

**B.Sc.,
COMPUTER SCIENCE &
INFORMATION TECHNOLOGY**

SYLLABUS

**FROM THE ACADEMIC YEAR
2023 – 2024**

1. Introduction

B.Sc.Computer Science & Information Technology

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) 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 Science 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 science 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 Science 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 science 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 science 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 Science 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.

The Students completing this programme will be able to present Software application clearly, 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, software industry, banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME	
Programme:	B.Sc., Computer Science & Information Technology
Programme Code:	
Duration:	3 years [UG]
Programme Outcomes:	<p>PO1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study</p> <p>PO2: Communication Skills: Ability to express thoughts and ideas effectively; Communicate with others using appropriate media; confidently share one’s views; 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>PO3: Critical thinking: Capability to apply analytic; 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> <p>PO4: Problem solving: Capacity to extrapolate from what one</p>

has learned and apply their competencies to solve different kinds of non-familiar problems and apply 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; 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, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate and 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; 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 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.

PO 12 Multicultural competence: 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.

PO 13: Moral and ethical awareness/reasoning: 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, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and

	<p>sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.</p> <p>PO 14: Leadership readiness/qualities: 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>PO 15: Lifelong learning: Ability to acquire knowledge and skills, including learning “how to learn”, 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>
Programme Specific Outcomes:	<p>PSO1: To enable students to apply basic microeconomic, macroeconomic and monetary concepts and theories in real life and decision making.</p> <p>PSO 2: To sensitize students to various economic issues related to Development, Growth, International Economics, Sustainable Development and Environment.</p> <p>PSO 3: To familiarize students to the concepts and theories related to Finance, Investments and Modern Marketing.</p> <p>PSO 4: Evaluate various social and economic problems in the society and develop answer to the problems as global citizens.</p> <p>PSO 5: Enhance skills of analytical and critical thinking to analyze effectiveness of economic policies.</p>

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
PSO 1	S	S	L	S	S	S	M	S
PSO 2	S	S	S	S	S	L	S	S
PSO3	M	S	M	S	M	S	L	S
PSO 4	S	S	S	S	S	S	S	S
PSO 5	L	S	S	S	S	S	S	M

S – Strong, M- Medium, L- 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 education and scientific front, practical training, devising mathematical models and algorithms for providing solutions to 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 application of conceptual knowledge to practical situations. The innovative provisions of the industrial training, 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.

Value additions in the Revamped Curriculum:

Semester	Newly introduced Components	Outcome/ Benefits
I	Foundation Course 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"> ➤ Instill confidence ➤ Create interest for the subject
I,II,III,IV	Skill Enhancement papers (Discipline centric / Generic/ Entrepreneurial)	<ul style="list-style-type: none"> ➤ Industry ready graduates ➤ Skilled human resource ➤ Equipped with essential skills to be employable
		<ul style="list-style-type: none"> ➤ Training on language and communication skills enable to gain knowledge and exposure in the competitive world.
		<ul style="list-style-type: none"> ➤ Discipline centric skill will improve the Technical know-how of solving real life problems.
III,IV,V& VI	Elective papers	<ul style="list-style-type: none"> ➤ Strengthening the domain knowledge ➤ Introducing the stakeholder to the State-of-Art techniques from the streams of multi-disciplinary, cross disciplinary and interdisciplinary nature ➤ Exposure to industry moulds students into solution providers ➤ Self-learning is enhanced ➤ Developing a research framework and presenting their independent and Intellectual ideas effectively.
Extra Credits: For Advanced Learners/ Honors degree		<ul style="list-style-type: none"> ➤ To cater to the needs of peer learners/ research aspirants
Skills acquired from the Courses		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Framework (LOCF) Guideline Based Credit and Hours Distribution System for all UG courses including Lab Hours

First Year – Semester-I

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses [in Total]	13	14
Part-4	Skill Enhancement Course SEC-1	2	2
	Foundation Course	2	2
		23	30

Semester-II

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses including laboratory [in Total]	13	14
Part-4	Skill Enhancement Course -SEC-2	2	2
	Skill Enhancement Course -SEC-3 (Discipline / Subject Specific)	2	2
		23	30

Second Year – Semester-III

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses including laboratory [in Total]	13	14
Part-4	Skill Enhancement Course -SEC-4 (Entrepreneurial Based)	1	1
	Skill Enhancement Course -SEC-5 (Discipline / Subject Specific)	2	2
	E.V.S	-	1
		22	30

Semester-IV

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses including laboratory [in Total]	13	13
Part-4	Skill Enhancement Course -SEC-6 (Discipline / Subject Specific)	2	2
	Skill Enhancement Course -SEC-7 (Discipline / Subject Specific)	2	2
	E.V.S	2	1
		25	30

**Third Year
Semester-V**

Part	List of Courses	Credit	No. of Hours
Part-3	Core Courses including Project / Elective Based	22	26
Part-4	Value Education	2	2
	Internship / Industrial Visit / Field Visit	2	2
		26	30

Semester-VI

Part	List of Courses	Credit	No. of Hours
Part-3	Core Courses including Project / Elective Based & LAB	18	28
Part-4	Extension Activity	1	-
	Professional Competency Skill	2	2
		21	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 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	1	22
Part V	-	-	-	-	-	2	2
Total	23	23	22	25	26	21	140

*** 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.**

MethodsofEvaluati on		
InternalEv aluation	ContinuousInternalAssessmentTest	25 Marks
	Assignments	
	Seminars	
	AttendanceandClassParticipation	
ExternalEv aluation	EndSemesterExamination	75 Marks
	Total	100 Marks
MethodsofAssesm ent		
Recall(K1)	Simpledefinitions,MCQ,Recallsteps,Conceptdefinitions	
Understand /Comprehend(K2)	MCQ,True/False,Shortessays,Conceptexplanations,Shortsumma ryor Overview	
Application (K3)	Suggestidea/conceptwithexamples,Suggestformulae, Solveproblems, Observe,Explain	
Analyze(K4)	Problem- solvingquestions,Finishaprocedureinmanysteps,Differentiate betweenvariousideas,Mapknowledge	
Evaluate(K5)	Longer essay/Evaluationessay,Critiqueorjustifywithprosandcons	
Create(K6)	Checkknowledgeinspecificoroffbeatsituations,Discussion,Debatin gorPresentations	

Eligibility for Admission to B.Sc., Computer Science & Information Technology:

Candidates who have studied Mathematics in HSC areeligible for this programme (item no. 11 of G.O. (D) No. 147, Higher Education (G1) Department dated 05.05.2023)

**Template for Curriculum Design for UG Programme in
B.Sc Computer Science & Information Technology
Credit Distribution for UG Programme in Computer Science & Information Technology
B.Sc Computer Science & Information Technology
First Year
Semester-I**

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 3 (CC1, CC2A, CC2 B)		
	CC1 Object Oriented Programming using C++	5	5
	CC2-1C++ Programming Lab	3	3
	CC2-2Multimedia Lab	2	2
Part-III	Elective Course 1	3	4
	EC1 Numerical Methods/Discrete Mathematics		
Part-IV	Skill Enhancement Course SEC-1	2	2
	Office Automation / Web Designing		
Part-IV	Foundation Course FC Fundamentals of Information Technology	2	2
		23	30

Semester-II

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 (CC3, CC4)		
	CC3 JAVAPROGRAMMING	5	5
	CC4-1 Java Programming Practical	3	3
	CC4-2 PHP Scripting Lab	2	2
Part-III	Elective Course 1 (Generic Discipline Specific)	3	4
	EC2 Optimization Techniques / Trends in Computing		
Part-IV	Skill Enhancement Course -SEC-2	2	2
	Advanced Excel / Quantitative Aptitude		
Part-IV	Skill Enhancement Course -SEC-3 (Discipline Specific / Generic) Software Testing/ Problem Solving Techniques	2	2
		23	30

CC1; Core Course 1: OBJECT ORIENTED PROGRAMMING USING C++

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	5	0	0	I	5	5	25	75	100
Learning Objectives									
LO1	To inculcate knowledge on Object-oriented concepts and programming using C++.								
LO2	Demonstrate the use of various OOPs concepts with the help of programs								
Unit	Contents								No. of Hours
I	OOP Paradigm – Concepts of OOP – Benefits of OOP - Object Oriented Languages – Applications of OOP – OOP Design: Using UML as a Design Tool Beginning with C++								15
II	Tokens, Expressions and Control Structures - Functions in C++ : Function Prototyping – Call by Reference - Return by Reference – Inline Function – Default Arguments – Const Arguments – Recursion – Function Overloading – Classes and Objects								15
III	Constructors and Destructors: Constructors – Parameterized Constructors – Multiple Constructors – Constructor with default Arguments – Copy Constructors – Dynamic Constructor – Destructors – Operator Overloading and Type Conversions: Operator Overloading – Overloading Unary Operators – Overloading Binary operators – Rules for Operator Overloading – Type Conversions								15
IV	Inheritance: Introduction – Types of Inheritance – Virtual Base Classes – Abstract Classes – Pointers - Virtual Function - Polymorphism								15
V	Templates: Class Templates – Function Templates – Overloading of template Function – Exception Handling								15
TOTAL								75	
CO	Course Outcomes								
CO1	Outline the C++ programming fundamentals and the concepts of object-oriented programming like object and class, Encapsulation, inheritance and polymorphism.								
CO2	Classify the control structures, types of constructors, inheritance and different type conversion mechanisms.								
CO3	Analyze the importance of object oriented programming features like polymorphism, reusability, generic programming, data abstraction and the usage of exception handling.								
CO4	Determine the use of object oriented features such as classes, inheritance and templates to develop C++ programs for complex problems.								
CO5	Create a program in C++ by implementing the concepts of object-oriented								

	programming.
Textbooks	
➤	E. Balaguruswamy, (2013), “Object Oriented Programming using C++”, 6th Edition, Tata McGraw Hill.
Reference Books	
1	Bjarne Stroustrup, “The C++ Programming Language”, Fourth Edition, Pearson Education.
2	Hilbert Schildt, (2009), “C++ - The Complete Reference”, 4th Edition, Tata McGrawHill
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1.	http://fahad.cprogramming.blogspot.com/p/c-simple-examples.html
2.	http://www.sitesbay.com/cpp/cpp-polymorphism

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	2
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	14	11	15	15	10

CC2-1: Core Practical 1 :C++ Programming Lab

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	0	0	3	I	3	3	25	75	100
Learning Objectives									
LO1	To inculcate knowledge on Object-oriented concepts and programming using C++.								
LO2	Demonstrate the use of various OOPs concepts with the help of programs								
List of Exercises									
Exercises: <ol style="list-style-type: none"> 1. Working with Classes and Objects 2. Using Constructors and Destructors 3. Using Function Overloading 4. Using Operator Overloading 5. Using Type Conversions 6. Using Inheritance 7. Using Polymorphism 8. Using Console I/O 9. Using Templates 10. Using Exceptions 									
TOTAL							75		
CO	Course Outcomes								
CO1	Understand the fundamentals of C++ programming structure								
CO2	Identify the basic features of OOPS such as classes, objects, polymorphism, inheritance								
CO3	Analyze the concept of inheritance with the understanding of early and late binding, usage of exception handling, constructors, destructors, generic programming and type conversions								
CO4	Determine the use of various data structures such as stacks, queues and lists to solve various computing problems in C++ by incorporating OOPS concepts.								
CO5	Develop a program in C++ with the concepts of object oriented programming to solve various problems.								

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	2
CO5	3	3	2	3	3	2
Weightage of course contributed to ea	15	14	11	15	15	10

chPSO						
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CC2-2: Core Practical 2: Multimedia Lab

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
SEC4	0	0	2	I	2	2	25	75	100
Learning Objectives									
LO1	Understands the basics of multimedia								
LO2	Acquire knowledge of image editing and animation techniques.								
LO3	Apply multimedia concepts to real world projects								
Unit	Contents								No. of Hours
I	GIMP's Tools- Taking Advantage of Paths - Working with Layers and masks - Using Channels Exercises: <ol style="list-style-type: none"> 1. Enlarge a Logo using path 2. Create an ink drawing using path 3. Replace Background of image using Channels 								6
II	Manipulating Images: Transforming Images - Using The Image Tools - Adjusting Colors - Working with Text - Painting in Gimp: Creating new brushes - Enhancing Photos - Exploring Filters and Effects. Exercises: <ol style="list-style-type: none"> 1. Design Front Cover for a Book. 2. Create a customized logo 3. Use clone tool to remove text from an image 4. Remove Red eye using Filter. 								6
III	Using GIMP animation package - Managing the Frames of Image Sequence with GAP - Morphing - onion skinning - Creating a Storyboard. Exercises: <ol style="list-style-type: none"> 1. Morphing - Create smooth transitions from one image to another. 2. Create a Story board for your project 								6
IV	Flash: Introduction - Creating and Editing Objects - Color and Text. Animations: Frame- by- frame animation-Motion Tweening- Motion Guides <ol style="list-style-type: none"> 1. Creating Frame-by-frame Animation 2. Create a Motion Tween for Graphic and Text Object 								6

	3. Create a Motion guide Layer	
V	Shape Tweening - Masking - Interactivity: Adding Script to Buttons - Testing and Publishing. Exercises: 1. Create a Shape Tween for Graphic Object 2. Create a Mask Layer 3. Adding buttons with Action Script	6
TOTAL		30
CO	Course Outcomes	
CO1	Demonstrate understanding and use of multimedia fundamentals	
CO2	Implement appropriate techniques required for editing images and designing animated system	
CO3	Solve various design and implementation issues materialize on the development of multimedia systems	
CO4	Assess different Photo Editing, Video Editing and animation tools and select the appropriate tool based on the requirements	
CO5	Design and develop Multimedia Projects	
Textbooks		
➤	1. Jason Van Gumster & Robert Shimonski (2010), "GIMP Bible", Wiley, 2nd edition. 2. Chris Gover, 2010, "Flash CS5: The missing Manual", 1st Edition, O' Reilly India.	
Reference Books		
1	Juan Manuel Ferreyra (2011), "GIMP 2.6 Cookbook", PACK publishing Ltd.	
2	Robert Reinhard (2003), "Macromedia Flash MX Bible", Wiley Dreamtech India Pvt Ltd.	
NOTE: Latest Edition of Textbooks May be Used		
Web Resources		
1.	https://www.youtube.com/watch?v=T8NIK3RdoIc (Unit IV: Gimp Video Editing)	
2.	https://www.youtube.com/watch?v=Jz9WrbELGYA	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	M	S	M			M		L
CO 2	S	M	S			M		
CO 3		S	S		M		L	
CO 4			S	L	M		M	
CO 5				M		S	M	S

Elective Course: EC1 A: NUMERICAL METHODS

COURSE OBJECTIVE:

L T P C
4 0 0 3

1. To introduce the concept of solving equations using different methods
2. To understand the use of Assignment and Transportation problems

Unit I:

Curve Fitting: Introduction, Method of Least squares, Curve Fitting, Fitting a Straight Line

Unit II:

Solution of Algebraic and Transcendental Equations: Bisection method, Regula Falsi method, Newton Raphson Method

Unit III:

Solution of Simultaneous Linear Equations: Solution of Simultaneous Linear Equations: Gauss Elimination method, Gauss-Jordan method, Gauss Seidel Method, Jacobi's method

Unit IV:

Numerical Differentiation & Integration: Differentiation: Using Newton's Forward Difference, Newton's Backward Difference, Newton's Divided Difference (First Order Differentiation only)

Integration: Using Trapezoidal rule, Simpson's 1/3 & Simpson's 3/8 rules

Unit V:

Solution of Ordinary Differential Equations: Runge-Kutta 2nd Order and 4th Order methods, Predictor-Corrector Methods: Milne and Adam's methods.

COURSE OUTCOME:

On successful completion of the course, the learners will be able to

1. Obtain numerical solutions of algebraic and transcendental equations
2. Solve system of linear equations numerically using direct and iterative methods
3. Solve ordinary differential equations
4. Compute integration using Simpson's & Trapezoidal Rule
5. Apply numerical methods in real life problems

CO - PO - PSO Mapping

NUMERICAL METHODS											
CO	PO					PSO					COGNITIVE LEVEL
	1	2	3	4	5	1	2	3	4	5	
CO 1	S	S	S	M	S	S	S	M	S	S	K - 2
CO 2	S	S	M	S	S	S	S	S	S	S	K - 6
CO 3	S	S	M	S	S	S	S	S	S	S	K - 4
CO 4	S	S	M	S	S	S	S	S	S	S	K - 6
CO 5	S	S	M	S	S	S	S	S	S	S	K - 6

Strongly Correlated – S, Moderately Correlated – M, Weekly Correlated - L

TEXT BOOKS

1. B.S. Grewal, "Numerical Methods in Engineering & Science", Khanna Publishers, Fifth Edition, April 1999.
2. M.K. Venkataraman, "Numerical Methods in Science & Engineering", National Publishing Co., 2005'

Elective Course: EC1 B: Discrete Mathematics

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
	DISCRETE MATHEMATICS	Elective	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 the 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 - digraphs.

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 – Logical Equivalence – Logical Implication – Normal Forms.

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 – Complex Matrix
– Conjugate of a Matrix – Determinant of a Matrix – Typical Square Matrices – Adjoint and Inverse of a Matrix – Singular and Non-singular Matrices – Adjoint of a Square Matrix – Properties of Adjoint of a Matrix – Properties of Inverse of a Matrix.

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 BikashKanti 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

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	2	3
CO 5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	15	14	15	14	14

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

Skill Based Elective: SEC 1 A

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	OFFICE AUTOMATION	Specific Elective	Y	2	-	I	2	2	25	75	100
Course Objective											
C1	Understand the basics of computer systems and its components.										
C2	Understand and apply the basic concepts of a word processing package.										
C3	Understand and apply the basic concepts of electronic spreadsheet software.										
C4	Understand and apply the basic concepts of database management system.										
C5	Understand and create a presentation using PowerPoint tool.										
UNIT	Details										No. of Hours
I	Introductory concepts: Memory unit– CPU-Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: DOS– UNIX–Windows. Introduction to Programming Languages.										6
II	Word Processing: Open, Save and close word document; Editing text – tools, formatting, bullets; Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, numbering; printing–Preview, options, merge.										6
III	Spreadsheets : Excel–opening, entering text and data, formatting, navigating; Formulas–entering, handling and copying; Charts–creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.										6
IV	Database Concepts: The concept of data base management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports; Linking of datafiles; Understanding Programming environment in DBMS; Developing menu drive applications in query language (MS–Access).										6
V	Power point: Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition–Animation effects, audio inclusion, timers.										6

		Total	30
	Course Outcomes		Programme Outcomes
CO		On completion of this course, students will	
1		Possess the knowledge on the basics of computers and its components	PO1,PO2,PO3,PO6,PO8
2		Gain knowledge on Creating Documents, spreadsheet and presentation.	PO1,PO2,PO3,PO6
3		Learn the concepts of Database and implement the Query in Database.	PO3,PO5,PO7
4		Demonstrate the understanding of different automation tools.	PO3,PO4,PO5,PO7
5		Utilize the automation tools for documentation, calculation and presentation purpose.	PO4,PO6,PO7,PO8
	Text Book		
1		Peter Norton,“Introduction to Computers”–Tata Mc Graw-Hill.	
	Reference Books		
1.		Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGrawHill.	
	Web Resources		
1.		https://www.udemy.com/course/office-automation-certificate-course/	
2.		https://www.javatpoint.com/automation-tools	

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	M	S	M			M		L
CO 2	S	M	S			M		
CO 3		S	S		M		L	
CO 4			S	L	M		M	
CO 5				M		S	M	S

S-Strong M-Medium L-Low

Skill Based Elective: SEC 1 B

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.	Marks		
									CIA	External	Total
	WEB DESIGNING	Specific Elective	Y	2	-	I	2	2	25	75	100
Course Objective											
C1	Understand the basics of HTML and its components										
C2	To study about the Graphics in HTML										
C3	Understand and apply the concepts of XML and DHTML										
C4	Understand the concept of JavaScript										
C5	To identify and understand the goals and objectives of the Ajax										
UNIT	Details							No. of Hours	Course Objective		
I	HTML: HTML-Introduction-tag basics- page structure-adding comments working with texts, paragraphs and line break. Emphasizing test- heading and horizontal rules-list-font size, face and color-alignment links-tables-frames.							6	C1		
II	Forms & Images Using Html: Graphics: Introduction-How to work efficiently with images in web pages, image maps, GIF animation, adding multimedia, data collection with html forms textbox, password, list box, combo box, text area, tools for building web page front page.							6	C2		
III	XML & DHTML: Cascading style sheet (CSS)-what is CSS-Why we use CSS-adding CSS to your web pages-Grouping styles-extensible markup language (XML).							6	C3		
IV	Dynamic HTML: Document object model (DCOM)-Accessing HTML & CSS through DCOM Dynamic content styles & positioning-Event bubbling-data binding. JavaScript: Client-side scripting, What is JavaScript, How to develop JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition,							6	C4		
V	Advance script, JavaScript and objects, JavaScript own objects, the DOM and web browser environments, forms and validations.							6	C5		
Total							60				

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Develop working knowledge of HTML	PO1, PO3, PO6, PO8
2	Ability to Develop and publish Web pages using Hypertext Markup Language (HTML).	PO1,PO2,PO3,PO6
3	Ability to optimize page styles and layout with Cascading Style Sheets (CSS).	PO3, PO5
4	Ability to develop a java script	PO1, PO2, PO3, PO7
5	An ability to develop web application using Ajax.	P02, PO6, PO7
Text Book		
1	Pankaj Sharma, “Web Technology”, SkKataria& Sons Bangalore 2011.	
2	Mike Mcgrath, “Java Script”, Dream Tech Press 2006, 1st Edition.	
3	Achyut S Godbole&AtulKahate, “Web Technologies”, 2002, 2nd Edition.	
Reference Books		
1.	Laura Lemay, RafeColburn , Jennifer Kyrnin, “Mastering HTML, CSS &Javascript Web Publishing”, 2016.	
2.	DT Editorial Services (Author), “HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)”, Paperback 2016, 2nd Edition.	
Web Resources		
1.	NPTEL & MOOC courses titled Web Design and Development.	
2.	https://www.geeksforgeeks.org	

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S		M			L		M
CO 2	S	M	L			M		
CO 3			S		M			
CO 4	S	M	M				L	
CO 5		M				L	M	

S-Strong M-Medium L-Low

Foundation Course FC1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
	FUNDAMENTALS OF INFORMATION TECHNOLOGY	FC	2	-	-	I	2	25	75	100
Learning Objectives										
LO1	Understand basic concepts and terminology of information technology.									
LO2	Have a basic understanding of personal computers and their operation									
LO3	Be able to identify data storage and its usage									
LO4	Get great knowledge of software and its functionalities									
LO5	Understand about operating system and their uses									
UNIT	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								6	
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.								6	
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								6	
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								6	
V	Operating System: Functions, Measuring System Performance, Assemblers, Compilers and Interpreters.Batch Processing, Multiprogramming, Multi Tasking, Multiprocessing, Time Sharing, DOS, Windows,								6	

	Unix/Linux.	
TOTAL HOURS		30
Course Outcomes		Programme Outcomes
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 applications of software.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Usage of Operating system in information technology which really acts as a interpreter between software and hardware.	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		
1	Anoop Mathew, S. KavithaMurugeshan (2009), “ Fundamental of Information Technology”, Majestic Books.	
2	Alexis Leon, Mathews Leon,” Fundamental of Information Technology”, 2 nd Edition.	
3	S. K Bansal, “Fundamental of Information Technology”.	
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	
Web Resources		
1.	https://testbook.com/learn/computer-fundamentals	
2.	https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html	
3.	https://www.javatpoint.com/computer-fundamentals-tutorial	
4.	https://www.tutorialspoint.com/computer_fundamentals/index.htm	
5.	https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	2	3
CO 5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	15	14	15	14	14

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

SEMESTER II

Core Course 3: CC3: JAVAPROGRAMMING

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	5	0	0	II	5	5	25	75	100
Learning Objectives									
L O 1	To provide knowledge on fundamentals of object-oriented programming								
L O 2	to have the ability to use the SDK environment to create, debug and run servlet programs								
Prerequisites: Basic knowledge about programming concepts									
Unit	Contents							No. of Hours	
I	Fundamentals of Object-Oriented Programming: Introduction – Object Oriented Paradigm – Concepts of Object-Oriented Programming – Benefits of OOP – Evolution: Java History - Java Features - Differs from C and C++ - Overview of Java Language: Java Program - Structure – Tokens – Java Statements – Java Virtual Machine – Command Line Arguments							15	
II	Constants, Variables and Data Types – Operators and Expressions – Decision making and Branching – Looping – Arrays - Strings – Collection Interfaces and classes							15	
II I	Classes objects and methods: Introduction – Defining a class – Method Declaration – Constructors - Method Overloading – Static Members – Nesting of methods – Inheritance – Overriding – Final variables and methods – Abstract methods and classes							15	
I V	Multiple Inheritance: Defining Interfaces – Extending Interfaces – Implementing Interfaces – Packages: Creating Packages – Accessing Packages – Using a Package – Managing Errors and Exceptions - Multithreaded Programming							15	
V	Layout Managers - JDBC – Java Servlet: - Servlet Environment Role – Servlet API – Servlet Life Cycle – Servlet Context – HTTP Support – HTML to Servlet Communication							15	
TOTAL							75		
C	Course Outcomes								

O	
C O 1	Outline the basic terminologies of OOP, programming language techniques, JDBC and Internet programming concepts
C O 2	Solve problems using basic constructs, mechanisms, techniques and technologies of Java
C O 3	Analyse and explain the behavior of simple programs involving different techniques such as Inheritance, Packages, Interfaces, Exception Handling and Thread and technologies such as JDBC and Servlets
C O 4	Assess various problem-solving strategies involved in Java to develop a high-level application.
C O 5	Design GUI based JDBC applications and able to develop Servlets using suitable OOP concepts and techniques
Textbooks	
	E Balagurusamy (2010), "Programming with Java", Tata McGraw Hill Edition India Private Ltd, 4th Edition
	C Xavier, "Java Programming – A Practical Approach", Tata McGraw Hill Edition Private Ltd
Reference Books	
	P. Naughton and H. Schildt (1999), "Java 2 The Complete Reference", TMH, 3rd Edition
	Jaison Hunder & William Crawford (2002), "Java Servlet Programming", O'Reilly
	Jim Keogh (2002), "J2EE: The Complete Reference", Tata McGraw Hill Edition.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
	http://javabeginnerstutorial.com/core-java/
	http://www.tutorialspoint.com/java/
	http://beginnersbook.com/java-tutorial-for-beginners-with-examples/
	http://www.homeandlearn.co.uk/java/java.html
	http://www.journaldev.com/1877/servlet-tutorial-java(UnitV:ServletAPI)

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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CO1	3	2	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	3	3	3	2	2
CO4	2	3	2	2	2	2
CO5	3	3	2	2	2	2
Weightage of course contributed to each PSO	12	14	11	11	10	10

CC4-1 Core Practical 3

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC4 -1	Java Programming Practical	Core	-	-	3	II	3	3	25	75	100
Learning Objectives											
LO1	To provide fundamental knowledge of object-oriented programming.										
LO2	To equip the student with programming knowledge in Core Java from the basics up.										
LO3	To enable the students to know about Event Handling .										
LO4	To enable the students to use String Concepts.										
LO5	To equip the student with programming knowledge in to create GUI using AWT controls.										
EXCERCISE	Details										
1	Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer										
2	Write a Java program to multiply two given matrices.										
3	Write a Java program that displays the number of characters, lines and words in a text										
4	Generate random numbers between two given limits using Random class and print messages according to the range of the value generated.										
5	Write a program to do String Manipulation using CharacterArray and perform the following string operations: a. String length										

	<ul style="list-style-type: none"> b. Finding a character at a particular position c. Concatenating two strings 	
6	<p>Write a program to perform the following string operations using String class:</p> <ul style="list-style-type: none"> a. String Concatenation b. Search a substring c. To extract substring from given string 	
7	<p>Write a program to perform string operations using String Buffer class:</p> <ul style="list-style-type: none"> a. Length of a string b. Reverse a string c. Delete a substring from the given string 	
8	<p>Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.</p>	
9	<p>Write a threading program which uses the same method asynchronously to print the numbers 1to10 using Thread1 and to print 90 to100 using Thread2.</p>	
10	<p>Write a program to demonstrate the use of following exceptions.</p> <ul style="list-style-type: none"> a. Arithmetic Exception b. Number Format Exception c. ArrayIndexOutOfBoundsException d. NegativeArraySizeException 	
11	<p>Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes</p>	
12	<p>Write a program to accept a text and change its size and font. Include bold italic options. Use frames and controls.</p>	
13	<p>Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes).</p>	
14	<p>Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.</p>	
15	<p>Write a Java program that simulates a traffic light. The program lets the</p>	

	user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “stop” or “ready” or “go” should appear above the buttons in a selected color. Initially there is no message shown.	
	Total	60
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	PO1
2	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO1, PO2
3	Implement multi-threading and I/O Streams of Core Java	PO4, PO6
4	Implement AWT and Event handling.	PO4, PO5, PO6
5	Use Swing to create GUI.	PO3, PO6
Text Book		
1	Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition	
2.	Gary Cornell, <i>Core Java 2 Volume I – Fundamentals</i> , Addison Wesley, 1999.	
Reference Books		
1.	Head First Java, O’Rielly Publications,	
2.	Y. Daniel Liang, <i>Introduction to Java Programming</i> , 7th Edition, Pearson Education India, 2010.	
Web Resources		
1.	https://www.w3schools.com/java/	
2.	http://java.sun.com	
3.	http://www.afu.com/javafaq.html	

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	3	2
CO2	3	3	3	2	2	3
CO3	2	2	1	3	3	3
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	2

Weightage of course contributed to each PSO	14	14	13	14	14	12
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S-Strong M-Medium L-Low

CC4-2: Core Practical 4: PHP SCRIPTING – PRACTICAL

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	0	0	2	II	2	2	25	75	100
Learning Objectives									
LO1	To enable the student to understand, analyze and build dynamic web pages using PHP and jQuery with MySQL database								
	Contents								No. of Hours
	Introduction to PHP: Embedding PHP in Web Pages Exercises: 1. Working with Forms.								5
	Exercises: 2. String Manipulations 3. Functions 4. Sorting								10
	Exercises: 5. Classes and Objects 6. Cookies and Sessions 7. Graphics								10
	Working with MySQL Database: Select data from a single table – Select data from multiple tables- Performing DML operations Exercises: 8. Working with multiple tables								5
TOTAL								30	
CO	Course Outcomes								
CO1	Demonstrates simple programs using PHP								
CO2	Apply the interface setup, styles & themes for the given application								
CO3	Analyze the problem and add necessary user interface components, multimedia components and web data source into the application								
CO4	Evaluate the results by implementing the correct techniques on the web form								
CO5	Construct web applications with the facilitated components in PHP								
Textbooks									
➤	Kevin Tatroe, Peter MacIntyre, Rasmus Lerdorf, “Programming PHP”, O’Reilly Publications, Third Edition								

➤	Joel Murach, Ray Harris (2010), “PHP and MySQL”, Shroff Publishers & Distributors
➤	CesarOtero, RobLorsen (2012), “Professional jQuery”, John WileySons &Inc
Reference Books	
1.	W.Jason Gilmore(2010), “BeginningPHP&MySQL”,Apress
2.	LarryUllman (2008), “PHP6 and MySQL5”, Pearson Education
3.	John Coggeshall(2006), “PHP5”,Pearson Education
4.	MichaleC.Glass(2004),“BeginningPHP,Apache, MySQLWebDevelopment”,Wiley DreamTechPress
5.	Robin Nixon (2013),“LearningPHP,MySQL, JavaScript &CSS”, O‘Reilly, 2 nd Edition
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1.	http://www.w3schools.com/jquery/
2.	http://www.ccc.commnet.edu/faculty/sfreeman/cst%20250/jqueryNotes.pdf
3.	http://www.w3schools.com/php/
4.	http://www.tutorialspoint.com/php/
5.	http://www.tutorialspoint.com/mysql/

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	2
CO2	3	3	2	2	2	3
CO3	3	2	3	2	2	3
CO4	3	2	2	2	2	3
CO5	3	2	2	3	2	2
Weightage ofcoursecontributedtoeachPSO	15	11	11	12	11	13

L T P C
4 0 0 3

EC2: Elective Course 2 A 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 Sequencing Problems.
CO3. Evaluate Queueing Models.
CO4. Apply PERT and CPM techniques to find the optimal solution.

UNIT I

12 hours

INTRODUCTION-LINEAR PROGRAMMING PROBLEM

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

Linear Programming Problem: Formulation of LP problems – Graphical solution of LP problems – General formulation of LPP – Slack and Surplus variables – Standard form of LPP – Some important forms of LPP – Simplex Method I.

UNIT II

12 hours

ASSIGNMENT PROBLEMS

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

UNIT III

12 hours

TRANSPORTATION PROBLEMS

Transportation Model: Mathematical formulation – Matrix form–Methods for finding Initial Basic Feasible solution and Optimal solution – Degeneracy in Transportation Problems – Unbalanced Transportation Problem.

UNIT IV

12 hours

SEQUENCING PROBLEMS AND QUEUEING MODELS

Sequencing Problems: Assumptions – Solutions to Sequencing Problems: Processing n jobs through 2 machines – Processing n jobs through 3 machines – Processing n jobs on m machines.

Queueing Models: Queueing System – Transient and Steady States–Kendal's Notation for representing Queueing Models – Various Models in

Queuing System – Birth and Death Model.

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 Mapping

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, Weekly Correlated-L

TEXT BOOK

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

REFERENCE BOOKS

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

EC2: Elective Course 2 B

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	Trends in Computing	Elective	4	Y	-	-	3	4	25	75	100
Course Objective											
C1	Learning current trends in various computer science and information technology fields.										
C2	Learning various fields of Cloud computing, Green computing ,the Edge and Fog computing technology.										
C3	To learn about Architecture and Application design of Cloud, Edge & fog computing.										
C4	To know computingandtoimprove security services of computing technologies.										
C5	To learn the various Case Studies in Cloud, Edge & fog Computing.										
UNIT	Details									No. of Hours	
I	Era of Cloud Computing: Introduction – Components of Cloud Computing – Cloud Types: Private, Public and Hybrid clouds – Limitations of the Cloud - Virtualization: Structure and Mechanisms.									12	
II	Cloud computing Services: Software as a Service(SaaS) – Platform as a Service(PaaS)- Infrastructure as a Service(IaaS)-Database as a Service(DBaaS)- Recent Trends in cloud computing and Standards- Data Security in Cloud – Risks and Challenges with Cloud Data-Security as a Service.									12	
III	EdgeComputing: EdgeComputing and Its Essentials: Introduction-EdgeComputing Architecture- Advantages and Limitations of EdgeComputingSystems- EdgeComputing Interfaces and Devices - EdgeAnalytics: Edge Data Analytics – Potential of EdgeAnalytics – Architecture of EdgeAnalytics – Case study									12	
IV	Edge Data storage Security: Edge-Based Attack Detection and Prevention-Edge Computing Use Cases and Case Studies: Edge Computing High- Potential Use Cases. Introductiontogreen computing –Calculatingcarbonfootprint- Choosing Green PC path: A green make over – Buying green									12	

	computer- ChoosingEarthFriendlyperipherals	
V	Fog Computing: Introduction to Fog computing – Architecture - Characteristics - Fog Computing Services – Fog Resource Estimation and Its Challenges-Fog computing on 5G networks – Fog computing Use cases and Case studies.	12
	Total	60
Course Outcomes		Program me Outcome
CO	On completion of this course, students will	
1	Outline the concepts, applications, benefits and limitations of various computing paradigms.	PO1
2	Classify the computing technologies based on its architecture and infrastructure and identify its strategies.	PO1, PO2
3	Examinevariouscloudservices, Securitythreatexposurewithinacloudcomputing infrastructure.	PO4, PO6
4	Asses the problems and solutions involved in various stages of different computing environments.	PO4, PO5, PO6
5	Discuss the importance of cloud, edge and Fog technology and implement innovative ideas and practices for regulating green IT.	PO3
Text Book		
1	Kailas Jayaswal,JagannathKallakurchi,DonaldJ.Houde,Dr.Devan Shah “ Cloud Computing –Black Book” Edition :2020 (UNIT I & II : CHAPTER 1,2,3,9,11)	
2	K. AnithaKumari G. SudhaSadasivam D. Dharani M. Niranjanamurthy, “EDGE COMPUTING Fundamentals, Advances and Applications”, First Edition 2022, CRC Press. (UNIT III & IV : CHAPTER 1, 2 , 3, 4,5,6)	
3	Woody Leonhard and Katherine Murray (2009) ,Green Home Computing forDummies,WilleyPublishingInc. (UNIT IV : CHAPTER 2 ,5,6,7)	
4	Evangelos Markakis, George Mastorakis, ConstandinosX.Mavromoutakis and Evangelospallis “Cloud and Fog computing in 5G mobile Networks” ,First edition 2017. (UNIT V: CHAPTER 2)	
Reference Books		
1.	RajKumarBuyya,ChristianVecchiola,S.ThamaraiSelvi,(2013),MasteringCloudComputing,McGraw Hill Education.	
2.	MichaelMiller,(2009), CloudComputing,PearsonEducation.	

3.	Shijun Liu BedirTekinerdoganMikio Aoyama Liang-Jie Zhang” Edge Computing – EDGE “ 2018.
4.	FlavioBonomi, Rodolfo Milito, Jiang Zhu, SateeshAddepalli, —Fog Computing and Its Role in the Internet of Thingsl, MCC’12, August 17, 2012, Helsinki, Finland. Copyright 2012.
5	Amir M. Rahmani · Pasi LiljebergJürgo-Sören Preden “Fog Computing in the Internet of Things”Springer,2018. (UNIT V: PART/CHAPTER (1.4,2.5)
Web Resources	
1.	https://static.googleusercontent.com/media/www.google.com/en//green/pdfs/google-green-computing.pdf (CaseStudy)
2.	http://whatiscloud.com/basic concepts and terminology/cloud
3.	http://www.computerweekly.com/guides/Using-green-computing-for-improving-energy-efficiency

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	S	S						
CO 3				S		S		
CO 4				S	S	S		
CO 5			S					S

S-Strong M-Medium L-Low

SEC 2: Skill Enhancement Course 2A

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	Advanced Excel	Skill Enha. Course (SEC)	2	Y	-	II	2	2	25	75	100
Learning Objectives											
LO1	Handle large amounts of data										
LO2	Aggregate numeric data and summarize into categories and subcategories										
LO3	Filtering, sorting, and grouping data or subsets of data										
LO4	Create pivot tables to consolidate data from multiple files										
LO5	Presenting data in the form of charts and graphs										
UNIT	Contents						No. of Hours				
I	Basics of Excel- Customizing common options- Absolute and relative cells- Protecting and un-protecting worksheets and cells- Working with Functions - Writing conditional expressions - logical functions - lookup and reference functions- VlookUP with Exact Match, Approximate Match- Nested VlookUP with Exact Match- VlookUP with Tables, Dynamic Ranges- Nested VlookUP with Exact Match- Using VLookUP to consolidate Data from Multiple Sheets						6				
II	Data Validations - Specifying a valid range of values - Specifying a list of valid values- Specifying custom validations based on formula - Working with Templates Designing the structure of a template- templates for standardization of worksheets - Sorting and Filtering Data - Sorting tables- multiple-level sorting- custom sorting-						6				

	Filtering data for selected view - advanced filter options- Working with Reports Creating subtotals- Multiple-level subtotal.	
III	Creating Pivot tables Formatting and customizing Pivot tables- advanced options of Pivot tables- Pivot charts- Consolidating data from multiple sheets and files using Pivot tables- external data sources- data consolidation feature to consolidate data- Show Value As % of Row, % of Column, Running Total, Compare with Specific Field- Viewing Subtotal under Pivot- Creating Slicers.	6
IV	More Functions Date and time functions- Text functions- Database functions- Power Functions - Formatting Using auto formatting option for worksheets- Using conditional formatting option for rows, columns and cells- What If Analysis - Goal Seek- Data Tables- Scenario Manager.	6
V	Charts - Formatting Charts- 3D Graphs- Bar and Line Chart together- Secondary Axis in Graphs- Sharing Charts with PowerPoint / MS Word, Dynamically- New Features Of Excel Sparklines, Inline Charts, data Charts- Overview of all the new features.	6
	Total	30
	Course Outcomes	Programme Outcomes
CO	On completion of this course, students will	
CO1	Work with big data tools and its analysis techniques.	PO1
CO2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO6
CO4	Perform analytics on data streams.	PO4, PO5, PO6

CO5	Learn No-SQL databases and management.	PO3, PO8
Text Book		
1	Excel 2019 All	
2	Microsoft Excel 2019 Pivot Table Data Crunching	
Reference Books		
1	Excel 2019 All-in-One for Dummies, Greg Harvey, 1st edition	
Web Resources		
1.	https://www.simplilearn.com	
2	https://www.javatpoint.com	
3	https://www.w3schools.com	

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	2	3	3	3
CO2	3	2	2	3	3	3
CO3	3	3	2	3	3	3
CO4	3	2	2	3	3	3
CO5	3	2	2	3	3	3
Weightage of course contributed to each PSO	15	12	10	15	15	15

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

SEC 2: Skill Enhancement Course 2B

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks			
									CIA	External	Total	
	Quantitative Aptitude	Specific Elective	Y	2	-	II	2	2	25	75	100	
Course Objective												
C1	To understand the basic concepts of numbers											
C2	Understand and apply the concept of percentage, profit & loss											
C3	To study the basic concepts of time and work, interests											
C4	To learn the concepts of permutation, probability, discounts											
C5	To study about the concepts of data representation, graphs											
UNIT	Details							No. of Hours	Course Objective			
I	Numbers-HCF and LCM of numbers-Decimal fractions-Simplification- Square root and cube roots - Average-problems on Numbers.							6	CO1			
II	Problems on Ages - Surds and Indices - percentage - profits and loss - ratio and proportion-partnership-Chain rule.							6	CO2			
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.							6	CO3			
IV	Permutation and combination-probability-True Discount-Bankers Discount – Height and Distances-Odd man out & Series.							6	CO4			
V	Calendar - Clocks - stocks and shares - Data representation - Tabulation – Bar Graphs-Pie charts-Line graphs.							6	CO5			
	Total							60				
Course Outcomes								Programme Outcome				
CO	On completion of this course, students will											
1	understand the concepts, application and the problems of numbers							PO1				

2	To have basic knowledge and understanding about percentage, profit & loss related processing	PO1, PO2
3	To understand the concepts of time and work	PO4, PO6
4	Speaks about the concepts of probability, discount	PO4, PO5, PO6
5	Understanding the concept of problem solving involved in stocks & shares, graphs	PO3
Text Book		
1	“Quantitative Aptitude”, R.S.AGGARWAL, S. Chand & Company Ltd.,	
Web Resources		
1.	https://www.javatpoint.com/aptitude/quantitative	
2.	https://www.toppr.com/guides/quantitative-aptitude/	

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	M	S						
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong M-Medium L-Low

SEC 3: Skill Enhancement Course 3A

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	Software Testing	Specific Elective	Y	2	-	II	2	2	25	75	100
Course Objective											
C1	To study fundamental concepts in software testing										
C2	To discuss various software testing issues and solutions in software unit test, integration and system testing.										
C3	To study the basic concept of Data flow testing and Domain testing.										
C4	To Acquire knowledge on path products and path expressions.										
C5	To learn about Logic based testing and decision tables										
UNIT	Details						No. of Hours	Course Objective			
I	Introduction: Purpose–Productivity and Quality in Software–Testing Vs Debugging–Model for Testing–Bugs–Types of Bugs – Testing and Design Style.						6	C1			
II	Flow / Graphs and Path Testing – Achievable paths – Path instrumentation Application Transaction Flow Testing Techniques.						6	C2			
III	Data Flow Testing Strategies - Domain Testing: Domains and Paths – Domains and Interface Testing.						6	C3			
IV	Linguistic –Metrics – Structural Metric – Path Products and Path Expressions, Syntax Testing–Formats–Test Cases						6	C4			
V	Logic Based Testing–Decision Tables–Transition Testing–States, State Graph, State Testing.						6	C5			
	Total						30				
Course Outcomes							Program Outcomes				
CO	On completion of this course, students will										
1	Students learn to apply software testing knowledge and engineering methods						PO1				

2	Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.	PO1, PO2
3	Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.	PO4, PO6
4	Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems	PO4, PO5, PO6
5	Have an ability to use software testing methods and modern software testing tools for their testing projects.	PO3
Text Book		
1	B.Beizer,“SoftwareTestingTechniques”,IIEdn.,DreamTechIndia,NewDelhi,2003.	
2	K.V.K.Prasad,“SoftwareTestingTools”,DreamTech.India,NewDelhi,2005	
Reference Books		
1.	I.Burnstein,2003,“PracticalSoftwareTesting”,SpringerInternationalEdn.	
2.	E. Kit, 1995, “Software Testing in the Real World: Improving the Process”, PearsonEducation,Delhi.	
3.	R. Rajani,andP.P.Oak,2004,“SoftwareTesting”,TataMcgrawHill,NewDelhi.	
Web Resources		
1.	https://www.javatpoint.com/software-testing-tutorial	
2.	https://www.guru99.com/software-testing.html	

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	M	S						
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong M-Medium L-Low

SEC 3: Skill Enhancement Course 3B

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	PROBLEM SOLVING TECHNIQUES	Specific Elective	Y	2	-	-	2	2	25	75	100
Course Objective											
C1	Understand the systematic approach to problem solving.										
C2	Know the approach and algorithms to solve specific fundamental problems.										
C3	Understand the efficient approach to solve specific factoring-related problems.										
C4	Understand the efficient array-related techniques to solve specific problems.										
C5	Understand the efficient methods to solve specific problems related to text processing. Understand how recursion works.										
UNIT	Details										No. of Hours
I	Introduction: Notion of algorithms and programs – Requirements for solving problems by computer – The problem-solving aspect: Problem definition phase, Getting started on a problem, The use of specific examples, Similarities among problems, Working backwards from the solution – General problem-solving strategies - Problem solving using top-down design – Implementation of algorithms – The concept of Recursion.										6
II	Fundamental Algorithms: Exchanging the values of two variables – Counting - Summation of a set of numbers - Factorial computation - Sine function computation - Fibonacci Series generation - Reversing the digits of an integer – Base Conversion.										6
III	Factoring Methods: Finding the square root of a number – The smallest divisor of an integer – Greatest common divisor of two integers - Generating prime numbers – Computing the prime factors of an integer – Generation of pseudo-random numbers - Raising a number to a large power – Computing the n th Fibonacci number.										6
IV	Array Techniques: Array order reversal – Array counting or histograming – Finding the maximum number in a set - Removal of duplicates from an ordered array - Partitioning an array – Finding the k^{th} smallest element – Longest monotone subsequence.										6

V	Text Processing and Pattern Searching: Text line length adjustment – Left and right justification of text – Keyword searching in text – Text line editing – Linear pattern search. Recursive algorithms: Towers of Hanoi – Permutation generation.	6
	Total	30
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the logic of problem and analyses implementation of algorithm and TopDown approach and concept of Recursion	PO1,PO6
2	Able to understand the Sequence of Numbers and Series Fibonacci, Reversing ,Base Conversion.	PO2
3	Able to do Algebraic operations	PO2,PO4
4	Coverage of Arrays and its Logics	PO6,PO8
5	Text Processing and Pattern Searching Approach	PO7
Text Book		
1	R. G. Dromey, <i>How to Solve it by Computer</i> , Pearson India, 2007	
Reference Books		
1.	George Polya, Jeremy Kilpatrick, <i>The Stanford Mathematics Problem Book: With Hints and Solutions</i> , Dover Publications, 2009 (Kindle Edition 2013).	
2.	Greg W. Scragg, <i>Problem Solving with Computers</i> , Jones & Bartlett 1st edition, 1996.	
Web Resources		
1.	https://www.studytonight.com/	
2.	https://www.w3schools.com/	

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	M					S		
CO 2		M						
CO 3		S		L				
CO 4						S		M
CO 5							M	

S-Strong M-Medium L-Low