | K1 & K2                                                                                                                                                                                                                                          | Explain the fundamental concepts of computers, computer organization, software types, programming languages, and problem-solving techniques including algorithms, flowcharts, and pseudocode. |
| CO2             | K3                                                                                                                                                                                                                                               | Apply problem-solving concepts, data types, operators, expressions, and programming structures to develop solutions for simple computational problems.                                        |
| CO3             | K4                                                                                                                                                                                                                                               | Analyze problems and organize logical solutions using modular programming, variables, functions, decision-making statements, and looping structures.                                          |
| CO4             | K5 & K6                                                                                                                                                                                                                                          | Evaluate and create structured computer-based solutions by integrating algorithms, flowcharts, pseudocode, and programming constructs for real-world problem solving.                         |
| Textbooks       |                                                                                                                                                                                                                                                  |                                                                                                                                                                                               |
| 1.              | E. Balagurusamy (2010), — Programming with Javal, Tata McGraw Hill Edition India Private Ltd, 4 <sup>th</sup> Edition                                                                                                                            |                                                                                                                                                                                               |
| 2.              | C. Xavier, Java Programming – A Practical Approach, Tata McGraw Hill Edition Pvt Ltd                                                                                                                                                             |                                                                                                                                                                                               |
| Reference Books |                                                                                                                                                                                                                                                  |                                                                                                                                                                                               |
| 1.              | P.Naughton and H.Schildt (1999),—Java 2 The Complete Reference, TMH, 3 <sup>rd</sup> Edition                                                                                                                                                     |                                                                                                                                                                                               |
| 2.              | Jaison Hunder & William Crawford (2002), Java Servlet Programming, O'Reilly                                                                                                                                                                      |                                                                                                                                                                                               |
| 3.              | Jim Keogh (2002), — J2EE: The Complete Reference, Tata McGraw Hill Edition.                                                                                                                                                                      |                                                                                                                                                                                               |
| Web Resources   |                                                                                                                                                                                                                                                  |                                                                                                                                                                                               |
|                 | <a href="http://javabeginnerstutorial.com/core-java/">http://javabeginnerstutorial.com/core-java/</a>                                                                                                                                            |                                                                                                                                                                                               |
|                 | <a href="http://www.tutorialspoint.com/java/">http://www.tutorialspoint.com/java/</a>                                                                                                                                                            |                                                                                                                                                                                               |
|                 | <a href="http://beginnersbook.com/java-tutorial-for-beginners-with-examples/">http://beginnersbook.com/java-tutorial-for-beginners-with-examples/</a>                                                                                            |                                                                                                                                                                                               |
|                 | <a href="http://www.homeandlearn.co.uk/java/java.html">http://www.homeandlearn.co.uk/java/java.html</a>                                                                                                                                          |                                                                                                                                                                                               |
|                 | <a href="http://www.journaldev.com/1877/servlet-tutorial-java">http://www.journaldev.com/1877/servlet-tutorial-java</a> (UnitV:ServletAPI)                                                                                                       |                                                                                                                                                                                               |

**CO-PO Mapping**

| CO/PO       | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|-------------|-----|-----|-----|-----|-----|-----|-----|
| CO1         | 3   | 1   | 1   | 1   | -   | 3   | 1   |
| CO2         | 2   | 2   | 3   | 1   | -   | 3   | 1   |
| CO3         | 2   | 3   | 2   | 2   | -   | 3   | 2   |
| CO4         | 3   | 3   | 3   | 3   | 1   | 3   | 3   |
| Total Score | 10  | 9   | 9   | 7   | 1   | 12  | 7   |

**CO-PSO Mapping**

| CO/PSO      | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-------------|------|------|------|------|------|------|------|
| CO1         | 3    | 1    | 2    | 1    | -    | 3    | 1    |
| CO2         | 2    | 2    | 3    | 1    | -    | 2    | 1    |
| CO3         | 2    | 3    | 2    | 2    | -    | 2    | 2    |
| CO4         | 3    | 3    | 3    | 3    | 1    | 3    | 3    |
| Total Score | 10   | 9    | 10   | 7    | 1    | 10   | 7    |

**CORE COURSE IV : JAVA PROGRAMMING PRACTICAL**

| Subject Code                                                                                                                                                                                                                                                                                           | L             | T | P                                                                                                                                                                          | Semester | Credits | Inst. Hours | Marks |          |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------|-------------|-------|----------|-------|
|                                                                                                                                                                                                                                                                                                        |               |   |                                                                                                                                                                            |          |         |             | CIA   | External | Total |
|                                                                                                                                                                                                                                                                                                        | 0             | 0 | 4                                                                                                                                                                          | II       | 3       | 4           | 50    | 50       | 100   |
| <b>Exercises</b>                                                                                                                                                                                                                                                                                       |               |   |                                                                                                                                                                            |          |         |             |       |          |       |
| 1. Basic Programs<br>2. Arrays<br>3. Strings<br>4. Array List, Hash Set and Vector collection classes<br>5. Classes and Objects<br>6. Interfaces<br>7. Inheritance<br>8. Packages<br>9. Exception Handling<br>10. Threads<br>11. Working with Database using JDBC<br>12. Web application using Servlet |               |   |                                                                                                                                                                            |          |         |             |       |          |       |
| CO                                                                                                                                                                                                                                                                                                     | Bloom's Level |   | Course Outcome Statement                                                                                                                                                   |          |         |             |       |          |       |
| CO1                                                                                                                                                                                                                                                                                                    | K1 & K2       |   | Explain the fundamental programming constructs in Java, including the structure of basic programs, object-oriented principles, and the role of various collection classes. |          |         |             |       |          |       |
| CO2                                                                                                                                                                                                                                                                                                    | K3            |   | Apply Java syntax and logic to implement arrays, string manipulation, and collection frameworks (ArrayList, HashSet, Vector) for solving computational problems.           |          |         |             |       |          |       |

|     |         |                                                                                                                                                                  |
|-----|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO3 | K4      | Analyze and organize modular code using classes, objects, inheritance, interfaces, and packages while implementing robust error-handling mechanisms.             |
| CO4 | K5 & K6 | Evaluate and Create advanced Java applications by integrating multithreading, database connectivity through JDBC, and server-side web components using Servlets. |

### CO-PO Mapping

| CO/PO       | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|-------------|-----|-----|-----|-----|-----|-----|-----|
| CO1         | 3   | 1   | 1   | 1   | 1   | 2   | 1   |
| CO2         | 2   | 2   | 3   | 2   | 1   | 2   | 1   |
| CO3         | 2   | 3   | 2   | 2   | 1   | 2   | 2   |
| CO4         | 2   | 3   | 3   | 3   | 2   | 3   | 3   |
| Total Score | 9   | 9   | 9   | 8   | 5   | 9   | 7   |

### CO-PSO Mapping

| CO/PSO      | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-------------|------|------|------|------|------|------|------|
| CO1         | 3    | 1    | 1    | 1    | 1    | 2    | 1    |
| CO2         | 2    | 2    | 3    | 2    | 1    | 2    | 1    |
| CO3         | 2    | 3    | 2    | 2    | 1    | 2    | 2    |
| CO4         | 2    | 3    | 3    | 3    | 2    | 3    | 3    |
| Total Score | 9    | 9    | 9    | 8    | 5    | 9    | 7    |

### ELECTIVE COURSE – II A :OPTIMIZATION TECHNIQUES

| Subject Code | L                                                                                                                                                                                                                                                                                                                                                                                                               | T | P | Semester | Credits | Inst. Hours | Marks |              |       |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|----------|---------|-------------|-------|--------------|-------|
|              |                                                                                                                                                                                                                                                                                                                                                                                                                 |   |   |          |         |             | CIA   | External     | Total |
|              | 4                                                                                                                                                                                                                                                                                                                                                                                                               | 0 | 0 | II       | 4       | 4           | 25    | 75           | 100   |
| Unit         | Contents                                                                                                                                                                                                                                                                                                                                                                                                        |   |   |          |         |             |       | No. of Hours |       |
| I            | INTRODUCTION – LINEAR PROGRAMMING PROBLEM<br>The Nature and Meaning of OR – Management – Applications of OR–Modeling in OR–General methods for solving OR models – Scope of OR.<br>Linear Programming Problem: Formulation of LP problems – Graphical solution of LP problems –General formulation of LPP – Slack and Surplus variables – Standard form of LPP –Some important forms of LPP – Simplex Method I. |   |   |          |         |             |       | 12           |       |
| II           | ASSIGNMENT PROBLEMS<br>Assignment Problem: Mathematical formulation–Hungarian method– Unbalanced assignment problem – Various types                                                                                                                                                                                                                                                                             |   |   |          |         |             |       | 12           |       |

|                 |                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                         |    |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| III             | TRANSPORTATION PROBLEMS<br>Transportation Model: Mathematical formulation–Matrix form – Methods for finding Initial Basic Feasible solution and Optimal solution – Degeneracy in Transportation Problems – Unbalanced Transportation Problem.                                                                                                                                                              |                                                                                                                                                                                                         | 12 |
| IV              | SEQUENCING PROBLEMS AND QUEUING MODELS<br>Sequencing Problems: Assumptions – Solutions to Sequencing Problems: Processing n jobs through 2 machines – Processing n jobs through 3 machines – Processing n jobs on m machines<br>Queuing Models: Queuing System – Transient and Steady States – Kendal’s Notation for representing Queuing Models –Various Models in Queuing System – Birth and Death Model |                                                                                                                                                                                                         | 12 |
| V               | PERT AND CPM TECHNIQUES<br>PERT and CPM Techniques: Basic Steps – Network Diagram representation–Rules for drawing Network Diagram–Labeling Fulkerson’s I–J Rule – Time Estimates and Critical Path in Network Analysis – Examples on optimum duration and minimum duration cost – PERT                                                                                                                    |                                                                                                                                                                                                         | 12 |
| TOTAL           |                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                         | 60 |
| CO              | Bloom's Level                                                                                                                                                                                                                                                                                                                                                                                              | Course Outcome Statement                                                                                                                                                                                |    |
| CO1             | K1 & K2                                                                                                                                                                                                                                                                                                                                                                                                    | Explain the nature, scope, and modeling principles of Operations Research, including the fundamental concepts of Linear Programming, Sequencing assumptions, and Queuing system notations.              |    |
| CO2             | K3                                                                                                                                                                                                                                                                                                                                                                                                         | Apply mathematical formulations and algorithmic methods, such as the Simplex, Hungarian, and North-West Corner rules, to solve structured optimization problems in assignment and transportation.       |    |
| CO3             | K4                                                                                                                                                                                                                                                                                                                                                                                                         | Analyze complex scheduling and network scenarios by calculating critical paths in PERT/CPM and determining optimal job sequences across multiple machines to improve process efficiency                 |    |
| CO4             | K5 & K6                                                                                                                                                                                                                                                                                                                                                                                                    | Evaluate and Create integrated mathematical models for real-world decision-making, optimizing duration-cost trade-offs in projects and synthesizing steady-state solutions for various queuing systems. |    |
| Textbook        |                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                         |    |
|                 | S.D.Sharma, — Operations Research, Tenth Edition, Pearson, 2017                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                         |    |
| Reference books |                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                         |    |
| 1.              | Hamdy A Taha, Operations Research, Ninth Edition, 2016                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                         |    |
| 2.              | V.Sundaresan, K.S.Ganapathy Subramanian, K.Ganesan, —Resource Management Techniques, Ninth Edition, A.R. Publications, 2015                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                         |    |

### CO-PO Mapping

| CO/PO       | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|-------------|-----|-----|-----|-----|-----|-----|-----|
| CO1         | 3   | 1   | 1   | 1   | 1   | 1   | 1   |
| CO2         | 2   | 2   | 3   | 1   | 1   | 2   | 1   |
| CO3         | 2   | 3   | 2   | 2   | 1   | 2   | 2   |
| CO4         | 2   | 3   | 3   | 3   | 2   | 3   | 3   |
| Total Score | 9   | 9   | 9   | 7   | 5   | 8   | 7   |

### CO-PSO Mapping

| CO/PSO      | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-------------|------|------|------|------|------|------|------|
| CO1         | 3    | 1    | 1    | 1    | 1    | 1    | 1    |
| CO2         | 2    | 2    | 3    | 1    | 1    | 2    | 1    |
| CO3         | 2    | 3    | 2    | 2    | 1    | 2    | 2    |
| CO4         | 2    | 3    | 3    | 3    | 2    | 3    | 3    |
| Total Score | 9    | 9    | 9    | 7    | 5    | 8    | 7    |

### ELECTIVE COURSE II B : DATA STRUCTURES

| Subject Code | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | T | P | Semester | Credits | Inst. Hours | Marks |              |       |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|----------|---------|-------------|-------|--------------|-------|
|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |   |   |          |         |             | CIA   | External     | Total |
|              | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0 | 0 | II       | 4       | 4           | 25    | 75           | 100   |
| Unit         | Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |   |          |         |             |       | No. of Hours |       |
| I            | <b>Introduction and Overview:</b> Definitions – Concept of Data Structures – Overview of Data Structures – Implementation of Data Structures. <b>Arrays:</b> 1 D Array – Memory allocation of an Array – Operation on Arrays – Application of Arrays – Multidimensional Arrays – 2 D Array – Sparse Matrices – 3 D and n – dimensional arrays                                                                                                                                          |   |   |          |         |             |       | 12           |       |
| II           | <b>Linked Lists:</b> Definition – Single Linked List – Representation of a Linked List in memory – Operations on a Single Linked List – Circular Linked List – Operations on a Double Linked List – Operations on Circular Double Linked List – Applications of Linked List – Sparse Matrix Manipulation – Polynomial Representation – Dynamic Storage Management – Memory Representation – Fixed Block Variable Block Storage.                                                        |   |   |          |         |             |       | 12           |       |
| III          | <b>Stacks :</b> Definitions – Representation– Array Representation of Stacks – Linked List Representation of Stacks – Operations on Stacks – Application of Stacks – Evaluation of Arithmetic Expressions – Implementation of Recursion – Factorial Calculation <b>Queue :</b> Definition – Representation of Queues – Representation of Queues using an Array – Representation of a Queue using a Linked List – Various Queue Structures – Circular Queue – Dequeue – Priority Queue. |   |   |          |         |             |       | 12           |       |

|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                      |    |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| IV                                             | <b>Tables :</b> Hash Tables – Hashing Techniques – Collision Resolution Techniques – Closed Hashing – Open Hashing. <b>Trees:</b> Definition-Representation of Binary Tree – Linear Representation of Binary Tree-Linked Representation of Binary Tree — Operation on a Binary Tree – Insertion – Deletion – Traversals Inorder – Preorder- Postorder – Merging together Two Binary Trees – Types of Binary Trees – Expression Tree – Binary Search Tree – Heap Tree – Threaded Binary Tree. |                                                                                                                                                                                                                                      | 12 |
| V                                              | <b>Sort:</b> Sorting Techniques – Straight Insertion Sort – Straight Selection Sort –Bubble Sort –Quick Sort – Merge Sort. Searching – Linear Search Techniques – Linear Search with Array – Linear Search with Linked List – Binary Search. <b>Graphs:</b> Graph types – Representation of graphs – Operations of graphs –operations on linked list representations of graphs - operations on matrix representations of graphs.                                                             |                                                                                                                                                                                                                                      | 12 |
| TOTAL                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                      | 60 |
| CO                                             | Bloom's Level                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Course Outcome Statement                                                                                                                                                                                                             |    |
| CO1                                            | K1 & K2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Explain the fundamental concepts of data structures, including memory allocation for arrays, the properties of various linked lists, stack/queue operations, and the basic characteristics of trees, graphs, and hashing techniques. |    |
| CO2                                            | K3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Apply appropriate data structures and algorithms, such as stacks for expression evaluation, queues for scheduling, and various sorting/searching techniques (Bubble, Quick, Merge, Linear, Binary), to solve computational problems. |    |
| CO3                                            | K4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Analyze the efficiency of different storage management strategies and organizational structures, comparing linked vs. array representations and evaluating collision resolution techniques in hash tables.                           |    |
| CO4                                            | K5 & K6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Evaluate and Create complex hierarchical and relational structures by synthesizing binary search trees, heap trees, and graph representations to design optimized solutions for dynamic data manipulation and storage.               |    |
| Textbook                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                      |    |
|                                                | Classic Data Structures   Debasis Samanta, PHI Learning Limited, New Delhi, 2009 Second Edition                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                      |    |
| Reference Books                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                      |    |
| 1.                                             | Seymour Lipschutz (1986), — Theory and Problems of Data Structures, Tata McGraw-Hill Edition                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                      |    |
| 2.                                             | E.Horowitz, S.Sahni, S.Rajasekaran (1998),—Computer Algorithms, Galgotia Publications.                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                      |    |
| 3.                                             | Robert Kruse, C.L.Tondo, Bruce Leung, — Data Structures and Program Design in C, Second Edition, Prentice Hall Publications                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                      |    |
| NOTE: Latest Edition of Text books May be Used |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                      |    |
| Web Resources                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                      |    |
| 1.                                             | <a href="http://www.cs.sunysb.edu/~skiena/214/lectures/">http://www.cs.sunysb.edu/~skiena/214/lectures/</a>                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                      |    |
| 2.                                             | <a href="http://datastructures.itgo.com/graphs/dfsdfs.htm">http://datastructures.itgo.com/graphs/dfsdfs.htm</a>                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                      |    |

|    |                                                                                                                                                                                             |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3. | <a href="http://oopweb.com/Algorithms/Documents/PLDS210/VolumeFrames.html">http://oopweb.com/Algorithms/Documents/PLDS210/VolumeFrames.html</a>                                             |
| 4. | <a href="http://discuss.codechef.com/questions/48877/data-structures-and-algorithms">http://discuss.codechef.com/questions/48877/data-structures-and-algorithms</a>                         |
| 5. | <a href="http://code.tutsplus.com/tutorials/algorithms-and-data-structures--cms-20437">http://code.tutsplus.com/tutorials/algorithms-and-data-structures--cms-20437</a>                     |
| 6. | <a href="https://www.tutorialspoint.com/data_structures_algorithms/insertion_sort_algorithm.htm">https://www.tutorialspoint.com/data_structures_algorithms/insertion_sort_algorithm.htm</a> |

| CO/PO       | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|-------------|-----|-----|-----|-----|-----|-----|-----|
| CO1         | 2   | 1   | 1   | 2   | 1   | 2   | 1   |
| CO2         | 2   | 2   | 3   | 2   | 1   | 2   | 2   |
| CO3         | 2   | 3   | 2   | 2   | 1   | 1   | 1   |
| CO4         | 3   | 3   | 3   | 3   | 2   | 2   | 2   |
| Total Score | 9   | 9   | 9   | 9   | 5   | 7   | 6   |

| COs / PSOs  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-------------|------|------|------|------|------|------|------|
| CO1         | 2    | 2    | 2    | 1    | 1    | 2    | 1    |
| CO2         | 2    | 3    | 2    | 2    | 1    | 3    | 2    |
| CO3         | 2    | 3    | 3    | 2    | 2    | 3    | 2    |
| CO4         | 3    | 3    | 3    | 3    | 2    | 3    | 3    |
| Total Score | 9    | 11   | 10   | 8    | 6    | 11   | 8    |

### SKILL ENHANCEMENT COURSE II: PHP SCRIPTING PRACTICAL

| Subject Code | L                                                                                                                                                                                                                                                              | T                        | P | Semester | Credits | Inst. Hours | Marks |          |       |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---|----------|---------|-------------|-------|----------|-------|
|              |                                                                                                                                                                                                                                                                |                          |   |          |         |             | CIA   | External | Total |
|              | 0                                                                                                                                                                                                                                                              | 0                        | 3 | II       | 2       | 3           | 50    | 50       | 100   |
|              | Exercises                                                                                                                                                                                                                                                      |                          |   |          |         |             |       |          |       |
|              | 1. Control Structures<br>2. Working with Forms.<br>3. String Manipulations<br>4. Arrays<br>5. Functions<br>6. Sorting<br>7. Classes and Objects<br>8. Cookies and Sessions<br>9. Graphics<br>10. Working with single table<br>11. Working with multiple tables |                          |   |          |         |             |       |          |       |
| CO           | Bloom's Level                                                                                                                                                                                                                                                  | Course Outcome Statement |   |          |         |             |       |          |       |

|                                                      |                                                                                                                                                           |                                                                                                                                                                                                                              |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO1                                                  | K1 & K2                                                                                                                                                   | <b>Explain</b> the fundamental syntax and concepts of web programming, including control structures, the role of cookies and sessions, and the basic principles of object-oriented programming in a server-side environment. |
| CO2                                                  | K3                                                                                                                                                        | <b>Apply</b> core programming elements such as string manipulations, arrays, and functions to process form data and implement sorting algorithms for data organization.                                                      |
| CO3                                                  | K4                                                                                                                                                        | <b>Analyze</b> the relationship between data structures and storage by organizing information into classes and objects while examining the interactions between single and multiple database tables.                         |
| <b>Textbooks</b>                                     |                                                                                                                                                           |                                                                                                                                                                                                                              |
| 1                                                    | Kevin Tatroe, Peter Mac Intyre, Rasmus Lerdorf, — Programming PHP,O Reilly Publications,Third Edition                                                     |                                                                                                                                                                                                                              |
| 2.                                                   | Joel Murach, Ray Harris (2010), — PHP and MySQL, Shroff Publishers & Distributors                                                                         |                                                                                                                                                                                                                              |
| <b>Reference Books</b>                               |                                                                                                                                                           |                                                                                                                                                                                                                              |
| 1.                                                   | W.Jason Gilmore (2010), — Beginning PHP & MySql, Apress                                                                                                   |                                                                                                                                                                                                                              |
| 2.                                                   | Larry Ullman (2008), — PHP 6 and MySQL 5, Pearson Education                                                                                               |                                                                                                                                                                                                                              |
| 3.                                                   | John Coggeshall (2006), — PHP 5, Pearson Education                                                                                                        |                                                                                                                                                                                                                              |
| 4.                                                   | Michale C.Glass(2004), — Beginning PHP, Apache, MySQL Web Development, Wiley Dream Tech Press                                                             |                                                                                                                                                                                                                              |
| 5.                                                   | Robin Nixon (2013), — Learning PHP, MySQL, Java Script & CSS, O Reilly, 2 <sup>nd</sup> Edition                                                           |                                                                                                                                                                                                                              |
| <b>NOTE: Latest Edition of Textbooks May be Used</b> |                                                                                                                                                           |                                                                                                                                                                                                                              |
| <b>Web Resources</b>                                 |                                                                                                                                                           |                                                                                                                                                                                                                              |
| 1.                                                   | <a href="http://www.w3schools.com/jquery/">http://www.w3schools.com/jquery/</a>                                                                           |                                                                                                                                                                                                                              |
| 2.                                                   | <a href="http://www.ccc.commnet.edu/faculty/sfreeman/cst%20250/jQueryNotes.pdf">http://www.ccc.commnet.edu/faculty/sfreeman/cst%20250/jQueryNotes.pdf</a> |                                                                                                                                                                                                                              |
| 3.                                                   | <a href="http://www.w3schools.com/php/">http://www.w3schools.com/php/</a>                                                                                 |                                                                                                                                                                                                                              |
| 4.                                                   | <a href="http://www.tutorialspoint.com/php/">http://www.tutorialspoint.com/php/</a>                                                                       |                                                                                                                                                                                                                              |
| 5.                                                   | <a href="http://www.tutorialspoint.com/mysql/">http://www.tutorialspoint.com/mysql/</a>                                                                   |                                                                                                                                                                                                                              |

### CO-PO Mapping

| CO/PO       | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|-------------|-----|-----|-----|-----|-----|-----|-----|
| CO1         | 3   | 1   | 1   | 1   | 1   | 2   | 1   |
| CO2         | 2   | 2   | 3   | 2   | 1   | 2   | 1   |
| CO3         | 2   | 3   | 2   | 2   | 1   | 2   | 2   |
| CO4         | 2   | 3   | 3   | 3   | 2   | 3   | 3   |
| Total Score | 9   | 9   | 9   | 8   | 5   | 9   | 7   |

**CO-PO Mapping**

| CO/PSO      | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-------------|------|------|------|------|------|------|------|
| CO1         | 3    | 1    | 1    | 1    | 1    | 2    | 1    |
| CO2         | 2    | 2    | 3    | 2    | 1    | 2    | 1    |
| CO3         | 2    | 3    | 2    | 2    | 1    | 2    | 2    |
| CO4         | 2    | 3    | 3    | 3    | 2    | 3    | 3    |
| Total Score | 9    | 9    | 9    | 8    | 5    | 9    | 7    |

**SKILL ENHANCEMENT COURSE III: INTRODUCTION TO INTERNET**

| Subject Code | L                                                                                                        | T | P                                                                                                                                                                                             | S  | Credits | Inst. Hours | Marks |          |              |
|--------------|----------------------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---------|-------------|-------|----------|--------------|
|              |                                                                                                          |   |                                                                                                                                                                                               |    |         |             | CIA   | External | Total        |
|              | 3                                                                                                        | 0 | 0                                                                                                                                                                                             | II | 2       | 3           | 25    | 75       | 100          |
| UNIT NO      | Contents                                                                                                 |   |                                                                                                                                                                                               |    |         |             |       |          | No. of Hours |
| I            | Introduction to the Internet – Networking – Internet – Email – Resource sharing – Gopher– World Wide Web |   |                                                                                                                                                                                               |    |         |             |       |          | 9            |
| II           | Internet Technologies – Browsers - Introduction to HTML – History of HTML – HTML documents               |   |                                                                                                                                                                                               |    |         |             |       |          | 9            |
| III          | Head and Body Sections – Designing the body section - Ordered and Unordered Lists                        |   |                                                                                                                                                                                               |    |         |             |       |          | 9            |
| IV           | Table Handling – DHTML and Style sheets                                                                  |   |                                                                                                                                                                                               |    |         |             |       |          | 9            |
| V            | Frames– A Webpage design project –Forms                                                                  |   |                                                                                                                                                                                               |    |         |             |       |          | 9            |
| TOTAL        |                                                                                                          |   |                                                                                                                                                                                               |    |         |             |       | 45       |              |
| CO           | Bloom's Level                                                                                            |   | Course Outcome Statement                                                                                                                                                                      |    |         |             |       |          |              |
| CO1          | K1 & K2                                                                                                  |   | Explain the fundamental concepts of the Internet and networking, including email protocols, resource sharing, and the structural components of HTML documents such as head and body sections. |    |         |             |       |          |              |
| CO2          | K3                                                                                                       |   | Apply HTML tags and formatting techniques to implement ordered and unordered lists, handle tables, and utilize browsers for effective web content rendering.                                  |    |         |             |       |          |              |
| CO3          | K4                                                                                                       |   | Analyze the integration of DHTML and cascading style sheets to organize layout and presentation, ensuring modular design through the use of frames.                                           |    |         |             |       |          |              |
| CO4          | K5 & K6                                                                                                  |   | Evaluate and Create comprehensive web projects by synthesizing forms, styling, and structural elements into a functional and aesthetically cohesive webpage design project.                   |    |         |             |       |          |              |
| Textbooks    |                                                                                                          |   |                                                                                                                                                                                               |    |         |             |       |          |              |
|              | C. Xavier, —World Wide Web Design with HTMLI, Tata McGraw Hill publication,First Edition , 2000.         |   |                                                                                                                                                                                               |    |         |             |       |          |              |

**CO-PO Mapping**

| CO/PO       | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|-------------|-----|-----|-----|-----|-----|-----|-----|
| CO1         | 3   | 1   | 1   | 1   | 1   | 3   | 1   |
| CO2         | 2   | 2   | 3   | 2   | 1   | 3   | 1   |
| CO3         | 2   | 3   | 2   | 2   | 1   | 3   | 2   |
| CO4         | 2   | 3   | 3   | 3   | 2   | 3   | 3   |
| Total Score | 9   | 9   | 9   | 8   | 5   | 12  | 7   |

**CO-PSO Mapping**

| CO/PSO      | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|-------------|------|------|------|------|------|------|------|
| CO1         | 3    | 1    | 1    | 1    | 1    | 3    | 1    |
| CO2         | 2    | 2    | 2    | 2    | 1    | 3    | 1    |
| CO3         | 2    | 3    | 2    | 2    | 1    | 3    | 2    |
| CO4         | 2    | 3    | 3    | 3    | 2    | 3    | 3    |
| Total Score | 9    | 9    | 8    | 8    | 5    | 12   | 7    |

**SOFT SKILLS FOR EMPLOYABILITY**

| Subject Code | L                                                                                                                                                                                                                                                                                                                                                                                    | T | P | S  | Credits | Inst. Hours | Marks |          |       |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|----|---------|-------------|-------|----------|-------|
|              |                                                                                                                                                                                                                                                                                                                                                                                      |   |   |    |         |             | CIA   | External | Total |
|              | -                                                                                                                                                                                                                                                                                                                                                                                    | - | - | II | 2       | -           | 0     | 100      | 100   |
| Unit         | Contents                                                                                                                                                                                                                                                                                                                                                                             |   |   |    |         |             |       |          |       |
| I            | <b>Minding the Mind:</b> This Unit will focus on meditation techniques and mental conditioning<br>1.1 Understanding YOU, which denotes ‘Your Own Universe’, wherein a person will be encouraged to self-introspect and critically analyse oneself.<br>1.2 Self-Analysis<br>1.3 Ice Breaker<br>1.4 Warming Up                                                                         |   |   |    |         |             |       |          |       |
| II           | <b>The Charming Skills:</b> This Unit will focus on training the students to develop and enhance their social skills, etiquette and basic personal grooming.<br>2.1 Introduction<br>2.2 Social Skill<br>2.3 Etiquette (This will be broad-based delving on various etiquettes necessary for varied areas such as general conversation, table party, official meets and social media) |   |   |    |         |             |       |          |       |
| III          | <b>The Communication Mechanism :</b> This Unit will focus on developing skills in both verbal and non-verbal communications (body language, framing emails, and social media communications). Moreover, inputs on importance of graphology will be taught.<br>3.1 Introduction to Communication<br>3.2 Types of Communication<br>3.3 Public Speaking                                 |   |   |    |         |             |       |          |       |

|     |                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                              |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | 3.4 Group Conversation<br>3.5 Letter writing and email                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                              |
| IV  | <b>The Negotiator:</b> This unit will focus on inculcating good negotiations and conflict management skills.<br>3.6 Introduction to Negotiation<br>3.6.1 The Negotiation Clock Face<br>3.6.2 Assertiveness Matters<br>3.6.3 Traits of Negotiations<br>3.6.4 Factors that Make a Difference<br>3.6.5 Tactics and Values                                                  |                                                                                                                                                                              |
| V   | <b>Campus to Corporate:</b> This Unit will focus on training about preparation of resumes, appearing for interviews and handling both after campus issues that people normally face while setting foot on the professional sphere.<br>4.1 The Doorstep<br>4.2 Resume Preparation / Portfolio Management<br>4.3 Interviews: The Different Types and How to face the same |                                                                                                                                                                              |
| CO  | Bloom's Level                                                                                                                                                                                                                                                                                                                                                           | Course Outcome Statement                                                                                                                                                     |
| CO1 | K1 & K2                                                                                                                                                                                                                                                                                                                                                                 | Outline the fundamental principles of self-analysis, social etiquette, verbal/non-verbal communication, negotiation strategies, and corporate readiness.                     |
| CO2 | K3                                                                                                                                                                                                                                                                                                                                                                      | Apply appropriate social skills, communication mechanisms, public speaking techniques, and resume writing formats to professional and social scenarios.                      |
| CO3 | K4                                                                                                                                                                                                                                                                                                                                                                      | Analyze personal behavior, structural elements of conflict/negotiation, communication dynamics, and diverse interview types to determine effective interpersonal approaches. |
| CO4 | K5 & K6                                                                                                                                                                                                                                                                                                                                                                 | Evaluate personal readiness, conflict outcomes, and corporate etiquettes to design impactful portfolios and exhibit leadership within real-world                             |

| Textbooks       |                                                                                                           |
|-----------------|-----------------------------------------------------------------------------------------------------------|
| 1.              | Bezborah, P., Soft Skills and Personality Development. Banalata, Dibrugarh.                               |
| 2.              | Hartely C. B., The Gentlemen's Book of Etiquette and Manual of Politeness. Julia Miller.                  |
| 3.              | Rai, U., English Language Communication Skills, Himalaya Publishing House                                 |
| Reference Books |                                                                                                           |
| 1.              | Amen, K. K. and Ruiz, M. S., Hand Writing Analysis – The Complete Basic Book. New Page Books, New Jersey. |
| 2.              | Gates, S., The Negotiation Book. T J International Limited, Cornwall.                                     |
| 3.              | Wainright. G. R., Understand Body Language. Hodder Education, London.                                     |

### CO-PO Mapping

| CO/PO              | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|--------------------|-----|-----|-----|-----|-----|-----|-----|
| CO1                | 3   | 1   | -   | 2   | 2   | 1   | 1   |
| CO2                | 3   | 2   | 2   | 2   | 2   | 1   | 2   |
| CO3                | 2   | 3   | 2   | 3   | 1   | -   | 2   |
| CO4                | 2   | 3   | 3   | 3   | 2   | 2   | 3   |
| <b>Total Score</b> | 10  | 9   | 7   | 10  | 7   | 4   | 8   |

### CO-PSO Mapping

| CO \ PSO           | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|--------------------|------|------|------|------|------|------|------|
| CO1                | 3    | 1    | 1    | 2    | 3    | 2    | 2    |
| CO2                | 3    | 2    | 1    | 2    | 3    | 2    | 3    |
| CO3                | 2    | 3    | 1    | 3    | 3    | 2    | 3    |
| CO4                | 3    | 3    | 2    | 3    | 3    | 3    | 3    |
| <b>Total Score</b> | 11   | 9    | 5    | 10   | 12   | 9    | 11   |