

1.1.3 Number of courses focusing on employability/entrepreneurship/skill development offered by the institution during the academic year 2022-23

1.2.1 Details of courses introduced across all programmes offered during the year.

SEMESTER: III									
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	PC	
THEORY									
1	22MYB05	Discrete Mathematics	BSC	-	4	3	1	0	4
2	22ITC04	Algorithms	PCC	-	3	3	0	0	3
3	22ITC05	Operating Systems	PCC	-	3	3	0	0	3
4	22ITC06	Java programming	PCC	-	3	3	0	0	3
5	22ITC07	Computer Networks	PCC	-	3	3	0	0	3
6	22ITC08	Design Thinking	PCC	-	3	3	0	0	3
PRACTICAL									
7	22ITP03	Algorithms Laboratory	PCC	-	4	0	0	4	2
8	22ITP04	Java Programming Laboratory	PCC	-	4	0	0	4	2
9	22ITP05	Computer Networks Laboratory	PCC	-	4	0	0	4	2
Mandatory Non Credit Courses									
10	22MAN07	Soft / Analytical Skills - III	MC	22MAN04	3	1	0	2	0
11	22MAN09	Indian Constitution	MC	-	1	1	0	0	0
TOTAL					35	20	1	14	25

SEMESTER: IV									
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	PC	
THEORY									
1	22ITC09	Theory of Computation	PCC	22MYB05	4	3	1	0	4
2	22ITC10	Fundamentals of Data Science	PCC	-	3	3	0	0	3
3	22ITC11	Database Management System	PCC	-	3	3	0	0	3
4	22ITC12	Agile Methodologies	PCC	-	3	3	0	0	3
5	22ITC13	Advanced Java Programming	PCC	22ITC06	3	3	0	0	3
6	22CYB07	Environmental Science and Engineering	BSC	-	3	3	0	0	3
PRACTICAL									
7	22ITP06	Database Management System Laboratory	PCC	-	4	0	0	4	2
9	22ITP07	Advanced Java Programming Laboratory	PCC	22ITP04	4	0	0	4	2
Mandatory Non Credit Courses									
11	22MAN08	Soft / Analytical Skills - IV	MC	22MAN07	3	1	0	2	0
12	22GED01	Personality and Character Development	EEC	-	1	1	0	0	0
TOTAL					31	20	1	10	23

22ITC04 ALGORITHMS
(Common to 22AIC06, 22CSC05, 22CCC04 and 22CIC04 Subjects)

	L	T	P	C
	3	0	0	3

PREREQUISITE : 22ITC01

Course Objectives		Course Outcomes	
1.0	To know the fundamental concepts and techniques for problem solving and algorithm design.	1.1	The students will be able to analyze worst, best and average case running times of algorithms using asymptotic notations.
2.0	To learn the different sorting algorithms and the strategy followed.	2.1	The students will be able to use different sorting techniques and strategies.
3.0	To be familiar with dynamic and greedy algorithm design techniques	3.1	The students will be able to design dynamic-programming and greedy algorithms and apply them to test for optimality.
4.0	To learn the different kinds of iterative improvement and limitations of algorithm power	4.1	The students will be able to analyze the notion of tractable and intractable problems.
5.0	To understand backtracking, Branch bound techniques.	5.1	The students will be able to Use the state space tree method for solving problems.

UNIT I - INTRODUCTION	(9)
Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency –Asymptotic Notations and their properties. Analysis Framework – Empirical analysis - Mathematical analysis for Recursive and Non-recursive algorithms – Visualization.	
UNIT II - BRUTE FORCE AND DIVIDE-AND-CONQUER	(9)
Brute Force – Computing an – String Matching - Selection Sort and Bubble Sort – Sequential Search - Closest-Pair and Convex-Hull Problems - Exhaustive Search: Travelling Salesman Problem - Knapsack Problem - Assignment problem. Divide and Conquer Methodology – Binary Search – Merge sort – Quick sort –Closest-Pair and Convex - Hull Problems.	
UNIT III - DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE	(9)
Dynamic Programming: Computing a Binomial coefficient – Warshall’s and Floyd’s Algorithm – Optimal Binary Search trees - 0/1 Knapsack Problem. Greedy Technique: Prim’s algorithm and Kruskal’s Algorithm - Huffman Trees.	
UNIT IV - ITERATIVE IMPROVEMENT AND LIMITATIONS OF ALGORITHM POWER	(9)
Iterative Improvement - The Simplex Method - The Maximum-Flow Problem- Maximum Matching in Bipartite Graphs. Limitations of Algorithm Power: Lower bound arguments – Decision trees – P, NP and NP complete Problems.	

UNIT V - STATE SPACE SEARCH ALGORITHMS	(9)
Backtracking: N Queen’s problem – Hamiltonian Circuit problem – Subset problem - Graph coloring problem. Branch and Bound: Solving 15-Puzzle problem - Assignment problem – Knapsack Problem – Travelling Salesman Problem.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:
1. Anany Levitin, “Introduction to the Design and Analysis of Algorithm”, Pearson Education Asia, 3rd ed., 2017.
REFERENCES:
1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran “Computer Algorithms/C++” Orient Blackswan, 2nd Edition, 2019. 2. S. Sridhar, “Design and Analysis of Algorithms “, Oxford university press, 2014. 3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", 3rd Edition, Prentice Hall of India, 2009.

Mapping of COs with POs / PSOs														
Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	2	-	-	-	1	-	-	-	-	-	3	2
2	3	3	2	-	-	-	-	-	-	-	-	-	3	2
3	3	2	1	1	-	-	1	-	-	-	-	-	3	1
4	3	2	1	1	-	-	-	-	-	-	-	-	3	2
5	3	2	1	1	-	-	1	-	-	-	-	-	3	2
CO (W.A)	3	2.4	1.4	1	-	-	1	-	-	-	-	-	3	1.8

22ITC05- OPERATING SYSTEMS
(Common to 22AIC08, 22CSC08 and 22CIC07 Subjects)

		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL					
Course Objectives		Course Outcomes			
1.0	To learn about the basics of operating system and system calls.	1.1	The students will be able to identify the systematic approach of the system.		
2.0	To impart the knowledge about how the process scheduling work together to perform computing tasks.	2.1	The students will be able to Apply the concepts of CPU scheduling.		
3.0	To Learn about the process synchronization and Deadlock concepts.	3.1	The students will be able to explain various synchronization and deadlock handling methods.		
4.0	To learn the importance of memory management in the operating system.	4.1	The students will be able to apply page replacement policies to address demand paging		
5.0	To explore the disk and files management of operating systems	5.1	The students will be able to Identify appropriate file system and disk organizations for a variety of computing scenario.		

UNIT I – FUNDAMENTALS	(9)
Introduction, System Architecture - Operating System Structure - Operations - Process Management, Memory Management - Storage Management - System Structure - User Operating System Interface, System Calls - Types, System Programs, Operating System Design and Implementation, Virtual machines.	
UNIT II - PROCESS MANAGEMENT	(9)
Process Concept - Process Scheduling, Operations on Processes, Inter Process Communication, Shared Memory and Message Passing Systems, Process Scheduling - Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling.	
UNIT III - PROCESS SYNCHRONIZATION	(9)
Synchronization - The Critical-Section Problem, Peterson's solution, Hardware support for Synchronization – Mutex, Semaphores, Deadlocks: Deadlock Characterization – Methods for handling deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.	
UNIT IV - MEMORY MANAGEMENT	
Main Memory - Swapping - Contiguous Memory Allocation - Paging, Segmentation, Virtual Memory - Demand Paging – Copy on Write -Page Replacement, Allocation of Frames, Thrashing,	
UNIT V - SECONDARY STORAGE MANAGEMENT	(9)
Secondary Storage Structure - Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap Space Management, File System - File Concept, Access Methods, Directory Structure, File System Mounting; File System Implementation – Structure, Implementation, Directory Implementation, Allocation Methods, Free Space Management; I/O Systems – I/O Hardware, Application I/O Interface, Kernel I/O Subsystem.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 10th Edition, John Wiley and Sons Inc., 2018.

REFERENCES:

1. William Stallings, "Operating Systems: Internals and Design Principles", 7 th Edition, Prentice Hall, 2018.
2. Andrew S. Tanenbaum, "Modern Operating Systems", 4th Edition, Prentice Hall of India Pvt., 2016.

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) / Programme Specific Outcomes (PSOs)

Mapping of COs with POs / PSOs														
Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	1	2	2	-	-	-	-	3	2	-	1	3	1
2	2	2	3	1	1	-	-	-	2	1	-	2	3	1
3	1	3	2	2	1	-	-	-	2	2	-	1	3	1
4	1	3	2	2	1	-	-	-	2	2	-	1	3	1
5	1	3	3	3	-	-	-	-	1	2	-	2	3	1
CO (W.A)	1.6	2.4	2.4	2	1	-	-	-	2	1.8	-	1.4	3	1

22ITC06 - JAVA PROGRAMMING (Common to 22AIC04 ,22CSC07, 22CCC06 and 22CIC06 Subjects)				
		L	T	P
		3	0	0
PRE-REQUISITE: Nil				
Course Objectives		Course Outcomes		
1.0	To understand Object oriented programming concepts and characteristics of Java	1.1	The students will be able to develop Java programs using OOP principles	
2.0	To know the principles of Inheritance, abstraction and interfaces	2.1	The students will be able to develop Java programs with the concepts of inheritance	
3.0	To define exceptions and use I/O streams	3.1	The students will be able to construct applications with exception handling.	
4.0	To understand threads concepts	4.1	The students will be able to develop Java applications using threads	
5.0	To design and build simple GUI programs using AWT and Swings.	5.1	The students will be able to develop interactive Java applications using GUI components.	
UNIT I - INTRODUCTION TO OOP AND JAVA FUNDAMENTALS				(9)
Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java – The Java Environment - Java Source File -Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays , Strings, Packages - JavaDoc comments.				
UNIT II - INHERITANCE AND INTERFACES				(9)
Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods-Keywords: Static-final-this- final methods and classes – Method overloading- Method overriding-Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces				
UNIT – III EXCEPTION HANDLING AND I/O				(9)
Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing File				
UNIT – IV –THREADS				(9)
Java Thread Model – Main Thread – Creating a Thread – Creating Multiple Threads — Thread Priorities – Synchronization – Inter thread Communication – Suspending, Resuming, and Stopping Threads – Using Multithreading.				
UNIT – V EVENT DRIVEN PROGRAMMING				(9)
Graphics programming - Frame – Components Basics of event handling - event handlers - adapter classes - actions - mouse events - AWT event hierarchy - Introduction to Swing – layout management - Swing Components – Text Fields, Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes.				
TOTAL (L:45) : 45 PERIODS				

TEXT BOOKS:

1. Herbert Schildt, "Java: The Complete Reference", 11th Edition, McGraw Hill Education, New Delhi, 2019 for Units I, II, III, IV.
2. Herbert Schildt, "Introducing JavaFX 8 Programming", 1st Edition, McGraw Hill Education, New Delhi, 2015 for Unit V.

REFERENCES:

1. Cay. S. Horstmann, Gary Cornell, "Core Java-JAVA Fundamentals", Prentice Hall, 10th ed., 2016.
2. Paul Deitel, Harvey Deitel, "Java SE 8 for programmers", 3rd Edition, Pearson, 2015.3. SCJP Sun Certified Programmer for Java 6 Study Guide. 6th edition, McGrawHill.

Mapping of COs with POs / PSOs

COs	Pos												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	1	-	1	-	-	-	1	-	-	1	3	3
2	3	1	1		1				1			1	3	3
3	3	1	1		1				2			1	3	3
4	3	2	1		1				2			2	3	3
5	3	2	2	2	1				3	1	3		3	3
CO (W.A)	3.00	1.6	1.2	2.00	1.00				1.8	1.00	3.00	1.25	3.00	3.00

22ITC07 COMPUTER NETWORKS
(Common to 22AIC12, 22CSC06, 22CCC05 and 22CIC09 Subjects)

	L	T	P	C
	3	0	0	3

PREREQUISITE : Nil

Course Objectives		Course Outcomes	
1.0	To understand the concepts of data communications	1.1	The students will be able to gain knowledge on Data Communication Concepts
2.0	To impart the fundamental concepts of Data Link Layer	2.1	The students will be able to use services of the Data Link Layer.
3.0	To gain exposure about Addressing and Routing Protocols	3.1	The students will be able to work with network addressing and Routing Protocols.
4.0	To get knowledge about services in Transport Layer	4.1	The students will be able to apply Transport Layer protocols.
5.0	To learn about Application Layer functionalities	5.1	The students will be able to work with Application layer protocols

UNIT I - INTERNET AND DATA COMMUNICATIONS	(9)
Internet – Network Edge – Network of Networks – Data communication Components – Data representation and Data flow – Networks – Protocols and Standards – OSI model – TCP/IP protocol suite – Physical Layer: Multiplexing – Transmission Media.	
UNIT II - DATA LINK LAYER	(9)
Framing – Error Control: Introduction – Block coding – Linear block codes – Cyclic codes – Checksum – Media Access Control: Random Access – CSMA/CD, CDMA/CA – Controlled Access – Wired LANs – Wireless LANs.	
UNIT III - NETWORK LAYER	(9)
IPV4 – IPV6 – ICMP – Transition from IPV4 to IPV6 – Routing Algorithm: Distance-Vector Routing, Link-State Routing, Path-Vector Routing – Unicast Routing protocols – Multicast Routing protocols.	
UNIT IV - TRANSPORT LAYER	(9)
Process to Process Communication – User Datagram Protocol – Transmission Control Protocol – SCTP – Congestion Control – Quality of Service.	
UNIT V - APPLICATION LAYER	(9)
Domain Name System – Standard Application: WWW and HTTP, FTP, Electronic Mail, TELNET – Firewalls – Network Management System – SNMP.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOK:

1. Behrouz A. Forouzan, "Data communication and Networking with TCP/IP Protocol Suite", 6th Edition, McGraw-Hill, 2022

REFERENCES:

1. William Stallings, "Data and Computer Communication", 8th Edition, Pearson Education, 2017.
2. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 8th Edition, Pearson Education, 2020.

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	-	3	-	-	3	-	3	3	3	-	3	3	3
2	3	3	3	-	3	-	-	-	3	-	-	3	3	3
3	3	3	3	3	3	-	-	-	3	3	-	3	3	3
4	3	3	3	2	3	-	-	-	3	3	-	3	3	3
5	3	3	3	2	3	-	-	-	3	3	-	3	3	3
CO (W.A)	3	3	3	2.3	3	3		3	3	3		3	3	3



22ITC08 DESIGN THINKING

L	T	P	C
3	0	0	3

PRE REQUISITE : NIL

Course Objectives		Course Outcomes	
1.0	The students recognize the importance of design thinking and its different phases	1.1	The students will be able to understand the importance of design thinking and its different phases.
2.0	The Students understands the empathize phase and the scope of the problem.	2.1	The students will be able to empathize with situation and be able to define clear problem statement
3.0	To make students understand the importance of ideate and prototyping phase	3.1	The students will be able to use the different ideation methods and come with different feasible and viable ideas for solving the problem statements.
4.0	The students understand rapid prototypes and importance of story boarding in design thinking	4.1	The students will be able to create the prototype and storyboarding for clear understanding of the problem statement.
5.0	Provide students with an understanding of the importance of the evolve phase and agile methodology	5.1	The students will be able to plan the implementation of the evolved activity system.

UNIT I – Introduction to design thinking:	(9)
Introduction – Need for design thinking – Design and Business – The Design Process – Phases in design thinking process – Five stage mode- Design Brief –Visualization – Four Questions, Ten Tools – Explore – STEEP Analysis – Strategic Priorities – Activity System – Stakeholder Mapping – Opportunity Framing.	
UNIT II - Empathize phase:	(9)
Visualization – Mind Mapping – Empathize – Empathize with the users - Steps in empathize phase – Developing empathy towards people –Observations – Need Finding – User Personas.	
UNIT-III Ideate phase and Prototype phase:	(9)
What is ideation – Need for ideation – Uses of ideation – Ideation Methods- Brainstorming-Rules for brainstorming -Ideation games - Six Thinking Hats –Doodling – Use of doodling in expressing creative ideas- Idea refinement. Prototyping- Guidelines for prototyping –Types of prototyping- Importance of prototyping in design thinking.	
UNIT IV – Engage phase:	(9)
Assumption Testing-Rapid Prototyping – Engage – Story telling – Characteristics of good stories – Reaching users through stories-Storyboarding-Characteristics of good stories-Value proposition- Guidelines to write value proposition	
UNIT V – Evolve phase:	(9)
Customer Co-Creation Learning Launch – Leading Growth and Innovation – Evolve– Concept Synthesis – Strategic Requirements – Evolved Activity Systems– Quick Wins Agile Methodology – Complementing agile with design thinking	
TOTAL= 45 PERIODS	

TEXT BOOKS:
<ol style="list-style-type: none"> 1. Lee Chong Hwa “Design Thinking The Guidebook”, Design Thinking Master Trainers of Bhutan, 1st Edition, 2017 2. Eli Woolery, Design Thinking Handbook, Invision, 2019 3. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires, 1st Edition, HarperCollins, 2009
REFERENCE:
<ol style="list-style-type: none"> 1. Jeanne Liedtka, Tim Ogilvie, and Rachel Brozenske, "The Designing for Growth FieldBook: A Step-by-Step Project Guide", Columbia University Press, 2014

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) / Programme Specific Outcomes (PSOs)

Mapping of COs with POs / PSOs														
COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	1	2	-	-	-	-	-	-	1	2	3	1
2	2	3	3	3	2	-	-	-	-	2	1	2	3	1
3	2	3	2	2	1	-	-	-	-	1	1	1	3	1
4	1	2	3	3	3	-	-	-	1	2	1	1	3	1
5	3	2	2	1	-	-	-	-	-	3	2	3	3	1
CO (W.A)	2.2	2.4	2.2	2	1	-	-	-	1	1.6	1.2	1.8	3	1

22ITP03 ALGORITHMS LABORATORY
(Common to 22AIP05, 22CSP04, 22CCP03 and 22CIP03 Subjects)

L	T	P	C
0	0	4	2

PREREQUISITE : Nil

Course Objectives		Course Outcomes	
1.0	To make the use of programs using Brute force technique.	1.1	The students will be able to implement programs using Brute force technique.
2.0	To gain exposure about the concept of divide and conquer design techniques.	2.1	The students will be able to Make use of algorithm design techniques like divide and conquer.
3.0	To understand the dynamic programming technique.	3.1	The students will be able to apply dynamic programming to solve problems
4.0	To explore knowledge about greedy techniques.	4.1	The students will be able to apply greedy techniques to solve problems
5.0	To understand the knowledge on Backtracking techniques.	5.1	The students will be able to apply Backtracking techniques to solve problems

LIST OF EXPERIMENTS:

1. Given a text txt [0...n-1] and a pattern pat [0...m-1], write a function search (char pat [], char txt []) that prints all occurrences of pat [] in txt []. You may assume that n > m.
2. Sort a given set of elements using the Insertion sort, Selection sort and Bubble sort
3. Implementation of Linear Search.
4. Implementation of Recursive Binary Search
5. Develop a program to find out the maximum and minimum numbers in a given list of n numbers using the divide and conquer technique.
6. Develop a program to sort the numbers using Merge and Quick sort .
7. Implement Floyd's algorithm for the All-Pairs- Shortest-Paths problem.
8. Compute the transitive closure of a given directed graph using Warshall's algorithm.
9. Find the minimum cost spanning tree of a given undirected graph using Prim's algorithm.
10. Implement N Queens problem using Backtracking.

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

Hardware:

LAN System with 30 nodes (OR) Standalone PCs – 30 Nos.,

Software:

C/C++/JAVA/ Python

TOTAL (P:60) : 60 PERIODS

Mapping of COs with POs / PSOs														
COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	2	-	-	-	-	-	-	-	-	-	3	2
2	3	3	2	-	-	-	-	-	-	-	-	-	3	2
3	3	2	1	1	-	-	1	-	-	-	-	-	3	1
4	3	2	1	1	-	-	1	-	-	-	-	-	3	1
5	3	2	1	1	-	-	1	-	-	-	-	-	3	2
CO (W.A)	3	2.4	1.4	1	-	-	1	-		-	-	-	3	1.6

Deep

22ITP04 JAVA PROGRAMMING LABORATORY (Common to 22AIP03, 22CSP06, 22CCP05 and 22CIP05 Subjects)					
		L	T	P	C
		0	0	4	2
PRE REQUISITE : Nil					
Course Objectives		Course Outcomes			
1.0	To impart fundamental concepts of OOP using java	1.1	The students will be able to create simple Java programs using basic programming elements in Java.		
2.0	To gain exposure about inheritance, packages and Interfaces	2.1	The students will be able to develop applications using inheritance, packages and interfaces.		
3.0	To explore about the exception handling mechanism	3.1	The students will be able to construct applications with exception handling.		
4.0	To understand threads concepts	4.1	The students will be able to build applications using threads and collection framework		
5.0	To know about Event handling using swing components.	5.1	The students will be able to create GUIs and event driven programming applications for real world problems		

LIST OF EXPERIMENTS:	
<ol style="list-style-type: none"> 1. Write simple Java programs using operators, arrays and control statement 2. Programs using Static, final and this keyword. 3. Demonstrate the concepts of inheritance 4. Programs illustrating overloading and overriding methods in Java 5. Programs to use packages and Interfaces in Java. 6. Implement exception handling and creation of user defined exception. 7. Implement program to demonstrate multithreading and inter thread communication. 8. Write a program to perform file operations. 9. Develop applications using swing layouts 	
HARDWARE OR SOFTWARE REQUIREMENT:	
HARDWARE:	
<ol style="list-style-type: none"> 1. LAN System with 33 nodes (OR) Standalone PCs – 33 Nos. 2. Printers – 3 Nos. 	
SOFTWARE:	
<ol style="list-style-type: none"> 1. Java / Equivalent Compiler 	
TOTAL L:60 PERIODS	

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) / Programme Specific Outcomes (PSOs)

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
1	3	3	-	-	2		3	2	2	2	3	3	1	3
2	2	2	3	3	3	1	3	3	2	2	3	3	1	3
3	2	2	3	3	3	1	3	3	2	2	3	3	1	3
4	2	2	3	3	3	1	3	3	2	2	3	3	1	3
5	2	2	3	3	3	2	3	3	2	2	3	3	1	3
CO (W.A)	2.2	2.2	3.0	3.0	2.8	1.25	3.00	2.8	2.00	2.00	3.00	3.00	1.00	3.00



22ITP05 COMPUTER NETWORKS LABORATORY
(Common to 22CSP05, 22CCP04 and 22CIP06 Subjects)

	L	T	P	C
	0	0	4	2

PREREQUISITE :

Course Objectives		Course Outcomes	
1.0	To know the connectivity of systems with different types of cables	1.1	The students will be able to connect a system with various topologies
2.0	To work with addressing protocols	2.1	The students will be able to apply addressing protocols
3.0	To gain knowledge about the working of routing algorithms	3.1	The students will be able to implement various routing algorithms
4.0	To learn socket programming	4.1	The students will be able to program using Sockets
5.0	To use analyzing tools to analyze the performance of protocols in different layers in computer networks	5.1	The students will be able to use Analyzer tools

LIST OF EXPERIMENTS:

1. Study of Color coding Jack RJ45 and do the following Cabling works in a network
 - a. Cable Crimping
 - b. Standard Cabling
 - c. Cross Cabling and
 - d. Establish a LAN connection using three systems using any topology.
2. Configure IP Address in a system in LAN (TCP/IP Configuration) and implement the client server communication using socket connection
3. Write a program for transferring a file between nodes in a network.
4. Perform CRC computation
5. By varying the number of frames, design the Sliding Window Protocol
6. Simulation of ARP/RARP
7. Display the routing table for the nodes in a network using Distance Vector Routing (DVR) algorithm.
8. Write a program for downloading a file from HTTP server
9. Develop a client that contacts a given DNS server to resolve a given host name.
10. Configure a Network topology using Packet tracer software
11. Study of Network simulator (NS) and Simulation of any one of routing protocol using NS2.

TOTAL (P:60) : 60 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 60 STUDENTS SOFTWARE:**HARDWARE:**

Standalone desktops 60 Nos., Jack RJ45 connectors

SOFTWARE:

C / C++ / Java / Equivalent Compiler

Network simulator like Ethereal / NS2 / NS3 / Glomosim / OPNET/ 60 Equivalent.

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	3	3	-	-	-	-	-	-	-	3	3	3
2	3	3	3	3	-	-	-	-	-	-	-	3	3	3
3	3	3	3	3	-	-	-	-	-	3	-	3	3	3
4	3	3	3	2	-	-	-	-	-	3	-	3	3	3
5	3	3	3	2	3	-	-	-	-	3	-	3	3	3
CO (W.A)	3	3	3	2.6	3		-	-	-	3	-	3	3	3



22ITC09 - THEORY OF COMPUTATION (Common to 22CSC10 Subject)		L	T	P	C
		3	1	0	4
PREREQUISITE : 22MYB05					
Course Objectives		Course Outcomes			
1.0	To learn the basic concepts in theoretical computer science.	1.1	The students will be able to explain the key properties of formal languages and finite automata		
2.0	To comprehend complex concepts and formal proofs in theoretical computer science in order to improve reasoning and problem solving skills.	2.1	The students will be able to design and describe the strings recognized by regular languages.		
3.0	To learn about context free grammar and how to develop context free grammar based on different normal forms.	3.1	The students will be able to construct the context-free grammars and explain the languages accepted by CFG		
4.0	To study about the Turing machine and push down automata.	4.1	The students will be able to design a Turing machine and push down automata that accomplish a specific task.		
5.0	To learn about the different classes of problem.	5.1	The students will be able to explain the undecidable and intractable classes of problems		

UNIT I - AUTOMATA	(9+3)
Introduction to finite automata(FA) – Central concepts of automata theory – Deterministic finite automata – Non deterministic finite automata – Finite automata with epsilon transitions – Equivalence between epsilon NFA and DFA - Minimization of automata.	
UNIT II - REGULAR EXPRESSIONS	(9+3)
Regular expressions(RE) - Manipulation of regular expressions - Equivalence between RE and FA - Inter conversion - Pumping lemma - Closure properties of regular sets – Decision properties of Regular Languages.	
UNIT III - CONTEXT FREE GRAMMAR	(9+3)
Context free Grammars (CFG) - Derivation trees - Ambiguity in Context-Free Grammars - Applications of Context Free Grammars - Normal Forms - Chomsky Normal Form (CNF) - Greibach Normal Form (GNF).	
UNIT IV - PUSH DOWN AUTOMATA AND TURING MACHINE	(9+3)
Push Down Automata (PDA) – Languages of PDA – Equivalence of PDA’s and CFG’s - Turing Machine, Programming techniques of Turing Machine – Types of Turing Machine.	
UNIT V - CLASSES OF PROBLEMS	(9+3)
A language that is not Recursively Enumerable – Universal Turing Machine – Rice’s Theorem and properties of the Recursively Enumerable Languages – Post’s Correspondence Problem (PCP) – The Classes P and NP – An NP Complete Problem.	
TOTAL (L:45+T:15) : 60 PERIODS	

TEXT BOOKS:
<ol style="list-style-type: none"> 1. John E Hopcroft, Rajeev Motwani, Jeffrey D Ullman, "Introduction to Automata Theory, Languages, and Computation", 3rd ed., Pearson, 2013. 2. John C Martin, "Introduction to Languages and the Theory of Computation", 4th ed., Tata McGraw Hill Publishing Company, New Delhi, 2011
REFERENCES:
<ol style="list-style-type: none"> 1. Kamala Krithivasan and Rama. R, "Introduction to Formal Languages, Automata Theory and Computation", Pearson Education 2009. 2. Lewis H.P. & Papadimitriou C.H., "Elements of Theory of Computation", Prentice Hall of India, 4th ed., 2007. 3. Mishra K L P and Chandrasekaran N, "Theory of Computer Science - Automata, Languages and Computation", Prentice Hall of India, New Delhi, 3rd ed., 2006. 4. Harry R Lewis, Christos H Papadimitriou, "Elements of the Theory of Computation", Prentice Hall of India/ Pearson Education, New Delhi, 2nd ed., 2015.

Mapping of COs with POs / PSOs														
Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	1	3	3	-	-	-	-	-	-	3	3	1
2	3	2	1	3	3	-	-	-	-	-	-	3	3	1
3	3	2	1	3	-	-	-	-	-	-	-	3	3	1
4	3	2	1	3	-	-	-	-	-	-	-	3	3	1
5	3	2	1	3	3	-	-	-	-	-	-	3	3	1
CO (W.A)	3	2	1	3	3	-	-	-	-	-	-	3	3	1

22ITC10 FUNDAMENTALS OF DATA SCIENCE

	L	T	P	C
	3	0	0	3

PREREQUISITE: Nil

Course Objectives		Course Outcomes	
1.0	To understand the data science fundamentals and process.	1.1	The students will be able to define the data science process
2.0	To learn to describe the data for the data science process.	2.1	The students will be able to understand different types of data description for data science process
3.0	To learn to describe the relationship between data.	3.1	The students will be able to gain knowledge on relationships between data
4.0	To utilize the Python libraries for Data Wrangling	4.1	The students will be able to use the Python Libraries for Data Wrangling
5.0	To present and interpret data using visualization libraries in Python	5.1	The students will be able to apply visualization Libraries in Python to interpret and explore data

UNIT I INTRODUCTION	(9)
Data Science: Benefits and uses – facets of data - Data Science Process : Overview – Defining research goals – Retrieving data – Data preparation - Exploratory Data analysis – build the model– presenting findings and building applications - Data Mining - Data Warehousing – Basic Statistical descriptions of Data	
UNIT II DESCRIBING DATA	(9)
Types of Data - Types of Variables -Describing Data with Tables and Graphs –Describing Data with Averages - Describing Variability - Normal Distributions and Standard (z) Scores	
UNIT III DESCRIBING RELATIONSHIPS	(9)
Correlation –Scatter plots –correlation coefficient for quantitative data –computational formula for correlation coefficient – Regression –regression line –least squares regression line – Standard error of estimate – interpretation of r ² –multiple regression equations –regression towards the mean	
UNIT IV PYTHON LIBRARIES FOR DATA WRANGLING	(9)
Basics of NumPy arrays – aggregations –computations on arrays –comparisons, masks, boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – Hierarchical indexing – combining datasets – aggregation and grouping – pivot tables	
UNIT V DATA VISUALIZATION	(9)
Importing Matplotlib – Line plots – Scatter plots – visualizing errors – density and contour plots – Histograms – legends – colors – subplots – text and annotation – customization – three-dimensional plotting - Geographic Data with Base map - Visualization with Seaborn .	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016. (Unit I)
2. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017. (Units II and III) 3
3. Jake VanderPlas, "Python Data Science Handbook", O'Reilly, 2016. (Units IV and V)

REFERENCES:

1. Allen B. Downey, "Think Stats: Exploratory Data Analysis in Python", Green Tea Press, 2014.

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	2	1	2	2	-	-	-	1	1	1	2	2	2
2	2	1	-	1	1	-	-	-	2	1	1	2	2	3
3	2	2	1	2	2	1	1	-	1	2	1	3	2	2
4	3	2	2	1	2	-	-	-	1	1	2	2	3	3
5	2	2	1	2	2	-	-	-	1	1	1	2	2	2
CO (W.A)	2	2	1	2	2	1	1	-	1	1	1	2	2	2

22ITC11 DATABASE MANAGEMENT SYSTEM (Common to 22CSCI1 and 22CIC10 Subjects)					L	T	P	C
					3	0	0	3
PRE REQUISITE: NIL				QUESTION PATTERN: TYPE - I				
COURSE OBJECTIVES AND OUTCOMES:								
Course Objectives				Course Outcomes				
1.0	To know the fundamentals of datamodels.			1.1	The students will be able to identify suitable datamodels for real time application and conceptualize a database system using ER Diagram			
2.0	To learn about Relational database architecture and querying throughSQL.			2.1	The students will be able to write queries inrelational algebra and SQL.			
3.0	To know about normalization			3.1	The students will be able to normalize the databasedesign.			
4.0	To understand the storage structures and the queriesprocessing/optimization.			4.1	The students will be able to apply storagestructure and process/optimize Queries.			
5.0	To gain knowledge about transaction processing, concurrency control and recovery.			5.1	The students will be able to apply concepts of query processing, transaction processing, and concurrency control.			

UNIT I - DATA BASE SYSTEM CONCEPT	(9)
Purpose of Database systems – Views of data – Database Languages - Database design – Database system architecture – Data models – Data Dictionary – Database Administration – Entity-Relationship model – EER Model.	
UNIT II - RELATIONAL DATABASE	(9)
Structure of Relational Database – Integrity Constraints – Relational Algebra – Relational Calculus – SQL – Views –Joins – Functions and Procedures – Triggers.	
UNIT III - DATABASE DESIGN	(9)
Functional Dependencies – Decomposition: Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.	
UNIT IV - PHYSICAL DATABASE DESIGN AND QUERY PROCESSING	(9)
Storage and file structure: RAID – File Organization – Organization of Records in Files – Data dictionary Storage - Indexing, Hashing and Transactions: Ordered indices – B tree index files – B+ Tree index files – Multiple key access – Static and Dynamic Hashing – Bitmap indices — Query Processing	
UNIT V -TRANSACTION PROCESSING	(9)
Transactions: Desirable properties of Transactions – Serializability – Concurrency Control: Lock-Based Protocols – Timestamp-Based Protocols – Validation-Based Protocols – Recovery systems.	
TOTAL (L: 45) = 45 PERIODS	
TEXT BOOK:	
1. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, 7th ed., McGraw Hill, 2020.	
REFERENCES:	
1. R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, 7th ed., Pearson Education/Addison Wesley, 2017.	
2. Date C.J., Kannan A. and Swamynathan S., “An Introduction to Database Systems”, 8th Edition, Pearson Education, New Delhi, 2013.	

Mapping of COs with POs / PSOs														
COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	3	2	3	3	-	3	3	-	3	3	3	3
2	3	3	3	3	2	-	-	-	-	-	3	3	3	3
3	3	3	3	3	2	-	-	2	3	-	3	3	3	3
4	3	3	3	3	3	-	-	2	2	-	3	3	3	3
5	3	3	3	3	3	3	-	3	3	-	3	3	3	3
CO (W.A)	3	3	3	2.8	2.6	3	-	2.5	2.75	-	3	3	3	3

22ITC12 – AGILE METHODOLOGIES
(Common to 22CSC17 Subject)

L	T	P	C
3	0	0	3

PREREQUISITE :

Course Objectives		Course Outcomes	
1.0	To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.	1.1	The students will be able to Realize the importance of interacting with business stakeholders in determining the requirements for a software system
2.0	To provide a good understanding of software design and a set of software technologies and APIs.	2.1	The students will be able to Perform iterative software development processes: how to plan them, how to execute them.
3.0	To do a detailed examination and demonstration of Agile development and testing techniques.	3.1	The students will be able to Point out the impact of social aspects on software development success.
4.0	To understand the benefits and pitfalls of working in an Agile team.	4.1	The students will be able to Develop techniques and tools for improving team collaboration and software quality and Perform Software process improvement as an ongoing task for development teams.
5.0	To understand Agile development and testing	5.1	The students will be able to Show how agile approaches can be scaled up to the enterprise level.

UNIT I	AGILE METHODOLOGY	(9)
Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model - Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values		
Unit – II	AGILE PROCESSES	(9)
Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.		
Unit – III	AGILITY AND KNOWLEDGE MANAGEMENT	(9)
Agile Information Systems – Agile Decision Making - Earl_S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment , Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).		
Unit – IV	AGILITY AND REQUIREMENTS ENGINEERING	(9)
Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.		

Unit – V AGILITY AND QUALITY ASSURANCE	(9)
Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance - Test Driven Development – Agile Approach in Global Software Development.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:
<ol style="list-style-type: none"> David J. Anderson and Eli Schragenheim, —Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003. Hazza and Dubinsky, —Agile Software Engineering, Series: Undergraduate Topics in Computer Sciencell, Springer, 2009.
REFERENCES:
<ol style="list-style-type: none"> Craig Larman, —Agile and Iterative Development: A Manager_s Guidell, Addison-Wesley, 2004. Kevin C. Desouza, —Agile Information Systems: Conceptualization, Construction, and Managementl, Butterworth-Heinemann, 2007.

Mapping of COs with POs / PSOs														
COs	POs											PSOs		
	1	2		1	2		1	2		1	2		1	2
1	3	-	-	-	-	-	-	-	-	-	1	2	2	3
2	3	2	3	-	3	-	-	-	-	-	2	2	3	3
3	3	2	2	-	-	-	-	-	-	-	2	2	3	3
4	3	2	2	2	2	-	2	-	-	2	3	3	3	3
5	3	2	2	3	2	2	3	3	-	-	-	2	3	3
CO (W.A)	3.00	2.0	2.25	2.5	2.33	2.00	2.50	3.00	-	2.00	2.33	2.25	2.80	3.00

22ITC13 ADVANCED JAVA PROGRAMMING
(Common to 22CSC12, 22CCC14 and 22CIC14 Subjects)

	L	T	P	C
	3	0	0	3

PRE REQUISITE : 22ITC06

Course Objectives		Course Outcomes	
1.0	To Explore advanced topic of Java network programming for solving problems	1.1	The students will be able to understand the networking concepts related to Java Technology
2.0	To know the principles of SQL and JDBC connectivity	2.1	The students will be able to develop database connected java programs using SQL and JDBC connectivity
3.0	To Provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business	3.1	The students will be able to develop advanced skills for programming in Java
4.0	To understand servlet life cycle and architecture and created servlet communication programs	4.1	The students will be able to Create dynamic web pages, using Servlets and JSP
5.0	To put into use the advanced features of the Java language to build and compile robust enterprise grade applications	5.1	The students will be able to explore the use of Java Server Programming and make a reusable software component using Java Bean

UNIT I NETWORK PROGRAMMING IN JAVA	(9)
Sockets – secure sockets – custom sockets – UDP datagrams – multicast sockets – URL classes – Reading Data from the server – writing data – configuring the connection– Reading the header – telnet application – Java Messaging services	
UNIT II DATABASE CONNECTIVITY	(9)
The Design of JDBC: JDBC Driver Types and Typical Uses of JDBC; the Structured Query Language; JDBC Configuration; Working with JDBC Statements; Query Execution; Scrollable and Updatable Result Sets; Row Sets	
UNIT III APPLICATIONS IN DISTRIBUTED ENVIRONMENT	(9)
Remote method Invocation – activation models – RMI custom sockets – Object Serialization – RMI – IIOP implementation – CORBA – IDL technology – Naming Services – CORBA programming Models - JAR file creation	
UNIT IV SERVLETS AND JSP	(9)
Background; The Life Cycle of a Servlet; A Simple Servlet; The Servlet API; The javax.servlet Package; Reading Servlet Parameters; The javax.servlet.http Package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking; Introduction to JSP; Using JSP; Comparing JSP with Servlet; Java Web Frameworks	
UNIT – V ENTERPRISE APPLICATIONS	(9)
Server Side Component Architecture – Introduction to J2EE – the Java Beans API; Writing JavaBeans Session Beans – Entity Beans–Persistent Entity Beans	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. Core java Volume 1— Fundamentals, Tenth Edition, Cary S. Horstmann, Prentice Hall
2. Core java Volume 11— Advanced Features, Tenth Edition, Cary S. Horstmann, Prentice Hall
3. Java: The Complete Reference, 10th, Herbert Schildt, McGraw-Hill

REFERENCES:

1. Advanced Java Programming, Uttam K. Roy, Oxford University Press
2. Java: Advanced Features and Programming Techniques, Nathan Clark

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	1	-	1	-	-	-	1	-	-	1	3	3
2	3	1	1	-	1	-	-	-	1	-	-	1	3	3
3	3	1	1	-	1	-	-	-	2	-	-	1	3	3
4	3	2	1	-	1	-	-	-	2	-	-	2	3	3
5	3	2	2	2	1	-	-	-	3	1	3	2	3	3
CO (W.A)	3.00	1.6	1.2	2.00	1.00				1.8	1.00	3.00	1.4	3.00	3.00

22ITP06 DATABASE MANAGEMENT SYSTEM LABORATORY
(Common to 22CSP07 and 22CIP07 Subjects)

		L	T	P	C
		0	0	4	2
PRE REQUISITE: NIL					
Course Objectives		Course Outcomes			
1.0	To design a database system.	1.1	The students will be able to define database with various integrity constraints.		
2.0	To study the usage of DDL and DML commands.	2.1	The students will be able to work with various DDL, DML queries.		
3.0	To learn about joins, views, various built-in functions and procedures and functions	3.1	The students will be able to create various views and make use of various types of joins and procedures and functions		
4.0	To know about normalization	4.1	The students will be able to design and normalize the design.		
5.0	To work with database connectivity.	5.1	The students will be able to work with real time data base connectivity		

LIST OF EXPERIMENTS	
1. Structured Query Language : Creating Database	<ul style="list-style-type: none"> • Creating a Table • Specifying Relational Data Types • Specifying Constraints • Creating Indexes
2. Table and Record Handling	<ul style="list-style-type: none"> • INSERT statement • Using SELECT and INSERT together • DELETE, UPDATE, TRUNCATE statements • DROP, ALTER statements
3. Retrieving Data from a Database	<ul style="list-style-type: none"> • The SELECT statement • Using the WHERE clause • Using Logical Operators in the WHERE clause • Using IN, BETWEEN, LIKE, ORDER BY, GROUP BY and HAVING Clause • Using Aggregate Functions Combining Tables Using JOINS Sub queries
4. Database Management	<ul style="list-style-type: none"> • Creating Views • Creating Column Aliases • Creating Database Users Using GRANT and REVOKE
5. High level language extension with Triggers	
6. Database design using E-R model and Normalization	
7. Design and implementation of Payroll processing system	
8. Design and implementation of Banking system	
9. Design and implementation of Library Information System	
10. Design and implementation of Student Evaluation System	
TOTAL (P: 60) = 60 PERIODS	

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:**HARDWARE:**

33 nodes with LAN connection or Standalone PCs

SOFTWARE:

1. MYSQL 8.0
2. Visual Basic 6.0

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	3	3	-	-	-	-	-	-	2	-	-	3	3
2	-	3	3	3	2	-	2	-	-	-	-	-	3	3
3	3	3	-	3	-	-	-	-	-	-	-	-	3	3
4	3	3	3	-	-	-	-	-	-	-	3	-	3	3
5	3	-	3	-	-	-	-	-	-	2	3	-	3	3
CO (W.A)	3	3	3	3	2		2	-	-	-	3	-	3	3



22ITP07 ADVANCED JAVA PROGRAMMING LABORATORY
(Common to 22CSP08, 22CCP09 and 22CIP09 Subjects)

	L	T	P	C
	0	0	4	2

PRE REQUISITE : 22ITP04

Course Objectives		Course Outcomes	
1.0	To understand creating GUI using AWT and SWING	1.1	The students will be able to design window-based applications
2.0	To develop Database applications	2.1	The students will be able to access database through java programs
3.0	To design applications using pre built frameworks.	3.1	The students will be able to invoke the remote methods in an application using Remote Method Invocation (RMI)
4.0	To develop web application using Java Servlet and Java Server Pages technology.	4.1	The students will be able to develop the dynamic web pages using JSP
5.0	To learn how to work with JavaBeans.	5.1	The students will be able to design reusable software components using java beans

LIST OF EXPERIMENTS:

1. The laboratory work includes writing Java programs
2. To create GUI applications using swing, event handling, and layout management
3. Use JDBC connectivity and create Table, insert and update data.
4. Write a program in Java to implement a Client/Server application using RMI.
5. Write a program in Java to create a Cookie and set the expiry time of the same.
6. Write a program in Java to create Servlet to count the number of visitors to a web page.
7. Write a program in Java to create a form and validate a password using Servlet.
8. Develop a Java Bean to demonstrate the use of the same.
9. Develop Chat Server using Java

TOTAL (P:60) : 60 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 60 STUDENTS SOFTWARE :

HARDWARE:

Standalone desktops 60 Nos.,

SOFTWARE:

Java SDK or JRE 1.6 or higher

Java Servlet Container (Free Servlet Container available)

Supported Database and library that supports the database connection with Java.

Mapping of COs with POs / PSOs														
COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	3	3	3	1	-	-	3	1	2	2	3	3
2	3	3	3	3	3	1	-	-	3	1	2	2	3	3
3	3	3	3	3	3	1	-	-	3	1	2	2	3	3
4	3	3	3	3	3	1	-	-	3	1	2	2	3	3
5	3	3	3	3	3	1	-	-	3	1	2	2	3	3
CO (W.A)	3.00	3.00	3.00	3.00	3.00	1.00			3.00	1.00	2.00	2.00	3.00	3.00

Deep

LIST OF PROGRAMME SPECIFIC ELECTIVES (PSE)									
AICTE NORMS : 10 –15%					ACTUAL : 12.96 %				
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRERQUISITE	CONTACT PERIODS	L	T	P	C
1.	17ITX04	Data mining and warehousing	PSE	17CSC07	3	3	0	0	3
2.	17ITX05	PHP Programming	PSE	17ITC09	3	3	0	0	3
3.	17ITX06	Programming with JAVA 2 Enterprise Edition	PSE	17ITC01	3	3	0	0	3
4.	17ITX07	Advanced Web Programming	PSE	17ITC09	3	3	0	0	3
5.	17ITX08	C# and .Net	PSE	17ITC01	3	3	0	0	3
6.	17ITX09	Ruby Programming	PSE	-	3	3	0	0	3
7.	17ITX11	Principles of Cloud Computing	PSE	-	3	3	0	0	3
8.	17ITX14	Software Testing	PSE	-	3	3	0	0	3
9.	17ITX19	Information Security Management	PSE	-	3	3	0	0	3
10.	17CSX19	Software Agents	PSE	-	3	3	0	0	3
11.	17CSX11	Human Computer Interaction	PSE	17ITC05	3	3	0	0	3
12.	17ITX17	Building Enterprise Applications	PSE	17ITX06	3	3	0	0	3
13.	17ITX20	Finite Automata	PSE	17ITC13	3	3	0	0	3
14.	17CSX20	Software Quality Assurance	PSE	-	3	3	0	0	3
15.	17ITX21	Knowledge Management Techniques	PSE	-	3	3	0	0	3
16.	17ITX22	Enterprise Resource Planning	PSE	-	3	3	0	0	3
17.	17CSX22	Natural Language Processing	PSE	-	3	3	0	0	3
18.	17ITX25	Video Processing And Analytics	PSE	-	3	3	0	0	3
19.	17MYB12	Basic Statistics and Numerical Analysis	PSE	-	3	3	0	0	3
20.	17ITX26	Problem Solving and Algorithmic Skills	PSE	-	3	3	0	0	3
21.	17CSX31	Problem Solving And Programming	PSE	-	3	3	0	0	3
22.	17CSX29	Internet of Things	PSE	17ITC05	3	3	0	0	3
23.	17CSX30	Agile Methodologies	PSE	-	3	3	0	0	3
24.	17CSX05	Network Analysis and Management	PSE	17ITC05	3	3	0	0	3
25.	17ITX28	Agile Software Development	PSE	-	3	3	0	0	3
26.	17ITX29	IT operations	PSE	-	3	3	0	0	3
27.	17ITX30	IT operations Advanced	PSE	17ITX29 17CSC09	3	3	0	0	3
28.	17ITX31	Professional Readiness for Innovation, Employability and Entrepreneurship	PSE	-	3	3	0	0	3
29.	17ITX32	Test Driven Programming	PSE	-	3	3	0	0	3
30.	17ITX33	Java-Full Stack Implementation	PSE	-	3	3	0	0	3
31.	17ITX37	Problem Solving Using JAVA	PSE	-	3	3	0	0	3

Honor Degree Courses								
Vertical I - Cloud and Data Center Technologies								
S.NO	SUB. CODE	SUBJECT	CONTACT PERIODS	PRERQUISITE	L	T	P	C
1.	17ITX01	Data Science and Big Data Analytics	3	17MYB04 17CSC07	3	0	0	3
2.	17ITX02	Advanced Database Management System	3	17CSC07	3	0	0	3
3.	17ITX03	Object Oriented Database Management System	3	17ITC01 17CSC07	3	0	0	3
4.	17ITX15	Information Storage Management	3	17CSC07	3	0	0	3
5.	17ITX18	Business Intelligence	3	-	3	0	0	3
6.	17ITX23	Text Mining Techniques	3	-	3	0	0	3
7.	17ITX27	Data Science Techniques	3	-	3	0	0	3
8.	17ITX34	Cloud Services Management	3	-	3	0	0	3

Vertical II - Networking and Security								
S.No	Sub. Code	Subject	Contact Periods	PRERQUISITE	L	T	P	C
1.	17ITX10	Mobile Communication	3	17ITC05	3	0	0	3
2.	17ITX12	Ethical Hacking	3	17ITC13	3	0	0	3
3.	17ITX13	Social media network analysis	3	17ITC13	3	0	0	3
4.	17ITX16	Composing Mobile Apps	3	-	3	0	0	3
5.	17ITX24	Distributed Systems Concepts and Design	3	-	3	0	0	3
6.	17ECX16	Internet Of Things And Its Applications	3	-	3	0	0	3
7.	17ITX35	Cyber Security	3	17ITC14	3	0	0	3
8.	17ITX36	Security and Privacy in Cloud	3	-	3	0	0	3

Minor Degree Courses

Web Development

S.No	Sub. Code	Subject	Contact Periods	PRE-REQUISITE	L	T	P	C
1	17ITM01	Fundamentals of Problem Solving	3	-	3	0	0	3
2	17ITM02	Java programming Basics	3	-	3	0	0	3
3	17ITM03	Database System Concepts	3	-	3	0	0	3
4	17ITM04	UI and UX Design	3	-	3	0	0	3
5	17ITM05	Web essentials	3	-	3	0	0	3
6	17ITM06	Full stack web development	3	-	3	0	0	3
7	17ITM07	App development	3	-	3	0	0	3
8	17ITM08	Web Application Security	3	-	3	0	0	3

CREDIT DISTRIBUTION

SEM	HS	BS	PC	ES	EEC	PSE	OE	TOTAL
I	3	11	-	7	-	-	-	21
II	3	11	-	10	-	-	-	24
III	-	3	12	4	-	-	-	19
IV	-	3	20	-	-	-	-	23
V	-	-	12	3	-	6	-	21
VI	-	-	9	2	-	9	-	20
VII	3	-	8	-	4	3	3	21
VIII	-	-	-	-	8	3	3	14
TOTAL	9	28	61	26	12	21	6	163
%	5.52	17.18	37.42	15.95	7.36	12.88	3.68	
AICTE %	5-10	15-20	30-40	15-20	-	10-15	5-10	

TOTALCREDITS (21+24+19+23+21+20+21+14) = 163CREDITS



17ITX29 IT OPERATIONS (Common to CSE and IT Branches)					L	T	P	C
					3	0	0	3
PREREQUISITE : NIL				QUESTION PATTERN: TYPE – III				
COURSE OBJECTIVES AND OUTCOMES:								
Course Objectives		Course Outcomes			Related Program outcomes			
1.0	To understand the basics of IT operations and differentiate IT Operation Management & IT Service Management.	1.1	The student will be able to identify the operation policies and procedures.	a,b,c,d,g,i				
2.0	To learn policies and procedures to achieve a safe working environment in terms of health and safety regulations.	2.1	The student will be able to apply the Corporate Etiquettes and make the working environment safer.	c,d,f,g,h,i,i				
3.0	To know the basic principles of an Organization in IT Operations.	3.1	The student will be able to recognize the Key Concepts of Service Management in IT - enabled services.	a,b,c,d,g,i,i				
4.0	To learn the basics of information security in IT environments.	4.1	The student will be able to design IT infrastructure and security mechanism in networks.	a,b,c,d,e,f,g,h,i				
5.0	To learn the basics of Microsoft 365 in IT Operations.	5.1	The student can Implement the policies in Microsoft 365.	a,b,c,d,e,f,g,i				

UNIT I - IT OPERATIONS	9
IT Operation Definition - Roles & Responsibilities of IT Operations - IT Monitoring - IT operations Management - Responsibilities of IT operations Management. IT Service Management: IT Service Management Best Practices - The Service Life Cycle(Service Strategy - Service Design - Service Transition - Service Operation - Continual Service Improvement) Functions of IT Service Management (Incident Management, Event Management, Request fulfillment, Problem Management, Change Management, Availability Management - The Service Desk) - Escalation & Governance Management.	
UNIT II - HEALTHY SAFE AND SECURE WORKING ENVIRONMENT & ETIQUETTE	9
Health and Safety Essentials - Control and Management Systems - Facilities Management and Ergonomics - Managing Equipment - Managing Material. Etiquette: Professionalism in Relationships - First Impressions - Conducting Yourself in a Working Environment - Make Your Work Place Healthy - Dining Etiquette - Elevator Etiquette - Cafeteria Etiquette - Meeting Etiquette - Telephone Etiquette - Dealing with Difficult People and Conflicting Situations.	
UNIT III - ITIL	9
Introduction –Understanding ITIL Guiding Principles in an Organization–Optimize and Automate – Four Dimensions of Service Management – Key Activities of the Service Value Chain	

UNIT IV - IT INFRASTRUCTURE & INFORMATION SECURITY	9
Definition - Components of IT Infrastructure (Hardware, Software, Network) - Types of IT infrastructure (Traditional, Cloud, Hyperconverged); Risk, Response and Recovery: Risk Management and Information Security - The Risk Management Process - Business Continuity Management - Backing Up Data and Applications - Incident Handling - Recovery From a Disaster.	
UNIT V – AMS & Tools	9
Introduction – Support Models – Activities Type – Audits – Microsoft 365 – Domain Management – Licensing – Managing Teams – Meeting Policies – Messaging Policies	
TOTAL (L:45) : 45 PERIODS	

REFERENCE BOOKS:
<ol style="list-style-type: none"> 1.IT Service Management Support for your ITSM Foundation exam by John Sansbury, Ernest Brewster, Aidan Lawes, Richard Griffiths. 2.Managing Health, Safety and Working Environment Revised Edition: Management Extra 1st Edition by Elearn 3.Everything About Corporate Etiquette by Vivek Bindra 4.AXELOS, "ITIL® Foundation ITIL 4 Edition", TSO, 2019 5.Fundamentals of Information Systems Security 3rd Edition by David Kim, Michael G. Solomon 6.https://docs.microsoft.com/en-us/learn/m365/

17ITX30 ADVANCED IT OPERATIONS (Common to CSE and IT Branches)				
			L	T
			P	C
			3	0
			0	3
PREREQUISITE : NIL			QUESTION PATTERN: TYPE – III	
COURSE OBJECTIVES AND OUTCOMES:				
Course Objectives		Course Outcomes		Related Program outcomes
1.0	To understand basic concepts of cloud platform & design intelligent Cloud Services and Applications.	1.1	The student will be able to Recognize the essentials of Cloud Computing.	a,b,c,e,g,i,k,l
2.0	To explore the concepts of Map Reduce Programming.	2.1	The student will be able to work with Big Data Platform and its Use cases	a,b,c,d,e,f,i,k,l
3.0	To introduce the basic concepts and techniques of Machine Learning, Deep Learning and Artificial Intelligence.	3.1	The student will be able to use ML and other AI technologies to automate the identification and Resolution of common IT issues.	a,b,c,d,e,i,k
4.0	To understand the key concepts of intelligent automation.	4.1	The student will be able to identify different types of Variables, control flow and data table automation.	a,b,c,d,e,f,g,h,i,j,k,l
5.0	To learn how to use ServiceNow to manage IT tasks at any organization.	5.1	The student will be able to do Site Reliability Engineering and to do simulation using ServiceNow.	a,b,c,e,f,g

UNIT I - CLOUD COMPUTING	8
Introduction – Characteristics of Cloud computing – Architecture – Types – Service Models – SaaS, IaaS, PaaS – Regions – Cloud Security	
UNIT II - BIG DATA & DATA SCIENCE	10
Introduction – Data science and Challenges – HDFS & Hadoop – Structured and Unstructured data – Processing Big Data – Supervised & Unsupervised Learning – Text Analysis – Data visualization	
UNIT III - AI/ML & AIOps	10
Introduction – Structure of Intelligent Agents – Knowledge and Reasoning – Machine Learning – Deep Learning – Applications of AI – AIOps Technologies – AIOps Benefits – Implementation.	
UNIT IV - ROBOTIC PROCESS AUTOMATION (RPA)	8
Introduction – Variables – Control flow – Data Tables and Excel Automation – UI Automation – Selectors – Email Automation	
UNIT V - SRE & SERVICENOW	9
Introduction – Adopting a DevOps & SRE Model – SRE vs DevOps – Architecture & Lifecycle – Practices – Error Budgets – Toil Management – DevOps Tools – Introduction to ServiceNow – Reporting & Managing Issue – Benefits.	
TOTAL (L:45) : 45 PERIODS	

REFERENCE BOOKS:

1. Cloud Computing: Concepts, Technology & Architecture by Erl, Thomas, Puttini, Ricardo, Mahmood, Zaigham
2. Hadoop 2 Quick-Start Guide: Learn the Essentials of Big Data Computing in the Apache Hadoop 2 Ecosystem (Addison-wesley Data & Analytics Series) 1st Edition, Kindle Edition by Douglas Eadline
3. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley, 2015.
4. Machine Learning in the AWS Cloud - Add Intelligence to Applications with Amazon Sage Maker and Amazon Recognition By Abhishek Mishra
5. Deep Learning for Vision Systems By Mohamed Elgendy ·
6. Learning Robotic Process Automation - Create Software Robots and Automate Business Processes with the Leading RPA Tool – UiPath By Alok Mani Tripathi
7. Ui Path, "RPA Design and Development", UiPath Academic Alliance Resource.
8. Hands-on Site Reliability Engineering - Build Capability to Design, Deploy, Monitor, and Sustain Enterprise Software Systems at Scale By Shamayel Mohammed Farooqui Vishnu Vardhan Chikoti.
9. Tim Woodruff, "Learning ServiceNow", 2nd Edition, 2018



17ITX31 – PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP					
		L	T	P	C
		1	0	4	3
PREREQUISITE : NIL		QUESTION PATTERN : TYPE -NIL			
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Program outcomes	
1.0	To give practice to access the resources, gain knowledge about the technology used and list the ideas for project in the chosen domain.	1.1	The students will be able to access the resources, gain knowledge about the technology used and list the ideas for project in the chosen domain.	a,b,c,d,e,f,g,h,i,j,k,l	
2.0	To develop an ability to propose a solution document fit to the problem, prepare Solution Architecture, Data Flow Diagram and Technology Architecture.	2.1	The students will be able propose a solution document fit to the problem, prepare Solution Architecture, Data Flow Diagram and Technology Architecture.	a,b,c,d,e,f,g,h,i,j,k,l	
3.0	To prepare milestones and tasks, sprint schedules, coding and Testing.	3.1	The students will be able to prepare milestones and tasks, sprint schedules, coding and Testing.	a,b,c,d,e,f,g,h,i,j,k,l	

PHASE I – PREPARATION PHASE	(3+3)
Access the resources - Join the mentoring channel - Register on IBM academic Initiative - Create Github account – Setup the System based on pre-requisites.	
PHASE II – IDEATION PHASE	(3+15)
Literature Survey – Technology Trainings – Empathy Canvas map Preparation – List the ideas.	
PHASE III – PROJECT DESIGN PHASE - I	(3+9)
Proposed solution document preparation – Problem solution fit - Solution Architecture Preparation.	
PHASE IV – PROJECT DESIGN PHASE - II	(3+9)
Requirement Analysis - Customer Journey – Data Flow Diagrams – Technology Architecture.	
PHASE V – PROJECT PLANNING PHASE	(3+3)
Milestones and Tasks preparation – Sprint Schedules	
PHASE VI – PROJECT DEVELOPMENT PHASE	(0+21)
Coding & Solutioning – Acceptance Testing – Performance Testing	
TOTAL (T:15+P:60) = 75 PERIODS	

17CSX05 NETWORK ANALYSIS AND MANAGEMENT					L	T	P	C
					3	0	0	3
PRE REQUISITE : 17CSC08				QUESTION PATTERN: TYPE - I				
COURSE OBJECTIVES AND OUTCOMES:								
Course objectives		Course outcomes				Related program outcomes		
1.0	To be familiar with basics of network design and requirement analysis.	1.1	The students will be able to explain basics of network design and requirement analysis.	a,b,c,e,g,h,i,j,l				
2.0	To understand the network flow analysis.	2.1	The students will be able to apply a range of techniques for characterizing network structure.	a,b,c,i,j,k,l				
3.0	To be aware of network logical design.	3.1	The students will be able to explain the methodologies for developing logical design of networks.	a,b,c,e,f,g,h,i,j,k,l				
4.0	To understand network management and security concepts.	4.1	The students will be able to explore the network management and security concepts.	a,b,c,d,g,h,i,j,k,l				
5.0	To understand network physical design and routing.	5.1	The students will be able to apply network physical design and routing for building networking applications.	a,b,c,d,e,f,h,j,k,l				

UNIT I - A SYSTEM APPROACH TO NETWORK DESIGN AND REQUIREMENT ANALYSIS	(9)
Introduction- Overview Of Analysis, Architecture And Design Process –System Methodology - System Description - Service Description - Service Characteristics-Performance Characteristics; User Requirements-Application Requirements-Device Requirements-Network Requirements –Requirement Analysis: Guidelines –Requirements Gathering And Listing-Developing Service Metrics To Measure Performance –Characterizing Behavior-Developing RMA Requirements.	
UNIT II - FLOW ANALYSIS: CONCEPTS, GUIDELINES AND PRACTICE	(9)
Background-flows-identifying and developing flows- data sources and sinks-flow model – flow prioritization – flow specification- examples of applying flow specs-case study.	
UNIT III - NETWORK ARCHITECTURE	(9)
Background- component architectures-reference architecture-architecture models- systems and network architectures; addressing and routing architecture-addressing mechanisms-routing mechanisms-address strategies-routing strategies- architectural considerations.	
UNIT IV- MANAGEMENT ARCHITECTURE AND PERFORMANCE ARCHITECTURE	(9)
Network Management Mechanisms- Architectural Considerations; Performance Architecture-Goals- Performance Mechanisms-Architectural Considerations	
UNIT V - SECURITY, PRIVACY AND NETWORK DESIGN	(9)
Developing a security and privacy plan- security and privacy administration- security and privacy mechanisms-architectural considerations; design concepts- design process- vendor, equipment and service-provider evaluations-network layout- design traceability- design metrics.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. James. D. McCabe, "Practical Computer Network Analysis and Design", 3rd ed., Morgan Kaufman, 2014.

REFERENCES:

1. J. Radz, "Fundamentals of computer network analysis and engineering: basic approaches for solving problems in the networked computing environment", universe, 2005.
2. Laura Chappell and Gerald Combs, "Wireshark 101: Essential Skills for Network Analysis", Kindle Edition, 2013.



17CSX30 AGILE METHODOLOGIES							
				L	T	P	C
				3	0	0	3
PRE REQUISITE : Nil				QUESTION PATTERN: TYPE - I			
COURSE OBJECTIVES AND OUTCOMES:							
Course objectives		Course outcomes				Related program outcomes	
1.0	To provide students with a theoretical as well as practical understanding of Agile software development practices and how small teams can apply them to create high-quality software	1.1	The student will be able to interact with business stakeholders in determining the requirements for a software system.			a,b,c,d,j,k	
2.0	To provide a good understanding of software design and a set of software technologies and APIs	2.1	The student will be able to perform iterative software development processes: how to plan them, how to execute them.			a,b,j,k	
3.0	To do a detailed examination and demonstration of Agile development and testing techniques	3.1	The student will be able to point out the impact of social aspects on software development success.			a,b,c,j,k	
4.0	To understand the benefits and pitfalls of working in an Agile team	4.1	The student will be able to develop techniques and tools for improving team collaboration and software quality.			a,b,c,j,k	
5.0	To understand Agile development and testing	5.1	The student will be able to perform Software process improvement as an ongoing task for development teams.			a,c,k	

UNIT I: AGILE METHODOLOGY	(9)
Theories for Agile Management –Agile Software Development –Traditional Model vs. Agile Model -Classification of Agile Methods –Agile Manifesto and Principles –Agile Project Management –Agile Team Interactions –Ethics in Agile Teams -Agility in Design, Testing –Agile Documentations Agile Drivers, Capabilities and Values.	
UNIT II: AGILE PROCESSES	(9)
Lean Production -SCRUM, Crystal, Feature Driven Development-Adaptive Software Development - Extreme Programming: Method Overview –Lifecycle –Work Products, Roles and Practices.	
UNIT III: AGILITY AND KNOWLEDGE MANAGEMENT	(9)
Agile Information Systems –Agile Decision Making -Earls' Schools of KM Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment , Leveraging –KM in Software Engineering –Managing Software Knowledge –Challenges of Migrating to Agile Methodologies –Agile Knowledge Sharing –Role of Story-Cards – Story-Card Maturity Model (SMM).	
UNIT IV: AGILITY AND REQUIREMENTS ENGINEERING	(9)
Impact of Agile Processes in RE–Current Agile Practices –Variance –Overview of RE Using Agile –Managing Unstable Requirements –Requirements Elicitation –Agile Requirements Abstraction Model –Requirements Management in Agile Environment, Agile Requirements Prioritization –Agile Requirements Modeling and Generation –Concurrency in Agile Requirements Generation.	

UNIT V: AGILITY AND QUALITY ASSURANCE	(9)
Agile Product Development –Agile Metrics –Feature Driven Development (FDD) –Financial and Production Metrics in FDD – Agile Approach to Quality Assurance -Test Driven Development –Agile Approach in Global Software Development.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. David J. Anderson and Eli Schragenheim, “Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results”, Prentice Hall, 2003.
2. Hazza and Dubinsky, “Agile Software Engineering, Series: Undergraduate Topics in Computer Science”, Springer, 2009.

REFERENCES:

1. Craig Larman, —Agile and Iterative Development: A manager s Guide, Addison-Wesley, 2004.
2. .Kevin C. Desouza, —Agile information systems: conceptualization, construction, and management, Butterworth- SHeinemann, 2007.

17ITX32- TEST DRIVEN PROGRAMMING

		L	T	P	C
		3	0	0	3
PRE REQUISITE : Nil					
COURSE OBJECTIVES AND OUTCOMES:					
Course objectives		Course outcomes			Related program outcomes
1.0	To understand Object Oriented Programming concepts and basic characteristics of Java	1.1	The students will be able to implement fundamental concepts of Java.	a,b,c,e,g,h,i, j,l	
2.0	To gain exposure about Abstract classes and collection framework	2.1	The students will be able to develop applications using Abstract classes and collection framework	a,b,c,i,j,k,l	
3.0	To develop a java application with multiple threads and to access database through Java programs, using Java Data Base Connectivity (JDBC)	3.1	The students will be able to access database through Java programs, using Java Data Base Connectivity (JDBC)	a,b,c,e,f,g,h, i,j,k,l	
4.0	Design and develop Web applications	4.1	The students will be able to Design and develop Web applications	a,b,c,d, g,h,i,j,k,l	
5.0	To know about Servlet, XML and AJAX	5.1	The students will be able to apply servlets and AJAX for their web development	a,b,c,d,e,f, h,j,k,l	

UNIT I - JAVA FUNDAMENTALS	(9)
<p>Java Architecture, Environment Setup, Variables, Data Types, Assignment, Operators.</p> <p>Flow Control Statements: If statement, If--Else Statement, Nested--If Statement, Switch Statement, While Statement, For Loop Statement, Enhanced For Loop Statement, Do while loop, Break and Continue Statement.</p> <p>Arrays: One dimensional and Two Dimensional Array.</p> <p>OOPS / Inheritance: Classes and Objects, Constructor, Return Statements. Encapsulation/Abstraction, Inheritance, Overriding/Polymorphism, Method Overloading, Garbage Collection, String, String Buffer.</p> <p>Eclipse Overview: Creating packages, classes, Adding Jar Files, Setting eclipse Preferences, Refactoring renaming classes or interfaces</p>	
UNIT II - COLLECTION AND ABSTRACTION	(9)
<p>Abstraction /Packages / Exception Handling: Abstract Classes, Final Keyword, Packages-import, Interfaces, Introduction to Exception Handling, Exception types, Try and Catch Block, Throws, Throw clause, Finally clause, Runtime exception.</p> <p>Wrapper Classes: Autoboxing, Unboxing and Cloneable Interface</p> <p>I/O Streams: Introduction to I/O, I/O Operations, Object Serialization</p> <p>Collection Framework: Introduction to Collection, List, Array Lists, Linked Lists, Sorting Lists, Using Iterators, Generics, Set, Map, HashMap, SortedMaps, Using Custom Objects, Map</p>	
UNIT III - TEST CASES AND DATABASE CONNECTIVITY	(9)
<p>Junit: Introduction to Junit, Junit Features, Junit with Eclipse, Assert Methods, Annotations, Test Suite, Introduction to Mockito</p> <p>Multithreading I / II: Introduction to Multithreading, Thread Creation-Thread class and Runnable Interface, Thread Control and Priorities, Thread Synchronization.</p>	

RDBMS / SQL / JDBC: Introduction to RDBMS, Oracle 11g Introduction, Select Statement, Restricting and Sorting Data, DML, DDL, Introduction to JDBC, Establishing Connection, Executing Query and Processing Results, Meta data & Prepared Statement, Using Callable Statement and Transactions	
UNIT IV- ANT,HTML & JAVASCRIPT	(9)
<p>ANT: Introduction to ANT, Building sample java projects,</p> <p>HTML : Introduction to HTML and its elemets, Basic Tags, Basic Elements, Formatting Tags, Layout tags and Semantic Tags, Tables, Forms and Frames, Style and div tags, Introduction to HTML5</p> <p>JavaScript / CSS: Introduction to CSS, Styles and Style sheets, Formatting with CSS, Links and Lists, CSS Box Model, CSS3, Introduction to Javascrpts, JS Functions, JS Strings, JS Events, JS Objects, JS Validations, JS Regular Expressions, Introduction to Bootstrap, Formatting and styling using Bootstrap, Table, Bootstrap Grid System.</p>	
UNIT V - SERVLET, XML AND AJAX	(9)
<p>Servlets and JSP: Introduction to Servlets, Servlet-Get and Post Requests, Servlet Config and Servlet Context, Servlet-Cookies and Session Management, Introduction to JSP, JavaBeans in JSP.</p> <p>XML-I and XML-II: Introduction to XML, Document Type Definition, XML Namespaces, XML Schema, XSLT.</p> <p>AJAX: Introduction to AJAX, AJAX working principle, AJAX Application, AJAX Database Application.</p>	
TOTAL (L: 45) = 45 PERIODS	
TEXT BOOKS:	
<ol style="list-style-type: none"> 1. Core Java Volume I- Fundamentals, Cay S. Horstmann, Gary Cornell, Pearson India Education Services Pvt. Ltd., 11th Edition, 2. Java: The Complete Reference, Eleventh Edition, 11th Edition by Herbert Schildt Released December 2018 3. HTML 5 Black Book, Kogent Learning Solutions Inc., ISBN:978-93-5004-095-9 	
REFERENCES	
<ol style="list-style-type: none"> 1. Head First EJB 3.0 by Kathy Sierra, Bert Bates, Publisher: O'Reilly Media 2. Head First Servlets and JSP by Bryan Basham, Kathy Sierra & Bert Bates, Publisher: O'Reilly Media 	

17ITX33 JAVA-FULL STACK IMPLEMENTATION				
			L	T
			3	0
PRE REQUISITE : Nil				
COURSE OBJECTIVES AND OUTCOMES:				
Course objectives		Course outcomes		Related program outcomes
1.0	Designing Enterprise based applications by encapsulating an application's business logic.	1.1	The students will be able to map Java classes and object associations to relational database tables with Hibernate mapping files	a,b,c,e,g,h,i,j,l
2.0	Learn Spring configuration using Java Configuration and Annotations	2.1	The students will be able to implement Spring configuration using Java Configuration and Annotations	a,b,c,i,j,k,l
3.0	Simplifying application development with Spring Boot	3.1	The students will be able to simplify application development using Spring Boot.	a,b,c,e,f,g,h,i,j,k,l
4.0	Consume REST services using observables	4.1	The students will be able to use REST web services	a,b,c,d,g,h,i,j,k,l
5.0	Utilizing AngularJS formats adequately	5.1	The students will be able to use various Angular features including directives, components, and services.	a,b,c,d,e,f,h,j,k,l

UNIT I - HIBERNATE	(9)
Hibernate Overview, Architecture, Configuration, Sessions, Annotations, Query Language, Native SQL, Batch Processing, Interceptors	
UNIT II - SPRING CORE	(9)
Spring Overview, Architecture, IoC Containers, Bean Definition and Scope, Bean Life cycle, Bean inheritance, Dependency injection, Beans auto wiring, java based configuration, event handling, Custom events, AOP with spring framework, JDBC framework, transaction management.	
UNIT III - SPRING BOOT	(9)
Spring Boot-Introduction, Bootstrapping, Tomcat deployment, Build systems, code structure, Spring beans and dependency, Spring boot runners, Application properties, Logging, Building RESTful web services, Exception handling, Interceptor, Servlet filter, tomcat port number, File handling, Consuming RESTful web services, Internationalization, Spring boot scheduling	
UNIT IV - REST WEB SERVICE	(9)
RESTful-Introduction, Environment setup, Resources, Messages, Addressing, Methods, Statelessness, Caching, Security, JAX-RS.	
UNIT V - ANGULAR	(9)
Angular Introduction, Features, Apps Loading, Architecture, Directives, ngIf Directive, ngFor Directive, ngSwitch Directive, Data Binding, Property Binding, String Interpolation, Event Binding, Two way data binding, Forms.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Soni, R. K. (2017). Full stack angularJS for java developers: Build a full-featured web application from scratch using angularJS with spring RESTful. Apress.
2. Duldulao, D. B., & Villafranca, S. R. (2022). Spring Boot and Angular: Hands-on full stack web development with Java, Spring, and Angular. Packt Publishing Ltd.
3. Fisher, P. T., & Murphy, B. D. (2010). Spring persistence with Hibernate. Apress.

REFERENCES

1. Just Hibernate, A Lightweight Introduction to the Hibernate Framework by Madhusudhan Konda, Publisher: O'Reilly Media



17ITX34 CLOUD SERVICES MANAGEMENT					L	T	P	C
					3	0	0	3
PRE REQUISITE : Nil					QUESTION PATTERN: TYPE - I			
COURSE OBJECTIVES AND OUTCOMES:								
Course Objectives		Course Outcomes			Related Program outcomes			
1.0	To Introduce Cloud Service Management terminology, definition & concepts	1.1	The students will be able to Explain the fundamentals of cloud computing		a,b,c,d,e,i,j,k,l			
2.0	To Compare and contrast cloud service management with traditional IT service management	2.1	The Students will be able to compare and contrast cloud and traditional IT service management		a,b,c,d,e,i,j,k,l			
3.0	To Identify strategies to reduce risk and eliminate issues associated with adoption of cloud services	3.1	The students will be able to Exhibit cloud-design skills to build and automate business solutions using cloud technologies		a,b,c,d,e,i,j,k,l			
4.0	To Select appropriate structures for designing, deploying and running cloud-based services in a business environment	4.1	The students will be able to Possess Strong theoretical foundation leading to excellence and excitement towards adoption of cloud-based services		a,b,c,d,e,i,j,k,l			
5.0	To Illustrate the benefits and drive the adoption of cloud-based services to solve real world problems	5.1	The students will be able to Solve the real world problems using Cloud services and technologies		a,b,c,d,e,i,j,k,l			
UNIT I - CLOUD SERVICE MANAGEMENT FUNDAMENTALS								(9)
Cloud Ecosystem, The Essential Characteristics, Basics of Information Technology Service Management and Cloud Service Management, Service Perspectives, Cloud Service Models, Cloud Service Deployment Models								
UNIT II - CLOUD SERVICES STRATEGY								(9)
Cloud Strategy Fundamentals, Cloud Strategy Management Framework, Cloud Policy, Key Driver for Adoption, Risk Management, IT Capacity and Utilization, Demand and Capacity matching, Demand Queueing, Change Management, Cloud Service Architecture								
UNIT III - CLOUD SERVICE MANAGEMENT								(9)
Cloud Service Reference Model, Cloud Service Lifecycle, Basics of Cloud Service Design, Dealing with Legacy Systems and Services, Benchmarking of Cloud Services, Cloud Service Capacity Planning, Cloud Service Deployment and Migration, Cloud Marketplace, Cloud Service Operations Management								
UNIT IV - CLOUD SERVICE ECONOMICS								(9)
Pricing models for Cloud Services, Freemium, Pay Per Reservation, Pay per User, Subscription based Charging, Procurement of Cloud-based Services, Capex vs Opex Shift, Cloud service Charging, Cloud Cost Models								
UNIT V - CLOUD SERVICE GOVERNANCE & VALUE								(9)
IT Governance Definition, Cloud Governance Definition, Cloud Governance Framework, Cloud Governance Structure, Cloud Governance Considerations, Cloud Service Model Risk Matrix, Understanding Value of Cloud Services, Measuring the value of Cloud Services, Balanced Scorecard, Total Cost of Ownership								
TOTAL (L: 45) = 45 PERIODS								

TEXT BOOKS:

1. Cloud Service Management and Governance: Smart Service Management in Cloud Era by Enamul Haque, Enel Publications
2. Cloud Computing: Concepts, Technology & Architecture by Thomas Erl, Ricardo Puttini, Zaigham Mohammad 2013
3. Cloud Computing Design Patterns by Thomas Erl, Robert Cope, Amin Naserpour

REFERENCES:

1. Economics of Cloud Computing by Praveen Ayyappa, LAP Lambert Academic Publishing
2. Mastering Cloud Computing Foundations and Applications Programming Rajkumar Buyya, Christian Vechhiola, S. Thamarai Selvi



17ITX35 CYBER SECURITY					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17ITC14					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Program outcomes	
1.0	To learn cybercrime and cyber law.	1.1	The students will be able to Explain the basics of cyber security, cyber crime and cyber law	a,,c,d,e,h,i,j,l	
2.0	To understand the cyber attacks and tools for mitigating them.	2.1	The students will be able to Classify various types of attacks and learn the tools to launch the attacks	a,c,e,h,k,l	
3.0	To understand information gathering	3.1	The students will be able to Apply various tools to perform information gathering	a,b,d,e,h,l	
4.0	To learn how to detect a cyber attack	4.1	The students will be able to Apply intrusion techniques to detect intrusion	a,b,c,e,g,h,j,l	
5.0	To learn how to prevent a cyber attack	5.1	The students will be able to Apply intrusion prevention techniques to prevent intrusion.	a,b,c,e,g,h,l	
UNIT I - INTRODUCTION					(9)
Cyber Security – History of Internet – Impact of Internet – CIA Triad; Reason for Cyber Crime – Need for Cyber Security – History of Cyber Crime; Cybercriminals – Classification of Cybercrimes – A Global Perspective on Cyber Crimes; Cyber Laws – The Indian IT Act – Cybercrime and Punishment.					
UNIT II - ATTACKS AND COUNTERMEASURES					(9)
OSWAP; Malicious Attack Threats and Vulnerabilities: Scope of Cyber-Attacks – Security Breach – Types of Malicious Attacks – Malicious Software – Common Attack Vectors – Social engineering Attack – Wireless Network Attack – Web Application Attack – Attack Tools – Countermeasures.					
UNIT III - RECONNAISSANCE					(9)
Harvester – Whois – Netcraft – Host – Extracting Information from DNS – Extracting Information from E-mail Servers – Social Engineering Reconnaissance; Scanning – Port Scanning – Network Scanning and Vulnerability Scanning – Scanning Methodology – Ping Sweer Techniques – Nmap Command Switches – SYN – Stealth – XMAS – NULL – IDLE – FIN Scans – Banner Grabbing and OS Finger printing Techniques.					
UNIT IV - INTRUSION DETECTION					(9)
Host -Based Intrusion Detection – Network -Based Intrusion Detection – Distributed or Hybrid Intrusion Detection – Intrusion Detection Exchange Format – Honeypots – Example System Snort.					
UNIT V - NTRUSION PREVENTION					(9)
Firewalls and Intrusion Prevention Systems: Need for Firewalls – Firewall Characteristics and Access Policy – Types of Firewalls – Firewall Basing – Firewall Location and Configurations – Intrusion Prevention Systems – Example Unified Threat Management Products.					
TOTAL (L: 45) = 45 PERIODS					

TEXT BOOKS:

1. Anand Shinde, "Introduction to Cyber Security Guide to the World of Cyber Security", Notion Press, 2021 (Unit 1)
2. Nina Godbole, Sunit Belapure, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley Publishers, 2011 (Unit 1)

REFERENCE:

1. David Kim, Michael G. Solomon, "Fundamentals of Information Systems Security", Jones & Bartlett Learning Publishers, 2013 (Unit 2)
2. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made easy", Elsevier, 2011 (Unit 3)
3. Kimberly Graves, "CEH Official Certified Ethical hacker Review Guide", Wiley Publishers, 2007 (Unit 3)
William Stallings, Lawrie Brown, "Computer Security Principles and Practice", Third Edition, Pearson Education, 2015 (Units 4 and 5)
4. Georgia Weidman, "Penetration Testing: A Hands-On Introduction to Hacking", No Starch Press, 2014 (Lab)



17ITX36 SECURITY AND PRIVACY IN CLOUD				
			L	T
			P	C
			3	0
			0	3
PRE REQUISITE : 17ITC14				
COURSE OBJECTIVES AND OUTCOMES:				
Course Objectives		Course Outcomes		Related Program outcomes
1.0	To Introduce Cloud Computing terminology, definition & concepts	1.1	The Students will be able to Understand the cloud concepts and fundamentals.	a,b,c,d,e,i,j,k,l
2.0	To understand the security design and architectural considerations for Cloud	2.1	The Students will be able to Explain the security challenges in the cloud.	a,b,c,d,e,i,j,k,l
3.0	To understand the Identity, Access control in Cloud	3.1	The Students will be able to Define cloud policy and Identity and Access Management	a,b,c,d,e,i,j,k,l
4.0	To follow best practices for Cloud security using various design patterns	4.1	The Students will be able to Understand various risks and audit and monitoring mechanisms in the cloud.	a,b,c,d,e,i,j,k,l
5.0	To be able to monitor and audit cloud applications for security	5.1	The Students will be able to Define the various architectural and design considerations for security in the cloud.	a,b,c,d,e,i,j,k,l
UNIT I - FUNDAMENTALS OF CLOUD SECURITY CONCEPTS				(9)
Overview of cloud security- Security Services - Confidentiality, Integrity, Authentication, Nonrepudiation, Access Control - Basic of cryptography - Conventional and public-key cryptography, hash functions, authentication, and digital signatures.				
UNIT II - SECURITY DESIGN AND ARCHITECTURE FOR CLOUD				(9)
Security design principles for Cloud Computing - Comprehensive data protection - End-to-end access control - Common attack vectors and threats - Network and Storage - Secure Isolation Strategies - Virtualization strategies - Inter-tenant network segmentation strategies - Data 143 Protection strategies: Data retention, deletion and archiving procedures for tenant data, Encryption, Data Redaction, Tokenization, Obfuscation, PKI and Key				
UNIT III - ACCESS CONTROL AND IDENTITY MANAGEMENT				(9)
Access control requirements for Cloud infrastructure - User Identification - Authentication and Authorization - Roles-based Access Control - Multi-factor authentication - Single Sign-on, Identity Federation - Identity providers and service consumers - Storage and network access control options - OS Hardening and minimization - Verified and measured boot - Intruder Detection and prevention				
UNIT IV - CLOUD SECURITY DESIGN PATTERNS				(9)
Introduction to Design Patterns, Cloud bursting, Geo-tagging, Secure Cloud Interfaces, Cloud Resource Access Control, Secure On-Premise Internet Access, Secure External Cloud				
UNIT V MONITORING, AUDITING AND MANAGEMENT				(9)
Proactive activity monitoring - Incident Response, Monitoring for unauthorized access, malicious traffic, abuse of system privileges - Events and alerts - Auditing – Record generation, Reporting and Management, Tamper-proofing audit logs, Quality of Services, Secure Management, User management, Identity management, Security Information and Event Management				
TOTAL (L: 45) = 45 PERIODS				

TEXT BOOKS:

1. Raj Kumar Buyya , James Broberg, andrzejGoscinski, –Cloud Computing:II, Wiley 2013
2. Dave shackleford, –Virtualization SecurityII, SYBEX a wiley Brand 2013.
3. Mather, Kumaraswamy and Latif, –Cloud Security and PrivacyII, OREILLY 2011

REFERENCE:

1. Mark C. Chu-Carroll –Code in the CloudII,CRC Press, 2011
2. Mastering Cloud Computing Foundations and Applications Programming RajkumarBuyya, Christian Vechhiola, S. ThamaraiSelvi .



17ITM01- FUNADAMENTALS OF PROBLEM SOLVING AND PROGRAMMING

	L	T	P	C
	3	0	0	3

PREREQUISITE : Nil

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program Outcomes
1.0	To gain knowledge about the basics of programming	1.1	The students will be able to understand the basics of Python Programming constructs.	a,c,l
2.0	To gain exposure about selection structure	2.1	The students will be able to design programs involving selection structure	a,b,c,d,l
3.0	To get knowledge about repetition structure, function and modules	3.1	The students will be able to design programs involving function, modules and loops.	a,b,c,d,k,l
4.0	To gain exposure about string	4.1	The students will be able to realize the need of strings.	a,b,c,d,k,l
5.0	To get knowledge about mutable and Immutable types	5.1	The students will be able to realize the need of list, tuples and dictionary.	a,b,c,d,k,l

UNIT I - INTRODUCTION TO BASICS OF PROGRAMMING	(9)
Basics - Variables and Assignment - Basic Data Types - Comments - Operators - print() - Floats	
UNIT II - SELECTION STRUCTURE	(9)
Introduction to Selection Structure - if statements, else statements, nested elif statements, truthy and falsey values, Control Structure	
UNIT III - VALUE – REPETITION AND RETURNING STRUCTURE	(9)
Loops - while loops, for loops - Nested Loops - Functions - modules - variable scope	
UNIT IV - DATA AND STRING PROCESSING	(9)
Strings - Accessing the Strings - Traversing the Strings - Working with Strings - Formatting Strings	
UNIT V - MUTABLE AND IMMUTABLE TYPES AND METHODS	(9)
Introduction to lists, indexing and slicing of list , del and list methods, Tuples, Dictionary and its methods.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Dr. R. Nageswara Rao, –Core Python Programming, Dreamtech Press, 2017 Edition.
2. Reema Thareja - Problem Solving and Programming – Python, Oxford University Press, 2nd Edition.

REFERENCE:

1. Wesley J. Chun, –Core Python Programming, Pearson Education, 2nd edition, 2010.

17ITM02 – JAVA PROGRAMMING BASICS

L	T	P	C
3	0	0	3

PRE REQUISITE : NIL

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To understand Object Oriented Programming concepts and basic characteristics of Java	1.1	The students will be able to implement fundamental concepts of Java.	a, b, c, d
2.0	To implement the keywords and inheritance concepts using class.	2.1	The students will be able to gain the knowledge on inheritance	b, c, d, k
3.0	To define exceptions and use I/O streams	3.1	The students will be able to understand the knowledge on handling exceptions and using Files	b, c, d, k
4.0	To know the principles of packages and interfaces	4.1	The students will be able to use packages and implement interfaces in Java classes.	b, c, d, k
5.0	To develop a java application with threads.	5.1	The students will be able to gain the knowledge about threads and advantages of multithreading.	b, c, d, k, l

UNIT I INTRODUCTION

(9)

Introduction of Java - Features of Java – Application of Java – Data Types –Statements – Operators – Control statements - Basics of Oops Concepts: Class – Objects – Methods –Constructor – finalizer –Access Control.

UNIT II INHERITANCE AND KEYWORDS

(9)

Inheritance: **Types of Inheritance – Polymorphism – Method Overloading – Method Overriding-** super – final with inheritance – Abstract Class - Keywords : static –final - this - String – Arrays

UNIT III EXCEPTION HANDLING AND FILES

(9)

Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, **Java’s Built-in Exceptions**, Creating Your Own Exception Subclasses, **Using Exceptions**. I/O Basics- Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files

UNIT IV PACKAGES AND INTERFACES

(9)

Packages and Interfaces: Packages, Access Protection, Importing Packages. Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces.

UNIT V THREADS

(9)

Java Thread Model - Main Thread - Creating a Thread - Creating Multiple Threads - Thread Priorities - Synchronization - Interthread Communication - Suspending, Resuming, and Stopping Threads- Using Multithreading.

TOTAL (L: 45) = 45 PERIODS

TEXT BOOK:

- Herbert Schildt, “The Complete Reference (Fully updated for jdk7)”, Oracle press Ninth Edition,2014.

REFERENCE:

- Deitel&Deitel, “Java How to Program”, Prentice Hall, 10th Edition, 2016.

17ITM03 – DATABASE SYSTEM CONCEPTS (Common to 17CSM03)					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Program outcomes	
1.0	To understand the different issues involved in the design and implementation of a database system.	1.1	The students will be able to describe the role of Database Management System in an Organization.	a,c,j,k	
2.0	To study the physical and logical database designs, database modeling.	2.1	The students will be able to study basic database concepts including the structure and operations of the relational data model.	a,c,j,k	
3.0	To understand and use data manipulation language to query, update, and manage a database	3.1	The students will be able to construct simple and Moderately advanced database queries using SQL	a,b,c,j,k	
4.0	To develop an understanding of essential DBMS concepts.	4.1	The students will be able to apply logical database design principles includes E-R diagrams & Normalization.	a,b,c,k	
5.0	To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS	5.1	The students will be able to explain various file organizing & Indexing structure	a,b,c,k	
UNIT I INTRODUCTION					(9)
Introduction to database systems - Definition of DBMS - Advantages of dbms - Views of data - Levels of data abstraction - Data Models and types - Database architecture - Entity relationship model - ER diagram.					
UNIT II - RELATIONAL DATA MODEL					(9)
Relational database structure - Procedural and Non procedural languages - Relational algebra : operations - Relational Calculus : Tuple relational calculus - Domain Relational Calculus - Integrity Constraints - SQL Commands : DDL - DML - TCL					
UNIT III - DATABASE DESIGN					(9)
Functional dependency: Full functional Dependency - Partial dependency - Transitive dependency - multi valued dependency - Decomposition - Normalization - Normal Forms: 1NF - 2NF - 3NF - BCNF - 4NF - 5NF					
UNIT IV - TRANSACTIONAL PROCESSING					(9)
Transaction - Properties of transaction - Transaction state - Serialization : types - Need for Serialization - Two Phase Commit - Save Point - Concurrency - Advantages of concurrency - Concurrency control mechanism - Locking protocols					
UNIT V - MEMORY STRUCTURES AND FILE ORGANIZATION					(9)
Memory hierarchy - Disk storage - Raid levels - Indexing: types - Hashing techniques - Query Processing tool - Query Evaluation.					
TOTAL (L: 45) = 45 PERIODS					

TEXT BOOK:

1. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Seventh Edition, McGraw Hill, 2020.

REFERENCES:

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.



17ITM04 – UI and UX DESIGN (Common to 17CSM07)					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes			Related Program outcomes
1.0	To provide a sound knowledge in UI & UX	1.1	The students will be able to Build UI for user Applications	a,b,c,d,e,i,j,k,l	
2.0	To understand the need for UI and UX	2.1	The students will be able to Evaluate UX design of any product or application	a,b,c,d,e,i,j,k,l	
3.0	To understand the various Research Methods used in Design	3.1	The students will be able to Demonstrate UX Skills in product development	a,b,c,d,e,i,j,k,l	
4.0	To explore the various Tools used in UI & UX	4.1	The students will be able to Implement Sketching principles	a,b,c,d,e,i,j,k,l	
5.0	Creating a wireframe and prototype	5.1	The students will be able to Create Wireframe and Prototype	a,b,c,d,e,i,j,k,l	
UNIT I FOUNDATIONS OF DESIGN					(9)
UI vs. UX Design - Core Stages of Design Thinking - Divergent and Convergent Thinking - Brainstorming and Game storming - Observational Empathy					
UNIT II FOUNDATIONS OF UI DESIGN					(9)
Visual and UI Principles - UI Elements and Patterns - Interaction Behaviors and Principles – Branding - Style Guides					
UNIT III FOUNDATIONS OF UX DESIGN					(9)
Introduction to User Experience - Why You Should Care about User Experience - Understanding User Experience - Defining the UX Design Process and its Methodology - Research in User Experience Design - Tools and Method used for Research - User Needs and its Goals - Know about Business Goals					
UNIT IV WIREFRAMING, PROTOTYPING AND TESTING					(9)
Sketching Principles - Sketching Red Routes - Responsive Design – Wireframing - Creating Wireflows - Building a Prototype - Building High-Fidelity Mockups - Designing Efficiently with Tools - Interaction Patterns - Conducting Usability Tests - Other Evaluative User Research Methods - Synthesizing Test Findings - Prototype Iteration					
UNIT V RESEARCH, DESIGNING, IDEATING, & INFORMATION ARCHITECTURE					(9)
Identifying and Writing Problem Statements - Identifying Appropriate Research Methods - Creating Personas - Solution Ideation - Creating User Stories - Creating Scenarios - Flow Diagrams - Flow Mapping - Information Architecture					
TOTAL (L: 45) = 45 PERIODS					

TEXT BOOKS:

1. Joel Marsh, "UX for Beginners", O'Reilly , 2022
2. Jon Yablonski, "Laws of UX using Psychology to Design Better Product & Services" O'Reilly 2021.

REFERENCES:

1. Jenifer Tidwell, Charles Brewer, Aynne Valencia, "Designing Interface" 3 rd Edition , O'Reilly 2020
2. Steve Schoger, Adam Wathan "Refactoring UI", 2018
3. Steve Krug, "Don't Make Me Think, Revisited: A Commonsense Approach to Web & Mobile", Third Edition, 2015
4. <https://www.nngroup.com/articles/>
5. <https://www.interaction-design.org/literature>.



17ITM05 – WEB ESSENTIALS					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Program outcomes	
1.0	To comprehend and analyze the basic concepts of web programming and internet protocols.	1.1	The students will be able to Apply JavaScript, HTML and CSS effectively to create interactive and dynamic websites	a,b,c,d,e,f,i,j,k,l	
2.0	To describe how the client-server model of Internet programming works.	2.1	The students will be able to Design and deploy simple web-applications	a,b,c,d,e,f,i,j,k,l	
3.0	To demonstrate the uses of scripting languages	3.1	The students will be able to Handle multimedia components	a,b,c,d,e,f,i,j,k,l	
4.0	To write simple scripts for the creation of web sites	4.1	The students will be able to Create simple PHP scripts	a,b,c,d,e,f,i,j,k,l	
5.0	To create database applications	5.1	The students will be able to Create simple database applications.	a,b,c,d,e,f,k,l	
UNIT I WEBSITE BASICS					(9)
Internet Overview - Fundamental computer network concepts - Web Protocols - URL – Domain Name- Web Browsers and Web Servers- Working principle of a Website –Creating a Website - Client-side and server-side scripting					
UNIT II WEB DESIGNING					(9)
HTML – Form Elements - Input types and Media elements - CSS3 - Selectors, Box Model, Backgrounds and Borders, Text Effects, Animations, Multiple Column Layout, User Interface.					
UNIT III CLIENT-SIDE PROCESSING AND SCRIPTING					(9)
JavaScript Introduction – Variables and Data Types-Statements – Operators - Literals-FunctionsObjects-Arrays-Built-in Objects- Regular Expression, Exceptions, Event handling, Validation - JavaScript Debuggers					
UNIT IV SERVER SIDE PROCESSING AND SCRIPTING – PHP					(9)
PHP - Working principle of PHP - PHP Variables - Constants - Operators – Flow Control and Looping - Arrays - Strings - Functions - File Handling - File Uploading – Email Basics - Email with attachments - PHP and HTML - Simple PHP scripts - Databases with PHP					
UNIT V SERVLETS AND DATABASE CONNECTIVITY					(9)
Servlets: Java Servlet Architecture – Servlet Life cycle- Form GET and POST actions -Sessions – Cookies – Database connectivity - JDBC Creation of simple interactive applications - Simple database applications					
TOTAL (L: 45) = 45 PERIODS					

TEXT BOOKS:

1. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Third Edition, O'Reilly publishers, 2014. 84
2. Paul Deitel, Harvey Deitel, Abbey Deitel, "Internet & World Wide Web - How to Program", 5th edition, Pearson Education, 2012.

REFERENCES:

1. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.
2. James F. Kurose, "Computer Networking: A Top-Down Approach", Sixth Edition, Pearson Education, 2012
3. Steven Holzener, "PHP – The Complete Reference", 1st Edition, Mc-Graw Hill, 2017
4. Fritz Schneider, Thomas Powell, "JavaScript – The Complete Reference", 3rd Edition, McGraw Hill Publishers, 2017
5. Bates, "Developing Web Applications", Wiley Publishers, 2006



17ITM06 – FULL STACK WEB DEVELOPMENT					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes			Related Program outcomes
1.0	To understand the various components of full stack development	1.1	The students will be able to Understand the various stacks available for web application development.		a,b,i,j,k,l
2.0	To learn Node.js features and applications	2.1	The students will be able to Use Node.js for application development		a,b,c,d,e,f,i,k,l
3.0	To develop applications with MongoDB	3.1	The students will be able to Develop applications with MongoDB		a,b,c,d,e,f,i,j,k,l
4.0	To understand the role of Angular and Express in web applications	4.1	The students will be able to : Use the features of Angular and Express		a,b,c,d,e,f,i,j,k,l
5.0	To develop simple web applications with React	5.1	The students will be able to Develop React applications		a,b,c,d,e,f,i,j,k,l
UNIT I BASICS OF FULL STACK					(9)
Understanding the Basic Web Development Framework - User - Browser – Webserver - Backend Services – MVC Architecture - Understanding the different stacks –The role of Express – Angular – Node – Mongo DB – React					
UNIT II NODE JS					(9)
Basics of Node JS – Installation – Working with Node packages – Using Node package manager – Creating a simple Node.js application – Using Events – Listeners –Timers - Callbacks – Handling Data I/O – Implementing HTTP services in Node.js					
UNIT III MONGO DB					(9)
Understanding NoSQL and MongoDB – Building MongoDB Environment – User accounts – Access control – Administering databases – Managing collections – Connecting to MongoDB from Node.js – simple applications					
UNIT IV EXPRESS AND ANGULAR					(9)
Implementing Express in Node.js - Configuring routes - Using Request and Response objects - Angular - Typescript - Angular Components - Expressions - Data binding - Built-in directives					
UNIT V REACT					(9)
MERN STACK – Basic React applications – React Components – React State – Express REST APIs - Modularization and Webpack - Routing with React Router – Server-side rendering					
TOTAL (L: 45) = 45 PERIODS					

TEXT BOOKS:

1. Brad Dayley, Brendan Dayley, Caleb Dayley, 'Node.js, MongoDB and Angular Web Development', Addison-Wesley, Second Edition, 2018
2. Vasan Subramanian, 'Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node', Second Edition, Apress, 2019.

REFERENCES:

1. Chris Northwood, 'The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer', Apress; 1st edition, 2018
2. Kirupa Chinnathambi, 'Learning React: A Hands-On Guide to Building Web Applications Using React and Redux', Addison-Wesley Professional, 2nd edition, 2018
3. https://www.tutorialspoint.com/the_full_stack_web_development/index.asp
4. <https://www.coursera.org/specializations/full-stack-react>
5. <https://www.udemy.com/course/the-full-stack-web-development/>



17ITM07 – APP DEVELOPMENT

L	T	P	C
3	0	0	3

PRE REQUISITE : NIL

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To learn development of native applications with basic GUI Components	1.1	The students will be able to Develop Native applications with GUI Components.	a,b,c,d,e,i,j,k,l
2.0	To develop cross-platform applications with event handling	2.1	The students will be able to Develop hybrid applications with basic event handling.	a,b,c,d,e,i,j,k,l
3.0	To develop applications with location and data storage capabilities	3.1	The students will be able to Implement cross-platform applications with location and data storage capabilities	a,b,c,d,e,i,j,k,l
4.0	To Develop applications with GUI and Event handling	4.1	The students will be able to Implement cross platform applications with basic GUI and event handling.	a,b,c,d,e,i,j,k,l
5.0	To develop web applications with database access	5.1	The students will be able to Develop web applications with cloud database access.	a,b,c,d,e,i,j,k,l

UNIT I FUNDAMENTALS OF MOBILE & WEB APPLICATION DEVELOPMENT (9)

Basics of Web and Mobile application development, Native App, Hybrid App, Cross-platform App, What is Progressive Web App, Responsive Web design

UNIT II NATIVE APP DEVELOPMENT USING JAVA (9)

Native Web App, Benefits of Native App, Scenarios to create Native App, Tools for creating Native App, Cons of Native App, Popular Native App Development Frameworks, Java & Kotlin for Android, Swift & Objective-C for iOS, Basics of React Native, Native Components, JSX, State, Props

UNIT III HYBRID APP DEVELOPMENT (9)

Hybrid Web App, Benefits of Hybrid App, Criteria for creating Native App, Tools for creating Hybrid App, Cons of Hybrid App, Popular Hybrid App Development Frameworks, Ionic, Apache Cordova

UNIT IV CROSS-PLATFORM APP DEVELOPMENT USING REACT-NATIVE (9)

What is Cross-platform App, Benefits of Cross-platform App, Criteria for creating Cross-platform App, Tools for creating Cross-platform App, Cons of Cross-platform App, Popular Crossplatform App Development Frameworks, Flutter, Xamarin, React-Native, Basics of React Native, Native Components, JSX, State, Props

UNIT V NON-FUNCTIONAL CHARACTERISTICS OF APP FRAMEWORKS (9)

Comparison of different App frameworks, Build Performance, App Performance, Debugging capabilities, Time to Market, Maintainability, Ease of Development, UI/UX, Reusability

TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:

1. Head First Android Development, Dawn Griffiths, O'Reilly, 1st edition
2. Apache Cordova in Action, Raymond K. Camden, Manning. 2015
3. Full Stack React Native: Create beautiful mobile apps with JavaScript and React Native, Anthony Accomazzo, Houssein Djirdeh, Sophia Shoemaker, Devin Abbott, FullStack publishing

REFERENCES:

1. Android Programming for Beginners, John Horton, Packt Publishing, 2nd Edition
2. Native Mobile Development by Shaun Lewis, Mike Dunn
3. Building Cross-Platform Mobile and Web Apps for Engineers and Scientists: An Active Learning Approach, Pawan Lingras, Matt Triff, Rucha Lingras
4. Apache Cordova 4 Programming, John M Wargo, 2015
5. React Native Cookbook, Daniel Ward, Packt Publishing, 2nd Edition



17ITM08 – WEB APPLICATION SECURITY					
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		3	0	0	3
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes			Related Program outcomes
1.0	To understand the fundamentals of web application security	1.1	The students will be able to Understand the basic concepts of web application security and the need for it.		a,b,c,d,e,i,j,k,l
2.0	To focus on wide aspects of secure development and deployment of web applications	2.1	The students will be able to be acquainted with the process for secure development and deployment of web applications		a,b,c,d,e,i,j,k,l
3.0	To learn how to build secure APIs	3.1	The students will be able to Acquire the skill to design and develop Secure Web Applications that use Secure APIs		a,b,c,d,e,i,j,k,l
4.0	To learn the basics of vulnerability assessment and penetration testing	4.1	The students will be able to get the importance of carrying out vulnerability assessment and penetration testing		a,b,c,d,e,i,j,k,l
5.0	To get an insight about Hacking techniques and Tools	5.1	The students will be able to Acquire the skill to think like a hacker and to use hackers tool sets		a,b,c,d,e,i,j,k,l
UNIT I FUNDAMENTALS OF WEB APPLICATION SECURITY					(9)
The history of Software Security-Recognizing Web Application Security Threats, Web Application Security, Authentication and Authorization, Secure Socket layer, Transport layer Security, Session Management-Input Validation					
UNIT II SECURE DEVELOPMENT AND DEPLOYMENT					(9)
Web Applications Security - Security Testing, Security Incident Response Planning, The Microsoft Security Development Lifecycle (SDL), OWASP Comprehensive Lightweight Application Security Process (CLASP), The Software Assurance Maturity Model (SAMM)					
UNIT III SECURE API DEVELOPMENT					(9)
API Security- Session Cookies, Token Based Authentication, Securing Natter APIs: Addressing threats with Security Controls, Rate Limiting for Availability, Encryption, Audit logging, Securing service-to-service APIs: API Keys , OAuth2, Securing Microservice APIs: Service Mesh, Locking Down Network Connections, Securing Incoming Requests					
UNIT IV VULNERABILITY ASSESSMENT AND PENETRATION TESTING					(9)
Vulnerability Assessment Lifecycle, Vulnerability Assessment Tools: Cloud-based vulnerability scanners, Host-based vulnerability scanners, Network-based vulnerability scanners, Database based vulnerability scanners, Types of Penetration Tests: External Testing, Web Application Testing, Internal Penetration Testing, SSID or Wireless Testing, Mobile Application Testing.					
UNIT V HACKING TECHNIQUES AND TOOLS					(9)
Social Engineering, Injection, Cross-Site Scripting(XSS), Broken Authentication and Session Management, Cross-Site Request Forgery, Security Misconfiguration, Insecure Cryptographic Storage, Failure to Restrict URL Access, Tools: Comodo, OpenVAS, Nexpose, Nikto, Burp Suite, etc.					
TOTAL (L: 45) = 45 PERIODS					

TEXT BOOKS:

1. Andrew Hoffman, Web Application Security: Exploitation and Countermeasures for Modern Web Applications, First Edition, 2020, O'Reilly Media, Inc.
2. Bryan Sullivan, Vincent Liu, Web Application Security: A Beginners Guide, 2012, The McGraw-Hill Companies.
3. Neil Madden, API Security in Action, 2020, Manning Publications Co., NY, USA.

REFERENCES:

1. Michael Cross, Developer's Guide to Web Application Security, 2007, Syngress Publishing, Inc.
2. Ravi Das and Greg Johnson, Testing and Securing Web Applications, 2021, Taylor & Francis Group, LLC.
3. Prabath Siriwardena, Advanced API Security, 2020, Apress Media LLC, USA.
4. Malcom McDonald, Web Security for Developers, 2020, No Starch Press, Inc.
5. Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, Gideon Lenkey, and Terron Williams Grey Hat Hacking: The Ethical Hacker's Handbook, Third Edition, 2011, The McGraw-Hill Companies.

