B.Sc. COMPUTER SCIENCE & INFORMATION TECHNOLOGY

SYLLABUS

For Those Who Joined
From The Academic Year

2026 - 2027

MANONMANIAM SUNDARANAR UNIVERSITY,
Tirunelveli – 627 012

1. University Vision

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

2. University 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 downtrodden students including women, socially oppressed and differently abled

3. Preamble

Bachelor of Computer Science & Information Technology is a Graduate Programme with courses designed to achieve high degrees of technical skills in problem solving and application development. The objective of this programme is to equip students to have the potential to meet the carrier path with much confidence. Learning the courses leads to the understanding of the fundamentals of hardware and software. The courses are also focused on Theories, concepts, algorithms, programming languages, applications and software tools. Cutting-edge technologies like AI and machine learning are also given importance in the programme. The data processing, digital signal processing, database management system and image processing are included in the courses of this programme to enable students to stand tall in the competitive world.

Aligned with BLOOM's Taxonomy, the curriculum, teaching methos, and evaluation methods are matched with suitable cognitive levels. The assessment of students' cognitive abilities and the evaluation of the attainment of expected course outcomes will be made possible by the OBE based evaluation methodologies.

4. Programme Educational Outcomes (PEO)

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(PO)

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: Expose the learner to the digital technology to learn through multiple sources

PO7: Train the learner to be a responsible player in teams and impart leadership qualities in them.

6. Programme Specific Outcomes (PSOs)

PSO 1 : To develop the ability to understand the basic theories and concepts in Computer Science & Information Technology and to comprehend the fundamental principles.

PSO 2 : To identify and analyse suitable techniques and algorithms and to use them in developing programs and apply them in software tools in Computer Science & Information Technology

PSO 3 : To apply fundamental theories in Computer Science & Information Technology to solve scientific and business problems.

PSO 4 : To think in a critical and logical manner to solve any problems in Computer Science & Information Technology that leads to acquire a lifelong learning process

PSO 5 : To understand and commit to rules and responsibilities, data ethics, cyber regulations and norms of professional practices in Computer Science & Information Technology and industries.

PSO6: To give exposure to latest technologies available in related subjects from books, journals and digital resources.

PSO7: To equip with professional skills that made to work among teams and collaborate with other talents in other areas and to develop overall working expertise.

COURSE OUTCOMES

FOUR Course Outcomes (COs) for each course that can be achieved by the learners on completion of that course. K1,K2 and K3 are taken as Lower Order Thinking(LOT). K4,K5 and K6 are taken as Higer Order Thinking(HOT).Considering outcomes related to

i. K1 and K2 level of evaluation in all the Units as CO1.
ii. K3 level of evaluation in all the Units as CO2.
iii. K4 level of evaluation in all the Units as CO3.
iv. K5 and K6 level of evaluation in all the Units as CO4.

K1 – Learner can **remember** and recall. K2-Learner can **understand** and interpret.

K3 – Learner can **apply** in situations. K4-Learner can **analyze** and infer.

K5 - Learner can **evaluate** to judge. K6-Learner can **create** or develop new concepts.

7. Programme Details

7.1 Eligibility Criteria:

Candidates who have studied Mathematics as one of the subjects in HSC (Academic Stream) 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)

7.2 Medium of Instruction:

English

7.3 Duration of the Course:

B.Sc. Computer Science & Information Technology is a 3-year full time undergraduate programme spread over six semesters.

8. Examination Scheme

8.1 Internal Assessment :

No passing minimum mark for internal assessment. The maximum mark for internal assessment is 25 for all theory courses. Out of which 5 marks are assigned for assignment, seminars and presentations. The remaining 20 marks are assessed by conducting three periodical 1-hour internal tests and calculating the average out of best two marks obtained. The periodical internal test questions may consist of two objective type questions for 2 marks (2 x 1 = 2), two descriptive questions for 10 marks (2 x 5 = 10) and one descriptive question (preferably of HOT) for 8 marks (1 x 8 = 8).

8.2 External Assessment:

The passing minimum for external assessment is 30. The maximum mark for external assessment is 75 for all **theory** courses, The assessment is based on the marks obtained by the end semester examination. The passing minimum mark for the course is 40 out of 100, which is calculated by adding both internal and external assessment marks.

8.3 Project Evaluation:

The maximum mark for Internal assessment is 50 for all projects. Out of which 30 marks are allotted for project innovation, analysis, design and report preparation and 20 marks are allotted for viva and project presentation. The maximum mark for external assessment is 50. Out of which 30 marks are allotted for writeup about the project and 20 marks are allotted for viva

and presentation The passing minimum for external assessment mark is 20 out of 50. The passing minimum mark for the course is 40 out of 100, which is calculated by adding both internal and external assessment marks.

8.4 Practical Examination:

The maximum mark for internal assessment is 50 for all practical. Out of which 20 marks are allotted for the successful completion of practical in time, 20 marks are allotted for practical model test and remaining 10 mark is allotted for practical records. The maximum mark for external assessment is 50. Out of which 30 marks are allotted for writeup based on the practical and 20 marks are allotted for debugging and result. The passing minimum for external assessment mark is 20. The passing minimum mark for the course is 40 out of 100, which is calculated by adding both internal and external assessment marks.

9. Question Paper Pattern.

Max Marks : 75

Time : Three Hours

Part A 10x1 = 10

Compulsory TEN Objective type questions with four choices. Each question carries ONE mark. Out of TEN questions, any SIX questions are from lower order thinking (K1,K2 and K3) remaining FOUR questions from higher order thinking (K4,K5 and K6)

Part B 5x5 = 25

FIVE questions, each of which has (a) and (b) options. The student must answer either (a) or (b) option. Both choices (a) and (b) should be at the same difficulty level. Each question carries FIVE marks. Out of FIVE questions any THREE questions are from lower order thinking (K1,K2 and K3) remaining TWO questions from higher order thinking (K4,K5 and K6).

Part C 5x8 = 25

FIVE questions, each of which has (a) and (b) options. The student must answer either (a) or (b) option. Both choices (a) and (b) should be at the same difficulty level. Each question carries EIGHT marks. Out of FIVE questions any THREE questions are from lower order thinking (K1,K2 and K3) remaining TWO questions from higher order thinking (K4,K5 and K6)

10. Model Question Paper

Sub. Code : April 2026

Manonmaniam Sundaranar University

BSc Computer Science & Information Technology

Degree Examination April 2026

Semester I, Part III

Object Oriented Programming with C++

Time : Three hours Maximum : 75 marks

PART A – (10 x 1 = 10 marks)

Answer **ALL** questions

Choose the correct answer :

No	Question	CO	K
1	_____ are the basic run time entities in an object-oriented system (a) Data (b) Objects (c) Classes (d) structure	1	1
2	a=5;If(a = 0) cout << a << " is 0"; else cout << a << " is not 0 "; Output of above code a) 5 is not 0 c)5 is 0 c) 0 is 0 d) 0 is not 0	4	5
3	Constructors are used to (a) Initialize variables (b) Allocate memory (c) Both (a) and (b) (d) Create objects	1	2
4	A destructor can have _____ arguments. (a) one (b) many (c) void (d) no	1	2
5	From the following, find out which one cannot use friend function (a) = (b) ( ) (c) [ ] (d) All the above	3	4
6	Grandparent base class is (a) an object (b) virtual (c) a class (d) a variable	3	4
7	We cannot use virtual (a) objects (b) classes (c) constructors (d) destructors	3	4
8	In C++, by default, the floating numbers are printed with _____ digits after the decimal points (a) 4 (b) 6 (c) 8 (d) 16	1	1
9	The stream state number uses _____ fields to store status (a) binary (b) bit field (c) non zero (d) file name	1	2
10	____ is generic programming (a) inheritance (b) polymorphism (c) data types (d) templates	1	2

PART B – (5 x 5 = 25 marks)

Answer **ALL** questions by choosing either (a) or (b)

No	Question	CO	K
11	(a) Recall in detail about object-oriented programming paradigm. Or (b) Illustrate the use of Inline Functions with example	1	2
12	(a) Explain how to access class members Or (b) Explain constructors with default arguments	2	3
13	(a) Compare overloading unary and binary operators Or (b) Overload a unary operator to find Transpose of a matrix.	3	4
14	(a) Compare polymorphism and overloading. Or (b) Why 'this' pointer is inevitable, explain with an example.	3	4
15	(a) How do you detect 'end of file'? Discuss Or (b) Explain the Standard Template Library and how it is working	2	3

PART C – (5 x 8 = 40 marks)

Answer **ALL** questions by choosing either (a) or (b)

No	Question	CO	K
16	(a) Discuss about the basic concepts of object-oriented programming Or (b) Elucidate in brief about else-if-ladder with example	1	2
17	(a) Examine in brief about friend functions with example. Or (b) Explain about parameterized constructor with example.	2	3
18	(a) Explain how to overload binary operator with example. Or (b) Explain in detail about type conversion with examples.	2	3
19	(a) Discuss about pointers to derived classes with examples Or (b) Elucidate virtual function with an example program	3	4
20	(a) Explain the importance of file opening and closing methods with example. Or (b) Analyse in brief about class templates syntax with example.	3	4

11. Entire Programme Structure

Credit Distribution for UG Programmes – B.Sc Computer Science & Information Technology

	Sem I	Cr	Ho	Sem II	Cr	Ho	Sem III	Cr	Ho	Sem IV	Cr	Ho	Sem V	Cr	Ho	Sem VI	Cr	Ho
Part – 1	Language – Tamil	3	6	Language – Tamil	3	6	Language – Tamil	3	6	Language – Tamil	3	6						
Part – 2	Language –English	3	6	Language –English	3	4	Language –English	3	6	Language –English	3	6						
Part – 3	1.3 Core Course – CC I	4	4	2.3 Core Course – CC III	4	4	3.3 Core Course – CC V	4	4	4.3 Core Course – CC VII	4	4	5.1 Core Course – CC IX	4	4	6.1 Core Course – CC XIV	4	4
	1.4 Core Course – CC II Practical	3	4	2.4 Core Course – CC IV Practical	3	4	3.4 Core Course – CC VI Practical	3	4	4.4 Core Course – CC VIII Practical	3	4	5.2 Core Course – CC X	4	4	6.2 Core Course – CC XV	4	4
													5.3 Core Course – CC XI	4	4	6.3 Core Course – CC XVI	4	4
													5.4 Core Course – CC XII Practical	3	6	6.4 Core Course – CC XVII Practical	3	6
													5.5 Core Course – CC XIII Mini Project	3	6	65 Core Course – CC XVIII Major Project	3	6
	1.5 Elective – Generic/ Discipline – EC I	4	4	2.5 Elective – Generic/ Discipline – EC II	4	4	3.5 Elective – Generic/ Discipline – EC III	4	4	4.5 Elective – Generic/ Discipline – EC IV	4	4	5.6 Elective – Generic/ Discipline – EC V	4	4	6.6 Elective – Generic/ Discipline – EC VI	4	4
Part – 4	1.6 Skill Enhancement – SEC I Practical	3	3	2.6 Skill Enhancement – SEC II Practical	2	3	3.6 Skill Enhancement – SEC IV Practical	2	2	4.6 Skill Enhancement – SEC VI Practical	2	2	5.7 Summer Internship / Industrial Training	1				
	1.7 Foundation Course	3	3	2.7 Skill Enhancement – SEC III	2	3	3.7 E.V.S.	2	2	4.7 Value Education	2	2						
				2.8 Naan Mudhalvan Course – English	2	2	3.8 Naan Mudhalvan / Skill Enhancement – SEC V	2	2	4.8 Naan Mudhalvan / Skill Enhancement – SEC VII	2	2	5.8 Naan Mudhalvan / Skill Enhancement – SEC VIII	2	2	6.7 Naan Mudhalvan / Skill Enhancement – SEC IX	2	2
Part – 5																6.8 Extension Activity	1	-
		23	**30**		**23**	**30**		**23**	**30**		**23**	**30**		**25**	**30**		**25**	**30**
	Total – 142 Credits																	

Manonmaniam Sundaranar University, Tirunelveli

OUTCOME BASED EDUCATION (OBE)
Choice Based Credit System

UG courses – B.Sc Computer Science & Information Technology – Curriculum Design

(For the academic year 2026-'27 to 2028-'29)

First Year – Semester I

	List of Courses	Credit	No. of Hours (L/T/P)	Page No
Part-1	Language – Tamil	3	6	
Part-2	Language – English	3	6	
Part-3	1.3 Core Course – CC I Theory – Object Oriented Programming with C++	4	4	15
	1.4 Core Course – CC II Practical – Object Oriented Programming with C++ Lab	3	4	18
	1.5 Elective Course – EC I Theory – Digital Logic Fundamentals / Digital Communication Systems	4	4	20/22
Part-4	1.6 Skill Enhancement Course – SEC I Practical – Office Automation Lab	3	3	24
	Foundation Course Theory – Fundamentals of Information Technology	3	3	27
		23	**30**	

First Year – Semester II

	List of Courses	Credit	No. of Hours (L/T/P)	Page No
Part-1	Language – Tamil	3	6	
Part-2	Language – English	3	4	
Part-3	2.3 Core Course – CC III Theory – Data Structure and Algorithms	4	4	30
	2.4 Core Course – CC IV Practical – Data Structure and Algorithms Lab	3	4	32
	2.5 Elective Course – EC II Theory – Discrete Mathematics / Probability and Statistics	4	4	34/36
Part-4	2.6 Skill Enhancement Course – SEC II Practical – Web Programming Lab	2	3	38
	2.7 Skill Enhancement Course – SEC III Theory – Quantitative Aptitude	2	3	40
	2.8 Naan Mudhalvan Course – English	2	2	
		23	**30**	

Second Year – Semester III

	List of Courses	Credit	No. of Hours (L/T/P)	Page No
Part-1	Language – Tamil	3	6	
Part-2	Language – English	3	6	
Part-3	3.3 Core Course – CC V Theory – Java Programming	4	4	
	3.4 Core Course – CC VI Practical – Java Programming Lab	3	4	
	3.5 Elective Course – EC III Theory – Resource Management Techniques / E-Commerce	4	4	
Part-4	3.6 Skill Enhancement Course – SEC IV Practical – PHP Programming Lab	2	2	
	3.7 Environmental Studies	2	2	
	3.8 Naan Mudhalvan / Skill Enhancement Course – SEC V – Software Tools for Office Automation	2	2	
		23	**30**	

Second Year – Semester IV

	List of Courses	Credit	No. of Hours (L/T/P)	Page No
Part-1	Language – Tamil	3	6	
Part-2	Language – English	3	6	
Part-3	4.3 Core Course – CC VII Theory – Database Management System	4	4	
	4.4 Core Course – CC VIII Practical – Database Management System Lab	3	4	
	4.5 Elective Course – EC IV Theory – Data Science / Information Security	4	4	
Part-4	4.6 Skill Enhancement Course – SEC VI Practical – Android Application Development Lab	2	2	
	4.7 Value Based Education	2	2	
	4.8 Naan Mudhalvan / Skill Enhancement Course – SEC VII – Internet Fundamentals	2	2	
		23	**30**	

Third Year – Semester V

	List of Courses	Credit	No. of Hours (L/T/P)	Page No
Part-3	5.1 Core Course – CC IX Theory – Software Engineering	4	4	
	5.2 Core Course – CC X Theory – Artificial Intelligence and Machine Learning	4	4	
	5.3 Core Course – CC XI Theory – Python Programming	4	4	
	5.4 Core Course – CC XII Practical – Python Programming Lab	3	6	
	5.5 Core Course – CC XIII Mini Project	3	6	
	5.6 Elective Course – EC V Theory – Cloud Computing / Image Processing	4	4	
Part-4	5.7 Summer Internship / Industrial Training	1	-	
	5.8 Naan Mudhalvan / Skill Enhancement Course – SEC VIII – Programming in C	2	2	
		25	**30**	

Third Year – Semester VI

	List of Courses	Credit	No. of Hours (L/T/P)	Page No
Part-3	6.1 Core Course – CC XIV Theory – Computer Networks	4	4	
	6.2 Core Course – CC XV Theory – Operating System	4	4	
	6.3 Core Course – CC XVI Theory – .NET Programming	4	4	
	6.4 Core Course – CC XVII Practical – .NET Programming Lab	3	6	
	6.5 Core Course – CC XVIII Major Project	3	6	
	6.6 Elective Course – EC VI Theory – Cyber Forensics / Blockchain and Cryptocurrency	4	4	
Part-4	6.7 Naan Mudhalvan / Skill Enhancement Course – SEC IX – Software Testing	2	2	
Part-5	6.8 Extension Activity	1	-	
		25	**30**	

Consolidated Semester wise and Component wise Credit distribution

Parts	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total Credits
Part - 1	3	3	3	3	-	-	12
Part - 2	3	3	3	3	-	-	12
Part - 3	11	11	11	11	22	22	88
Part - 4	6	6	6	6	3	2	29
Part - 5	-	-	-	-	-	1	1
Total	23	23	23	23	25	25	**142**

***Part I. II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components. IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.**

12. Course - PSO Mapping

No	Title of the Course	Category	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	Total Score
1.	Object Oriented Programming with C++	Core	3	3	3	2.5	1	3	2	17.5
2.	Object Oriented Programming with C++ Lab	Core	3	3	3	2.5	1	3	2	17.5
3.	Digital Logic Fundamentals	Elective	3	3	3	3	1	3	2	18
4.	Digital Communication Systems	Elective	3	2	2	2	2.25	3	2	16.25
5.	Office Automation Lab	SEC	3	3	3	3	1	3	2	18
6.	Fundamentals of Information Technology	FC	2.5	2.5	2.5	2	1	3	2	15.5
7.	Data Structure and Algorithms	Core	3	3	3	2.5	1	3	2	17.5
8.	Data Structure and Algorithms Lab	Core	3	3	3	2.5	1	3	2	17.5
9.	Discrete Mathematics	Elective	3	3	3	2	0	2	1	14
10.	Probability and Statistics	Elective	3	3	3	3	1	2	2	17
11.	Web Programming Lab	SEC	3	3	3	3	1	3	2	18
12.	Quantitative Apptitude	SEC	3	3	2	2	0	2	1	13
13.	Java Programming	Core								
14.	Java Programming Lab	Core								
15.	Resource Management Techniques	Elective								
16.	E-Commerce	Elective								
17.	PHP Programming Lab	SEC								
18.	Database Management System	Core								
19.	Database Management System Lab	Core								
20.	Data Science	Elective								
21.	Information Security	Elective								
22.	Android Application Development Lab	SEC								

23.	Software Engineering	Core								
24.	Artificial Intelligence and Machine Learning	Core								
25.	Python Programming	Core								
26.	Python Programming Lab	Core								
27.	Mini Project	Core								
28.	Cloud Computing	Elective								
29.	Image Processing	Elective								
30.	Computer Networks	Core								
31.	Operating System	Core								
32.	.NET Programming	Core								
33.	.NET Programming Lab	Core								
34.	Major Project	Core								
35.	Cyber Forensics	Elective								
36.	Blockchain and Cryptocurrency	Elective								
Total Score of all courses contributing to 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 with L-P-T Distribution of Hours

First Year – Semester I
CORE - Theory

Subject Code	Subject Name	Category	Hours				Credits	Marks		
			L	T	P	S		CIA	Exter - nal	Total
CC1	**Object Oriented Programming with C++**	**Core - Theory**	4	-	-	-	**4**	25	75	**100**

COURSE OUTCOMES (COs)

Upon completion of the course,

CO-1	Students read and understand the concepts of Object-Oriented programming (OOP).
CO-2	Students apply the OOP concepts using C++ programming language.
CO-3	Students analyse the C++ programs and infer the OOP concepts
CO-4	Students can evaluate the performance of C++ programs and to modify the programs. This will help the learner to write their own C++ programs.

UNIT	Course Contents	No. of Hours
I	**Principles of OOP:** Basic concepts of Object-Oriented Programming – Benefits and applications – Object Oriented Languages – A Simple C++ Program - Structure of C++ program. **Basic Elements of C++:** Token – Keywords – Identifiers and constants – Basic Data Types – User-defined Data Types – Enumerated Data Type – Storage Class – Derived Data Types – Symbolic Constants – Declaration 0f Variables – Reference Variables – Scope Resolution Operator – Memory Deferencing Operator – Memory Management Operators – Manipulators – Type Case Operator – Expressions – Operator Precedence – Control Structures **Functions in C++:** The Main function – Function Prototyping – Call by Reference – inline functions – Default Arguments – Recursion – Function Overloading – Math Library Functions.	**12**
II	**Classes and Objects:** C Structures Revisited – Specifying a Class – Declaring Objects – Defining Member Function – Private Member Function – Memory Allocation for Objects – Static Data Member and Member Functions – Array of Objects – Object as Function Arguments – Friendly functions – Returning Objects – Pointers to Members. **Constructor and Destructors:** Constructor – Parameterized Constructors – Multiple Constructors in a Class – Dynamic Initialization of Objects – Copy Constructor – Constructing 2-Dimentional Arrays – Destructors.	**12**

III	**Operator Overloading:** Overloading unary, binary operators – Overloading Binary Operators using Friend – Rules – Type conversions. **Inheritance:** Types of Inheritance – Single Inheritance – Making a Private Member Inheritable – Multilevel Inheritance – Multiple Inheritance – Ambiguity Resolution in Inheritance – Hierarchal Inheritance – Hybrid Inheritance – Virtual Base Classes – Abstract Classes – Constructors in Derived Classes.	**12**
IV	**Pointers:** Declaration and Initializing Pointers – Manipulation of Pointers – Pointer Expression and Pointer Arithmetic – Using Pointers with Arrays and Strings – Pointers to Functions – Pointer to Objects – this Pointer – Polymorphism – Pointers to derived Classes – Virtual Functions – Pure Virtual Functions. **Managing Console I/O Operations:** C++ Streams – Unformatted I/O Operations – Formatted Console I/O Operations – Managing Output with Manipulators.	**12**
V	**Files:** Introduction – File stream classes – Opening and Closing a File – Detecting End-of-File – File Modes – File Pointers and their manipulations – Sequential Input and Output Operations – Updating a File: Random Access – Error Handling during File Operations – Command Line Arguments **Templates:** Class Templates – Class Templates with Multiple Paramaters – Function Templates – Member Function Templates	**12**
	TOTAL HOURS	**60**

Textbooks	
1.	E. Balagurusamy, "Object-Oriented Programming with C++", 8th Edition, McGraw Hill, 2020
Reference Books	
1.	Bjarne Stroustrup, "The C++ Programming Language", 4th Edition, Pearson Education, 2022
2.	Reema Thareja, "Object Oriented Programming with C++", 2nd Edition, Oxford University Press, 2025
3.	Herbert Schildt, "The Complete Reference C++" 4th Edition, McGraw Hill Education, 2017

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	3	3	3	1	3	2
CO 2	3	3	3	3	1	3	2
CO 3	3	3	3	2	1	3	2
CO 4	3	3	3	2	1	3	2
Total Score	12	12	12	10	4	12	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	3	3	1	3	2
CO 2	3	3	3	3	1	3	2
CO 3	3	3	3	2	1	3	2
CO 4	3	3	3	2	1	3	2
Total Score	12	12	12	10	4	12	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

First Year – Semester I
CORE - Practical

Subject Code	Subject Name	Category	Hours				Credits	Marks		
			L	T	P	S		CIA	Exter - nal	Total
CC2	**Object Oriented Programming with C++ Lab**	**Core - Practical**	-	-	4	-	**3**	50	50	**100**

COURSE OUTCOMES (COs)

Upon completion of the course,

CO-1	Students read, understand and practice the concepts of Object-Oriented programming (OOP).
CO-2	Students apply the OOP concepts using C++ programming language.
CO-3	Students analyse the C++ programs and grasp the OOP concepts
CO-4	Students evaluate the performance of C++ programs and modify the programs. This will help the learner to write their own C++ programs.

No.	List of Exercises	No. of Hours
1.	Write a C++ program to demonstrate Class and Objects	
2.	Write a C++ program to demonstrate function overloading	
3.	Write a C++ program to demonstrate the concept of Passing Objects to Functions	
4.	Write a C++ program to demonstrate the Friend Functions.	
5.	Write a C++ program to demonstrate Constructor and Destructor	
6.	Write a C++ program to demonstrate Unary Operator Overloading	
7.	Write a C++ program to demonstrate Binary Operator Overloading	
8.	Write a C++ program to demonstrate:Single Inheritance	
9.	Write a C++ program to demonstrate:Multiple Inheritance	
10.	Write a C++ program to demonstrate Virtual Functions.	
11.	Write a C++ program to find the Biggest Number using Command Line Arguments	
12.	Write a C++ program to demonstrate error handling.	
13.	Write a C++ program to traverse an array using pointers	
14	Write a C++ program to create a text file and write some content into it	
15.	Write a ++ program to open an existing text file and display its contents	
	TOTAL HOURS	**60**

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	3	3	3	1	3	2
CO 2	3	3	3	3	1	3	2
CO 3	3	3	3	2	1	3	2
CO 4	3	3	3	2	1	3	2
Total Score	12	12	12	10	4	12	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	3	3	1	3	2
CO 2	3	3	3	3	1	3	2
CO 3	3	3	3	2	1	3	2
CO 4	3	3	3	2	1	3	2
Total Score	12	12	12	10	4	12	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

First Year – Semester I
ELECTIVE - Theory

Subject Code	Subject Name	Category	Hours				Credits	Marks		
			L	T	P	S		CIA	Exter - nal	Total
EC1(a)	**Digital Logic Fundamentals**	**Elective -Theory**	4	-	-	-	**4**	25	75	**100**

COURSE OUTCOMES (COs)	
Upon completion of the course,	
CO-1	Students can understand the basics of number system and basic digital components.
CO-2	Students can apply K-Maps to optimize the logical equations
CO-3	Students can analyze and find minimal component circuits.
CO-4	Students can design digital circuits for the given logical equations

UNIT	**Course Contents**	**No. of Hours**
I	**Number Systems :**Codes and Digital Logic Binary Number System – Binary to Decimal Conversion – Decimal to Binary Conversion – Octal Numbers –Hexadecimal Numbers –The ASCII Code –The Excess- 3 Code –The Gray Code. Digital Logic: The Basic gates NOT,OR,AND–Universal Logic Gates NOR,NAND– AND-OR Invert Gates.	**12**
II	**Combinational Logic**: Circuits Boolean Laws and Theorems – Sum of Products Method–Truth Table to Karnaugh Map –Pairs, Quads and Octets –Karnaugh Simplifications –Don't Care Conditions –Product of Sums Method –Product of Sums Simplification.	**12**
III	**Data Processing and Arithmetic circuits :**Multiplexers –De-multiplexers –1-of-16-Decoders –BCD- to-Decimal Decoders – Seven-Segment decoders – Encoders –Exclusive-OR gates. Arithmetic Circuits: Binary Addition –Binary Subtraction –Unsigned Binary Numbers–Sign-Magnitude Numbers– 2'sComplement Representation–2's Complement Arithmetic.	**12**
IV	**Flip-Flops:** RS Flip Flops–Edge Triggered RS Flip Flops-Edge Triggered D Flip Flops-Edge Triggered JK Flip Flops –JK Master Slave Flip Flops	**12**
V	**Registers :** Types of Registers –Serial in serial out –serial in parallel out – parallel in serial out –parallel in parallel out–Universal Shift Register.	**12**
	TOTAL HOURS	**60**

Textbooks	
1.	Digital Principles and Applications, by Albert Paul Malvino & Donald P.Leach, Seventh Edition, McGraw Hill Education Private Limited
Reference Books	
1.	Fundamentals of Digital Circuits, A.AnandKumar, Second Edition, PHI Learning Private Limited
2.	Digital design, M.Morris Mano, Third Edition, Pearson Education

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	3	3	3	1	3	2
CO 2	3	3	3	3	1	3	2
CO 3	3	3	3	3	1	3	2
CO 4	3	3	3	3	1	3	2
Total Score	12	12	12	12	4	12	8

0 – No Correlation 1 – Low 2 - Medium 3 – High

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	3	3	1	3	2
CO 2	3	3	3	3	1	3	2
CO 3	3	3	3	3	1	3	2
CO 4	3	3	3	3	1	3	2
Total Score	12	12	12	12	4	12	8

0 – No Correlation 1 – Low 2 - Medium 3 – High

First Year – Semester I
ELECTIVE - Theory

Subject Code	Subject Name	Category	Hours				Credits	Marks		
			L	T	P	S		CIA	Exter - nal	Total
EC1(b)	**Digital Communication Systems**	**Elective -Theory**	4	-	-	-	**4**	25	75	**100**

COURSE OUTCOMES (COs)	
Upon completion of the course,	
CO-1	Students can understand the basics of digital communication system.
CO-2	Students can apply principles like error detection and correction techniques while transferring data.
CO-3	Students can analyze and find suitable protocols for communication.
CO-4	Students can delve deeper into digital communication systems to design advanced features.

UNIT	Course Contents	No. of Hours
I	**Introduction to Electronic Communication:** Communication Systems – Types of Electronic Communication – Modulation and Multiplexing – Electromagnetic Spectrum – Bandwidth – Communication Applications – Jobs and Careers in the Communication Industry **Electronic Fundamentals for Communications:** Gain, Attenuation and Decibels – Fourier Theory – Amplitude Modulation Concepts – Basic Principles of Frequency Modulation – Principles of Phase Modulation	**12**
II	**Digital Communication Techniques:** Digital Transmission of Data – Parallel and Serial Transmission – Data Conversion – Pulse Modulation – Digital Signal Processing **Digital Data Transmission:** Digital Codes – Principles of Digital Transmission – Broadband Modem Techniques – Error Detection and Correction – Protocols	**12**
III	**Fundamentals of Networking, LAN and Ethernet:** Network Fundamentals – LAN Hardware – Ethernet LANs – Advanced Ethernet **Internet Technologies:** Internet Applications – Internet Transmission Systems – Storage-Area Networks – Internet Security	**12**
IV	**Satellite Communications:** Satellite Orbits – Satellite Communication Systems – Satellite Subsystems – Ground Stations – Satellite Applications – Global Navigation Satellite Systems	**12**
V	**Cell Phone Technologies:** Cellular Telephone Systems – Overview of Cellular Industry – 2G and 3G Digital Cell Phone Systems – Long term evolution and 4G Cellular Systems – Base Stations	**12**

TOTAL HOURS	**60**
Textbooks	
1.	Louis E. Frenzel, "Principles of Electronic Communication Systems", 4th Edition, McGraw Hill, 2016
Reference Books	
1.	Simon Haykin, "Digital Communication Systems", Wiley India, 2021
2.	Wayne Tomasi, "Electronic Communications Systems", 5th Edition, Pearson Education, 2008

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	2	2	3	3	2
CO 2	3	2	2	2	2	3	2
CO 3	3	2	2	2	2	3	2
CO 4	3	2	2	2	2	3	2
Total Score	12	8	8	8	9	12	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	2	2	2	3	3	2
CO 2	3	2	2	2	2	3	2
CO 3	3	2	2	2	2	3	2
CO 4	3	2	2	2	2	3	2
Total Score	12	8	8	8	9	12	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

First Year – Semester I
SKILL ENHANCEMENT - Practical

Subject Code	Subject Name	Category	Hours				Credits	Marks		
			L	T	P	S		CIA	Exter - nal	Total
SEC1	**Office Automation Lab**	**Skill - Practical**	-	-	3	-	**3**	50	50	**100**

COURSE OUTCOMES (COs)	
Upon completion of the course,	
CO-1	Students gain knowledge about Word Documents, Excel Sheets, PPTs and Access database.
CO-2	Students can process data using excel formulas and functions
CO-3	Students can analyse data using charts and graphs in excel
CO-4	Students can create and design PPTs, create databases and design tables.

No.	List of Exercises	No. of Hours
1	Prepare your resume in a document. Use Numbers, Bullets and Table	
2	Prepare a month calendar in a document (Refer Microsoft Outllook templates). Mark the public holiday and specify the reason below the calendar.	
3	Prepare a write-up about your college. Highlight the activities and facilities in various departments. Use Spell Check, Find and Replace, indent, header and footer, and page numbers.	
4	Prepare a document to show the alphabet picture chart. Show all 26 alphabets in a table with relevant pictures	
5	Prepare a semester-wise mark statement for a computer science class of 25 students using any spreadsheet. Display the total and average for each student and rank them based on the student's total mark. Give proper headings. Display the column headings in bold and italics	
6	Prepare a spreadsheet with 2 columns: names and address [door_number, street_name] (20 rows). Use the following functions with various arguments **Text Function:** upper, lower, proper, trim, left, right, mid, clean, text, value, replace, substitute, find and concat Display the results in the next 14 column.	
7	Prepare a spreadsheet with input data columns: date, time, day, hour, etc (20 rows). Use the following functions with various arguments **Date Function:** date, today, now, datevalue, day, month, year, eomonth, weekday, datedif and workday **Time Function:** hour, minute, second, time and timevalue Display the results in the subsequent columns	

8	Prepare a spreadsheet with input data columns (20 rows). Use the following functions with various arguments **Math Function:** abs, floor, ceiling, round, even, sign, mod, log, product, rand, sin, cos, tan, sum and base Display the results in the subsequent columns	
9	Prepare a spreadsheet with input data columns (20 rows). Use the following functions with various arguments **Statistical Function:** min, max, average, median, mode, stdev, var, count, countif, counta, rank and percentile Display the results in the subsequent columns	
10	Use any spreadsheet to plot a chart for marks obtained by the students – marks (Max: 5) vs frequency (Total students in class: 50).	
11	Prepare a presentation to display the sport day celebration in your campus	
12	Prepare a presentation to display a simple story with script dialogues and animation	
13.	Create a student database and specify validation rules for the fields: age, date of birth, pincode etc.	
14	Create the employee database and populate data through input form. Prepare a report containing the list of employees with designation and department.	
15.	Create a mobile shop database and use queries to display (i) products in a specific brand (ii) products available in a price range. (iii) products with offers and discounts	
	TOTAL HOURS	**45**

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	3	3	3	1	3	2
CO 2	3	3	3	3	1	3	2
CO 3	3	3	3	3	1	3	2
CO 4	3	3	3	3	1	3	2
Total Score	12	12	12	12	4	12	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	3	3	1	3	2
CO 2	3	3	3	3	1	3	2
CO 3	3	3	3	3	1	3	2
CO 4	3	3	3	3	1	3	2
Total Score	12	12	12	12	4	12	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

First Year – Semester I
FOUNDATION COURSE - Theory

Subject Code	Subject Name	Category	Hours				Credits	Marks		
			L	T	P	S		CIA	Exter - nal	Total
FC1	**Fundamentals of Information Technology**	**FC - Theory**	3	-	-	-	**3**	25	75	**100**

COURSE OUTCOMES (COs)	
Upon completion of the programme,	
CO-1	Students understand the concepts used in Information Technology
CO-2	Students can apply the concepts while using programming languages
CO-3	Students can analyse language features and identify the best to use.
CO-4	Students can create new principles in programming languages

UNIT	Course Contents	No. of Hours
I	**Introduction to Computers:** Introduction, Definition, .Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer	**9**
II	**Basic Computer Organization**: Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.	**9**
III	**Storage** Fundamentals: Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives	**9**
IV	**Software:** Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS	**9**

V	**Operating System:** Functions, Measuring System Performance, Assemblers, Compilers and Interpreters.Batch Processing, Multiprogramming, Multi Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.	**9**
	TOTAL HOURS	**45**
Textbooks		
1.	Anoop Mathew, S. Kavitha Murugeshan (2009), " Fundamental of Information Technology", Majestic Books.	
2	Alexis Leon, Mathews Leon," Fundamental of Information Technology", 2nd Edition.	
Reference Books		
1.	Bhardwaj Sushil Puneet Kumar, "Fundamental of Information Technology"	
2.	GG WILKINSON, "Fundamentals of Information Technology", Wiley-Blackwell	
3.	A Ravichandran , "Fundamentals of Information Technology", Khanna Book Publishing	

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	3	3	2	1	3	2
CO 2	3	3	3	2	1	3	2
CO 3	2	2	2	2	1	3	2
CO 4	2	2	2	2	1	3	2
Total Score	10	10	19	8	4	12	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	3	2	1	3	2
CO 2	3	3	3	2	1	3	2
CO 3	2	2	2	2	1	3	2
CO 4	2	2	2	2	1	3	2
Total Score	10	10	19	8	4	12	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

First Year – Semester II
CORE - Theory

Subject Code	Subject Name	Category	Hours				Credits	Marks		
			L	T	P	S		CIA	Exter - nal	Total
CC3	**Data Structure and Algorithms**	**Core - Theory**	4	-	-	-	**4**	25	75	**100**

COURSE OUTCOMES (COs)

Upon completion of the course,

CO-1	Students learn and understand the concepts of ADTs, linear and nonlinear data structures.
CO-2	Students can solve problems using the learned data structures and algorithms.
CO-3	Students can select suitable algorithm based on the nature of the problem.
CO-4	Students can create new algorithms after critically evaluating the problem

UNIT	Course Contents	No. of Hours
I	**Abstract Data Types (ADTs)-** List ADT-array-based implementation-linked list implementation singly linked lists-circular linked lists-doubly-linkedlists-applicationsoflists-PolynomialManipulation-All operations-Insertion-Deletion-Merge-Traversal	**12**
II	**StackADT-Operations-** Application s- Evaluating arithmetic expressions –Conversion of infix to postfix expression-Queue ADT-Operations-Circular Queue-Priority Queue-deQueue applications of queues.	**12**
III	**Tree ADT-tree traversals-**Binary Tree ADT-expression trees-applications of trees-binary search tree ADT-Threaded Binary Trees-Heap-Applications of heap.	**12**
IV	**Definition-Representation of Graph-**Types of graph-Breadth first traversal–Depthfirsttraversal-Topologicalsort-Bi-connectivity–Cut vertex-Euler circuits-Applications of graphs.	**12**
V	**Searching-Linear search-Binary search-**Sorting-Bubble sort-Selection sort-Insertionsort-Shell sort--Hashing-Hash functions-Separate chaining- Open Addressing-	**12**
	TOTAL HOURS	**60**

Textbooks	
1.	Mark Allen Weiss,—Data Structures and Algorithm Analysis C++‖,Pearson Education2014,4thEdition.
2	Reema Thareja,—Data Structures Using C‖,OxfordUniversitiesPress2014,2nd Edition
Reference Books	
1.	ThomasH.Cormen,ChalesE.Leiserson,RonaldL.Rivest,CliffordStein,—Introduction To Algorithms‖, McGraw Hill2009,3rdEdition.
2.	Aho, Hopcroft and Ullman,—DataStructuresandAlgorithms‖,PearsonEducation2003
3.	Ellis Horowitz, Satraj Sahni —Fundamentals of Computer Algorithms‖, Universities Press; Second edition (1 January 2008)

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	3	3	3	1	3	2
CO 2	3	3	3	3	1	3	2
CO 3	3	3	3	2	1	3	2
CO 4	3	3	3	2	1	3	2
Total Score	12	12	12	10	4	12	8

0 – No Correlation 1 – Low 2 - Medium 3 – High

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	3	3	1	3	2
CO 2	3	3	3	3	1	3	2
CO 3	3	3	3	2	1	3	2
CO 4	3	3	3	2	1	3	2
Total Score	12	12	12	10	4	12	8

0 – No Correlation 1 – Low 2 - Medium 3 – High

First Year – Semester II
CORE - Practical

Subject Code	Subject Name	Category	Hours				Credits	Marks		
			L	T	P	S		CIA	Exter - nal	Total
CC4	**Data Structure and Algorithms Lab**	**Core - Practical**	-	-	4	-	**4**	50	50	**100**

COURSE OUTCOMES (COs)

Upon completion of the course,

CO-1	Students realize the concepts by implementing data structure and algorithms.
CO-2	Students can use data structure and algorithms to solve real life problems.
CO-3	Students can choose suitable algorithms to solve a problem
CO-4	Students can write their own programs by using the data structure and algorithms.

No.	List of Exercises	No. of Hours
1.	Implementation of Breadth First Search algorithm.	
2.	Implementation of Quick Sort	
3.	Implementation of Depth First Search algorithm.	
4.	Implementation of Merge Sort	
5.	Search for an element in a list using Binary Search	
6.	Implement Linear (Singly) Linked List. Write code to add a node at the beginning, add a node at the end, delete a node from the beginning and delete a node from the end.	
7.	Implement Doubly Linked List. Write code to add a node at the beginning, add a node at the end, delete a node from the beginning and delete a node from the end.	
8.	Implementation of Stack – Push, Pop and Peek.	
9.	Implementation of Queue– Enqueue, Dequeue and Peek.	
10.	Implementation of Binary Tree Traversals using recursion. a) Pre-order b) In-order c) Post-order	
	TOTAL HOURS	**60**

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	3	3	3	1	3	2
CO 2	3	3	3	3	1	3	2
CO 3	3	3	3	2	1	3	2
CO 4	3	3	3	2	1	3	2
Total Score	12	12	12	10	4	12	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	3	3	1	3	2
CO 2	3	3	3	3	1	3	2
CO 3	3	3	3	2	1	3	2
CO 4	3	3	3	2	1	3	2
Total Score	12	12	12	10	4	12	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

First Year – Semester II
ELECTIVE - Theory

Subject Code	Subject Name	Category	Hours				Credits	Marks		
			L	T	P	S		CIA	Exter - nal	Total
EC2(a)	**Discrete Mathematics**	**Elective -Theory**	4	-	-	-	**4**	25	75	**100**

COURSE OUTCOMES (COs)

Upon completion of the course,

CO-1	Students understand how to solve problems based on discrete mathematics
CO-2	Students can apply direct methods for solving linear systems
CO-3	Students can select suitable methods to solve a problem
CO-4	Students can write their own programs to solve problems using known programming languages.

UNIT	Course Contents	No. of Hours
I	**Set theory**-Sets and elements-Specifications of sets-Identity and Cardinality-Set Inclusion-Equality of sets-proper sets-Power sets-Universal set-Operations on sets-ordered pairs-Cartesian product of sets	**12**
II	**Relations and functions**-Definition-example-Relations on sets-Equivalence Relations-Equivalence Class – Functions	**12**
III	**Mathematical Logic-**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	**Matrix Algebra -** 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.	**12**
V	**Adjoint and Inverse of a Matrix** –Singular and Non-singular Matrices–Adjoint of a Square Matrix –Properties of Adjoin to a Matrix–Properties of Inverse of a Matrix.	**12**
	TOTAL HOURS	**60**

Textbooks	
1.	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.

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	3	3	2	0	2	1
CO 2	3	3	3	2	0	2	1
CO 3	3	3	3	2	0	2	1
CO 4	3	3	3	2	0	2	1
Total Score	12	12	12	8	0	8	4

0 – No Correlation 1 – Low 2 - Medium 3 – High

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	3	2	0	2	1
CO 2	3	3	3	2	0	2	1
CO 3	3	3	3	2	0	2	1
CO 4	3	3	3	2	0	2	1
Total Score	12	12	12	8	0	8	4

0 – No Correlation 1 – Low 2 - Medium 3 – High

First Year – Semester II

ELECTIVE – Theory

Subject Code	Subject Name	Category	Hours				Credits	Marks		
			L	T	P	S		CIA	Exter - nal	Total
EC2(b)	**Probability and Statistics**	**Elective -Theory**	4	-	-	-	**4**	25	75	**100**

COURSE OUTCOMES (COs)

Upon completion of the course,

CO-1	Students acquire knowledge on basics of probability and statistics.
CO-2	Students can apply theorems on real life problems
CO-3	Students can choose suitable models to solve a problem
CO-4	Students can write their own programs for solving real life problems.

UNIT	Course Contents	No. of Hours
I	**Probability**- Definition of probability - independent events – conditional probability - Bayes Theorem. Random variables: Discrete and continuous random variables – distribution function -properties – probability mass function and probability density function – discrete and continuous probability distributions.	**12**
II	**Multiple Random Variables** - Joint, marginal and conditional distribution functions - independence of random variables – transformation of random variables and their distribution functions. Mathematical expectation: Expectation – properties – conditional expectation and conditional variance. Moment generating function, characteristic function, probability generating function and their properties.	**12**
III	**Convergence** in probability, weak law of large numbers – Bernoulli's theorem, Khintchine's theorem (statements only) - Central limit theorem.	**12**
IV	**Discrete Distributions** Bernoulli, Binomial, Poisson, Geometric and Negative binomial distributions - Multinomial distribution. Moments – probability generating function, moment generating function, characteristic function and properties.	**12**
V	**Continuous Distributions** Uniform, Normal, Cauchy and Lognormal distributions - concepts, moments, moment generating function, characteristic function and properties. Sampling distributions: Chi-square, t and F distributions	**12**
	TOTAL HOURS	**60**

Textbooks	
1.	Goon, A.M., M. K. Gupta and B. Das Gupta (2017) Fundamentals of Statistics- Vol. I.,World Press, Ltd, Kolkata.
2	Gupta, S.C. and V.K. Kapoor (2020) Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
Reference Books	
1.	Robert, V. Hogg, Joseph W. McKean and Allen T. Craig (2013) Introduction to Mathematical Statistics (Seventh Edition), Pearson Education, New York
2.	Bhuyan K.C. (2010), Probability Distribution Theory and Statistical Inference, New Central Book Agency (P) Ltd., New Delhi.

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	3	3	3	1	2	2
CO 2	3	3	3	3	1	2	2
CO 3	3	3	3	3	1	2	2
CO 4	3	3	3	3	1	2	2
Total Score	12	12	12	12	4	8	8

0 – No Correlation 1 – Low 2 - Medium 3 – High

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	3	3	1	2	2
CO 2	3	3	3	3	1	2	2
CO 3	3	3	3	3	1	2	2
CO 4	3	3	3	3	1	2	2
Total Score	12	12	12	12	4	8	8

0 – No Correlation 1 – Low 2 - Medium 3 – High

First Year – Semester II
SKILL ENHANCEMENT - Practical

Subject Code	Subject Name	Category	Hours				Credits	Marks		
			L	T	P	S		CIA	Exter - nal	Total
SEC2	**Web Programming Lab**	**Skill - Practical**	-	-	3	-	**2**	50	50	**100**

COURSE OUTCOMES (COs)	
Upon completion of the course,	
CO-1	Students realize the concepts behind Web Pages.
CO-2	Students can apply the HTML,CSS and JavaScript to develop Web Pages.
CO-3	Students can choose suitable HTML elements to design a Web Page
CO-4	Students can write their own programs using JavaScript.

No.	**List of Exercises**	**No. of Hours**
1.	Create a website for an educational institution. Use internal links and add images.	
2.	Design a calendar using table tag.	
3.	Create a HTML document to display a list of five flowers and link each one to another document displaying brief description of the flower, Add pictures wherever possible.	
4.	Write an HTML code to display a list of 5 cars in a frame, Link each one to a brief Description in second frame. The left frame Should display the list, and the right frame should display the paragraph about the frame.	
5.	Create a simple HTML form to read the UG application form details. Implement major form elements.	
6.	Create a website for a shop (textile or jewelry or automobile). Embed Audio and Video in an HTML page	
7.	Rotate a text element and an image element using CSS.	
8.	Build a simple quiz and display the score.	
9.	Using HTML, JavaScript and CSS, develop a money calculator. Given the count of currency denominations, the application should display the total amount.	
10.	Design a login form. Use email as user ID. Validate if email is in the correct format and if the password has minimum of eight characters long and a combination of letters, numbers and special characters using JavaScript.	
	TOTAL HOURS	**45**

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	3	3	3	1	3	2
CO 2	3	3	3	3	1	3	2
CO 3	3	3	3	3	1	3	2
CO 4	3	3	3	3	1	3	2
Total Score	12	12	12	12	4	12	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	3	3	1	3	2
CO 2	3	3	3	3	1	3	2
CO 3	3	3	3	3	1	3	2
CO 4	3	3	3	3	1	3	2
Total Score	12	12	12	12	4	12	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

First Year – Semester II
SKILL ENHANCEMENT - Theory

Subject Code	Subject Name	Category	Hours				Credits	Marks		
			L	T	P	S		CIA	Exter - nal	Total
SEC3	**Quantitative Aptitude**	**FC - Theory**	3	-	-	-	**2**	25	75	**100**

COURSE OUTCOMES (COs)

Upon completion of the course,

CO-1	Students realize the concepts by implementing programs.
CO-2	Students can apply the OOPs concept to solve real life problems.
CO-3	Students can choose suitable concepts to solve a problem
CO-4	Students can write their own programs by experiments.

UNIT	Course Contents	No. of Hours
I	Numbers-HCF and LCM of numbers-Decimal fractions-Simplification- Square root and cube roots - Average-problems on Numbers.	**9**
II	Problems on Ages - Surds and Indices - percentage - profits and loss - ratio and proportion-partnership-Chain rule.	**9**
III	Time and work - pipes and cisterns - Time and Distance - problems on trains - Boats and streams - simple interest - compound interest - Logarithms - Area-Volume and surface area -races and Games of skill.	**9**
IV	Permutation and combination-probability-True Discount-Bankers Discount – Height and Distances-Odd man out & Series.	**9**
V	Calendar - Clocks - stocks and shares - Data representation - Tabulation – Bar Graphs-Pie charts-Line graphs.	**9**
	TOTAL HOURS	**45**

Textbooks

1.	"Quantitative Aptitude", R.S.AGGARWAL, S. Chand & Company Ltd.,

Web References	
1.	https://www.javatpoint.com/aptitude/quantitative
2.	https://www.toppr.com/guides/quantitative-aptitude/

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	3	2	2	0	2	1
CO 2	3	3	2	2	0	2	1
CO 3	3	3	2	2	0	2	1
CO 4	3	3	2	2	0	2	1
Total Score	12	12	12	8	0	8	4

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	2	2	0	2	1
CO 2	3	3	2	2	0	2	1
CO 3	3	3	2	2	0	2	1
CO 4	3	3	2	2	0	2	1
Total Score	12	12	12	8	0	8	4

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**