

**B.C.A.,**

**SYLLABUS**

**FROM THE ACADEMIC YEAR  
2023 - 2024**

**ManonmaniamSundaranar University  
Tirunelveli**

## **Introduction**

### **BCA (Bachelor of Computer Application)**

Education is the key to development of any society. Role of higher education is crucial for securing right kind of employment and also to pursue further studies in best available world class institutes elsewhere within and outside India. Quality education in general and higher education in particular deserves high priority to enable the young and future generation of students to acquire skill, training and knowledge in order to enhance their thinking, creativity, comprehension and application abilities and prepare them to compete, succeed and excel globally. Learning Outcomes-based Curriculum Framework (LOCF) which makes it student-centric, interactive and outcome-oriented with well-defined aims, objectives and goals to achieve. LOCF also aims at ensuring uniform education standard and content delivery across the state which will help the students to ensure similar quality of education irrespective of the institute and location.

Computer Application is the study of quantity, structure, space and change, focusing on problem solving, application development with wider scope of application in science, engineering, technology, social sciences etc. throughout the world in last couple of decades and it has carved out a space for itself like any other disciplines of basic science and engineering. Computer Application is a discipline that spans theory and practice and it requires thinking both in abstract terms and in concrete terms. Nowadays, practically everyone is a computer user, and many people are even computer programmers. Computer Application can be seen on a higher level, as a science of problem solving and problem solving requires precision, creativity, and careful reasoning. The ever-evolving discipline of computer Application also has strong connections to other disciplines. Many problems in science, engineering, health care, business, and other areas can be solved effectively with computers, but finding a solution requires both computer science expertise and knowledge of the particular application domain. Computer Application has a wide range of specialties. These include Computer Architecture, Software Systems, Graphics, Artificial Intelligence, Computational Science, and Software Engineering. Drawing from a common core of computer science knowledge, each specialty area focuses on specific challenges. Computer Application is practiced by mathematicians, scientists and engineers. Mathematics, the origins of Computer Science, provides reason and logic. Science provides the methodology for learning and refinement. Engineering provides the techniques for building hardware and software.

## Programme Outcome, Programme Specific Outcome and Course Outcome

Computer Application is the study of quantity, structure, space and change, focusing on problem solving, application development with wider scope of application in science, engineering, technology, social sciences etc. The key core areas of study in Mathematics include Algebra, Analysis (Real & Complex), Differential Equations, Geometry, and Mechanics.

The Students completing this programme will be able to present Software application clearly and precisely, make abstract ideas precise by formulating them in the Computer languages. Completion of this programme will also enable the learners to join teaching profession, enhance their employability for government jobs, jobs in software industry, banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

<b>LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME</b>	
<b>Programme:</b>	<b>B.C.A.,</b>
<b>Programme Code:</b>	
<b>Duration:</b>	<b>3 years [UG]</b>
<b>Programme Outcomes:</b>	<p><b>PO1: Disciplinary knowledge:</b> Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study</p> <p><b>PO2: Communication Skills:</b> Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.</p> <p><b>PO3: Critical thinking:</b> Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.</p>

**PO4: Problem solving: Capacity** to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.

**PO5: Analytical reasoning:** Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.

**PO6: Research-related skills:** A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation

**PO7: Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team

**PO8: Scientific reasoning:** Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.

**PO9: Reflective thinking:** Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.

**PO10 Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

**PO 11 Self-directed learning:** Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.

	<p><b>PO 12 Multicultural competence:</b> Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.</p> <p><b>PO 13: Moral and ethical awareness/reasoning:</b> Ability to embrace moral/ethical values in conducting one’s life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one’s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.</p> <p><b>PO 14: Leadership readiness/qualities:</b> Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.</p> <p><b>PO 15: Lifelong learning:</b> Ability to acquire knowledge and skills, including „learning how to learn“, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.</p>
<p><b>Programme Specific Outcomes:</b></p>	<p><b>PSO1:</b> To enable students to apply basic microeconomic, macroeconomic and monetary concepts and theories in real life and decision making.</p> <p><b>PSO 2:</b> To sensitize students to various economic issues related to Development, Growth, International Economics, Sustainable Development and Environment.</p> <p><b>PSO 3:</b> To familiarize students to the concepts and theories related to Finance, Investments and Modern Marketing.</p> <p><b>PSO 4:</b> Evaluate various social and economic problems in the society and develop answer to the problems as global citizens.</p> <p><b>PSO 5:</b> Enhance skills of analytical and critical thinking to</p>

	analyze effectiveness of economic policies.
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	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
<b>PSO 1</b>	Y	Y	Y	Y	Y	Y	Y	Y
<b>PSO 2</b>	Y	Y	Y	Y	Y	Y	Y	Y
<b>PSO3</b>	Y	Y	Y	Y	Y	Y	Y	Y
<b>PSO 4</b>	Y	Y	Y	Y	Y	Y	Y	Y
<b>PSO 5</b>	Y	Y	Y	Y	Y	Y	Y	Y

**3 – Strong, 2- Medium, 1- Low**

**Highlights of the Revamped Curriculum:**

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising mathematical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced mathematical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Mathematics based problem solving skills are included as mandatory components in the ‘Training for Competitive Examinations’ course at the final semester, a first of its kind.
- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.

- The Industrial Statistics course is newly introduced in the fourth semester, to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience, that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, industrial visit, project and internships will give students an edge over the counterparts in the job market.
- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest - Artificial Intelligence.

**Value additions in the Revamped Curriculum:**

<b>Semester</b>	<b>Newly introduced Components</b>	<b>Outcome/ Benefits</b>
<b>I</b>	<b>Foundation Course</b> To ease the transition of learning from higher secondary to higher education, providing an overview of the pedagogy of learning Literature and analysing the world through the literary lens gives rise to a new perspective.	<ul style="list-style-type: none"> <li>➤ Instill confidence among students</li> <li>➤ Create interest for the subject</li> </ul>
<b>I,II,III,IV</b>	<b>Skill Enhancement papers</b> (Discipline centric /Generic/Entrepreneurial)	<ul style="list-style-type: none"> <li>➤ Industry ready graduates</li> <li>➤ Skilled human resource</li> <li>➤ Students are equipped with the essential skills to make them employable</li> </ul>
		<ul style="list-style-type: none"> <li>➤ Training on language and communication skills enable the students gain knowledge and exposure in the competitive world.</li> </ul>
		<ul style="list-style-type: none"> <li>➤ Discipline centric skill will improve the Technical know-how of solving real life problems.</li> </ul>
<b>III,IV,V&amp; VI</b>	Elective papers	<ul style="list-style-type: none"> <li>➤ Strengthening the domain knowledge</li> <li>➤ Introducing the stakeholder to the State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and interdisciplinary nature</li> <li>➤ Emerging topics in higher education/industry/communication network/health sector etc. are introduced with hands-on-training.</li> </ul>



<b>IV</b>	ElectivePapers	<ul style="list-style-type: none"> <li>➤ Exposuretoindustry modelsstudentsintosolution providers</li> <li>➤ GeneratesIndustryready graduates</li> <li>➤ Employmentopportunitiesenhanced</li> </ul>
<b>VSemester</b>	Electivepapers	<ul style="list-style-type: none"> <li>➤ Self-learning isenhanced</li> <li>➤ Applicationoftheconceptto realsituationisconceivedresulting intangibleoutcome</li> </ul>
<b>VISemester</b>	Electivepapers	<ul style="list-style-type: none"> <li>➤ Enriches the studybeyondthe course.</li> <li>➤ Developingaresearchframework and presenting their independent and intellectual ideas effectively.</li> </ul>
<b>ExtraCredits: ForAdvancedLearners/Honorsdegree</b>		<ul style="list-style-type: none"> <li>➤ Tocater totheneeds ofpeer learners/research aspirants</li> </ul>
<b>SkillsacquiredfromtheCourses</b>		Knowledge, Problem Solving, Analytical ability,ProfessionalCompetency,ProfessionalCommunicationandTransferrable Skill

### Credit Distribution for UG Programme

Sem I	Credit	Sem II	Credit	Sem III	Credit	Sem IV	Credit	Sem V	Credit	Sem VI	Credit
1.1. Language - Tamil	3	2.1. Language - Tamil	3	3.1. Language - Tamil	3	4.1. Language - Tamil	3	5.1 Core Course – \CC IX	4	6.1 Core Course – CC XIII	4
1.2 English	3	2.2 English	3	3.2 English	3	4.2 English	3	5.2 Core Course – CC X	4	6.2 Core Course – CC XIV	4
1.3 Core Course – CC I	5	2.3 Core Course – CC III	5	3.3 Core Course – CC V	5	4.3 Core Course – CC VII Core Industry Module	5	5. 3.Core Course CC -XI	4	6.3 Core Course – CC XV	4
1.4 Core Course – CC II	5	2.4 Core Course – CC IV	5	3.4 Core Course – CC VI	5	4.4 Core Course – CC VIII	5	5. 3.Core Course –/ Project with viva-voce CC -XII	4	6.4 Elective -VII Generic/ Discipline Specific	3
1.5 Elective I Generic/ Discipline Specific	3	2.5 Elective II Generic/ Discipline Specific	3	3.5 Elective III Generic/ Discipline Specific	3	4.5 Elective IV Generic/ Discipline Specific	3	5.4 Elective V Generic/ Discipline Specific	3	6.5 Elective VIII Generic/ Discipline Specific	3
1.6 Skill Enhancement Course SEC-1 (NME)	2	2.6 Skill Enhancement Course SEC-2 (NME)	2	3.6 Skill Enhancement Course SEC-4, (Entrepreneurial Skill)	1	4.6 Skill Enhancement Course SEC-6	2	5.5 Elective VI Generic/ Discipline Specific	3	6.6 Extension Activity	1
1.7 Skill Enhancement - (Foundation Course)	2	2.7 Skill Enhancement Course –SEC-3(NME)	2	3.7 Skill Enhancement Course SEC-5	2	4.7 Skill Enhancement Course SEC-7	2	5.6 Value Education	2	6.7 Professional Competency Skill	2
				3.8 E.V.S		4.8 E.V.S	2	5.7 Summer Internship /Industrial Training	2		
					-						
	<b>23</b>		<b>23</b>		<b>22</b>		<b>25</b>		<b>26</b>		<b>21</b>
	<b>Total CreditPoints</b>										<b>140</b>

**CREDIT DISTRIBUTION FOR U.G.**

<b>3 – Year UG Programme Credits Distribution</b>			
		<b>No. of Papers</b>	<b>Credits</b>
<b>Part I</b>	Tamil( 3 Credits )	4	12
<b>Part II</b>	English( 3 Credits)	4	12
<b>Part III</b>	Core Courses (4 Credits)	15	68
	Elective Courses :Generic / Discipline Specific ( 3 Credits)	8	24
<b>Total</b>			<b>116</b>
<b>Part IV</b>	NME( 2 Credits)	2	4
	Skill Enhancement Courses (7 courses)		13
	Entrepreneurial Skill -1 Professional Competency Skill Enhancement Course	1	2
	EVS( 2 Credits)	1	2
	Value Education ( 2 Credits)	1	2
<b>Part IV Credits</b>			<b>23</b>
<b>Part V</b>	Extension Activity (NSS / NCC / Physical Education)		1
<b>Total Credits for the UG Programme</b>			<b>140</b>

### Consolidated Semester wise and Component wise Credit distribution

Parts	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total Credits
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	13	13	13	13	22	18	92
Part IV	4	4	3	6	4	2	23
Part V	-	-	-	-	-	1	1
<b>Total</b>	23	23	22	25	26	21	<b>140</b>

\*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

Methods of Evaluation		
<b>Internal Evaluation</b>	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
<b>External Evaluation</b>	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
<b>Recall (K1)</b>	Simple definitions, MCQ, Recall steps, Concept definitions	
<b>Understand/Comprehend (K2)</b>	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
<b>Application (K3)</b>	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
<b>Analyze (K4)</b>	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
<b>Evaluate (K5)</b>	Longer essay/Evaluation essay, Critique or justify with pros and cons	
<b>Create (K6)</b>	Check knowledge in specific or off-beat situations, Discussion, Debating or Presentations	

**BCA  
First Year  
Semester-I**

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>Hours per week (L/T/P)</b>
Part-I	Language – Tamil	3	6
Part-II	English	3	6
Part-III	Core Courses 2 (CC1, CC2)	10	10
	Elective Course 1 ( Generic / Discipline Specific)EC1	3	4
Part-IV	Skill Enhancement Course SEC-1 (Non Major Elective)	2	2
	Foundation Course FC	2	2
		<b>23</b>	<b>30</b>

**Semester-II**

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>Hours per week (L/T/P)</b>
Part-I	Language – Tamil	3	6
Part-II	English	3	6
Part-III	Core Courses 2 (CC3, CC4)	10	10
	Elective Course 1 ( Generic / Discipline Specific) EC2	3	4
Part-IV	Skill Enhancement Course -SEC-2 (Non Major Elective)	2	2
	Skill Enhancement Course -SEC-3 (Discipline Specific / Generic)	2	2
		<b>23</b>	<b>30</b>

**Second Year  
Semester-III**

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>Hours per week (L/T/P)</b>
Part-I	Language – Tamil	3	6
Part-II	English	3	6
Part-III	Core Courses 2 (CC5, CC6)	10	10
	Elective Course 1 ( Generic / Discipline Specific)EC3	3	4
Part-IV	Skill Enhancement Course -SEC-4 (Entrepreneurial Based)	1	1
	Skill Enhancement Course -SEC-5 (Discipline Specific/ Generic)	2	2
	Environmental Studies(EVS)	-	1
		<b>22</b>	<b>30</b>

### Semester-IV

Part	List of Courses	Credit	Hours per week (L/T/P)
Part-I	Language – Tamil	3	6
Part-II	English	3	6
Part-III	Core Courses 2 (CC7, CC8)	10	10
	CC7: Core Industry Module -1 - <b>Industrial Statistics</b>		
	CC8 : Any Core paper		
	Elective Course 1 (Generic / Discipline Specific)EC4	3	3
Part-IV	Skill Enhancement Course -SEC6	2	2
	Skill Enhancement Course -SEC-7 (Discipline Specific / Generic)	2	2
	Environmental Studies EVS	2	1
		<b>25</b>	<b>30</b>

### Third Year

#### Semester-V

Part	List of Courses	Credit	Hours per week (L/T/P)
Part-III	Core Courses 3(CC9, CC10, CC11)	12	15
	Elective Courses 2 (Generic / Discipline Specific) EC5, EC6	6	8
	Core /Project with Viva voce CC12	4	5
Part-IV	Value Education	2	2
	Internship / Industrial Training (Carried out in II Year Summer vacation) (30 hours)	2	
		<b>26</b>	<b>30</b>

#### Semester-VI

Part	List of Courses	Credit	Hours per week (L/T/P)
Part-III	Core Courses 3 (CC13, CC14, CC15)	12	18
	Elective Courses 2 (Generic / Discipline Specific) EC7, EC8	6	10
Part IV	Professional Competency Skill Enhancement Course SE8	2	2
Part-V	Extension Activity (Outside college hours)	1	-
		<b>21</b>	<b>30</b>

**Total Credits: 140**

**Remarks: English Soft Skill Two Hours Will be handled by English Teachers (4+2 = 6 hours for English).**

**BCA  
First Year  
Semester-I**

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>Hours per week (L/T/P)</b>
Part-I	Language – Tamil	3	6
Part-II	English	3	6
Part-III	CC1 Python Programming	5	5
	CC2 Python LAB	5	5
	EC1 Discrete Mathematics I	3	4
Part-IV	SEC-1 Fundamentals of Information Technology	2	2
	FC Structured Programming Language in C	2	2
		<b>23</b>	<b>30</b>

**Semester-II**

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>Hours per week (L/T/P)</b>
Part-I	Language – Tamil	3	6
Part-II	English	3	6
Part-III	CC3 Object Oriented Programming concepts Using C++	5	5
	CC4 C++ Programming Lab	5	5
	EC2 Optimization techniques	3	4
Part-IV	SEC-2 Introduction to HTML	2	2
	SEC-3 PHP Programming	2	2
		<b>23</b>	<b>30</b>

**CORE PAPER  
FIRST YEAR**

**SEMESTER - I**

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
CC1	PYTHON PROGRAMMING		5	-	-	-	4	25	75	100
<b>Learning Objectives</b>										
LO1	To make students understand the concepts of Python programming.									
LO2	To apply the OOPs concept in PYTHON programming.									
LO3	To impart knowledge on demand and supply concepts									
LO4	To make the students learn best practices in PYTHON programming									
LO5	To know the costs and profit maximization									
UNIT	Contents									No. of Hours
I	<b>Basics of Python Programming:</b> History of Python-Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements – Input Statements-Comments – Indentation- Operators-Expressions-Type conversions. <b>Python Arrays:</b> Defining and Processing Arrays – Array methods.									15
II	<b>Control Statements:</b> Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. <b>Jump Statements:</b> break, continue and pass statements.									15
III	<b>Functions:</b> Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. <b>Function Arguments:</b> Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments-Recursion. <b>Python Strings:</b> String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. <b>Modules:</b> import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules.									15
IV	<b>Lists:</b> Creating a list -Access values in List-Updating values in Lists-Nested lists -Basic list operations-List Methods. <b>Tuples:</b> Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. <b>Dictionaries:</b> Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.									15



V	<b>Python File Handling:</b> Types of files in Python - Opening and Closing files- Reading and Writing files: write() and writelines() methods- append() method – read() and readlines() methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files.	<b>15</b>
<b>TOTAL HOURS</b>		<b>75</b>
<b>Course Outcomes</b>		<b>Programme Outcomes</b>
CO	On completion of this course, students will	
CO1	Learn the basics of python, Do simple programs on python, Learn how to use an array.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Usage of File handlings in Python, Concept of reading and writing files, Do programs using files.	PO1, PO2, PO3, PO4, PO5, PO6
<b>Textbooks</b>		
1	ReemaThareja, “Python Programming using problem solving approach”, First Edition, 2017, Oxford University Press.	
2	Dr. R. Nageswara Rao, “Core Python Programming”, First Edition, 2017, Dream tech Publishers.	
<b>Reference Books</b>		
1.	VamsiKurama, “Python Programming: A Modern Approach”, Pearson Education.	
2.	Mark Lutz, ”Learning Python”, Orielly.	
3.	Adam Stewarts, “Python Programming”, Online.	
4.	Fabio Nelli, “Python Data Analytics”, APress.	
5.	Kenneth A. Lambert, “Fundamentals of Python – First Programs”, CENGAGE Publication.	
<b>Web Resources</b>		
1.	<a href="https://www.programiz.com/python-programming">https://www.programiz.com/python-programming</a>	
2.	<a href="https://www.guru99.com/python-tutorials.html">https://www.guru99.com/python-tutorials.html</a>	
3.	<a href="https://www.w3schools.com/python/python_intro.asp">https://www.w3schools.com/python/python_intro.asp</a>	
4.	<a href="https://www.geeksforgeeks.org/python-programming-language/">https://www.geeksforgeeks.org/python-programming-language/</a>	
5.	<a href="https://en.wikipedia.org/wiki/Python_(programming_language)">https://en.wikipedia.org/wiki/Python_(programming_language)</a>	

**Mapping with Programme Outcomes:**

<b>CO/PSO</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>	<b>PSO 6</b>
<b>CO 1</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>CO 3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>
<b>CO 4</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>CO 5</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>Weightage of course contributed to each PSO</b>	15	10	10	15	13	14

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
CC2	PYTHON LAB		-	-	4	-	4	25	75	100
<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. Be able to design and program Python applications.</li> <li>2. Be able to create loops and decision statements in Python.</li> <li>3. Be able to work with functions and pass arguments in Python.</li> <li>4. Be able to build and package Python modules for reusability.</li> <li>5. Be able to read and write files in Python.</li> </ol>										
<b>LAB EXERCISES</b>									<b>Required Hours</b>	
<ol style="list-style-type: none"> <li>1. Program using variables, constants, I/O statements in Python.</li> <li>2. Program using Operators in Python.</li> <li>3. Program using Conditional Statements.</li> <li>4. Program using Loops.</li> <li>5. Program using Jump Statements.</li> <li>6. Program using Functions.</li> <li>7. Program using Recursion.</li> <li>8. Program using Arrays.</li> <li>9. Program using Strings.</li> <li>10. Program using Modules.</li> <li>11. Program using Lists.</li> <li>12. Program using Tuples.</li> <li>13. Program using Dictionaries.</li> <li>14. Program for File Handling.</li> </ol>									<b>60</b>	
<b>Course Outcomes</b>										
On completion of this course, students will										
CO1	Demonstrate the understanding of syntax and semantics of									
CO2	Identify the problem and solve using PYTHON programming techniques.									
CO3	Identify suitable programming constructs for problem solving.									
CO4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.									
CO5	Develop a PYTHON program for a given problem and test for its correctness.									

**Mapping with Programme Outcomes:**

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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<b>CO 1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>
<b>CO 2</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>-</b>	<b>2</b>
<b>CO 3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>
<b>CO 4</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>-</b>	<b>1</b>
<b>CO 5</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>-</b>
<b>Weightage of course contributed to each PSO</b>	12	11	12	7	5	7

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
FC	<b>Structured Programming Language in C</b>	FC	Y	-	-	-	2	2	25	75	100
<b>Course Objective</b>											
LO1	To familiarize the students with the Programming basics and the fundamentals of C, Datatypes in C, Mathematical and logical operations.										
LO2	To understand the concept using if statements and loops										
LO3	This unit covers the concept of Arrays										
LO4	This unit covers the concept of Functions										
LO5	To understand the concept of implementing pointers.										
UNIT	Details								No. of Hours	Course Objectives	
I	<b>Overview of C:</b> Importance of C, sample C program, C program structure, executing C program. Constants, Variables, and Data Types: Character set, C tokens, keywords and identifiers, constants, variables, data types, declaration of variables, Assigning values to variables--- Assignment statement, declaring a variable as constant, as volatile. Operators and Expression.								6	CO1	
II	<b>Decision Making and Branching:</b> Decision making with If, simple IF, IF ELSE, nested IF ELSE , ELSE IF ladder, switch, GOTO statement. <b>Decision Making and Looping:</b> While, Do-While, For, Jumps in loops.								6	CO2	
III	<b>Arrays:</b> Declaration and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays.								6	CO3	
IV	<b>Functions:</b> The form of C functions, Return values and types, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes-character arrays and string functions								6	CO4	
V	<b>Pointers:</b> definition, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures.								6	CO5	
<b>Total</b>								<b>30</b>			

<b>Course Outcomes</b>		<b>Programme Outcome</b>
CO	On completion of this course, students will	
1	Remember the program structure of C with its syntax and semantics	PO1,PO3,PO5
2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2,PO3,PO6,PO7
3	Apply the programming principles learnt in real-time problems	PO3,PO4,PO7
4	Analyze the various methods of solving a problem and choose the best method	PO4,PO5,PO6
5	Code, debug and test the programs with appropriate test cases	PO7,PO8
<b>Text Book</b>		
1	E. Balagurusamy, Programming in ANSI C, Fifth Edition, Tata McGraw-Hill, 2010.	
<b>Reference Books</b>		
1.	Byron Gottfried, Schaum's Outline Programming with C, Fourth Edition, Tata McGraw-Hill, 2018.	
2.	Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998	
3.	Yashavant Kanetkar, Let Us C, Eighteenth Edition, BPB Publications, 2021	
<b>Web Resources</b>		
1.	<a href="https://codeforwin.org/">https://codeforwin.org/</a>	
2.	<a href="https://www.geeksforgeeks.org/c-programming-language/">https://www.geeksforgeeks.org/c-programming-language/</a>	
3.	<a href="http://en.cppreference.com/w/c">http://en.cppreference.com/w/c</a>	
4.	<a href="http://learn-c.org/">http://learn-c.org/</a>	
5.	<a href="https://www.cprogramming.com/">https://www.cprogramming.com/</a>	

**Mapping with Programme Outcomes:**

<b>CO/PSO</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>	<b>PSO 6</b>
<b>CO 1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>-</b>
<b>CO 2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>-</b>	<b>2</b>
<b>CO 3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>-</b>
<b>CO 4</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>-</b>	<b>1</b>
<b>CO 5</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>
<b>Weightage of course contributed to each PSO</b>	<b>7</b>	<b>10</b>	<b>10</b>	<b>18</b>	<b>15</b>	<b>6</b>

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

**Elective Course: EC1 Discrete Mathematics**

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
	<b>DISCRETE MATHEMATICS</b>	<b>Elective</b>	4	-	-	I	3	25	75	100

**COURSE OUTCOMES**

**On Successful completion of the course, the student will be able to**

**CO1: To recall basic concepts for clear understanding of mathematical principles**

**CO2: To explain practical problems.**

**CO3: To construct matrices using discrete mathematics**

**CO4: To analyze techniques to draw graph using mathematics**

**CO5: To design graphs using their representations**

**Unit-I: RELATIONS**

**12 Hours**

Introduction to Relations – Binary relation – Classification of Relations – Composition of Relations – Inverse of Relation – Closure operation on Relations – Matrix representation of Relation.

**Unit-II: FUNCTIONS**

**12 Hours**

Introduction to Functions – Addition and Multiplication of Functions - Classifications of Functions – Composition of Function – Inverse Function.

**Unit-III: MATHEMATICAL LOGIC**

**12 Hours**

Introduction – Statement (Propositions) – Laws of Formal Logic – Basic Set of Logical operators/operations - Propositions and Truth Tables – Algebra Propositions - Tautologies and Contradictions.

**Unit-IV: MATRIX ALGEBRA**

**12 Hours**

Introduction – Definition of a Matrix - Types of Matrices – Operations on Matrices – Related Matrices – Transpose of a Matrix – Symmetric and Skew-symmetric Matrices – 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.

**Unit-V: GRAPH**

**12 Hours**

Introduction – Graph and Basic Terminologies – Types of Graphs – Sub Graph and Isomorphic Graph – Operations on Graphs – Representation of Graph.

**Text Book:**

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

3. [https://www.tutorialspoint.com/discrete\\_mathematics](https://www.tutorialspoint.com/discrete_mathematics)



**MappingwithProgrammeOutcomes:**

<b>CO/PSO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>	<b>PSO6</b>
<b>CO1</b>	3	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3	3
<b>CO4</b>	3	3	3	3	2	3
<b>CO5</b>	3	3	2	3	3	2
<b>Weightage of coursecontributed to eachPSO</b>	15	15	14	15	14	14

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

Subject Code								CIA	External	Total
	<b>FUNDAMENTAL SOFTWARE TECHNOLOGY</b>	Specific Elective	2	-	-	1	2	25	75	100
<b>Learning Objectives</b>										
<b>LO1</b>	Understand basic concepts and terminology of information technology.									
<b>LO2</b>	Have a basic understanding of personal computers and their operation									
<b>LO3</b>	Be able to identify data storage and its usage									
<b>LO4</b>	Get great knowledge of software and its functionalities									
<b>LO5</b>	Understand about operating system and their uses									
<b>UNIT</b>	<b>Contents</b>								<b>No. Of. Hours</b>	
I	<b>Introduction to Computers</b> -Generations of Computer-Data and Information – Components of Computer – Software – Hardware – Input Devices-Output Devices—Types of Operating System.								<b>6</b>	
II	<b>MS Word:</b> Introduction –Elements of Window– Files, Folders and Directories – Text Manipulating: Cut, Copy, Paste, Drag and Drop – Text Formatting: Font – Style, Size, Face and Colors (Both foreground and background)–Alignment-Bullets and Numbering-Header and footer-watermark –inserting objects (images, other application document) – Table creation– Mail merge.								<b>6</b>	
III	<b>Ms Excel:</b> Introduction–Inserting rows and columns–Sizing rows and columns–Implementing formulas–Generating series-Functions in excel –Creation of Chart–Inserting objects–Filter–Sorting–Inserting worksheet.								<b>6</b>	
IV	<b>MS PowerPoint:</b> Introduction–Slides Manipulation (Inserting new, Copy, paste, delete and duplicate slides) – Slide show– Types of Views – Types of Animations–Inserting Objects–Implementing multimedia (Video and Audio) –Templates (Built-in and User-Defined).								<b>6</b>	
V	<b>Internet:</b> Introduction to Internet and Intranet – Services of Internet - Domain Name – URL – Browser – Types of Browsers – Search Engine - E-Mail – Basic Components of E-Mail –.How to send group mail. <b>E-Commerce:</b> Digital Signature–Digital Currency–Online shopping and transaction.								<b>6</b>	
<b>TOTAL HOURS</b>								<b>30</b>		
<b>Course Outcomes</b>								<b>Programme Outcomes</b>		
CO	On completion of this course, students will									
CO1	Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.								PO1, PO2, PO3, PO4, PO5, PO6	

CO2	Develop organizational structure using for the devices present currently under input or output unit.	PO1, PO2,PO3, PO4,PO5, PO6
CO3	Concept of storing data in computer using two header namely RAM and ROM with different types of ROM with advancement in storage basis.	PO1,PO2, PO3, PO4,PO5, PO6
CO4	Work with different software, Write program in the software and application of software.	PO1,PO2, PO3, PO4,PO5, PO6
CO5	Usage of Operating system in information technology which really acts as an interpreter between software and hardware.	PO1, PO2,PO3, PO4, PO5,PO6
<b>Textbooks</b>		
1	Anoop Mathew, S.Kavitha Murugesan (2009), "Fundamental of Information Technology", Majestic Books.	
2	Alexis Leon, Mathews Leon, "Fundamental of Information Technology", 2 <sup>nd</sup> Edition.	
3	S.K Bansal, "Fundamental of Information Technology".	
<b>Reference Books</b>		
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	
<b>Web Resources</b>		
1.	<a href="https://testbook.com/learn/computer-fundamentals">https://testbook.com/learn/computer-fundamentals</a>	
2.	<a href="https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html">https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html</a>	
3.	<a href="https://www.javatpoint.com/computer-fundamentals-tutorial">https://www.javatpoint.com/computer-fundamentals-tutorial</a>	
4.	<a href="https://www.tutorialspoint.com/computer_fundamentals/index.htm">https://www.tutorialspoint.com/computer_fundamentals/index.htm</a>	
5.	<a href="https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf">https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf</a>	

**Mapping with Programme Outcomes:**

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	1	1
CO2	3	2	3	2	3	3
CO3	3	2	2	2	2	3
CO4	2	3	3	3	3	1
CO5	3	3	3	3	3	2
<b>Weightage of course contributed to each PSO</b>	<b>13</b>	<b>13</b>	<b>13</b>	<b>12</b>	<b>12</b>	<b>10</b>

**S-Strong-3    M-Medium-2L-Low-1**

**Mapping with Programme Outcomes:**

<b>CO/PSO</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>	<b>PSO 6</b>
<b>CO 1</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>1</b>
<b>CO 2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>-</b>	<b>-</b>
<b>CO 3</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>1</b>	<b>-</b>
<b>CO 4</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>
<b>CO 5</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>2</b>
<b>Weightage of course contributed to each PSO</b>	12	9	6	5	6	4

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

## SEMESTER II

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC3	<b>OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++</b>	Core	Y	-	-	-	4	5	25	75	100
<b>Course Objective</b>											
LO1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects										
LO2	Understand dynamic memory management techniques using pointers, constructors, destructors, etc										
LO3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism										
LO4	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming										
LO5	Demonstrate the use of various OOPs concepts with the help of programs										
<b>UNIT</b>	<b>Details</b>									<b>No. of Hours</b>	
I	Introduction to C++ - key concepts of Object-Oriented Programming – Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. <b>Control Structures</b> : Decision Making and Statements : If ..else, jump, goto, break, continue, Switch case statements - Loops in C++ :for, while, do - Functions in C++ - inline functions – Function Overloading.									15	
II	<b>Classes and Objects:</b> Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.									15	
III	<b>Operator Overloading:</b> Overloading unary, binary operators – Overloading Friend functions –type conversion – <b>Inheritance:</b> Types of Inheritance – Single, Multilevel, Multiple, Hierarchal,Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.									15	
IV	Pointers – Declaration – Pointer to Class , Object – this pointer – Pointers to derived classes andBase classes – Arrays – Characteristics – array of classes – Memory models – new and deleteoperators – dynamic object –									15	

	Binding, Polymorphism and Virtual Functions.	
V	Files – File stream classes – file modes – Sequential Read / Write operations – Binary and ASCIIFiles – Random Access Operation – Templates – Exception Handling - String – Declaring andInitializing string objects – String Attributes – Miscellaneous functions .	15
	<b>Total</b>	<b>75</b>
<b>Course Outcomes</b>		<b>Programme Outcome</b>
CO	Upon completion of the course the students would be able to:	
1	Remember the program structure of C with its syntax and semantics	PO1,PO6
2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2
3	Apply the programming principles learnt in real-time problems	PO4 ,PO7
4	Analyze the various methods of solving a problem and choose the best method	PO6
5	Code, debug and test the programs with appropriate test cases	PO7,PO8
<b>Text Book</b>		
1	E. Balagurusamy, “Object-Oriented Programming with C++”, TMH 2013, 7th Edition.	
<b>Reference Books</b>		
1.	Ashok N Kamthane, “Object-Oriented Programming with ANSI and Turbo C++”, Pearson Education 2003.	
2.	Maria Litvin& Gray Litvin, “C++ for you”, Vikas publication 2002.	
<b>Web Resources</b>		
1.	<a href="https://alison.com/course/introduction-to-c-plus-plus-programming">https://alison.com/course/introduction-to-c-plus-plus-programming</a>	

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
<b>CC4</b>	<b>C++ PROGRAMMING LAB</b>	Core	-	-	Y	-	4	5	25	75	100
<b>Course Objective</b>											
LO1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects										
LO2	Understand dynamic memory management techniques using pointers, constructors, destructors, etc										
LO3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism										
LO4	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming										
LO5	Demonstrate the use of various OOPs concepts with the help of programs										
S.No	Details										No. of Hours
1	Write a C++ program to demonstrate function overloading, Default Arguments and Inlinefunction.										
2	Write a C++ program to demonstrate Class and Objects										
3	Write a C++ program to demonstrate the concept of Passing Objects to Functions										
4	Write a C++ program to demonstrate the Friend Functions.										
5	Write a C++ program to demonstrate the concept of Passing Objects to Functions										
6	Write a C++ program to demonstrate Constructor and Destructor										
7	Write a C++ program to demonstrate Unary Operator Overloading										
8	Write a C++ program to demonstrate Binary Operator Overloading										

9	Write a C++ program to demonstrate: <ul style="list-style-type: none"> <li>• Single Inheritance</li> <li>• Multilevel Inheritance</li> <li>• Multiple Inheritance</li> <li>• Hierarchical Inheritance</li> <li>• Hybrid Inheritance</li> </ul>	
10	Write a C++ program to demonstrate Virtual Functions.	
11	Write a C++ program to manipulate a Text File.	
12	Write a C++ program to perform Sequential I/O Operations on a file.	
13	Write a C++ program to find the Biggest Number using Command Line Arguments	
14	Write a C++ program to demonstrate Class Template	
15	Write a C++ program to demonstrate Function Template.	
16	Write a C++ program to demonstrate Exception Handling.	

<b>Course Outcomes</b>		<b>Programme Outcome</b>
CO	Upon completion of the course the students would be able to:	
1	Remember the program structure of C with its syntax and semantics	PO1,PO6
2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2
3	Apply the programming principles learnt in real-time problems	PO4 ,PO7
4	Analyze the various methods of solving a problem and choose the best method	PO6
5	Code, debug and test the programs with appropriate test cases	PO7,PO8

**Text Book**

1	E. Balagurusamy, “Object-Oriented Programming with C++”, TMH 2013, 7th Edition.
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<b>Reference Books</b>	
1.	Ashok N Kamthane, “Object-Oriented Programming with ANSI and Turbo C++”, Pearson Education 2003.
2.	Maria Litvin& Gray Litvin, “C++ for you”, Vikas publication 2002.
<b>Web Resources</b>	
1.	<a href="https://alison.com/course/introduction-to-c-plus-plus-programming">https://alison.com/course/introduction-to-c-plus-plus-programming</a>

**Mapping with Programme Outcomes:**

<b>CO/PSO</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>	<b>PSO 6</b>
<b>CO 1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>2</b>
<b>CO 2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>2</b>
<b>CO 3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>2</b>
<b>CO 4</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>2</b>
<b>CO 5</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>2</b>
<b>Weightage of course contributed to each PSO</b>	11	15	15	15	5	10

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

## EC2: Elective Course **OPTIMIZATION TECHNIQUES**

### *Course objectives:*

1. To apply various optimization techniques for decision making.
2. To introduce the use of variables for formulating complex mathematical models in management, science and industrial applications

### *Course Outcome:*

On successful completion of the course, the learners will be able to CO1. Formulate and solve Linear Programming Problems.

CO2. Analyze the usage of Assignment Problems. CO3. Evaluate Transportation Models.

CO4. Apply PERT and CPM techniques to find the optimal solution.

**UNIT I** 12 hours

### **INTRODUCTION OPERATIONS RESEARCH**

The Nature and Meaning of OR – Management – Applications of OR  
– Modeling in OR – General methods for solving OR models – Scope of OR –  
Advantages and disadvantages of OR

**UNIT II** 12 hours

### **LINEAR PROGRAMMING PROBLEM**

Linear Programming Problem: Formulation of LP problems –  
Graphical solution of LP problems – General formulation of LPP – Slack  
and Surplus variables – Standard form of LPP

**UNIT III** 12 hours

### **ASSIGNMENT PROBLEMS**

Assignment Problem: Mathematical formulation – Hungarian method –  
Unbalanced assignment problem – Various types

**UNIT IV** 12 hours

### **TRANSPORTATION PROBLEMS**

Transportation Model: Mathematical formulation – Matrix form – Methods  
for finding Initial Basic Feasible solution and Optimal solution.

**UNIT V****12 hours****PERT AND CPM TECHNIQUES**

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.

CO-PO–  
PSO Map  
ping

OPTIMIZATION TECHNIQUES											
CO	PO					PSO					COGNITIVE LEVEL
	1	2	3	4	5	1	2	3	4	5	
CO1	S	S	S	M	S	S	S	M	S	S	K-2
CO2	S	S	M	S	S	S	S	S	S	S	K-1
CO3	S	S	M	S	S	S	S	S	S	S	K-3
CO4	S	S	M	S	S	S	S	S	S	S	K-5
CO5	S	S	M	S	S	S	S	S	S	S	K-6

Strongly Correlated – S, Moderately Correlated – M, Weakly Correlated – L

**TEXTBOOK**

S.D.Sharma, “Operations Research”, Tenth Edition, Pearson, 2017.

**REFERENCE BOOKS**

1. Hamdy A.Taha, “Operations Research”, Ninth Edition, Pearson, 2016.
2. V.Sundaresan, K.S.Ganapathy Subramanian, K. Ganesan, “Resource Management Techniques”, Ninth Edition, A.R.Publications, 2015.

Subject Code	SubjectName	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
	<b>INTRODUCTION TO HTML</b>	Specific Elective	2	-	-		2	25	75	100
<b>Learning Objectives</b>										
LO1	Insert a graphic within a webpage.									
LO2	Create a link within a webpage.									
LO3	Create a table within a web page.									
LO4	Insert heading levels within a webpage.									
LO5	Insert ordered and unordered lists within a webpage. Create a webpage.									
UNIT	Contents									No. Of. Hours
I	<b>Introduction:</b> Web Basics: What is Internet – Web browsers – What is Web page – HTML Basics: Understanding tags.									6
II	Tags for Document structure (HTML, Head, Body Tag). Block level text elements: Headings paragraph (<p>tag) – Font style elements: (bold, italic, font, small, strong, strike, big tags)									6
III	Lists: Types of lists: Ordered, Unordered – Nesting Lists – Other tags: Marquee, HR, BR – Using Images – Creating Hyperlinks.									6
IV	Tables: Creating basic Table, Table elements, Caption – Table and cell alignment – Rowspan, Colspan – Cellpadding.									6
V	Frames: Frameset – Targeted Links – No frame – Forms: Input, Textarea, Select, Option.									6
<b>TOTAL HOURS</b>									<b>30</b>	
Course Outcomes								Programme Outcomes		
CO	On completion of this course, students will									
CO 1	Knows the basic concept in HTML Concept of resources in HTML									PO1, PO2, PO3, PO4, PO5, PO6
CO 2	Knows Design concept. Concept of Meta Data Understand the concept of save the files.									PO1, PO2, PO3, PO4, PO5, PO6
CO 3	Understand the page formatting. Concept of list									PO1, PO2, PO3, PO4, PO5, PO6

CO 4	CreatingLinks. Knowtheconceptofcreating linkto emailaddress	PO1, PO2,PO3, PO4, PO5,PO6
CO 5	Concept of adding imagesUnderstandthetable creation.	PO1, PO2,PO3, PO4, PO5,PO6
<b>Textbooks</b>		
1	“MasteringHTML5andCSS3MadeEasy”,TeachUCompInc.,2014.	
2	<b>ThomasMichaud,“FoundationsofWebDesign:IntroductiontoHTML&amp;CSS”</b>	
<b>WebResources</b>		
1	<a href="https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf">https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf</a>	
2	<a href="https://www.w3schools.com/html/default.asp">https://www.w3schools.com/html/default.asp</a>	

**MappingwithProgrammeOutcomes:**

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	2	3	3	3
CO3	2	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	2	3	3
<b>Weightageof coursecontributedtoeach PSO</b>	14	15	14	14	15	15

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	<b>PHP PROGRAMMING</b>	Specific Elective	Y				2	2	25	75	100
<b>Course Objective</b>											
LO1	To provide the necessary knowledge on basics of PHP.										
LO2	To design and develop dynamic, database-driven web applications using PHP version.										
LO3	To get an experience on various web application development techniques.										
LO4	To learn the necessary concepts for working with the files using PHP.										
LO5	To get a knowledge on OOPS with PHP.										
UNIT	Details								No. of Hours	Course Objectives	
I	Introduction to PHP - Basic Knowledge of websites - Introduction of Dynamic Website - Introduction to PHP - Scope of PHP - XAMPP and WAMP Installation								6	CO1	
II	PHP Programming Basics - Syntax of PHP - Embedding PHP in HTML - Embedding HTML in PHP.								6	CO2	
	Introduction to PHP Variable - Understanding Data Types - Using Operators - Using Conditional Statements - If(), elseif() and else if condition Statement.										
III	Switch() Statements - Using the while() Loop - Using the for() Loop PHP Functions. PHP Functions - Creating an Array - Modifying Array Elements - Processing Arrays with Loops - Grouping Form Selections with Arrays - Using Array Functions.								6	CO3	
IV	PHP Advanced Concepts - Reading and Writing Files - Reading Data from a File.								6	CO4	
V	Managing Sessions and Using Session Variables - Destroying a Session - Storing Data in Cookies - Setting Cookies.								6	CO5	
	<b>Total</b>								<b>30</b>		

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	Write PHP scripts to handle HTML forms	PO1, PO4, PO6, PO8.
2	Write regular expressions including modifiers, operators, and metacharacters.	PO2, PO5, PO7.
3	Create PHP Program using the concept of array.	PO3, PO6, PO8.
4	Create PHP programs that use various PHP library functions	PO2, PO3, PO5, PO8.
5	Manipulate files and directories.	PO3, PO5, PO6.
<b>Text Book</b>		
1	Head First PHP & MySQL: A Brain-Friendly Guide- O'Reilly 2009- Lynn Beighley and Michael Morrison.	
2	The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL- Alan Forbes	
<b>Reference Books</b>		
1.	PHP: The Complete Reference- Steven Holzner, McGraw Hill, 2008.	
2.	HTML 5 Black Book - Dreamtech Press 2016, 2 <sup>nd</sup> Edition.	
<b>Web Resources</b>		
1.	Refer MOOC Courses like NPTEL and SWAYAM	
2.	<a href="https://www.w3schools.com/php/default.asp">https://www.w3schools.com/php/default.asp</a>	

**Mapping with Programme Outcomes:**

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	1	-	1
CO2	2	-	1	1	2	1
CO3	3	3	1	1	-	1
CO4	1	3	2	1	-	1
CO5	3	2	1	1	-	1
<b>Weightage of course contributed to each PSO</b>	12	11	6	5	2	5

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