ALAGAPPA UNIVERSITY, KARAIKUDI
NEW SYLLABUS UNDER CBCS PATTERN (w.e.f.2023-24)

B.Sc. Software

Sem.	Part	Course Code	Title of the Paper	Cr.	Hrs./ Week	Max. Marks		
						Int.	Ext.	Total
I	I	2311T	தமிழ் இலக்கிய வரலாறு- I /Other Languages -I	3	6	25	75	100
	II	2312E	English - I	3	6	25	75	100
	III	23BSO1C1	Programming in C	4	5	25	75	100
		23BSO1P1	Programming in C Lab	4	4	25	75	100
		---	Allied – I Mathematics/ Physics/ Information Technology/ Commerce	3	3	25	75	100
			Allied I Practical - Respective Allied Theory Course	2	2	25	75	100
	IV	23BSO1S1	Introduction to HTML	2	2	25	75	100
		23BSO1FC	Fundamentals of Information Technology	2	2	25	75	100
			Total	**23**	**30**	**200**	**600**	**800**
II	I	2321T	தமிழ்இலக்கிய வரலாறு-2 /Other Languages-II	3	6	25	75	100
	II	2322E	English – II	3	6	25	75	100
	III	23BSO2C1	Data Structures and Algorithms	4	5	25	75	100
		23BSO2P1	Data Structures and Algorithms using C Lab	4	4	25	75	100
		---	Allied – I Mathematics/ Physics/ Information Technology/ Commerce	3	3	25	75	100
			Allied I Practical - Respective Allied Theory Course	2	2	25	75	100
	IV	23BSO2S1	Electronic Publishing	2	2	25	75	100
		23BSO2S2	PHP Programming	2	2	25	75	100
			Naan Mudhalvan Course					
			Total	**23**	**30**	**200**	**600**	**800**
III	I	2331T	**தமிழக வரலாறும் பண்பாடும்** /Other Languages-III	3	6	25	75	100
	II	2332E	English – III	3	6	25	75	100
	III	23BSO3C1	Operating systems	4	5	25	75	100
		23BSO3P1	Operating Systems Lab	4	4	25	75	100
		---	Allied – I Mathematics/ Physics/ Information Technology/ Commerce	3	3	25	75	100
			Allied I Practical - Respective Allied Theory Course	2	2	25	75	100
		23BSO3S1	Quantitative Aptitude	2	2	25	75	100
		233AT/ 23BSO3S2	Adipadai Tamil/ Enterprise Resource Planning	2	2	25	75	100
			Naan Mudhalvan Course					
			Total	**23**	**30**	**200**	**600**	**800**

IV	I	2341T	தமிழும்அறிவியலும்/ /Other Languages -IV	3	6	25	75	100
	II	2342E	English – IV	3	6	25	75	100
	III	23BSO4C1	Object Oriented Programming with Java	4	4	25	75	100
		23BSO4P1	Object Oriented Programming with Java Lab	3	3	25	75	100
		---	Allied – I Mathematics/ Physics/ Information Technology/ Commerce	3	3	25	75	100
			Allied I Practical - Respective Allied Theory Course	2	2	25	75	100
	IV	23BSO4S1	Android Programming	2	2	25	75	100
		234AT	Adipadai Tamil/ Naan Mudhalvan Course	2	2	25	75	100
		23BES4	Environmental Studies	2	2	25	75	100
			Total	**24**	**30**	**225**	**675**	**900**

V	III	23BSO5C1	Relational Database Management System	4	5	25	75	100
		23BSO5P1	RDBMS Lab using Oracle	4	5	25	75	100
		23BSO5C2	Open Source Software Technologies	4	5	25	75	100
		23BSO5P2	Open Source Technologies Lab	4	5	25	75	100
		23BSO5E1/ 23BSO5E2	Software Engineering/Software Testing	3	4	25	75	100
		23BSO5E3/ 23BSO5E4	Computer Networks / Wireless Networks	3	4	25	75	100
	IV	23BVE5	Value Education	2	2	25	75	100
		23BSO5I	Internship/Industrial Visit/ Field Visit	2	-	25	75	100
			Naan Mudhalvan Course					
			Total	**26**	**30**	**200**	**600**	**800**
VI		23BSO6C1	ASP.NET Programming	4	6	25	75	100
		23BSO6P1	ASP.NET Programming Lab	8	12	25	75	100
		23BSO6E1/ 23BSO6E2	Mobile Application Development / Mobile Computing	3	5	25	75	100
		23BSO6E3/ 23BSO6E4	E-Commerce Technologies / Internet of Things	3	5	25	75	100
			Extension Activity	1	-	-	-	-
		23BSO6S1	Essential Reasoning and Quantitative Aptitude	2	2	25	75	100
			Naan Mudhalvan Course					
			Total	**21**	**30**	**125**	**375**	**500**
			Grand Total	**140**	**--**	**1150**	**3450**	**4600**

1. TOL-Tamil/Other Languages,
2. E – English

- CC-Core course
- Generic Elective (Allied)
- SEC-Skill Enhancement Course
- FC-Foundation Course
- DSE – Discipline Specific Elective

Allied Subjects for B.Sc. Software Students offered by other departments

Semester I: Allied AI - Theory - Object Oriented Programming in C++
(offered by Computer Science Department)
Allied I - Practical - Object Oriented Programming in C++ Lab
(offered by Computer Science Department)

Semester II : Allied AII – Theory – Numerical Methods with Applications (Offered by Maths Dept)
Allied AII – Practical – Numerical Methods Lab

Semester III: Allied III: Theory: Operations Research
Allied III : Practical: Operations Research Lab (Offered by Maths Dept)

Semester IV: Allied IV: Microprocessors and Micro Controllers
Allied IV : Microprocessors and Micro Controllers Lab (offered by Computer Science/BCA/IT department)

Allied Subjects offered by B.Sc. Software Department to other department students

Semester I : Allied – I Office Automation
Allied I Practical - Office Automation Lab

Semester II: Allied - II – C Programming
Allied – II Practical – C Programming Lab

Semester III: Allied III – Theory: Internet and Web Design
: Allied III – Practical: Internet and Web Design Lab

Semester IV: Allied IV: Advanced Excel
Allied IV : Advanced Excel Lab

Out of 36 subjects, 35 subjects follows TANSCHE syllabus

Semester I

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23BSO1C1	**PROGRAMMING IN C**	**CC-I**	5	-	-	-	4	5	25	75	100

Learning Objective	
LO1	To familiarize the students with the Programming basics and the fundamentals of C, Data types in C, Mathematical and logical operations.
LO2	To understand the concept using if statements and loops
LO3	This unit covers the concept of Arrays and Functions
LO4	This unit covers the concept of Structurs and unions and Preprocessors
LO5	To understand the concept of implementing pointers.

	Contents	**No. of Hours**
UNIT I	**Overview of C**: 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**: Arithmetic, Relational, logical, assignment, increment, decrement, conditional, bitwise and special operators, arithmetic expressions, operator precedence, type conversions, mathematical functions **Managing Input and Output Operators**: Reading and writing a character, formatted input, formatted output.	15
UNIT II	**Decision Making and Branching**: Decision making with If, simple IF, IF ELSE, nested IF ELSE , ELSE IF ladder, switch, GOTO statement. **Decision Making and Looping**: While, Do-While, For, Jumps in loops.	15
UNIT III	**Arrays**: Declaration and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays. **Functions**: 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.	15
UNIT IV	**Structures and Unions**: Defining, giving values to members, initialization and comparison of structure variables, arrays of structure, arrays within structures, structures within structures, structures and functions, unions. **Preprocessors**: Macro substitution, file inclusion.	15
UNIT V	**Pointers:** 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.	15
	Total	**75**

Course Outcomes		**Programme Outcome**
CO	On completion of this course, students will	
CO1	Remember the program structure of C with its syntax and semantics	PO1,PO3,PO5
CO2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions,	PO2,PO3,PO6

	structures, pointers and files)	
CO3	Apply the programming principles learnt in real-time problems	PO3,PO4,PO5
CO4	Analyze the various methods of solving a problem and choose the best method	PO4,PO5,PO6
CO5	Code, debug and test the programs with appropriate test cases	PO5,PO6
Text Book		
1	E. Balagurusamy, Programming in ANSI C, Fifth Edition, Tata McGraw-Hill, 2010.	
Reference Books		
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.	YashavantKanetkar, Let Us C, Eighteenth Edition, BPB Publications,2021	
Web Resources		
1.	https://codeforwin.org/	
2.	https://www.geeksforgeeks.org/c-programming-language/	
3.	http://en.cppreference.com/w/c	
4.	http://learn-c.org/	
5.	https://www.cprogramming.com/	

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	2	3	3
CO 3	2	3	2	3	3	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	2
Weight age of course contributed to each PSO	14	15	14	14	15	13

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

Semester I

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23BSO1P1	**PROGRAMMING IN C LAB**	**CC-II**	-	-	4	-	4	4	25	75	100
Course Objective											
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 and Functions										
LO4	This unit covers the concept of Structurs and unions and Preprocessors										
LO5	To understand the concept of implementing pointers and files										
	List of Excercises								**No. of Hours**		
UNIT I	**Variables, Data types, Constants and Operators** 1.Evaluation of expression ex: ((x+y) ^2 * (x+z))/w 2.Temperature conversion problem (Fahrenheit to Celsius) 3.Program to convert days to months and days (Ex: 364 days = 12 months and 4 days) 4.Solution of quadratic equation 5.Salesman salary (Given: Basic Salary, Bonus for every item sold, commission on the total monthly sales)								12		
UNIT II	**Decision making Statements** 6.Maximum of three numbers 7.Calculate Square root of five numbers (using gototatement) 8.Pay-Bill Calculation for different levels of employee (Switch statement) 9. Fibonacci series 10.Floyds Triangle 11.Pascal's Triangle								12		
UNIT III	**Arrays, Functions and Strings** 12.Prime numbers in an array 13.Sorting data (Ascending and Descending) 14.Matrix Addition and Subtraction 15.Matrix Multiplication 16.Function with no arguments and no return values 17.Function that convert lower case letters to upper case 18. Factorial using recursion. 19.Perform String Operations using Switch Case.								12		
UNIT IV	**Structures and Macros** 20.Structure that describes a Hotel (name, address, grade, avg room rent, number of rooms) Perform some operations (list of hotels of a given grade etc.) 21. Using Pointers in Structures. 22.Cricket team details using Union. 23.Write a macro that calculates the max and min of two numbers 24.Nested macro to calculate Cube of a number.								12		

UNIT V	**Pointers and Files** 25.Evaluation of Pointer expressions 26.Function to exchange two pointer values 27.Creation, insertion and deletion in a linked list 28.Program to read a file and print the data. 29.Program to receive a file name and a line of text as command line arguments and write the text to the file 30. Program to copy the content of one file to another file.	12
	Total	**60**

Course Outcomes		**Programme Outcome**
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
3	Apply the programming principles learnt in real-time problems	PO3,PO4
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	PO4,PO6

Text Book

1	E. Balagurusamy, Programming in ANSI C, Fifth Edition, Tata McGraw-Hill, 2010.

Reference Books

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.	YashavantKanetkar, Let Us C, Eighteenth Edition, BPB Publications,2021

Web Resources

1.	https://codeforwin.org/
2.	https://www.geeksforgeeks.org/c-programming-language/
3.	http://en.cppreference.com/w/c
4.	http://learn-c.org/
5.	https://www.cprogramming.com/

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	2	3	3	3	3	3
CO 3	3	3	2	3	3	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
Weight age of course contributed to each PSO	14	15	14	15	15	14

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

Semester I

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO1S1	**INTRODUCTION TO HTML**	**SEC –I**	2	-	-	I	2	25	75	100

Learning Objectives	
LO1	Understand the basic concepts of internet and web design.
LO2	Understand the general structure of HTML pages and design simple pages.
LO3	Understand different forms of list, tables and framesets.
LO4	Understand stylesheet definitions and use them in designing web pages
LO5	Understand form design for data capturing from user and pass them to server

	Contents	**No. Of. Hours**
UNIT I	Introduction to the Internet : Electronic mail – Resource Sharing – Remote Login – World Wide Web – Search Engine – Browsers – Introduction to static, dynamic and active web pages. Introduction to HTML: Designing a Home page - History of HTML - HTML Generations - HTML Documents - Anchor Tag - Hyper links	**6**
UNIT II	Head and Body Sections : Header Section – Title – Links - Colorful Web page - Comment Lines - Designing the Body Section: Heading – Printing - Aligning the Headings - Horizontal Rule - Paragraph-Tab Settings - Images and Pictures - Embedding Images	**6**
UNIT III	Ordered and Un Ordered Lists: Lists – Un Ordered Lists - Headings in a List - Ordered Lists - Nested Lists - Table Handling: Table creation in HTML - width of the Table and Cells - Cells Spanning Multiple Rows/Columns - Coloring Cells - Column Specification	**6**
UNIT IV	DHTML and Style Sheets: Defining Styles - Elements of Styles - Linking a Style Sheet to an HTML Document – In-line Styles - Internal and External Style Sheets - Multiple Styles - Frames: Frameset Definition - Frame Definition - Nested Framesets	**6**
UNIT V	Forms: Action Attribute - Method Attribute - Enctype Attribute - Drop down list - Check Boxes - Radio Buttons - Text Field - Text area - Password and Hidden Fields - Submit and Reset Buttons - Designing Sample Forms	**6**
	TOTAL HOURS	**30**

Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
CO1	understand the basics of World Wide Web and internet.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	• learn the basic tags in HTML and design simple web pages using them.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	learn list and table designing with HTML tags and manage screen space with framesets	PO1, PO2, PO3, PO4, PO5, PO6
CO4	• learn style sheets to control overall design of web pages.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	learn Form design for data capturing	PO1, PO2, PO3, PO4, PO5, PO6

Textbooks	
1	World Wide Web design with HTML, C. Xavier - Tata McGraw Hill Publishing Company Limited 2000. ISBN 9780074639719

Reference Books	
1.	HTML 5 and CSS 3 Made Simple : Ivan Bayross, 2012, BPB Publications ISBN 9788183334419

Web Resources	
1.	http://www.pagetutor.com/html_tutor/index.html
2.	http://www.tutorialspoint.com/html/html_tutorial.pdf
3.	http://www.htmlcodetutorial.com/
4.	http://www.w3schools.com

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 I

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO1FC	**FUNDAMENTALS OF INFORMATION TECHNOLOGY**	**Foundation Course**	2	-	-	I	2	25	75	00

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

	Contents	**No. Of. Hours**
UNIT 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**
UNIT 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**
UNIT 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**
UNIT 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 s/w	**6**
UNIT V	**Operating System:** Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.	**6**
	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	PO1, PO2,

	different types of ROM with advancement in storage basis.	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. Kavitha Murugeshan (2009), " Fundamental of Information Technology", Majestic Books.	
2	Alexis Leon, Mathews Leon," Fundamental of Information Technology", 2nd Edition.	
3	S. K Bansal, "Fundamental of Information Technology".	
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

Course Code	Course Title	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO2C1	DATA STRUCTURES AND ALGORITHMS	CC III	5	-	-	II	4	25	75	100

	LearningObjectives	
LO1	Understand the meaning asymptotic time complexity analysis and various data structures	
LO2	Toenhancing theproblemsolvingskillsandthinkingskills	
LO3	Towriteefficientalgorithms andPrograms	
LO4	Tomakethestudents learnbestpractices inPYTHON programming	
LO5	Tounderstandhow tohandlethefilesinData Structure	
	Contents	**No.Of. Hours**
UNIT I	**Arrays and ordered Lists** Abstract data types – asymptotic notations – complexity analysis-Linkedlists: Singly linked list – doublylinkedlists-Circularlinkedlist,Generallists-stacks– Queues – Circular Queues – Evaluation of expressions	**15**
UNIT II	**Trees and Graphs** Trees – Binary Trees – Binary Tree Traversal– BinaryTreeRepresentations–BinarySearchTrees - threaded Binary Trees - Application of trees (Sets). Representation of Graphs – Graph implementation – graph Traversals - Minimum Cost Spanning Trees – Shortest Path Problems-Application of graphs	**15**
UNIT III	**SearchingandSorting**Sorting–BubbleSort,InsertionSort, QuickSort,MergeSort,SelectionSort.Searching –Linearsearch, Binarysearch	**15**
UNIT IV	**Greedy Method and Dynamic programming** Greedy Method: Knapsack problem– Job Sequencing with deadlines – Optimal storage on tapes. General method – Multistage Graph Forward Method– All pairs shortest path – Single source shortest path – Search Techniques for Graphs – DFS – Connected Components – Bi-Connected Components	**15**
UNIT V	**Backtracking** General Method – 8-Queen‟s – Sum Of Subsets – Graph Colouring – Hamiltonian Cycles – Branch And Bound: General Method – Travelling Sales Person Problem	**15**
	TOTALHOURS	**75**

Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
CO1	To understand the a symp to ticnotations and analysis of time and space complexity To understand the concept sofLinked List, Stack and Queue.	PO1,PO2, PO3,PO4, PO5,PO6
CO2	To understand the Concepts of Trees and Graphs Perform traversal operations on Trees and Graphs. To enable the applications of Trees and Graphs.	PO1,PO2, PO3,PO4, PO5, PO6

CO3	To apply searching and sorting techniques	PO1,PO2, PO3,PO4, PO5, PO6
CO4	TounderstandtheconceptsofGreedyMethod To apply searching techniques.	PO1,PO2, PO3,PO4, PO5, PO6
CO5	UsageofFilehandlingsinpython,Conceptofreadingand writing files, Do programs using files.	PO1,PO2, PO3,PO4, PO5, PO6
Textbooks		
1	Seymour Lipshutz,Schaum"s Outlines- Data Structureswith C, Tata McGraw Hill publications, 2011	
2	EllisHorowitzandSartajSahni,FundamentalsofComputerAlgorithms, Galgotia Publications Pvt., Ltd.,2010	
3	Dr.K.NageswareRao, Dr.ShaikAkbar, ImmadiMuraliKrishna,ProblemSolving and Python Programming, 2018	
ReferenceBooks		
1.	Gregory L.Heileman, Data Structures, Algorithms and Object-Oriented Programming, McGraw Hill International Edition, Singapore., 1996	
2.	A.V.Aho, J.D. Ullman, J.E.Hopcraft. Data Structures and Algorithms, Addison Wesley Publication., 2000	
3.	EllisHorowitzandSartajSahni,SanguthevarRajasekaran,Fundamentalsof Computer Algorithms, Galgotia Publications Pvt.Ltd., 2010	
Web Resources		

2.	https://www.programiz.com/dsa
3.	https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/
1.	https://www.tutorialspoint.com/data_structures_algorithms/index.htm

appingwithProgrammeOutcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO5	PSO 6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	1	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	2
Weightageofcourse contributed to each PSO	15	15	15	15	13	14

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

Course Code	Course Title	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO2P1	DATA STRUCTURES AND ALGORITHMS USING C LAB	CCIV	-	-	4	II	4	25	75	100

Objectives

To predict the performance of different algorithms in order to guide design decisions, provide theoretical estimation for the required resources of an algorithm to solve a specific computational problem

LISTOFPROGRAMS	Required Hour
1. Performstack operations 2. Performqueueoperations 3. Performtreetraversal operations 4. Searchanelementinanarrayusinglinearsearch. 5. Searchanelementinanarrayusingbinarysearch 6. SortthegivensetofelementsusingMergeSort. 7. SortthegivensetofelementsusingQuick sort. 8. Searchthe KthsmallestelementusingSelection Sort 9. FindtheOptimalsolutionforthegivenKnapsackProblemusingGreedy Method. 10. FindallpairsshortestpathforthegivenGraphusingDynamicProgramming method 11. FindtheSinglesourceshortestpathforthegivenTravellingSalesman problem using DynamicProgramming method 12. Findall possiblesolutionforanNQueenproblemusingbacktrackingmethod 13. FindallpossibleHamiltonianCycleforthegivengraphusingbacktracking method	75

CourseOutcomes	
CO	Oncompletionofthiscourse,studentswill
CO1	Tounderstandtheconcepts ofLinkedList,Stackand Queue.
CO2	ConceptsofTreesandGraphs.Performtraversal operationsonTreesand Graphs. ToenabletheapplicationsofTreesandGraphs.
	Toapplysearching andsortingtechniques
CO3	
CO4	TodeterminetheconceptsofGreedyMethodToapplysearchingtechniques.
CO5	UsageofFilehandlingsinpython,Conceptofreadingandwritingfiles,Do programs using files.
	Text Books
1	EllisHorowitz,SartajSahni,SusanAndersonFreed,SecondEdition, “Fundamentals of Data inC”, Universities Press
2	E.Horowitz,S.SahniandS.Rajasekaran,SecondEdition,“Fundamentalsof Computer Algorithms “ Universities Press
	ReferenceBooks

1	SeymourLipschutz,"DataStructureswithC",FirstEdition,Schaum'soutline series in computers, Tata McGraw Hill.
2	R.KrishnamoorthyandG.IndiraniKumaravel,DataStructuresusingC,Tata McGrawHill – 2008.
3	A.K.Sharma,DataStructuresusingC,PearsonEducationIndia,2011.
4	G.BrassardandP.Bratley,"FundamentalsofAlgorithms",PHI,NewDelhi, 1997
5	A.V.Aho,J.E.Hopcroft,J.D.Ullmann,,"Thedesignandanalysisof Computer Algorithms",AddisonWesley,Boston,1974

CourseOutcomes	
CO	Oncompletionofthiscourse,studentswill
CO1	Implementdatastructuresusing C
CO2	Implementvarioustypesoflinked listsandtheirapplications
CO3	ImplementTreeTraversals
CO4	ImplementvariousalgorithmsinC
CO5	Implementdifferentsortingandsearching algorithms

MappingwithProgrammeOutcomes:

CO/PSO	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO5**	**PSO 6**
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	2	2	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	1	2
Weightageofcourse contributed to each PSO	15	15	14	14	13	14

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

Course Code	Course Title	Category	L	T	P	S	Credits	Inst.Hours	Marks		
									CIA	External	Total
23BSO2S1	**Electronic Publishing**	SEC - II	2	-	-	-	2	2	25	75	100

	Learning Objectives	
LO1	To familiarize with Photoshop software and its on-screen tools	
LO2	To understand the use of various toolsin photoshop and their formatting effects	
LO3	To understand the features of page maker electronic publishing software	
LO4	To learn to work with drawing and text tools, handle pages, graphics and print document	
LO5	To learn to embed objects from other software and creating master pages.	
	Contents	**RequiredHours**
Unit I	**Getting Started with Photoshop:** Exploring the Toolbox - The New CS4 Applications -Bar & the Options Bar - Exploring Panels & Menus - Creating & Viewing a New – Document - Customizing the Interface - Setting Preferences. Working with images: Introduction - Making Selections – Resizing & Cropping Images.	**6**
Unit II	Getting Started with Layers: Layers Palette – Working with Layers – Hiding/Showing Layers – Flattening Images – Working with Adjustment Layers – Layer Effects. Painting in Photoshop – Photo Retouching. Type: Creating Type – Type Tool – Moving the Text – Creating Paragraph Type. Filters: The Filter Menu – Filter Gallery – Filter Effects – Lighting Effects.	**6**
Unit III	Getting started with Page maker: PageMaker Basics - Starting PageMaker - About the work area - Using the toolbox - working with palettes - Viewing pages - Working with text and graphics - Moving between pages, adding and deleting pages - Working with multiple open publications.	**6**
Unit IV	Drawing tools and text tools: Different drawing tools - Text tools - Character formatting, paragraph formatting - Controlling windows and orphans - Controlling page breaks, tabs and hyphenation - Grid manager - Printing a document.	**6**
Unit V	Importing Graphics: Placing graphics - Sizing and cropping graphics – OLE - Embedding an OLE object. Master Pages: Creating a master page - Numbering pages - Setting up ruler guides - Applying master page design.	**6**

Course Outcomes		**Programme Outcome**
CO	On completion of this course, students will be	
1	Able to handle photoshop software and enhance photographs	PO1,PO3,PO5
2	Able to handle all the tools in Photoshop to create multiple layers	PO2,PO3,PO6
3	Able to handle PageMaker software to typeset books, reports etc.	PO3,PO4
4	Able to handle drawing tools to draw shapes and page layout features	PO4,PO5,PO6
5	Able to handle graphics on pages, OLE objects and creating master pages	PO4,PO6

Text Book

1. David Xenakis Benjamin Levisay. Photoshop 6 in Depth. DreamTech Press, New Delhi.
2. Satish Jain. PageMaker 7, Training Guide, Paraglyph Pr, March 2001

Reference Books	
1	Adele Droblas Greenberg, Seth Greenberg. The Complete Reference Photoshop 6. McGraw-Hill Education Publications,2001.
2	Ramesh Bangia. Learning Page maker 7.Khanna Book Publishing,2015
3	Carolyn M. Connally. PageMaker 7: The Complete Reference. Osborne/McGraw- Hill, 2002
	Web Resources
1	https://www.photoshopessentials.com/basics/
2	https://www.javatpoint.com/photoshop
3	https://www.tutorialspoint.com/adobe-photoshop-photo-and-design-software
4	http://designstacks.net/pagemaker-70-basics
5	https://www.tutorialspoint.com/adobe_indesign_cc/desktop_publishing_popular_dtp_software.htm

MAPPING TABLE						
CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**3**	**2**	**2**	**2**
CO2	**3**	**3**	**3**	**3**	**3**	**2**
CO3	**3**	**2**	**3**	**3**	**3**	**3**
CO4	**3**	**2**	**2**	**3**	**3**	**3**
CO5	**3**	**3**	**2**	**3**	**3**	**3**
Weightage of coursecontributed to each PSO	**15**	**12**	**13**	**14**	**14**	**13**

Course Code	Course Title	Category	L	T	P	S	Credits	Inst.Hours	Marks		
									CIA	External	Total
23BSO2S2	**PHP Programming**	SEC - III	2	-	-	-	2	2	25	75	100

	Learning Objectives	
LO1	To familiarize the students with Basic knowledge of website and Web servers.	
LO2	To understand the use of data types and control statements in PHP	
LO3	To understand the concepts of array and user defined functions.	
LO4	To learn to create and use files and understand the concept of sessions to secure data.	
LO5	To understand and use object oriented concepts in PHP	
Units	**Contents**	**RequiredHours**
Unit I	Introduction to PHP -Basic Knowledge of websites – Introduction of Dynamic Website-Introduction to PHP-Scope of PHP-XAMPP and WAMP Installation-PHP Programming Basics -Syntax of PHP	**6**
Unit II	Introduction to PHP Variable -Understanding Data Types -UsingOperators-UsingConditionalStatements-If(),elseif() and else if condition Statement -Switch() Statements -Using the while() Loop -Using the for() Loop	**6**
Unit III	PHP Functions -PHP Functions -Creating an Array -ModifyingArrayElements-ProcessingArrayswithLoops-GroupingFormSelections withArrays-UsingArray	**6**
Unit IV	PHP Advanced Concepts -Reading and Writing Files - Reading Data from a File -Managing Sessions and Using Session Variables	**6**
Unit V	OOPS Using PHP -OOPS Concept-Class, Object, Abstractions, Encapsulation, Inheritance, Polymorphism - Creating Classes and Object in PHP-Cookies and Session Management	**6**

Course Outcomes		**Programme Outcome**
CO	On completion of this course, students will be	
1	Able to design simple web pages	PO1,PO3,PO5
2	Able to use data types and web interaction with simple PHP scripts	PO2,PO3,PO6
3	Able to write script to perform decision making and looping	PO3,PO4
4	Able to use arrays and process controls and data	PO4,PO5,PO6
5	Able to write server side scripting and manage sessions	PO4,PO6

Text Book

1. LynnmighleyandMichaelMorrison, HeadFirstPHP&MySQL:ABrain-FriendlyGuide-2009.

Reference Books

1. Alan Forbes, TheJoyofPHP:ABeginner'sGuidetoProgrammingInteractiveWebApplicationswithPHP and MySQL, BeakCheck LLC; 6th edition, 2012.

Web Resources

1. https://www.w3schools.com/php/
2. https://www.javatpoint.com/php-tutorial
3. https://www.tutorialspoint.com/php/index.htm

MAPPING TABLE						
CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**3**	**2**	**2**	**2**
CO2	**3**	**3**	**3**	**3**	**3**	**2**
CO3	**3**	**2**	**3**	**3**	**3**	**3**
CO4	**3**	**2**	**2**	**3**	**3**	**3**
CO5	**3**	**3**	**2**	**3**	**3**	**3**
Weightage of coursecontributed to each PSO	**15**	**12**	**13**	**14**	**14**	**13**

Semester III

Course Code	Course Title	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO3C1	**OPERATING SYSTEMS**	**CC-V**	5	-	-	II	4	25	75	100

Learning Objectives	
LO1	To learn history and concepts of operating systems
LO2	To learn inter process communication mechanism
LO3	To learn process scheduling and memory management algorithms
LO4	To learn deadlock detection and mitigation
LO5	To learn I/O and file system services of operating systems

UNIT	**Contents**	**No. Of. Hours**
UNIT I	Introduction - History of operating system- Different kinds of operating system – Operating system concepts - System calls-Operating system structure.	**15**
UNIT II	Processes and Threads: Processes - threads - thread model and usage - inter process communication.	**15**
UNIT III	Scheduling - Memory Management: Memory Abstraction - Virtual Memory - Page replacement algorithms.	**15**
UNIT IV	Deadlocks: Resources- introduction to deadlocks - deadlock detection and recovery - deadlocks avoidance - deadlock prevention. Multiple processor system: multiprocessors - multi computers	**15**
UNIT V	Input / Output: principles of I/O hardware - principles of I/O software. Files systems: Files - directories - files systems implementation - File System Management and Optimization.	
	TOTAL HOURS	**75**

Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
CO1	Understand the concepts operating systems and their services	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Understand the inter process communication and related concepts	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Understand process scheduling and memory management servicesof operating systems	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Understand deadlock detection and avoidance using algorithms	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Understand and master I/O and file management services of operating systems	PO1, PO2, PO3, PO4, PO5, PO6

Textbooks	
1	Andrew S. Tanenbaum, "Modern Operating Systems", 2nd Edition, PHI private Limited, New Delhi, 2008.

Reference Books

1.	William Stallings, "Operating Systems - Internals & Design Principles",5thEdition, Prentice - Hall of India private Ltd, New Delhi, 2004.
2.	Sridhar Vaidyanathan, "Operating System", 1st Edition,Vijay Nicole Publications, 2014.

Web Resources

1. https://www.w3schools.in/operating-system/intro
2. https://www.tutorialspoint.com/operating_system/operating_system_tutorial.pdf
3. https://www.guru99.com/os-tutorial.html
4. https://www.tutorialspoint.com/unix/index.htm

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	1	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	2
Weightage of course contributed to each PSO	15	15	15	15	13	14

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

Semester III

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23BSO3P1	**OPERATING SYSTEMS LAB**	**CC-VI**	-	-	4	-	4	4	25	75	100

Course Objective	
LO1	To learn the operating system calls and command format
LO2	To understand file system commands
LO3	To understand unix operating system and learn linux command format
LO4	To understand linux commands and programming
LO5	To understand GUI interaction in Windows and execute command using mouse and keyboard

UNIT	**List of Excercises**	**No. of Hours**
CYCLE I	**Disk Operating System (DOS) Commands** 1. Write DOS command to perform the following: a) Display files only (**DIR** /a-d) b) Display directories only (**DIR** /ad) c) Display all hidden files and directories (**DIR** /ah) d) Display all files and directories (**DIR** /a) 2. Write DOS commands to perform the following: a) Create a directory and change to it (**MD** directory-name, CD directory-name) b) Copy files from current directory to new directory created (**COPY** *.* path:directory-name) c) Move from current directory to prevous level in directory hierarchy. (**CD** ..) 3. Write DOS commands to create a text file and list it after creation: **COPY CON file-name** Press Enter Key This is a test file created from DOS console prompt Welcome to Alagappa University Karaikudi Tamilnadu **Press Ctrl+Z** PressEnter Key **DIR file-name** 4. Write DOS command to perform the following: a) Display all file names starting with the letter **a** (**DIR** a*) b) Display all file names starting with the letter **d** and ending with letter **s** (**DIR** d*s) c) Display all file names with three letters (**DIR** ???) d) Display all three letter file names starting with the letter m and ending with the letter t (**DIR** m?t) 5. Write DOS command to perform the following: a) rename a file to another name (**REN** old-file-name new-name) b) rename a set of files starting with letter **a** to start with letter **t** (**REN** a* t*) 6. Write DOS command to perform the following: a) delete a file (**DEL** file-name) b) delete all files in a directory (**DEL** *.*) c) delete all files starting with letter a (**DEL** a*) 7. Write DOS external command to print list of files one by on	10

	PRINT file-1 file-2 file-3 8. Write DOS command to display the contents of more than one file one after another TYPE file-1 file-2 file-3 9. Write DOS external command to check your hard disk for error CHKDSK 10. Write DOS external command to sort the contents of a text file SORT file-name	
CYCLE II	**LINUX OS Shell Programming Problems** 1) Write a shell script to ask your name, degree name, enrollment number and print them on the screen. 2) Write a shell script to find the sum, the average and the product of the four integers input. 3) Write a shell program to exchange the values of two variables 4) Find the lines containing numeric values in a file 5) Write a shell script to display the digits which are in odd position in a given 5 digit number 6) Write a shell program to reverse the digits of five digit integer 7) Write a shell script to find the largest among the 3 given numbers 8) Write a shell program to search for a given number from the list of numbers input, using binary search method 9) Write a shell program to concatenate two strings and find the length of the resultant string 10) Write a shell program to find the position of substring in given string	40
CYCLE III	WINDOWS OS COMMANDS Using Mouse Operations, perform the following in WINDOWS: 1. Creating file folders 2. Changing the order in which files are displayed 3. Copying files from one folder to another folder. 4. Creating shortcut for an application or file on the desktop 5. Deleting and recovering files from recycle bin. Coming out of windows to DOS prompt.	10
	Total	**60**

Course Outcomes		**Programme Outcome**
CO	On completion of this course, students will	
1	be able to use dos commands to get services from OS	PO1,PO3,PO5
2	be able to use linux commands to get services from Unix OS	PO2,PO3,PO6
3	be able to use system calls and command piping	PO3,PO4
4	be able to write shell scripts and automate processes	PO4,PO5,PO6
5	be able to use windows commands using keyboard and mouse and get services from windows OS.	PO4,PO6

Reference Books

1	DOS: The Complete Reference Paperback, Kris Jamsa, 4th Edition, McGraw Hill 1993.
2	Linux: The Complete Reference, Sixth Edition – Illustrated, Richard Petersen, McGraw Hill, 2008.
3	Windows 10: The Missing Manual, 2nd Edition, David Pogue, O'Reilly Media, Inc., 2018.

Web Resources

1.	https://www.w3schools.io/terminal/dos-logical-operators/

2.	https://www.tutorialspoint.com/unix/index.htm
3.	https://bjpcjp.github.io/pdfs/devops/linux-commands-handbook.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	2	3	3	3	3	3
CO 3	3	3	2	3	3	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
Weight age of course contributed to each PSO	14	15	14	15	15	14

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

Semester III

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO3S1	**QUANTITATIVE APTITUDE**	**SEC-IV**	2	-	-	-	2	25	75	100

Learning Objectives	
LO1	To enhance the quantitative skills fo the students
LO2	Learn to solve numeric problems
LO3	Learn to solve problems involving Time and Work
LO4	Learn to solve permutation and combination problems
LO5	To mould the students to face various competetive exams

Units	**Contents**	**Required Hours**
UNIT I	Numbers- HCF and LCM of numbers-Decimal fractions- Simplification-Square roots and cube roots- Average- problems on Numbers	**6**
UNIT II	Problems on Ages - Surds and Indices - percentage - profits and loss - ratio and proportion-partnership- Chain rule.	**6**
UNIT III	Time and work - pipes and cisterns - Time and Distance - problems on trains - Boats and streams - simple interest - compound interest - Logarithms – Area-Volumeandsurfacearea-races and Games of skill.	**6**
UNIT IV	Permutation and combination-probability-True Discount Bankers Discount - Height and Distances-Odd man out & Series.	**6**
UNIT V	Calendar - Clocks - stocks and shares - Data representation - Tabulation – Bar Graphs- Piecharts-Linegraphs	**6**
	TOTAL HOURS	**30**

Course Outcomes	
CO1	Acquire quantitative skills in finding solutions to numeric problems
CO2	Able to solve numeric problems
CO3	Able to solve problems involving Time and Work
CO4	Able to solve permutation and combination problems
CO5	Facing various competetive exams with confidence in problem solving

Text Book:
"QuantitativeAptitude",R.S.AGGARWAL.,S.Chand&CompanyLtd.,
Webresources: Authentic Web resources related to Competitive examinations

MAPPING TABLE						
CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**3**	**2**	**2**	**3**
CO2	**3**	**3**	**3**	**3**	**3**	**3**
CO3	**3**	**2**	**2**	**2**	**3**	**3**
CO4	**3**	**3**	**2**	**3**	**3**	**3**
CO5	**3**	**3**	**3**	**3**	**3**	**3**
Weightage of course contributed to each PSO	**15**	**13**	**13**	**13**	**14**	**15**

Semester III

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO3S2	**ENTERPRISE RESOURCE PLANNING**	**SEC V**	2	-	-	-	2	25	75	100

Learning Objectives:(forteachers:whattheyhavetodointheclass/lab/field)

- Understand the concept of ERP and the ERP model; define key terms; identify the levelsof ERP maturity.
- To integrate business processes; define and analyze a process; create a process map and improve and/or simplify the process; apply the result to an ERP implementation.
- To know the elements of a value chain, and explain how core processes relate; identifyhow the organizational infrastructure supports core business processes; explain the effect of a new product launch on the three core business processes

Course Outcomes:(forstudents:Toknowwhattheyaregoingtolearn)**CO1:**
Understand the basic concepts of ERP.
CO2: Identify different technologies used in ERP
CO3: Understand and apply the concepts of ERP Manufacturing Perspective and ERP Modules
CO4: Discuss the benefits of ERP
CO5: Apply different tools used in ERP

Units	Contents	Required Hours
UNIT I	ERP Introduction, Benefits, Origin, Evolution and Structure: Conceptual Model of ERP, the Evolution of ERP, the Structure of ERP, Components and needs of ERP, ERP Vendors; Benefits & Limitations of ERP Packages.	**6**
UNIT II	Need to focus on Enterprise Integration/ERP; Information mapping; Role of common shared Enterprise database; System Integration, Logical vs. Physical System Integration, Benefits & limitations of System Integration.	**6**
UNIT III	ERP Marketplace and Marketplace Dynamics: Market Overview, Marketplace Dynamics, the Changing ERP Market. ERP- Functional Modules: Introduction, Functional Modules of ERP Software, Integration of ERP, Supply chain.	**6**
UNIT IV	ERP Implementation Basics, , ERP implementation Strategy, ERP Implementation Life Cycle ,Pre- Implementation task,Role of SDLC/SSAD, Object Oriented Architecture, Consultants, Vendors and Employees.	**6**

UNIT V	ERP & E-Commerce, Future Directives- in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP into or-ganizational culture. Using ERP tool: either SAP or	**6**
	ORACLE format to case study.	

Learning Resources:

- **Recommended Texts**
  1. Enterprise Resource Planning – Alexis Leon, Tata McGraw Hill.
- **Reference Books**
  1. Enterprise Resource Planning – Diversified by Alexis Leon, TMH.
  2. Enterprise Resource Planning – Ravi Shankar & S. Jaiswal , Galgotia

MAPPING TABLE						
CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**3**	**3**	**2**	**2**	**2**
CO2	**2**	**3**	**3**	**3**	**3**	**2**
CO3	**2**	**3**	**3**	**3**	**3**	**3**
CO4	**3**	**3**	**3**	**3**	**3**	**3**
CO5	**3**	**3**	**3**	**3**	**3**	**3**
Weightage of course contributedto each PSO	**13**	**15**	**15**	**14**	**14**	**13**

Semeser IV

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO4C1	**OBJECT ORIENTED PROGRAMMING WITH JAVA**	**CCVII**	4	-	-	IV	4	25	75	100

Learning Objectives	
LO1	Object Oriented Programming with Java.
LO2	Apply the OOPs concept in JAVA programming.
LO3	Become proficient programmers through the java programming language.
LO4	Give insight into real world applications.
LO5	Get the attentions of users in user interface using graphics

UNIT	**Contents**	**No. Of. Hours**
UNIT I	**Introduction:** Introduction to Java-Features of Java-Object Oriented Concepts-Software Evolution – Software Development, SDLC Models – SDLC steps – Software Testing – Software Quality – Lexical Issues-Data Types – Variables – Arrays – Operators – Control Statements – Classes – Objects –Constructors – Overloading method – Access control – static and fixed methods – Inner classes – Inheritance-Overriding Methods-Using super-Abstract class.	**15**
UNIT II	**Packages & Threads:** Packages-Access Protection- Importing Packages-Interfaces-Exception Handling-Throw and Throws-Thread-Synchronization-Messaging- Runnable Interface-Inter thread communication-Deadlock-suspending, resuming and stopping threads-Multithreading	**15**
UNIT III	**Input/Output & Collection API:** I/O Streams-File Streams- String Objects-String Buffer-Char Array – Java Utilities-Collections interface – Collection classes-Enumeration – Vector–Stack –Hash tables – String class.	**15**
UNIT IV	**Networking:** Networking –Networking basics – java and the Net – Inet Address- TCP/IP Client Sockets –URL- URL Connection – TCP/IP Server Sockets – Datagrams.	**15**
UNIT V	**Graphical User Interface in Java:** Working with windowsusing AWT Classes – Class Hierarchy of Window and Panel – AWT controls – Layout Managers – Menus- Menu bars - Dialog Boxes- File Dialog-Applets-Lifecycle of Applet-Types of Applets-Event handling-Applet tags - JDBC and connecting to Databases – CRUD operations.	**15**
	TOTAL HOURS	**75**

Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
CO1	Use the syntax and semantics of java programming language and basic concepts of OOP.	PO1, PO2, PO3, PO4, PO5, PO6

CO2	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Apply the concepts of Multithreading and Exception handling toDevelop efficient and error free codes.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Design event driven GUI and web related applications which mimic the real word scenario	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Build the internet-based dynamic applications using the concept ofapplets	PO1, PO2, PO3, PO4, PO5, PO6

Textbooks

1	**P.Naughton and H.Schildt**(1999), Java 2 (The Complete Reference), Third Edition,Tata MCGraw Hill Edition
2	**K.K. Aggarwal &Yogesh Sing** (2008), Software Engineering, Revised Third Edition, NewAge International Publishers.

Reference Books

1.	Cay S. Horstmann, Gary Cornell(2012), Core Java 2 Volume I, Fundamentals- Ninth Edition Addision Wesley
2.	K.Arnold and J.Gosling, The Java Programming Language- Second Edition, ACM Press/Addison-Wesley Publishing Co. New York

Web Resources

1.	https://www.w3schools.com/java/java_oop.asp#:~:text=OOP%20provides%20a%20clear%20structure,code%20and%20shorter%20development%20time
2.	https://www.geeksforgeeks.org/object-oriented-programming-oops-concept-in-java/
3.	https://www.javatpoint.com/java-oops-concepts
4.	https://www.coursera.org/learn/object-oriented-java
5.	https://docs.oracle.com/javase/tutorial/java/concepts/index.html

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

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

Semester IV

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO4P1	**OBJECT ORIENTED PROGRAMMING WITH JAVA LAB**	**CC VIII**	-	-	4	IV	4	25	75	100

Learning Objectives:

1. Use an integrated development environment to write, compile, run, and test simpleobject-oriented Java programs.
2. Read and make elementary modifications to Java programs that solve real-worldproblems.
3. Be able to create an application using string concept.
4. Be able to create a program using files in application.
5. Be able to create an Applet to create an application.

	Number of Hours
Lab Exercises: 1. Program using Class and Object. 2. Program using Constructors. 3. Program using Command-Line Arguments. 4. Program using Random Class. 5. Program using Vectors. 6. Program using String Tokenizer Class. 7. Program using Interface. 8. Program using all forms of Inheritance. 9. Program using String class. 10. Program using String Buffer class. 11. Program using Exception Handling. 12. Implementing Thread based applications 13. Program using Packages. 14. Program using Files. **Applets:** 15. Working with Colors and Fonts. 16. Parameter passing technique. 17. Drawing various shapes using Graphical statements. 18. Usage of AWT components and Listener in suitableapplications.	**60**

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

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

Semester IV

Course Code	Course Title	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23BSO4S1	**Android Programming**	SEC - VI	2	-	-	-	2	2	25	75	100

	Learning Objectives	
LO1	To learn the fundamentals of android studio for Mobile Application Development	
LO2	To understand the use of various elements used in interface and data transfer in an App	
LO3	To understand the android activities and menus in an App	
LO4	To learn to create and use database interface	
LO5	To learn about publishing a developed App	
Units	**Contents**	**Required Hours**
UNIT I	Introduction - History about Android operating system - Android program structure - User interface - Building blocks of User interface - Android Layout types - Layout attributes - Toasts - Activity.	**6**
UNIT II	Dialogs - Intent - types of intent - Explicit and Implicit intent - Intent data transfer from one activity to another - Android switch button.	**6**
UNIT III	Android life cycle: Android Activity life cycle - menus - menu Activity - Synchronous Task - Recycler view - Broadcast receiver and Notification.	**6**
UNIT IV	Shared preferences - sqlite Database - Alarm manager - alarm Types - Android services.	**6**
UNIT V	Testing Activity - Publishing App - steps of Publishing App	**6**

Course Outcomes		**Programme Outcome**
CO	On completion of this course, students will be	
CO 1	Able to design simple apps	PO1,PO3,PO5
CO 2	Able to use various elements for mobile device display interface	PO2,PO3,PO6
CO 3	Able to store and retrieve data from database	PO3,PO4
CO 4	Able to design and use menus for app	PO4,PO5,PO6
CO 5	Able to publish the app in playstore	PO4,PO6

Text Book	
1	Pratiyash Guleria,2018,Android For Beginners, BPB publications

Reference Books	
1.	John Horton, 2018, Android programming for Beginners,, Packt
2.	Android system programming, Roger Ye, Packt

	Web Resources
1	https://developer.android.com/

2	https://www.geeksforgeeks.org/android-tutorial/
3	https://info448-s17.github.io/lecture-notes/introduction.html

MAPPING TABLE						
CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**3**	**2**	**2**	**2**
CO2	**3**	**3**	**3**	**3**	**3**	**2**
CO3	**3**	**2**	**3**	**3**	**3**	**3**
CO4	**3**	**2**	**2**	**3**	**3**	**3**
CO5	**3**	**3**	**2**	**3**	**3**	**3**
Weightage of course contributed to each PSO	**15**	**12**	**13**	**14**	**14**	**13**

Semester V

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO5C1	**RELATIONAL DATABASE MANAGEMENT SYSTEM**	**CC IX**	5	-	-	V	4	25	75	100

Learning Objectives	
LO1	To understand the different issues involved in the design and implementation of a database system.
LO2	To study the physical and logical database designs, database modeling, relational,
	hierarchical, and network models
LO3	To understand and use data manipulation language to query, update, and manage a database
LO4	To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency,
LO5	To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

UNIT	**Contents**	**No. Of. Hours**
UNIT I	**Introduction:** Database System-Characteristics of Database Management Systems- Architecture of Database Management Systems-Database Models-System Development Life Cycle-Entity Relationship Model.	**18**
UNIT II	**Relational Database Model:** Structure of Relational Model-Types of keys. Relational Algebra: Unary operations-Set operations-Join operations. Normalization: Functional Dependency- First Normal form-Second Normal Form-Third Normal form- Boyce-Codd Normal Form-Fourth Normal Form.	**18**
UNIT III	**SQL:** Introduction. Data Definition Language: Create, alter, drop, rename and truncate statements. Data Manipulation Language: Insert, Update and Delete Statements. Data Retrieval Language: Select statement. Transaction Control Language: Commit, Rollback and Save point statements. Single row functions using dual: Date, Numeric and Character functions. Group/Aggregate functions: count, max, min, avg and sum functions. Set Functions: Union, union all, intersect and minus. Subquery: Scalar, Multiple and Correlated subquery. Joins: Inner and Outer joins. Defining Constraints: Primary Key, Foreign Key, Unique, Check, Not Null.	**18**
UNIT IV	PL/SQL: Introduction-PL/SQL Basic-Character Set- L/SQL Structure – SQL Cursor-Subprograms-Functions- Procedures.	**18**
UNIT V	Exception Handling: Introduction-Predefined Exception- User Defined Exception-Triggers-Implicit and Explicit Cursors-Loops in Explicit Cursor.	**18**
	TOTAL HOURS	**90**

Course Outcomes		Programme Outcomes
CO1	To demonstrate the characteristics of Database ManagementSystems. To study about the concepts and models of database. To impart the concepts of System Development Life Cycle and E-R Model.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	To classify the keys and the concepts of Relational Algebra.To impart the applications of various Normal Forms Classification of Dependency.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	To elaborate the different types of Functions and Joins and their applications. Introduction of Views, Sequence, Index and Procedure.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Representation of PL-SQL Structure. To impart the knowledge of Sub Programs, Functions andProcedures.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Representation of Exception and Pre-Defined Exception. To Point out the Importance of Triggers, Implicit and ExplicitCursors.	PO1, PO2, PO3, PO4, PO5, PO6
	Textbooks	
1	**Pranab Kumar Das Gupta and P. Radha Krishnan,** "Database Management System Oracle SQL and PL/SQL", Second Edition, 2013, PHI Learning PrivateLimited.	
	Reference Books	
1	**RamezElmasri and Shamkant B. Navathe**, "*Fundamentals of Database Systems*", Seventh Edition, Pearson Publications.	
2	**Abraham Silberschatz, Henry Korth, S. Sudarshan**, "*Database System Concepts*", Seventh Edition, TMH.	
	Web Resources	
1	http://www.amazon.in/DATABASE-MANAGEMENT-SYSTEM-ORACLE-SQLebook/dp/B00LPGBWZ0#reader_B00LPGBWZ0	

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

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

Semester V

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO5P1	**RDBMS LAB USING ORACLE**	**CC X**	-	-	5	V	4	25	75	100

Learning Objectives:

1. To explain basic database concepts, applications, data models, schemas andinstances.
2. To demonstrate the use of constraints and relational algebra operations
3. Describe the basics of SQL and construct queries using SQL.
4. To emphasize the importance of normalization in databases
5. To facilitate students in Database design

LAB EXERCISES:

SQL:

1. DDL commands.
2. Specifying constraints-Primary Key, Foreign Key, Unique, Check, Not Null.
3. DML commands.
4. Set Operations.
5. Joins.
6. Sub-queries.

PL/SQL:

7. Control Constructs.
8. Exception Handlers.
9. Implicit Cursor.
10. Explicit Cursor.
11. Procedures.
12. Functions.
13. Triggers.
14. TCL Commands usage (Commit, Rollback, Savepoint)

	Course Outcomes
CO	On completion of this course, students will
CO1	To demonstrate the characteristics of Database Management Systems.To study about the concepts and models of database. To impart the concepts of System Development Life Cycle and E-R Model.
CO2	To classify the keys and the concepts of Relational Algebra.To impart the applications of various Normal Forms Classification of Dependency.
CO3	To elaborate the different types of Functions and Joins and their applications. Introduction of Views, Sequence, Index and Procedure.

CO4	Representation of PL-SQL Structure. To impart the knowledge of Sub Programs, Functions and Procedures.
CO5	Representation of Exception and Pre-Defined Exception. To Point out the Importance of Triggers, Implicit and Explicit Cursors.

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

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

Semester V

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks CIA	Subject Code		
									CIA	External	Total
23BSO5C2	**OPEN SOURCE SOFTWARE TECHNOLOGIES**	**CC XI**	5	-	-	V	4	25		75	100

Course Objective	
C1	Able to Acquire and understand the basic concepts in Java,application of OOPS concepts.
C2	Acquire knowledge about operators and decision-making statements.
C3	To Identify the significance and application of Classes, arrays and interfaces andanalyzing java arrays
C4	Understand about the applications of OOPS concepts and analyze overriding andpackages through java programs.
C5	Can Create window-based programming using applet and graphics programming.

UNIT	**Details**	**No. of Hours**	**CO**
UNIT I	Open Source – open source vs. commercial software – What is Linux? – Free Software – Where I can use Linux? - Linux kernel – Linux distributions.	6	C1
UNIT II	Introduction Linux Essential Commands – File System concept – Standard Files – The Linux Security Model – Introduction to Unix – UnixComponents Unix Files –	6	C2
UNIT III	Introduction - Apache Explained – Starting, Stopping and Restarting Apache – Modifying the Default configuration – Securing Apache – Set user and Group	6	C3
UNIT IV	**MySQL:** Introduction to MySQL – The show databases and table – TheUSE command –Create Database and Tables – Describe Table –	6	C4
UNIT V	**Introduction** –PHP Form processing – Database Access with PHP – MySQL, MySQLFunctions – Inserting Records – Selecting Records – Deleting Records – Update Records.	6	C6
	Total	**30**	

Course Outcomes		**Programme Outcome**
CO	On completion of this course, students will	
1	Acquire and understand the basic concepts in Java, application of OOPS concepts.	PO1
2	Acquire knowledge about operators and decision-making statements.	PO1,PO2

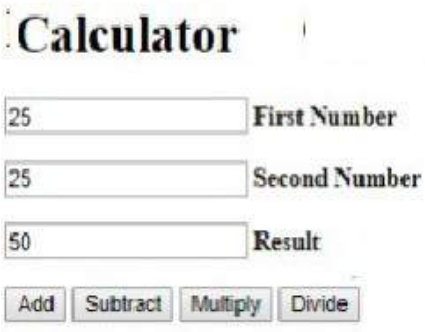
3	Identify the significance and application of Classes, arrays and interfaces and analyzing java arrays	PO4,PO6
4	Understand about the applications of OOPS conceptsand analyze overriding and packages through java programs.	PO4,PO5,PO6
5	Create window-based programming using applet andgraphics programming.	PO3,PO8
Text Book		
1	James Lee and Brent Ware "Open Source Web Development with LAMP using	
2	LINUX, Apache, MySQL, Perl and PHP", Dorling Kindersley (India) Pvt. Ltd, 2008.	
Reference Books		
1.	Eric Rosebrock, Eric Filson, "Setting up LAMP: Getting Linux, Apache, MySQL andPHP and working together", John Wiley and Sons, 2004.	
2.	2. Anthony Butcher , "Teach Yourself MySQL in 21 days", 2nd Edition, SamsPublication.	
3.	3. Rich Bower, Daniel Lopez Ridreejo, Alian Liska , "Apache Administrator's Handbook", Sams Publication.	
4.	4. Tammy Fox, "RedHat Enterprise Linux 5 Administration Unleashed", SamsPublication.	
5.	5. Naramore Eligabette, Gerner Jason, Wrox Press, Wiley Dreamtech Press,"Beginning PHP5, Apache, MySQL Web Development", 2005.	
Web Resources		
1.	Introduction to Open-Source and its benefits - GeeksforGeeks	
2.	https://www.bing.com/	

MAPPING TABLE						
CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**3**	**2**	**3**	**2**
CO2	**2**	**3**	**3**	**3**	**3**	**2**
CO3	**2**	**2**	**3**	**3**	**3**	**3**
CO4	**3**	**3**	**2**	**3**	**3**	**3**
CO5	**3**	**3**	**3**	**3**	**3**	**3**
Weightage of course contributed to each PSO	**13**	**13**	**14**	**14**	**15**	**13**

Semester V

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23BSO5P2	**OPEN SOURCE TECHNOLOGIES LAB**	**CC-XII**	-	-	4	-	4	5	25	75	100

Course Objective	
LO1	To Explore open source technology PHP in web
LO2	To learn the fundamentals of PHP script
LO3	To understand the control statements in PHP
LO4	To write program statements for input, output and computations
LO5	To create elements and write events for them for interaction with user.

List of Excercises	**No. of Hours**
1. Create a simple HTML form and accept the user name and display the name through PHP echo statement. 2. Write a PHP script to redirect a user to a different page. 3.Write a PHP function to test whether a number is greater than 30, 20 or 10 using ternary operator. 4.Create a PHP script which display the capital and country name from the given array. Sort the list by the name of the country 5.Write a PHP script to calculate and display average temperature, five lowest and highest temperatures. 6.Create a script using a for loop to add all the integers between 0 and 30 and display the total. 7.Write a PHP script using nested for loop that creates a chess board. 8.Write a PHP function that checks if a string is all lower case. 9.Write a PHP script to calculate the difference between two dates. 10. Write a PHP script to display time in a specified time zone. 11. Write a PHP script to create a simple calculator as shown below  12. Create MYSQL database of your choice and add records to it using PHP script	60

13. Retrieve data from SQL database of your choice and display in boxes. 14. Write user-defined function myfunc() to display the data passed to it. Pass your name and address. 15. Create an address file with PHP code. 16. Write PHP script to start and destroy a session 17. Write PHP code to create a class and object for student data. Write functions to input and display data. 18. Write PHP code to send email to your friend whose address is input 19. Write PHP code to upload a file 20. Write PHP code to download a file from web.	
Total	**60**

Course Outcomes		**Programme Outcome**
CO	On completion of this course, students will	
1	be able to write PHP code for web pages	PO1,PO3,PO5
2	be able to write sophisticated code to achieve the desired operation on web pages.	PO2,PO3,PO6
3	be able to use constrol structures in PHP	PO3,PO4
4	be able to create GUI application and handle data with PHP code.	PO4,PO5,PO6
5	be able to use advanced commands in PHP	PO4,PO6
Reference Books		
1	Tim Warren, 2020, PHP Programming For Beginners, Ingram Publishing	
WEB SOURCES		
1.	https://www.w3schools.com/php	
2.	https://www.geeksforgeeks.org/php-tutorial/	
3.	https://www.javatpoint.com/php-tutorial	

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	2	3	3	3	3	3
CO 3	3	3	2	3	3	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
Weight age of course contributed to each PSO	14	15	14	15	15	14

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

Semester V

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks	
								External	Total
23BSO5E1	**SOFTWARE ENGINEERING**	**DSE-I**	4	-	-	-	3	75	100

Learning Objectives	
LO1	To understand the software engineering concepts and software models
LO2	To learn coding, testing and user interface design
LO3	To Design, develop the software projects and software reliability and qualitymanagement
LO4	To understand software testing methods
LO5	To understand software quality metrics

UNIT	Contents	No. Of. Hours
UNIT I	Introduction - Software Engineering Discipline - Evolution and Impact - Programs Vs Software Products. Software Life Cycle Models: Use of a Life Cycle Models - Classical Waterfall Model -Iterative Waterfall Model - Prototyping Model - Evolutionary Model - Spiral Model. Software Project Management: Responsibilities of a Software Project Manager - Project Planning - Metrics for Project Size Estimation - Project Estimation Techniques -Risk Management.	**12**
UNIT II	Requirements Analysis and Specification: Requirements Gathering and Analysis -Software Requirements Specification (SRS) - Formal System Development Techniques. Software Design: Characteristics of a Good Software Design - Cohesion and Coupling -Neat Arrangement - Software Design Approaches.	**12**
UNIT III	Function-Oriented Software Design: Overview of SA/SD Methodology - Structured Analysis - Data Flow Diagrams (DFDs).Object Modeling Using UML: Overview of Object-Oriented Concepts - UML Diagrams - Use Case Model - Class Diagrams - Interaction Diagrams - Activity Diagrams - State Chart Diagram.	**12**
UNIT IV	User Interface Design: Characteristics of a Good User Interface - Basic Concepts - Types of User Interfaces - Component-Based GUI Development; Coding and Testing: Coding - Testing - UNIT Testing - Black-Box Testing - White-Box Testing - Debugging -Integration Testing - System Testing.	**12**
UNIT V	Software Reliability and Quality Management: Software Reliability - Statistical Testing -Software Quality - Software Quality Management System - ISO 9000.Computer Aided Software Engineering: CASE Environment - CASE support in Software Life Cycle - Characteristics of CASE Tools - Architecture of a CASE Environment. Software Maintenance: Characteristics of Software Maintenance - Software Reverse Engineering - Software Maintenance Process Models - Estimation of Maintenance Cost. Software Reuse: Issues in any Reuse Program - Reuse Approach.	**12**
	TOTAL HOURS	**60**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	be able to perform software project planning using models	PO1, PO2, PO3, PO4, PO5, PO6
CO2	be able to perform good software design	PO1, PO2, PO3, PO4, PO5, PO6
CO3	be bale to perform different analysis methods	PO1, PO2, PO3, PO4, PO5, PO6
CO4	be able to design user interface and testing of finished software project	PO1, PO2, PO3, PO4, PO5, PO6
CO5	be able to assess software quality and perform software maintenance	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		
1	Rajib Mall, 2008, "Fundamentals of Software Engineering",3rd Edition, PrenticeHall of India Private Limited	
Reference Books		
1.	Rajib Mall, "Fundamentals of Software Engineering", 4thEdition, Prentice Hall of India Private Limited, 2014.	
2.	Richard Fairley, "Software Engineering Concepts", TMGH Publications, 2004	
Web Resources		
1.	https://www.tutorialspoint.com/software_engineering/index.htm	
2.	https://www.geeksforgeeks.org/software-engineering-introduction-to-software-engineering/	
3	https://www.javatpoint.com/software-testing-tutorial	

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	2	3	3	3	2	3
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	2	3
CO 5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	15	15	15	12	14

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

Semester V

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO5E2	**SOFTWARE TESTING**	**DSE-I**	4	-	-	-	3	25	75	100

Learning Objectives	
LO1	To understand the basic concepts of testing and debugging a software
LO2	To understand the concept of path testing
LO3	To understand the concepts of domain and data flow testing
LO4	To understand metrics and syntax testing
LO5	To understand logic based testing and state testing

UNIT	**Contents**	**No. Of. Hours**
UNIT I	Introduction: Purpose – Productivity and Quality in Software – Testing Vs Debugging – Model for Testing – Bugs – Types of Bugs – Testing and Design Style.	**12**
UNIT II	Flow / Graphs and Path Testing – Achievable paths – Path instrumentation – Application – Transaction Flow Testing Techniques.	**12**
UNIT III	Data Flow Testing Strategies - Domain Testing: Domains and Paths – Domains and Interface Testing.	**12**
UNIT IV	Linguistic –Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing – Formats – Test Cases.	**12**
UNIT V	Logic Based Testing – Decision Tables – Transition Testing – States, State Graph, State Testing.	**12**
	TOTAL HOURS	**60**

Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
CO1	be able to identify bugs and and suitable design styles	PO1, PO2, PO3, PO4, PO5, PO6
CO2	be able to trace the paths in code and perform transaction flow testing	PO1, PO2, PO3, PO4, PO5, PO6
CO3	domain and interface testing	PO1, PO2, PO3, PO4, PO5, PO6
CO4	be able to create test cases and perform synax testing	PO1, PO2, PO3, PO4,

		PO5, PO6
CO5	be able to perform logic based testing	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		
1	B. Beizer, 2003, “Software Testing Techniques”, II Edn., DreamTech India, New Delhi.	
2	K.V.K. Prasad ,2005, “Software Testing Tools”, DreamTech. India, New Delhi.	
Reference Books		
1.	I. Burnstein, 2003, “Practical Software Testing”, Springer International Edn.	
2.	E. Kit, 1995, “Software Testing in the Real World: Improving the Process”, Pearson Education, Delhi.	
3	R.Rajani, and P.P.Oak, 2004, “Software Testing”, Tata Mcgraw Hill, New Delhi.	
Web Resources		
1.	https://www.javatpoint.com/software-testing-tutorial	
2.	https://www.w3schools.in/software-testing/tutorials/	

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	2	3	3	3	2	3
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	2	3
CO 5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	15	15	15	12	14

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

Semester V

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO5E3	**COMPUTER NETWORKS**	**DSE-II**	4	-	-	-	3	25	75	100

	Learning Objectives
LO1	to understand network layers and models
LO2	to understand data link layer, communication media and error handling
LO3	to explore data link layer design issues
LO4	to understand network layer and its functions
LO5	to understand transport layer and data security

UNIT	Contents	No. Of.Hours
UNIT I	Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media	**12**
UNIT II	Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.	**12**
UNIT III	Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth.	**12**
UNIT IV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.	**12**
UNIT V	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transport Protocols (ITP) - Network Security: Cryptography.	**12**
	TOTAL HOURS	**60**

	Course Outcomes	**Programme Outcomes**
CO	On completion of this course, students will	
CO1	be able to differentiate betweeen different network topologies and models	PO1, PO2, PO3, PO4,PO5, PO6
CO2	be able to understand different forms of data communications	PO1, PO2, PO3, PO4,PO5, PO6
CO3	be able to understand different protocols in data link layer	PO1, PO2,PO3, PO4,PO5, PO6

CO4	be able to understand the functions of routing algorithms and TCP/IP	PO1, PO2,PO3, PO4,PO5, PO6
CO5	be able to understand protocols for secure communication in transport layers	PO1, PO2,PO3, PO4,PO5, PO6
Textbooks		
1	A. S. Tanenbaum, 2008 ,"Computer Networks", 4th Edition, Prentice-Hall of India,.	
Reference Books		
1.	B. A. Forouzan, 2007,"Data Communications and Networking", Tata McGraw Hill, 4th Edition.	
2.	F. Halsall,2008,"Data Communications, Computer Networks and Open Systems", Pearson Education.	
3	D. Bertsekas and R. Gallagher, 2008 ,"Data Networks", 2nd Edition, PHI.	
4	Lamarca,2002 "Communication Networks", Tata McGraw- Hill.	
Web Resources		
1.	https://www.tutorialspoint.com/data_communication_computer_network/index.htm	
2.	https://www.guru99.com/data-communication-computer-network-tutorial.html	

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	2	3	3	3	2	3
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	2	3
CO 5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	15	15	15	12	14

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

Semester V

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO5E4	**WIRELESS NETWORKS**	**DSE-II**	4	-	-	-	3	25	75	100

Learning Objectives	
LO1	to learn wireless LAN technologies and standards
LO2	to learn the concepts of Mobile IP and Ad-Hoc Networks
LO3	to learn the use and modifications of transmission control protocol in wireless networks
LO4	to learn UMTS architecture and hight speed 3G packet access
LO5	to learn 4G features and its applications

UNIT	**Contents**	**No. Of.Hours**
UNIT I	Introduction-WLAN Technologies: Infrared, UHF Narrowband, Spread Spectrum - IEEE802.11: System Architecture, Protocol Architecture, Physical Layer, MAC Layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband Layer, Link Manager Protocol, Security – IEEE802.16-WIMAX: Physical Layer, MAC, Spectrum Allocation For WIMAX.	**12**
UNIT II	Introduction – Mobile IP: IP Packet Delivery, Agent Discovery, Tunneling And Encapsulation, IPV6-Network Layer In The Internet- Mobile IP Session Initiation Protocol – Mobile Ad-Hoc Network: Routing, Destination Sequence Distance Vector, Dynamic Source Routing.	**12**
UNIT III	TCP Enhancements For Wireless Protocols – Traditional TCP: Congestion Control, Fast Retransmit/Fast Recovery, Implications Of Mobility – Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time Out Freezing, Selective Retransmission, Transaction Oriented TCP – TCP Over 3G Wireless Networks.	**12**
UNIT IV	Overview Of UMTS Terrestrial Radio Access Network-UMTS Core Network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High Speed Downlink Packet Access (HSDPA) - LTE Network Architecture And Protocol.	**12**
UNIT V	Introduction – 4G Vision – 4G Features And Challenges – Applications Of 4G – 4G Technologies: Multicarrier Modulation, Smart Antenna Techniques, OFDM- MIMO Systems, Adaptive Modulation And Coding With Time Slot Scheduler, Cognitive Radio.	**12**
	TOTAL HOURS	**60**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Ackquire knowledge on wireless LAN technologies and standards	PO1, PO2, PO3, PO4,PO5, PO6
CO2	Ackquire knowledge on the concepts of Mobile IP and Ad-Hoc Networks	PO1, PO2, PO3, PO4,PO5, PO6
CO3	Ackquire knowledge on the use and modifications of transmission control protocol in wireless networks	PO1, PO2,PO3, PO4, PO5, PO6
CO4	Ackquire knowledge on UMTS architecture and hight speed 3G packet access	PO1, PO2,PO3, PO4, PO5, PO6
CO5	Ackquire knowledge on 4G features and its applications	PO1, PO2,PO3, PO4, PO5, PO6
Textbooks		
1	Jochen Schiller,2012, "Mobile Communications", Second Edition, Pearson Education 2012.(Unit I,II,III)	
2	Vijay Garg , "Wireless Communications And Networking", First Edition, Elsevier 2007.(Unit IV,V)	
Reference Books		
1.	Erik Dahlman, Stefan Parkvall, Johan Skold And Per Beming, 2008,"3G Evolution HSPA And LTE For Mobile Broadband", Second Edition, Academic Press.	
2.	Anurag Kumar, D.Manjunath, Joy Kuri, 2011,"Wireless Networking", First Edition, Elsevier.	
3	Simon Haykin , Michael Moher, David Koilpillai,2013, "Modern Wireless Communications", First Edition, Pearson Education.	
Web Resources		
1.	https://www.tutorialspoint.com/Wireless-Networks	
2.	https://www.geeksforgeeks.org/wired-and-wireless-networking	
3.	https://www.javatpoint.com/wireless-lan-introduction	

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	2	3	3	3	2	3
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	2	3
CO 5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	15	15	15	12	14

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

Semester VI

Subject Code	SubjectName	Category	L	T	P	S	Credits	Inst.Hours	Marks		
									CIA	External	Total
23BSO6C1	**ASP.Net Programming**	**CC-XIII**	6	-	-	-	4	6	25	75	100

CourseObjective	
LO1	To identify and underst the goals and objectives of the NET framework and ASP.NET
LO2	To develop ASP.NET Webapplication using standard controls.
LO3	To implement file handling operations.
LO4	To handle SQL Server Database using ADO.NET.
LO5	Underst and the Gridviewcontrol and XML classes.

UNIT	**Details**	**No. ofHours**
UNIT I	Overview of .NETframework: Common Language Runtime(CLR), Frame work Class Library-C# Fundamentals: Primitive types and Variables – Operators -Conditional statements – Looping statements –Creating and using Objects – Arrays–String operations.	15
UNIT II	Introduction to ASP.NET -Language supported Components – Working with Web Forms – Webform standard controls: Properties and its events – HTML controls - ListControls: Properties and its events.	15
UNIT III	Rich Controls: Properties and its events –validationcontrols: Properties and its events– File Stream classes -File Modes – File Share – Reading and Writing to files –Creating, Moving,Copying and Deletingfiles –File uploading.	15
UNIT IV	ADO.NET Overview – Database Connections – Commands –DataReader – DataAdapter - DataSets-DataControls and	15
	Its Properties – Data Binding	
UNIT V	Grid View control: Deleting, editing, Sorting and Paging. XML classes – Web form to manipulate XMLfiles – Website Security – Authentication – Authorization –Creating a Web application.	15
	Total	**75**

CourseOutcomes		**ProgrammeOutcome**
CO	On completionof this course, students will	
CO1	Develop working knowledge of C# programming constructs and the.NETFramework	PO1,PO2,PO6
CO2	To develop a software to solve real world problems using ASP.NET	PO2,PO3,PO8
CO3	ToWorkOn Various Controls and Files	PO1,PO3,PO7

CO4	To create a web application using Microsoft ADO.NET.	PO2,PO6
CO5	To develop web applications using XML	PO1,PO3,PO8
TextBook		
1	SvetlinNakov, VeselinKolev&Co, 2019 Fundamentals of Computer Programming with C#, Faber publication.	
2	Mathew, MacDonald, 2015, The Complete Reference ASP.NET,Tata McGraw-Hill.	
ReferenceBooks		
1.	Herbert Schildt,2017, The Complete Reference C#.NET,Tata McGraw-Hill.	
2.	KogentLearningSolutions,2013, .NET4.5 BlackBook, Dreamtechpres.	
3.	Anne Boehm, Joel Murach, Murach's C#2015,2016, Mike Murach & Associates Inc.	
4.	Denielle Otey, Michael Otey, 2008, ADO.NET: The Complete reference, Tata McGrawHill.	
5.	Matthew MacDonald,2010, Beginning ASP.NET 4 in C#2010, APRESS.	
WebResources		
1.	https://www.geeksforgeeks.org/introduction-to-net-framework/	
2.	https://www.javatpoint.com/net-framework	

MappingwithProgrammeOutcomes:

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**1**	**2**	**2**	**1**	3
CO2	**3**	**2**	**2**	**2**	**2**	3
CO3	**3**	**3**	**2**	**2**	**3**	3
CO4	**3**	**1**	**2**	**2**	**1**	3
CO5	**3**	**1**	**2**	**2**	**1**	2
Weightage of course contributed to each PSO	15	8	10	10	8	14

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

Semester VI

Subject Code	SubjectName	Category	L	T	P	S	Credits	Inst.Hours	Marks		
									CIA	External	Total
23BSO6P1	**ASP.Net Programming LAB**	CC-X14	-	-	12	-	8	12	25	75	100

CourseObjective	
LO1	To develop ASP.NET Web application using standard controls.
LO2	To create database-rich applications using ADO.NET.
LO3	To implement file handlingoperations.
LO4	To implement XML classes.
LO5	ToutilizeASP.NETsecurityfeaturesforauthenticatingthewebsite

Sl.No	**Programs**	
1.	Create an user interface using tools	60
2.	Implement the HTML Controls	
3.	Implement the Server Controls	
4.	Web application using Web controls.	
5.	Web application using List controls.	
6.	Web Page design using Rich control. Validate user input usingValidation controls. Working with File concepts.	
7.	Web application using Data Controls.	
8.	Data binding withWeb controls	
9.	Data binding with Data Controls.	
10.	Database application to perform insert, update and delete operations.	
11.	Database application using Data Controls to perform edit, paging and sorting operations.	

12.	Implement the XML classes.	
13.	Implement Authentication – Authorization.	
14.	Ticket reservation system using ASP.NET controls.	
15.	Online examination system using ASP.NETcontrols	
	Total Hours	60
Course Outcomes		**ProgrammeOutcome**
CO	Oncompletionofthiscourse, studentswill	
1	create web applications and implement variousc ontrols	PO1,PO2,PO6
2	Create web pages using Richcontrol.	PO3,PO8
3	Perform file handling operations	PO1,PO4,PO8
4	Be able to design XML classes	PO2,PO6,PO7
5	develop a software to solve real-world problems using ASP.NET	PO1,PO3,PO5,PO8
WebResources		
1.	https://www.w3schools.com/asp/default.ASP	
2.	https://www.javatpoint.com/asp-net-tutorial	
3.	https://www.tutorialspoint.com/asp.net/index.htm	

MappingwithProgrammeOutcomes:

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**2**	**2**	**1**	1
CO2	**3**	**2**	**3**	**2**	**2**	2
CO3	**3**	**3**	**2**	**2**	**1**	1
CO4	**3**	**2**	**3**	**2**	**1**	1
CO5	**3**	**2**	**2**	**2**	**1**	2
Weightageofcoursecontributedtoeach PSO	**15**	11	12	10	6	7

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

Semester VI

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO6E1	**MOBILE APPLICATION DEVELOPMENT**	**DSE-III**	5	-	-	-	3	25	75	100

Learning Objectives	
LO1	Understand the life cycle of mobile application and Android studio
LO2	Understand user interface design and activities
LO3	Understand list views and file data handling
LO4	Understand data sharing and SMS messaging
LO5	Understand the use of web services and own services

UNIT	**Contents**	**No. Of.Hours**
UNIT I	Mobile Application Development - Mobile Applications and Device Platforms - Alternatives for Building Mobile Apps - Comparing Native vs. Hybrid Applications -The Mobile Application Development Lifecycle-The Mobile Application Front-End-The Mobile Application Back-End- Key Mobile Application Services-What is Android-Android version history-Obtaining the Required Tools- Launching Your First Android Application-Exploring the IDE-Debugging Your Application-Publishing Your Application	**12**
UNIT II	Understanding Activities-Linking Activities Using Intents-Fragments-Displaying Notifications- Understanding the Components of a Screen-Adapting to Display Orientation-Managing Changes to Screen Orientation- Utilizing the Action Bar-Creating the User Interface Programmatically Listening for UI Notifications	**12**
UNIT III	Using Basic Views-Using Picker Views -Using List Views to Display Long Lists-Understanding Specialized Fragments - Using Image Views to Display Pictures -Using Menus with Views-Using WebView- Saving and Loading User Preferences-Persisting Data to Files-Creating and Using Databases.	**12**
UNIT IV	Sharing Data in Android-Creating Your Own Content Providers - Using the Content Provider- SMS Messaging -Sending Email-Displaying Maps- Getting Location Data- Monitoring a Location.	**12**
UNIT V	Consuming Web Services Using HTTP-Consuming JSON Services- Creating Your Own Services - Binding Activities to Services -Understanding Threading .	**12**

	TOTAL HOURS	**60**
Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
CO1	be able to design simple application and publish	PO1, PO2, PO3, PO4,PO5, PO6
CO2	be able to design user interface for mobile device and create activities	PO1, PO2, PO3, PO4,PO5, PO6
CO3	be able to create lists and handle file data	PO1, PO2,PO3, PO4, PO5, PO6
CO4	be able to share data and send SMS messages	PO1, PO2,PO3, PO4, PO5, PO6
CO5	be able to consume web services using HTTP, JSON and bind activities to services.Understand the use of web services and own services and bind them to activities	PO1, PO2,PO3, PO4, PO5, PO6
Textbooks		
1	Jerome DiMarzio, 2016,"Beginning Android Programming with Android Studio", 4thEdition, WROX	
Reference Books		
1.	Dawn Griffiths, David Griffiths,2017, "Head First Android Development: A Brain-Friendly Guide", Shroff/O'Reilly	
2.	Neil Smyth , 2014, "Android Studio 3.0 Development Essentials: Android", 8th Edition, Neil Smyth / Payload Media	
3	Pradeep Kothari,2014, "Android Application Development (With Kitkat Support)", Black Book, DreamTech Press	
Web Resources		
1.	https://www.tutorialspoint.com/mobile_development_tutorials.htm	
2.	https://www.javatpoint.com/android-tutorial	
3.	https://www.geeksforgeeks.org/android-tutorial/	
4.	https://en.wikipedia.org/wiki/Mobile_app_development	
5. 6.	https://developer.android.com/guide	
7.	https://flutter.dev/	
8.	http://ai2.appinventor.mit.edu	

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	2	3	3	3	2	3
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	2	3
CO 5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	15	15	15	12	14

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

Semester VI

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO6E2	**MOBILE COMPUTING**	**DSE-III**	5	-	-	-	3	25	75	100

Learning Objectives	
LO1	Understand the architecture and paradigms of mobile computing
LO2	Understand the layers and multiple access technologies
LO3	Understand the TCP/IP and its role in client server computing
LO4	Understand the data communication and delivery mechanisms
LO5	Understand the routing algorithms and protocols for mobile computing

UNIT	**Contents**	**No. Of.Hours**
UNIT I	Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.	**12**
UNIT II	Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)-Mobile Network Layer IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.	**12**
UNIT III	Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks. Database Issues: Database Hoarding and Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.	**12**
UNIT IV	Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization.	**12**
UNIT V	Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, Mobile Agents, Service Discovery. Protocols and Platforms for Mobile Computing: WAP, Bluetooth, J2ME, iOS/Windows CE, Android-Security.	**12**
	TOTAL HOURS	**60**

Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
CO1	Appreciate the use of computing	PO1, PO2, PO3, PO4, PO5, PO6
CO2	be able to choose suitable technology for mobile computing	PO1, PO2,

		PO3, PO4, PO5, PO6
CO3	be able to use TCP/IP in client-server communication	PO1, PO2, PO3, PO4, PO5, PO6
CO4	be able to use data delivery mechanisms	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Appreciate the use of WAP, bluetooth and 2ME and their security features	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		
1	Jochen Schiller,2009, "Mobile Communications", Addison-Wesley, Second Edition.	
2	Raj Kamal, 2007, "Mobile Computing", Oxford University Press, ISBN: 0195686772	
Web Resources		
1.	http://www.nettech.in/e-books/Wireless-networks-and-mobile-computing.pdf	
2.	http://ebooks.cambridge.org/ebook.jsf?bid=CBO9780511546969	

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	2	3	3	3	2	3
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	2	3
CO 5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	15	15	15	12	14

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

Semester VI

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO6E3	**E-COMMERCE TECHNOLOGIES**	**DSE-IV**	5	-	-	-	3	25	75	100

Learning Objectives	
LO1	To explore the history and advantages of E-Commerce
LO2	To understand E-Business model suitable for E-Commerce
LO3	To understand technologies that enable E-Commerce
LO4	To understand digital payment systems
LO5	To understand the backbone network technologies and Mobile Commerce

UNIT	**Contents**	**No. Of.Hours**
UNIT I	History of E-commerce and Indian Business Context: E-Commerce -Emergence of the Internet - Emergence of the WWW - Advantages of E-Commerce - Transition to E-Commerce in India - The Internet and India - E-transition Challenges for Indian Corporate.	**12**
UNIT II	Business Models for E-commerce: Business Model - E-business Models Based on the Relationship of Transaction Parties - E-business Models Based on the Relationship of Transaction Types.	**12**
UNIT III	Enabling Technologies of the World Wide Web: World Wide Web - Internet Client-Server Applications - Networks and Internets - Software Agents - Internet Standards and Specifications - ISP.E-Marketing : Traditional Marketing - Identifying Web Presence Goals - Online Marketing - E-advertising -Ebranding.	**12**
UNIT IV	E-Payment Systems: Main Concerns in Internet Banking - Digital Payment Requirements - Digital Token-based e-payment Systems - Classification of New Payment Systems - Properties of Electronic Cash - Cheque Payment Systems on the Internet.	**12**
UNIT V	Information systems for Mobile Commerce: Introduction - Wireless Applications - Cellular Network - Wireless Spectrum - Technologies for Mobile Commerce - Wireless Technologies.	**12**
	TOTAL HOURS	**60**

Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
CO1	be aware of transition to E-Commerce in India	PO1, PO2, PO3, PO4,PO5, PO6
CO2	be able to To understand E-Business model suitable for E-Commerce	PO1, PO2, PO3, PO4,PO5, PO6
CO3	be bale to use the technologies that enable E-Commerce	PO1, PO2,PO3, PO4, PO5, PO6
CO4	be able to use different types of secure e-payment systems	PO1, PO2,PO3, PO4,

		PO5, PO6
CO5	be able to use Mobile Commerce and other wireless technologies.	PO1, PO2,PO3, PO4, PO5, PO6
Textbooks		
1	P.T.Joseph, 2023, "E-Commerce - An Indian Perspective", Big Book, 7th Edition, PHI Learning.	
Web Resources		
1.	Subhabrata DE, 2023, Fundamentals of E-Commerce,Arambhag Book House, Kokata.	
2.	Janice Reynolds, 2017, " The Complete E-Commerce Book: Design, Build & Maintain a Successful Web-based Business", 2nd Edition, CRC Press	
3.	Kamalesh K Bajaj and Debjani Nag, 2005, "E-Commerce - The cutting edge of Business", 2nd Edition, Tata McGraw-Hill Education.	
4.	Ritendra Goel,2016, "E-commerce", New Age International Publishers.	

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	2	3	3	3	2	3
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	2	3
CO 5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	15	15	15	12	14

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

Semester VI

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23BSO6E4	**INTERNET OF THINGS**	**DSE-IV**	5	-	-	-	3	25	75	100

Learning Objectives	
LO1	To understand the basic perspective of IoT
LO2	To understand the architecture of IoT
LO3	To understand the design consideration methodology
LO4	To explore the applications of IoT
LO5	To understand the security features of IoT.

UNIT	Contents	No. Of. Hours
UNIT I	IoT & Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.	**12**
UNIT II	M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.	**12**
UNIT III	IoT Architecture -State of the Art – Introduction, State of the art, Architecture. Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views	**12**
UNIT IV	IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and GasIndustry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.	**12**
UNIT V	Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security	**12**
	TOTAL HOURS	**60**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Describe what IoT is and how it works today	PO1, PO2, PO3, PO4,PO5, PO6
CO2	Design and program IoT devices	PO1, PO2, PO3, PO4,PO5, PO6
CO3	Use real IoT protocols for communication	PO1, PO2,PO3, PO4, PO5, PO6
CO4	Define the infrastructure for supporting IoT deployments	PO1, PO2,PO3, PO4, PO5, PO6
CO5	be able to address security and privacy issues in IoT	PO1, PO2,PO3, PO4, PO5, PO6
Textbooks		
1	Vijay Madisetti and ArshdeepBahga, 2015, "Internet of Things: (A Hands-on Approach)", Universities Press (INDIA) Private Limited, 1st Edition.	
2	WaltenegusDargie, ChristianPoellabauer,2011, "Fundamentals of Wireless Sensor Networks: Theory and Practice" 4..CunoPfister, "Getting Started with the Internet of Things", O"Reilly Media.	
3	Samuel Greengard, The Internet of Things, 2015, The MIT press Essential Knowledge series.	
Reference Books		
1	Michael Miller, "The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities AreChanging the World", kindle version.	
2	Francis daCosta, 2013, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", Apress Publications, 1st Edition.	
Web Resources		
1.	https://www.javatpoint.com/iot-internet-of-things	
2.	https://data-flair.training/blogs/iot-tutorial/	
3.	https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/	

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	2	3	3	3	2	3
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	2	3
CO 5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	15	15	15	12	14

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

<table>
<tr><td colspan="2">Title of the Course</td><td colspan="6">ESSENTIAL REASONING AND QUANTITATIVE APTITUDE</td></tr>
<tr><td colspan="2">Paper Number</td><td colspan="6">Professional Competency Skill</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">PCS</td><td>Year</td><td>III</td><td rowspan="2">Credits</td><td rowspan="2">2</td><td colspan="2" rowspan="2">Sub. Code
23BSO6S1</td></tr>
<tr><td>Semester</td><td>VI</td></tr>
<tr><td colspan="2" rowspan="2">Instructional Hours per week</td><td>Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Lab Practice</td><td>Total</td></tr>
<tr><td>1</td><td colspan="2">1</td><td colspan="2">-</td><td>2</td></tr>
<tr><td colspan="2">Objectives of the Course</td><td colspan="6">• Develop Problem solving skills for competitative examinations
• Understand the concepts of averages , simple interest , compound interest</td></tr>
<tr><td colspan="2">UNIT-I:</td><td colspan="6">Quantitative Aptitude: Simplifications=averages-Concepts –problem-Problems on numbers-Short cuts- concepts –Problems</td></tr>
<tr><td colspan="2">UNIT-II:</td><td colspan="6">Profit and Loss –short cuts-Concepts –Problems –Time and work - Short –uts -Concepts -Problems.</td></tr>
<tr><td colspan="2">UNIT-III:</td><td colspan="6">Simple interest –compound interest- Concepts- Prolems</td></tr>
<tr><td colspan="2">UNIT-IV:</td><td colspan="6">Verbal Reasoning : Analogy- coding and decoding –Directions and distance –Blood Relation</td></tr>
<tr><td colspan="2">UNIT-V:</td><td colspan="6">Analytical Reasoning :Data sufficiency
Non-Verbal Reasoning : Analogy ,Classification and series</td></tr>
<tr><td colspan="2"></td><td colspan="6"></td></tr>
<tr><td colspan="2">Skills acquired from this course</td><td colspan="6">Studnets relating the concepts of compound interest and simple interest</td></tr>
<tr><td colspan="2">Recommended Text</td><td colspan="6">1.”Quantitative Aptitude” by R.S aggarwal ,S.Chand & Company Ltd 2007</td></tr>
<tr><td colspan="2"></td><td colspan="6"></td></tr>
<tr><td colspan="2">Website and e-Learning Source</td><td colspan="6">https://nptel.ac.in</td></tr>
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