GOVERNMENT ARTS COLLEGE (A), KUMBAKONAM

DEPARTMENT OF COMPUTER APPLICATIONS

MCA SYLLABUS

Effect From 2023 - 2024 Onwards

ANNEXURE - III

GOVERNMENT ARTS COLLEGE(AUTONOMOUS),KUMBAKONAM

Course Structure Under CBCS for Science (2023 - 2024 Onwards)

P.G. PROGRAMME(MCA)

SEM	SUBJECT CODE	COURSE TITLE	Credits	INST. Hours /Week	Marks		Total
					Int.	Ext.	
I	23P1CA1	CC - DISCRETE MATHEMATICS	5	6	25	75	100
	23P1CA2	CC - DATA STRUCTURES AND ALGORITHMS	5	6	25	75	100
	23P1CA3	CC - LINUX AND SHELL PROGRAMMING	5	6	25	75	100
	23P1CAP1	CP - LAB - I: DATA STRUCTURES AND ALGORITHMS	2	3	40	60	100
	23P1CAP2	CP - LAB - II: LINUX AND SHELL PROGRAMMING	2	3	40	60	100
	23P1CA4EC	EC - MOBILE COMPUTING	3	3	25	75	100
	23P1CA5EC	EC - INTERNET OF THINGS	3	3	25	75	100
Total			**25**	**30**			**700**
II	23P2CA6	CC - BIG DATA ANALYTICS	5	6	25	75	100
	23P2CA7	CC - WEB TECHNOLOGY	5	6	25	75	100
	23P2CA8	CC - ADVANCED OPERATING SYSTEM	5	6	25	75	100
	23P2CAP3	CP - LAB - III: BIG DATA ANALYTICS	2	3	40	60	100
	23P2CAP4	CP - LAB - IV: WEB TECHNOLOGY	2	3	40	60	100
	23P2CA9EC	EC - DIGITAL ELECTRONICS & MICROPROCESSOR	3	3	25	75	100
	23P2CA10EC	EC - SOFT COMPUTING	3	3	25	75	100
Total			**25**	**30**			**700**
III	23P3CA11	CC - ADVANCED JAVA PROGRAMMING	5	6	25	75	100
	23P3CA12	CC - DOT NET TECHNOLOGIES	5	6	25	75	100
	23P3CA13	CC - RELATIONAL DATABASE MANAGEMENT SYSTEM	4	6	25	75	100
	23P3CAP5	CC - LAB - V: ADVANCED JAVA PROGRAMMING	2	3	40	60	100
	23P3CAP6	CC - LAB - VI: DOT NET TECHNOLOGIES	2	3	40	60	100
	23P3CA14EC	EC - PRINCIPLES OF COMPILER DESIGN	4	3	25	75	100
	23P3CA15EC	EC - CLOUD COMPUTING	3	3	25	75	100
	23P3CAIS	IS - INTERNSHIP/INDUSTRIAL ACTIVITY	2				
Total			**27**	**30**			**700**
IV	23P4CA16	CC - PYTHON PROGRAMMING	5	5	25	75	100
	23P4CAP7	CC - LAB -VII: PYTHON PROGRAMMING	2	10	40	60	100
	23P4CA17SEC	SEC - PROFESSIONAL COMPETENCY SKILL	4	5	25	75	100
	23P4CA18PW	PW - PROJECT WORK	4	10	25	75	100
	23P4CAEA	EA - EXTENSION ACTIVITY	1				
Total			**15**	**30**			**400**
Net Total Credits			**93**	**120**			**2500**

M.C.A. - COURSE STRUCTURE - SUMMARY

COURSE	NO. OF PAPERS	CREDITS
CORE COURSE	10	49
CORE COURSE - PRACTICAL	7	14
ELECTIVE	6	18
SKILL ENHANCEMENT COURSE	1	3
INTERSHIP/INDUSTRIAL VISIT/FIELD VISIT	1	2
PROJECT VIVA-VOCE	1	4
EXTENSION ACTIVITY	1	1
NET TOTAL	**27**	**91**

MCA – FIRST YEAR

23P1CA1 **SEMESTER – I**

CC – I Discrete Mathematics

Course Objective

- To know the concepts of relations and functions
- To distinguish among different normal forms and quantifiers
- To solve recurrence relations and permutations & combinations
- To know and solve matrices , rank of matrix & characteristic equations
- To study the graphs and its types

Unit-I

Relations - Binary relations-Operations on relations - properties of binary relations in a set – Equivalence relations - Representation of a relation by a matrix - Representation of a relation by a digraph - Functions - Definition and examples - Classification of functions -Composition of functions - Inverse function

Unit-II

Mathematical Logic - Logical connectives - Well formed formulas – Truth table of well formed formula – Algebra of proposition – Quine's method - Normal forms of well formed formulas - Disjunctive normal form - Principal Disjunctive normal form - Conjunctive normal form - Principal conjunctive normal form - Rules of Inference for propositional calculus – Quantifiers - Universal Quantifiers - Existential Quantifiers

Unit-III

Recurrence Relations - Formulation - solving recurrence Relation by Iteration - solving Recurrence Relations - Solving Linear Homogeneous Recurrence Relations of Order Two - Solving Linear Non homogeneous Recurrence Relations. Permutations - Cyclic permutation- Permutations with repetitions - permutations of sets with indistinguishable objects – Combinations - Combinations with repetition

Unit-IV

Matrices - special types of matrices – Determinants - Inverse of a square matrix - Cramer's rule for solving linear equations - Elementary operations - Rank of a matrix - solving a system of linear equations - characteristic roots and characteristic vectors – Cayley - Hamilton Theorem - problems

Unit-V

Graphs - Connected Graphs - Euler Graphs - Euler line-Hamiltonian circuits and paths –planar graphs – Complete graph - Bipartite graph - Hyper cube graph - Matrix representation of graphs

Text book

N. Chandrasekaran and M. Umaparvathi, Discrete mathematics, PHI Learning Private Limited, New Delhi, 2010.

Reference Book

1. Kimmo Eriksson & Hillevi Gavel, Discrete Mathematics & Discrete Models, Student litterature AB, 2015.
2. Kenneth H. Rosen Discrete Mathematics and applications, Mc Graw Hill, 2012

Course Outcomes

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

CO1:	To understand the concepts of relations and functions distinguish among normal forms	K2	IO
CO2:	To analyze and evaluate the recurrence relations	K4,K5	HO
CO3:	To distinguish among various normal forms and predicate calculus	K5	HO
CO4:	To solve and know various types of matrices	K1	LO
CO5:	To evaluate and solve various types of graphs	K6	HO

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	L	L	L	L	S	S	S	L	M	M
CO2	S	M	S	M	M	L	L	L	L	L	M	M
CO3	S	S	S	L	L	L	M	M	M	M	M	L
CO4	S	S	S	L	L	L	M	M	M	L	L	L
CO5	S	S	S	L	M	M	S	S	S	S	M	L

L - Low, M- Medium, S - Strong

23P1CA2 **CC – II Data Structures and Algorithms**

Course Objectives:

- To get a clear understanding of various ADT structures.
- To understand how to implement different ADT structures with real-time scenarios.
- To analyze the various data structures with their different implementations.
- To get an idea of applying right models based on the problem domain.
- To realize, and understand how and where to implement modern data structures with Python language.

Unit-I

Abstract Data Types: Introduction – Date Abstract Data Type – Bags – Iterators. Arrays: Array Structure – Python List – Two Dimensional Arrays – Matrix Abstract Data Type. Sets, Maps: Sets – Maps – Multi – Dimensional Arrays.

Unit-II

Algorithm Analysis: Experimental Studies – Seven Functions – Asymptotic Analysis. Recursion: Illustrative Examples – Analyzing Recursive Algorithms – Linear Recursion – Binary Recursion – Multiple Recursion.

Unit-III

Stacks, Queues, and Deques: Stacks – Queues – Double – Ended Queues Linked. Lists: Singly Linked Lists – Circularly Linked Lists – Doubly Linked Lists. Trees: General Trees –Binary Trees – Implementing Trees – Tree Traversal Algorithms.

Unit-IV

Priority Queues: Priority Queue Abstract Data Type – Implementing a Priority Queue – Heaps – Sorting with a Priority Queue. Maps, Hash Tables, and Skip Lists: Maps and Dictionaries – Hash Tables – Sorted Maps – Skip Lists – Sets, Multisets, and Multimaps.

Unit-V

Search Trees: Binary Search Trees – Balanced Search Trees – AVL Trees – Splay Trees. Sorting and Selection: Merge sort – Quick sort – Sorting through an Algorithmic Lens – Comparing Sorting Algorithms – Selection. Graph Algorithms: Graphs – Data Structures for Graphs – Graph Traversals – Shortest Paths – Minimum Spanning Trees.

Text book:

1. Rance D. Necaise, “Data Structures and Algorithms Using Python”, John Wiley & Sons, 2011. (Unit – 1)Chapters: 1, 2, 3.
2. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, “Data Structures and Algorithms in Python”, John Wiley & Sons, 2013. (Unit – 2, 3, 4, and 5)Chapters: 3 to 12, and 14.

Reference books:

1. Dr. Basant Agarwal; Benjamin Baka, "Hands-On Data Structures and Algorithms with Python: Write complex and powerful code using the latest features of Python 3.7", Packt Publishing, 2018.
2. Magnus Lie Hetland, "Python Algorithms: Mastering Basic Algorithms in the Python Language", Apress, 2014.

Course Outcome:

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

CO1	To Understand various ADT concepts	K1-K6
CO2	To Familiar with implementation of ADT models with Python language and understand how to develop ADT for the various real-time problems	
CO3	To Apply with proper ADT models with problem understanding	
CO4	To Apply and Analyze right models based on the problem domain	
CO5	To Evaluate modern data structures with Python language	

K1- Remember, K2 – Understand, K3 - Apply , K4 – Analyze, K5 – Evaluate, K6 –Create

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	L	L	L	L	S	S	S	L	M	M
CO2	S	M	S	M	M	L	L	L	L	L	M	M
CO3	S	S	S	L	L	L	M	M	M	M	M	L
CO4	S	S	S	L	L	L	M	M	M	L	L	L
CO5	S	S	S	L	M	M	S	S	S	S	M	L

L – Low, M- Medium, S – Strong

23P1CA3 **CC – III Linux and Shell Programming**

Course Objective

- To teach principles of operating system including File handling utilities, Basic Linux commands, Scripts and filters.
- To familiarize fundamentals of shell (bash), shell programming, pipes, Control structures, arithmetic in shell interrupt processing, functions, debugging shell scripts.
- To impart fundamentals of file concepts kernel support for file, File structure related system calls (file API's).
- To facilitate students in understanding Inter process communication, semaphore and shared memory.
- To explore real-time problem solution skills in Shell programming.

Unit-I

Basic bash Shell Commands: Interacting with the shell - Traversing the file system - Listing files and directories - Managing files and directories - Viewing file contents. Basic Script Building: Using multiple commands - Creating a script file - Displaying messages - Using variables - Redirecting input and output – Pipes - Performing math - Exiting the script. Using Structured Commands: Working with the if-then statement - Nesting ifs - Understanding the test command - Testing compound conditions - Using double brackets and parentheses -Looking at case.

Unit-II

More Structured Commands: Looping with for statement - Iterating with the until statement - Using the while statement - Combining loops - Redirecting loop output. Handling User Input: Passing parameters - Tracking parameters - Being shifty - Working with options -Standardizing options - Getting user input. Script Control: Handling signals - Running scripts in the background - Forbidding hang - ups - Controlling a Job - Modifying script priority -Automating script execution.

Unit-III

Creating Functions: Basic script functions - Returning a value - Using variables in functions - Array and variable functions - Function recursion - Creating a library - Using functions on the command line. Writing Scripts for Graphical Desktops: Creating text menus - Building text window widgets - Adding X Window graphics. Introducing sed and gawk: Learning about the sed Editor - Getting introduced to the gawk Editor - Exploring sed Editor basics.

Unit-IV

Regular Expressions: Defining regular expressions - Looking at the basics - Extending our patterns - Creating expressions. Advanced sed: Using multiline commands - Understanding the hold space - Negating a command - Changing the flow - Replacing via a pattern - Using sed in scripts - Creating sed utilities. Advanced gawk: Reexamining gawk - Using variables in gawk - Using structured commands - Formatting the printing - Working with functions.

Unit-V

Working with Alternative Shells: Understanding the dash shell - Programming in the dash shell- Introducing the zsh shell - Writing scripts for zsh. Writing Simple Script Utilities: Automating backups - Managing user accounts - Watching disk space. Producing Scripts for Database, Web, and E-Mail: Writing database shell scripts - Using the Internet from your scripts - Emailing reports from scripts. Using Python as a Bash Scripting Alternative: Technical requirements - Python Language - Hello World the Python way - Pythonic arguments - Supplying arguments - Counting arguments-Significant whitespace - Reading user input - Using Python to write to files - String manipulation.

Text book:

1. Richard Blum, Christine Bresnahan, "Linux Command Line and Shell Scripting BIBLE", Wiley Publishing, 3rd Edition, 2015.Chapters: 3, 11 to 14, 16 to 25.
2. Mokhtar Ebrahim, Andrew Mallett, "Mastering Linux Shell Scripting", Packt Publishing, 2nd Edition, 2018. Chapter: 14.

Reference Books:

1. ClifFlynt,SarathLakshman,ShantanuTushar, "Linux Shell Scripting Cookbook ", Packt Publishing, 3rd Edition, 2017.
2. Stephen G.Kochan, Patrick Wood, "Shell Programming in Unix, Linux, and OS X", Addison Wesley Professional, 4th Edition, 2016.
3. Robert Love, "Linux System Programming", O'Reilly Media, Inc, 2013
4. W.R. Stevens, "Advanced Programming in the UNIX environment", 2nd Edition, Pearson Education, 2013
5. Graham Glass, King Ables, " UNIX for Programmers and Users", 3rd Edition, Pearson Education, 2003

Course Outcomes

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

CO1:	To understand, apply and analyze the concepts and methodology of Linux shell programming	K1-K6
CO2:	To comprehend, impart and apply fundamentals of control structure and script controls	K1-K6
CO3:	To understand, analyses and evaluate the functions, graphical desktop interface and editors	K1-K6
CO4:	To collaborate, apply and review the concepts and methodology of regular expression and advanced gawk	K1-K6
CO5:	To comprehend, use and illustrate the advance concepts such as alternate shell script, data connectivity and bash scripting using python	K1-K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12
CO1	S	S	S	-	S	L	-	M	M	M	M	S
CO2	S	S	M	-	S	L	-	M	M	M	M	S
CO3	S	S	M	-	S	L	-	M	M	S	S	S
CO4	S	S	M	-	S	L	-	M	M	M	M	S
CO5	S	S	M	-	S	L	-	M	M	M	M	S

S- Strong; M-Medium; L-Low

23P1CAP1 **CP – I LAB – I: Data Structures and Algorithms**

Course Objectives:

- To understand Stack , Queue and Doubly Linked ADT structures.
- To implement different ADT structures with real-time scenarios.
- To analyze the recursion concepts.
- To apply different sorting and tree techniques.
- To implement modern data structures with Python language.

Implement the following problems using Python 3.4 and above

1. Recursion concepts.
    i) Linear recursion
    ii) Binary recursion.

2. Stack ADT.
3. Queue ADT.
4. Doubly Linked List ADT.
5. Heaps using Priority Queues.
6. Merge sort.
7. Quick sort.
8. Binary Search Tree.
9. Minimum Spanning Tree.
10. Depth First Search Tree traversal.

Course Outcome:

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

CO1	To Strong understanding in various ADT concepts	K1-K6
CO2	To become a familiar with implementation of ADT models	
CO3	To Apply sort and tree search algorithms	
CO4	To Evaluate the different data structure models	
CO5	To Learn how to develop ADT for the various real-time problems	

K1- Remember, K2 - Understand, K3 - Apply , K4 - Analyze, K5 - Evaluate, K6 -Create

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	L	L	L	L	S	S	M	M	S	S
CO2	S	M	S	M	M	L	S	M	S	L	M	M
CO3	S	S	S	L	L	L	M	M	M	M	S	L
CO4	S	S	S	M	M	S	M	M	S	S	S	L
CO5	S	S	S	S	L	M	S	M	M	M	M	L

L - Low, M- Medium, S - Strong

23P1CAP2 **CP - II LAB – II: Linux and Shell Programming**

Course Objectives

- To enable the students to study and understand the efficiency of Linux shell script.
- To demonstrate the File Backup process.
- To develop and implement the shell script for GUI processing.
- To develop and implement the shell script for IPC and Networking.
- To demonstrate PostgreSQL.

List of Programs

1. Write a Shell Script program to calculate the number of days between two dates.
2. Write a Shell Script program to check systems on local network using control structures with user input.
3. Write a Shell Script program to check systems on local network using control structures with file input.
4. Write a Shell Script program to demonstrate the script control commands.
5. Write a Shell Script program to demonstrate the Shell script function.
6. Write a Shell Script program to demonstrate the Regular Expressions.
7. Write a Shell Script program to demonstrate the sed and awk Commands.
8. Write a Shell Script program to demonstrate the File Backup process through creating a daily archive location.
9. Write a Shell Script program to create a following GUI tools.

    a) Creating text menus
    b) Building text window widgets
10. Write a Shell Script program to demonstrate to connect a PostgreSQL database and performing CRUD operations.

Course Outcomes

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

CO1:	To understand, apply and analyze the concepts and methodology of Linux shell programming	K1-K6
CO2:	To comprehend, impart and apply fundamentals of control structure and script controls	K1-K6
CO3:	To understand, analyses and evaluate the functions, graphical desktop interface and editors	K1-K6
CO4:	To collaborate, apply and review the concepts and methodology of regular expression and advanced gawk	K1-K6
CO5:	To comprehend, use and analyze the advance concepts such as alternate shell script, dy and bash scripting using PostgreSQL	K1-K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO 2	PO 3	PO 4	PO5	PO6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO 1	S	S	S	-	S	-	-	-	M	-	-	-
CO 2	S	S	S	-	S	-	-	-	M	-	-	-
CO 3	S	S	S	-	S	-	-	-	M	S	S	S
CO 4	S	S	S	-	S	-	-	-	M	-	-	-
CO 5	S	S	S	-	S	-	-	-	M	S	S	S

S- Strong; M-Medium; L-Low

23P1CA4EC **EC – I Mobile Computing**

Course Objective:

- To introduce the concepts of wireless devices with signal, Antenna, Radio Frequencies, Signal Propagation.
- To introduce wireless communication and networking principles, that support connectivity to cellular networks, Wireless LAN, GSM, CDMA.
- To introduce the WAP Architecture, MANET and Routing

Unit-I

Introduction – Applications – History of wireless communication – A Simplified reference model - Wireless transmission – Frequencies for radio transmission – Regulations – Signals – Antennas - Signal propagation: Path loss of radio signals - Additional signal propagation effects - Multi-path propagation – Multiplexing –Modulation Chapters: 1, 2.1 to 2.6

Unit-II

Spread spectrum – Direct sequence spread spectrum – Frequency hopping spread spectrum – Cellular systems. Medium access control: Hidden and exposed terminals – Near and far terminals – SDMA, FDMA, TDMA, Fixed TDM, Classical Aloha, slotted Aloha, Carrier sense multiple access – Reservation TDMA – Multiple access with collision avoidance – Polling – CDMA – Spread Aloha multiple access. Chapters: 3.1 to 3.3, 3.4.1 to 3.4.4, 3.4.7 to 3.4.9, 3.5.1

Unit-III

GSM - Mobile services – System architecture – Radio interface – Protocols – Localization and calling – Handover – Security – New Data services. UMTS and IMT-2000 - Satellite Systems: Applications – Basics – Routing – Localization – Handover.Chapters: 3.6, 4.1.1 to 4.1.8, 4.4, 5.2 to 5.6

Unit-IV

Wireless LAN: Infra red vs. radio transmission – Infrastructure and ad-hoc network – IEEE 802.11 – System architecture – Protocol architecture – Physics layer – Medium access control layer – MAC management – Blue tooth. Mobile network layer: Mobile IP: Goals, assumptions and requirements – entities and terminology – packet delivery – Agent discovery – Registration – Tunneling and encapsulation Recent technologies Chapters: 7.1 to 7.3.5, 7.5, 8.1.1 to 8.1.6

Unit-V

WAP: Architecture – wireless datagram Protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Mobile ad-hoc networks – MANET Characteristics – Classification of MANETs, Routing of MANETs, Proactive Routing Protocol - DSDV, Reactive Routing Protocols – DSR, AODV.Chapter10.3.1 to 10.3.6 (Text Book 2- 6.1, 6.2, 6.4, 6.5, 6.6)

Text Book:

1. Jochen Schiller, "Mobile Communications", Second Edition, PearsonEducation, 2013.
2. KumKumGarg, "Mobile Computing Theory and Practice", Pearson Education, 2014.

Reference Books:

1. Rifaat A. Dayen, "Mobile Data & Wireless LAN Technologies", Prentice Hall,1997.
2. Steve Mann and Scoot Schibli, "The Wireless Application Protocol", John Wiley & Inc., 2000.

Course Outcomes:

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

CO1	Understanding the basic concepts of Mobile and Wireless Communication	K1, K2	LO
CO2	Understanding the basic concepts of Spread Spectrum. Analyzing the concepts of Medium Access Control.	K3	IO
CO3	Analyzing the concepts of Global System for Mobile Communication and Satellite Communications. Understanding the basic concepts of Wireless LAN	K4	HO
CO4	Understanding the basic concepts of Wireless LAN. Evaluate the performance of Mobile Network Layer	K2, K5	HO
CO5	Understanding the basic concepts of Wireless Application Protocol and create a MoileApp with real time application. Analyzing the concepts of Routing Protocols in MANET	K2, K4, K6	HO

K1- Remember, K2- Understand, K3- Apply , K4- Analyze, K5- Evaluate, K6- Create

Mapping Course outcomes with Programme outcomes

s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	-	-	-	-	-	-	-	-	-	-	-
CO2	S	M	M	M	M	-	M	-	-	-	-	-
CO3	S	M	M	M	M	-	M	-	-	L	-	M
CO4	S	M	M	M	M	-	M	-	-	L	-	M
CO5	S	M	M	M	M	-	M	-	-	L	-	M

S- Strong; M-Medium; L-Low

23P1CA5EC **EC – II Internet of Things**

Course Objectives:

- To get familiar with the evolution of IOT with its design principles
- To outline the functionalities and protocols of internet communication
- To analyze the hardware and software components needed to construct IOT applications
- To identify the appropriate protocol for API construction and writing embedded code
- To realize various business models and ethics in Internet of Things

UNIT I

What is IOT? – IOT Architectures: oneM2M, IOT World Forum (IOTWF) and Additional IOT models – Simplified IOT Architecture - Fog, Edge and The Hierarchy of Edge, Fog, and Cloud.

UNIT II

Connecting Smart Objects : IOT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – IP as the IoT Network Layer: Constrained Nodes and Constrained Networks, IP versions – Optimizing IP for IOT: From 6LoWPAN to 6Lo. IOT Application Transport Methods: Supervisory Control and Data Acquisition (SCADA)

UNIT – III

Prototyping Embedded Devices: Electronics - Embedded Computing Basics – Arduino - Raspberry Pi - Beagle Bone Black - Electric Imp. Prototyping the Physical Design: Non digital Methods - Laser Cutting - 3D printing - CNC Milling - Repurposing/Recycling.(cha 5,6)

UNIT – IV

Prototyping Online Components: Getting started with an API - Writing a New API - Real-Time Reactions - Other Protocols. Techniques for Writing Embedded Code: Memory Management - Performance and Battery Life – Libraries - Debugging. (cha 7)

UNIT – V

Business Models: History of Business Models – Model –Funding An Internet of Starting up – Lean Startups. Moving to Manufacture: Designing Kits - Designing Printed circuit boards – Certification – Costs - Scaling Up Software. Ethics: Privacy – Control – Environment – Solutions.(cha 9,10, 11)

Text Books:

David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, ―IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017 (UNIT I and II)

1. Adrian McEwen and Hakim Cassimally, “Designing the Internet of Things”, Wiley, 2014. (UNIT III, IV and V)

Reference Books:

1. Ovidiu Vermesan and Peter Friess, "Internet of Things – From Research and Innovation to Market Deployement" , River Publishers, 2014.
2. Peter Waher, "Learning Internet of Things" ,Packt Publishing, 2015.
3. Donald Norris, "The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBoneBlack",McGraw Hill, 2015.

Course Outcomes

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

CO1:	To Comprehend the IoT evolution with its architecture and sensors	K1- K6
CO2:	To Understand the networking concepts for communication and underlying IoT protocols	
CO3:	To Assess the embedded technologies and develop prototypes for the IoT products	
CO4:	To Evaluate the use of Application Programming Interface and design an API for IoT in realtime	
CO5:	To Recognize the ethics of business models and perform security analysis	

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	M	S	S	M	S
CO3	S	M	S	S	S	S	M	S	S	M	S	S
CO4	S	S	S	S	S	S	S	S	S	S	M	S
CO5	S	S	S	S	M	S	S	S	S	M	M	S

S- Strong; M-Medium; L-Low

MCA – FIRST YEAR

23P2CA6 **SEMESTER - II**

CC - IV Big Data Analytics

Course Objectives

- To introduce big data tools & Information Standard formats.
- To understand the basic concepts of big data.
- To learn Hadoop, HDFS and MapReduceconcepts.
- To teach the importance of NoSQL.
- To explore the big data tools such as Hive, HBase and Pig.

UNIT I

Big Data and Analytics: Classification of Digital Data: Structured Data- Semi Structured Data and Unstructured Data. Introduction to Big Data: Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data - Big Data - Traditional Business Intelligence versus Big Data - Data Warehouse and Hadoop. Environment Big Data Analytics: Classification of Analytics – Challenges - Big Data Analytics important - Data Science - Data Scientist - Terminologies used in Big Data Environments – Basically Available Soft State Eventual Consistency - Top Analytics Tools

UNIT II

Technology Landscape:NoSQL, Comparison of SQL and NoSQL, Hadoop -RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem

UNIT III

Mongodb and Mapreduce Programming:MongoDB: Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - MongoDB Query Language.MapReduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression

UNIT IV

Hive: Introduction – Architecture - Data Types - File Formats - Hive Query Language Statements – Partitions – Bucketing – Views - Sub- Query – Joins – Aggregations - Group by and Having – RCFile - Implementation - Hive User Defined Function - Serialization and Deserialization.

UNIT V

Pig: Introduction - Anatomy – Features – Philosophy - Use Case for Pig - Pig Latin Overview - Pig Primitive Data Types - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Types - Piggy Bank - User-Defined Functions - Parameter Substitution – Diagnostic Operator - Word Count Example using Pig - Pig at Yahoo! - Pig Versus Hive

Text Book:

1. Seema Acharya, Subhashini Chellappan, “Big Data and Analytics”, Wiley Publications, First Edition,2015

Reference Book:

1. Judith Huruwitz, Alan Nugent, Fern Halper, Marcia Kaufman, “Big data for dummies”, John Wiley & Sons, Inc. (2013)
2. Tom White, “Hadoop The Definitive Guide”, O’Reilly Publications, Fourth Edition, 2015
3. Dirk Deroos, Paul C.Zikopoulos, Roman B.Melnky, Bruce Brown, Rafael Coss, “Hadoop For Dummies”, Wiley Publications, 2014
4. Robert D.Schneider, “Hadoop For Dummies”, John Wiley & Sons, Inc. (2012)
5. Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill, 2012 Chuck Lam, “Hadoop In Action”, Dreamtech Publications, 2010

Course Outcomes

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

CO1:	To understand, illustrate and evaluate the concepts and techniques of Data Science, Big Data Analytics and its tools	K1-K6
CO2:	To collaborate,apply and review the computing for big data in Hadoop, and NoSQL environment.	K1-K6
CO3:	To comprehend, implement and review the concepts of data science and big data analytics projects using MapReduce, and MongoDB	K1-K6
CO4:	To understand, use and analyze the concepts of big data analytics projects using HIVE database.	K1-K6
CO5:	To illustrate, develop and review the concepts of PIG database in Hadoop environment.	K1-K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5 Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	-	-	-	-	L	-	-	-	-	-	-
CO2	S	-	M	-	M	L	-	-	-	-	-	-
CO3	S	-	S	-	S	L	-	-	-	S	S	S
CO4	S	-	S	-	S	L	-	-	-	S	S	S
CO5	S	-	S	-	S	L	-	-	-	S	S	S

S- Strong; M-Medium; L-Low

23P2CA7 **CC -- V Web Technology**

Course Objectives:

- To Understand the fundamentals of the web and thereby develop web applications using various development languages and tools.
- To Enrich knowledge about XHTML control and Cascading Style Sheets.
- To Provide in- depth knowledge about Javascript.
- To enhance knowledge in XML documents with presentations using CSS and XSLT.
- To Deliver depth knowledge about PHP, Angular JS, Jquery.

UNIT -I

WEB FUNDAMENTALS AND HTML: A Brief Introduction to the Internet - The World Wide Web - Web Browsers - Web Servers -URLs, MIME, HTTP, Security- Introduction to HTML- Origins and Evolution of HTML and HTML - Basic Syntax - Standard HTML Document Structure - Basic Text Markup - Images- Hypertext Links - Lists, Tables, Forms, The Audio Element, The Video Element - Organization Elements, The Time Element

UNIT – II

INTRODUCTION TO XHTML AND CSS: Basic syntax, Standard structure, Basic text-markup, Images, Hypertext Links. Lists, Tables, Forms, Frames, syntactic differences between HTML and XHTML-Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and tags, Conflict resolution.

UNIT - III

THE BASICS OF JAVASCRIPT: Overview of JavaScript, Object orientation and JavaScript, general Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts.JAVASCRIPT AND XHTML DOCUMENTS: The JavaScript Execution Environment, The Document Object Model, Elements Access in Java Script, Events and Event Handling, Handling Events from Body Elements, Handling Events from Text Box and password Elements, The DOM2 Model

UNIT- IV

DYNAMIC DOCUMENTS WITH JAVASCRIPT AND XML: Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Color and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements. Introduction to XML, Syntax of XML, XML Document Structure, Document type definitions, Namespaces, XML schemas, displaying raw XML documents, Displaying XML documents with CSS, XSLT Style Sheets, Web services.

UNIT - V

PHP, ANGULAR JS AND JQUERY: Introduction to PHP: Overview of PHP -General Syntactic Characteristics - Primitives, Operations, and Expressions - Output - Control Statements - Arrays - Functions - Pattern Matching - Form Handling - Cookies - Session Tracking - Introduction to JQuery, Syntax, selectors, events, JQuery HTML, JQuery Effects, JQuery CSS. Introduction to Angular JS, Directives, Expressions, Controllers, Filters, Services, Events, Forms, Validations, Examples.

TEXT BOOKS:

1. Robert W. Sebesta: Programming the World Wide Web, Eighth Edition, Pearson education, 2015. UNITS: 1,2,3,4
2. Dayley Brad, Dayley Brendan ,"AngularJS, JavaScript, and jQuery All in One", Sams Teach Yourself 1st Edition, Kindle Edition, 2015.UNIT: 5

REFERENCE BOOKS:

1. M. Srinivasan: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2009.
2. Jeffrey C. Jackson: Web Technologies-A Computer Science Perspective, Pearson Education, 7th Impression,2012.
3. Chris Bates: Web Technology Theory and Practice, Pearson Education, 2012.
4. Raj Kamal: Internet and Web Technologies, McGraw Hill Education.

Course Outcomes:

On the successful completion of the course, students will be able

CO1	Design dynamic web pages using Javascript, Jquery and Angular Java script	K1	LO
CO2	Develop Web pages using HTML, CSS and XML	K2	IO
CO3	Create web application using PHP and MySQL	K3, K4	HO
CO4	To design dynamic web pages using Angular javascript	K2,K3	HO
CO5	Develop interactive web pages using Jquery	K4,K5	HO

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	S	S	S	M	M	S	M	M	S	S
CO2	S	S	M	S	S	S	M	S	S	S	S	S
CO3	S	S	S	M	S	S	M	M	S	M	M	S
CO4	S	S	S	M	S	M	M	S	S	M	S	M
CO5	S	S	S	M	S	S	M	S	M	S	S	M

S- Strong; M-Medium; L-Low

23P2CA8 **CC – VI Advanced Operating System**

Course Objectives

The student should be made to:

- To Study the basic concepts and functions of operating systems.
- To understand the structure and functions of OS.
- To Learn about Processes, Threads and Scheduling algorithms.
- To understand the principles of concurrency and Deadlocks.
- To learn various memory management schemes.
- To Study I/O management and File systems.
- To learn the basics of Linux system and perform administrative tasks on Linux Servers.

Unit – I

Introduction: What is Operating Systems - Computer System Organization – Computer System Architecture - Operating System Structure - Operating System Operations. Operating System Structures: Operating System Services - User and Operating - System Interface - System Calls - Types of System Calls.

Unit – II

Process Management: Processes: Process Concept - Process Scheduling. CPU Scheduling: Basic Concepts - Scheduling Criteria. Deadlocks: System Model - Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection - Recovery from Deadlock.

Unit – III

Memory Management: Main Memory: Background - Swapping - Contiguous Memory Allocation – Segmentation. Virtual Memory: Background - Demand Paging.

Unit- IV

Storage Management: Mass-Storage Structure: Overview of Mass-Storage Structure - Disk Structure - Disk Attachment - Disk Scheduling - Disk Management. File - System Interface: File Concept - Access Methods. File-System Implementation: File System Structure - File System Implementation.

Unit – V

Protection And Security: Protection : Goals of Protection - Principles of Protection - Domain of Protection. Security : The Security Problem - Program Threats - Firewalling to Protect Systems and Networks – Computer Security Classifications. Case studies: The Linux System - Linux History - Design Principles.

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 9th Edition, John Wiley and Sons Inc., 2012.

Reference books:

1. William Stallings, "Operating Systems – Internals and Design Principles", 7th Edition, Prentice Hall, 2011.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2001.
3. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education", 1996.
4. D M Dhamdhere, "Operating Systems: A Concept-Based Approach", Second Edition, Tata McGraw-Hill Education, 2007.

Course Outcomes

On the successful completion of the course, students will be able

CO1:	Understand the Computer System Architecture including operating system structure and operations, Operating System Services	K1-K2
CO2:	Design various Scheduling algorithms. Design deadlock, prevention and avoidance algorithms.	K1-K5
CO3:	Compare and contrast various memory management schemes.	K1-K6
CO4:	Design and Implement a prototype file systems.	K1- K6
CO5:	Perform administrative tasks on Linux Servers.	K1-K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	-	M	S	-	-	-	S	M	-
CO2	S	S	S	-	M	S	-	-	-	L	M	-
CO3	S	S	M	-	L	S	-	-	-	M	M	-
CO4	M	S	M	-	S	S	-	-	-	M	S	-
CO5	S	M	M	-	M	L	-	-	-	M	M	-

S- Strong; M-Medium; L-Low

23P2CAP3 **CP – III LAB – III: Big Data Analytics**

Course Objectives

- To teach the fundamental techniques for handling the big data tools.
- To familiarize the tools required to manage big data.
- To analyse big data using Hadoop, MapReduce, Hive, and Pig
- To teach the fundamental principles in achieving big data analytics with scalability and streaming capability
- To enable students to have skills that will help them to solve complex.

List of Programs

1. Implement File System Shell Commands for HDFS in Hadoop Environment
2. Write a Mapreduce program using single reduce function for finding Maximum and Minimum Number
3. Write a Mapreduce program using multiple reduce function for Word Count in an given Text document
4. Implement the following using Pig Latin Input and Output Operations Relational Operations
5. Implement the following using Pig Latin User Defined Functions Advanced Relational Operations
6. Write a Word Count program using Pig Latin Script
7. Write a program to find a maximum temperature using Pig Latin Script
8. Implement the following using Hive commands Handling the Database Creating and Manipulating table
9. Implement Simple Queries for database using Mongo
10. Implement Simple Queries for collections using Mongo

Course Outcomes

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

CO1:	Understand and develop conceptually how Big Data is stored and implement it using different tools	K1-K6
CO2:	Comprehend and implement programs for data storage in HDFS and table manipulation using Big Data tools in Hadoop environment	K1-K6
CO3:	Understand and Critically analyse existing Big Datadatasets and implementations the solutions for it using MongoDB	K1- K6
CO4:	Understand and examine existing Big Datadatasets and implementations the solutions using HIVE database	K1- K6
CO5:	Comprehend and review existing datasets and implementations the solutions to handle it using PIG	K1- K6

K1- Remember, K2- Understand, K3- Apply , K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PO10	PO11	PO12
CO1	S	S	M		M	S	-	-	-	-	-	-
CO2	S	M	S	S	S	M	-	-	-	-	-	-
CO3	S	S	S	S	S	S	-	-	-	-	-	-
CO4	S	M	S	S	S	M	-	-	-	-	-	-
CO5	S	S	S	S	S	S	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

23P2CAP4 **CP – IV LAB – IV: Web Technology**

Course Objectives:

At the end of the course, the student should be able to do:

- To Learn how to create web pages using HTML, CSS and Javascript.
- To Implement dynamic web pages using Javascript, Jquery and Angular Java script
- To create web applications using PHP and MySQL
- To Create web pages using XML and Cascading Style Sheets
- To Create XML documents and Schemas.

PROGRAM LIST

1. Develop a web page to display your education details in a tabular format.
2. Develop a web page to display your CV on a web page.
3. Design a Homepage having three links: About Us, Our Services and Contact Us. Create separate web pages for the three links.
4. Design a web page to demonstrate the usage of inline CSS, internal CSS and external CSS.
5. Design an XML document and create a style sheet in CSS & display the document in the browser.
6. Develop a web page to Create image maps.
7. Design a web page to perform input validation using Angular Javascript.
8. Develop a web page in PHP to fetch details from the database.
9. Design a web page to hide paragraph using JQuery
10. Create a web page and add Javascript to handle mouse events and form events

Course Outcomes:

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

CO1	To Design dynamic web pages using JavaScript, Jquery and Angular Java script	K1	LO
CO2	To Develop Web pages using HTML, CSS and XML	K2	IO
CO3	To Create web application using PHP and MySQL	K3, K4	HO
CO4	To Develop interactive web pages using Jquery	K2,K3	HO
CO5	To design dynamic web pages using Angular javascript	K4,K5	HO

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	S	S	S	M	M	S	M	M	S	M
CO2	S	S	M	S	S	S	M	S	S	S	M	S
CO3	S	S	S	M	M	S	M	M	S	M	M	S
CO4	S	M	S	M	S	M	M	S	S	M	S	M
CO5	M	M	S	M	S	S	M	S	M	M	S	M

S- Strong; M-Medium; L-Low

23P2CA9EC **EC – III Digital Electronics & Microprocessor**

Course Objectives:

To disseminate knowledge of digital principles, combinational and sequential logic fundamentals

To introduce the internal organization of Intel 8085 Microprocessor.

To know about various instruction sets and classifications

To enable the students to write assembly language programs using 8085

UNIT I

Number Systems and Codes: Binary, Octal and Hexadecimal Number Systems- Conversion between number systems- Complements - Binary Arithmetic- Binary Codes Boolean Algebra and Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR gates –Truth tables- Applications of XOR gates- Fundamentals of Boolean Algebra- Boolean functions- Minterms and Maxterms.

UNIT II

Boolean Laws and Expressions: Laws and theorems of Boolean algebra- Demorgan's theorems- the Universal building blocks – NAND and NOR gates - Canonical SOP and POS forms- Algebraicsimplification-Karnaugh Maps- SOP and POS Simplification- NAND / NORimplementation of Boolean expressions- Don't care conditions- Overlapping, Rollinggroups, eliminating redundant groups.

UNIT III

Combinational Logic Circuits: Half and FullAdders- Half and Full Subtractors- Parallel binary adder- Multiplexer & De-Multiplexer-Encoder & Decoder.Sequential Logic Circuits: NAND, NOR latches- SR Flipflop-JK Flipflop – Edge triggering- PRESET and CLEAR inputs- Shift Register, - Intermediary to Binary Counters -Asynchronous Forms- BCD counter.

UNIT IV

Microprocessor architecture: Introduction- Intel 8085: ALU-Timing and Control unit – Registers- Data and Address Bus-Pin configuration-Intel 8085 instructions—Instruction cycle- Timing diagram- RISC and CISC processors.

UNIT V

Instruction Set for Intel 8085: Instruction and Data formats - Addressing modes- Status Flags - Intel 8085 instruction groups. Assembly Language Programming: Addition- Subtraction - Decimal addition /subtraction- Complement Arithmetic - Shifting – Masking- concept of Arrays and operation on array values- Sum of Series – Multiplication – Division - Multibyte addition / subtraction.

Text book:

1. Thomas Bartee C, Digital Computer Fundamentals. TMH, 3rd Edition

2. Malvino and Leech, Digital principles and Applications, TMH, 2nd Edition

3. Badri Ram, Fundamentals of Microprocessors and Microcomputers, DhanpatRai Publications(P) Ltd, 4th Edition

Reference Books:

1. "Microprocessor Architecture, Programming, and Applications with the 8085" by R Gaonkar
2. Fundamentals of Digital Circuits by Anand Kumar – India.
3. Digital Electronics : An Introduction To Theory And Practice by William Gothmann H – UK.
4. "Microprocessors: Principles and Applications" by A Pal

Course Outcomes

On the successful completion of the course, students will be able

CO1:	To Describe the various structures of various number systems and its application in digital design.	K1-K6
CO2:	To Develop the appropriate truth table from a description of a combinational logic function.	K1-K6
CO3:	To Implement combinational logic function described by a truth table using and/or/inv gates, muxes or ROMs, and analyze its timing behavior.	K1-K6
CO4:	To Describe the operation and timing constraints for latches and registers	K1-K6
CO5:	To Design memory organization that uses banks for different word size operations.	K1-K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	L	L	L	L	S	S	S	L	M	M
CO2	S	M	S	M	M	L	L	L	L	L	M	M
CO3	S	S	S	L	L	L	M	M	M	M	M	L
CO4	S	S	S	L	L	L	M	M	M	L	L	L
CO5	S	S	S	L	M	M	S	S	S	S	M	L

S- Strong; M-Medium; L-Low

23P2CA10EC **EC – IV Soft Computing**

Course Objectives:

- Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
- To understand supervised and unsupervised learning algorithms
- To enable the students to gain a basic understanding of neural networks.
- To know about fuzzy logic, fuzzy inference systems, and their functions.
- To impart basic knowledge on Genetic algorithms and their applications.

UNIT-I INTRODUCTION TO SOFT COMPUTING: Artificial Neural Networks - Biological Neurons - Basic Models of Artificial Neural Networks - Connections-Learning - Activation Functions - Important Terminologies of ANNs - Muculloch and Pitts Neuron - Linear Separability - Hebb Network - Flowchart of Training Process - Training Algorithm.

UNIT – II SUPERVISED LEARNING NETWORK : Perceptron Networks – Perceptron Learning Rule –Architecture - Flowchart for Training Process - Perceptron Training Algorithms for Single Output Classes - Perceptron Training Algorithm for Multiple Output Classes - Perceptron Network Testing Algorithm - Adaptive Linear Neuron - Delta Rule for Single Output Unit -Flowchart for training algorithm - Training Algorithm – Testing Algorithm - Multiple Adaptive Linear Neurons - Architecture-Flowchart of Training Process - Training Algorithm - Back Propagation Network - Architecture-Flowchart for Training Process - Training Algorithm - Learning Factors of Back - Propagation Network - Radial Basis Function Network – Architecture - Flowchart for Training Process - Training Algorithm.

UNIT-III UNSUPERVISED LEARNING NETWORK: Associative Memory Networks - Auto Associative Memory Network-Architecture - Flowchart for Training Process - Training Algorithm - Testing Algorithm - Bidirectional Associative Memory – Architecture - Discrete Bidirectional Associative Memory - Iterative Auto Associative Memory Networks - Linear AutoAssociative Memory – Kohonen Self-Organizing Feature Map – Architecture - Flowchart for Training Process - Training Algorithm.

UNIT-IV INTRODUCTION TO FUZZY LOGIC: Classical Sets – Operations on Classical Sets-Fuzzy sets - Fuzzy Sets - Properties of Fuzzy Sets- Fuzzy Relations – Membership Functions: Fuzzification - Methods of Membership Value Assignments – Defuzzification – Lambda-Cuts for Fuzzy sets and Fuzzy Relations – Defuzzification Methods – Max-Membership Principle -Centroid Method - Weighted Average Method - Mean Max Membership - Center of Sums - Center of Largest Area-First of Maxima - Fuzzy Set Theory - Fuzzy Arithmetic And Fuzzy Measures: Fuzzy Measures – Belief and Plausibility Measures - Probability Measures - Possibility and Necessity Measures - Formation of Rules – Fuzzy Inference Systems (FIS) – Fuzzy Decision Making – Fuzzy Logic Control Systems.

UNIT-V GENETIC ALGORITHM: Introduction - Biological Background - Traditional Optimization and Search Techniques - Gradient Based Local Optimization Method - Random Search - Stochastic Hill Climbing - Simulated Annealing - Symbolic Artificial Intelligence - Operators in Genetic Algorithm - Encoding-Selection – Crossover - Mutation - Stopping Conditions for Genetic Algorithm Flow - Genetic Programming - Working of Genetic Programming -Characteristics of Genetic Programming - Data Representation.

TEXT BOOKS

1. Principles of Soft Computing, S.N. Sivanandam, S.N.Deepa, Wiley, Third Edition, 2019.

REFERENCE BOOKS

1. Das, A. (2018). Artificial Intelligence and Soft Computing for Beginners.
2. Amit, K. (2018). Artificial intelligence and soft computing: behavioral and cognitive modeling of the human brain. CRC press.
3. Rajasekaran, S., &Pai, G. V. (2011). Neural networks, fuzzy logic and genetic algorithm: synthesis and applications (with cd). PHI Learning Pvt. Ltd.
4. Jang, J. S. R., Sun, C. T., &Mizutani, E. (2004). Neuro-fuzzy and soft computing-a computational approach to learning and machine intelligence [Book Review]. IEEE Transactions on automatic control, 42(10), 1482-1484.
5. Gupta, M. M. (2004). Soft computing and intelligent systems: theory and applications. Elsevier.
6. Jang, J. S. R., Sun, C. T., &Mizutani, E. (1997). Neuro-fuzzy and soft computing-a computational approach to learning and machine intelligence [Book Review]. IEEE Transactions on automatic control, 42(10), 1482-1484.

Course Outcomes:

- On the successful completion of the course, students will be able to

CO1	To provide an introduction to the basic principles, techniques, and applications of soft computing	K- 1 K2	LO
CO2	To get familiar with Neural network architectures and supervised learning algorithms	K3	IO
CO3	To understand the architectures and algorithms of Unsupervised Learning techniques	K3- K4	HO
CO4	To Develop the skills to gain a basic understanding of fuzzy logic theory and fuzzy inference systems	K4	IO
CO5	To Ability to learn traditional optimization and search techniques and genetic programming	K5	HO

Mapping with Programme Outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	S	M	S	M	S	S	S	M	S	M	S	S
CO2	M	S	M	S	M	M	M	S	M	S	S	M
CO3	M	M	S	S	S	M	M	S	S	S	S	S
CO4	S	S	M	M	M	S	S	S	S	M	M	M
CO5	S	S	S	S	S	M	S	M	M	S	S	M

S- Strong; M-Medium; L-Low

MCA – SECOND YEAR

23P3CA11 **SEMESTER - III**

CC-VII Advanced Java Programming

Course Objectives

- To gain knowledge of Object Oriented Programming Concept in Java
- To understand usages of String functions in Java
- To familiarize with the applet and swing
- To grasp the concepts on Java Beans
- To comprehend the connection between Relational Database and Java.

Unit – I

An Overview of Java: Object Oriented Programming- Data Types, Variables, and Arrays – Type Conversion and Casting- Arrays-Operators - Control Statements: Conditional Statements, Loop Statements, Jump Statement – Classes and Methods – Inheritance- Exception Handling.

Unit – II

String Handling: The String Constructors - String Length - Special String Operations - Character Extraction - String Comparison - Searching Strings - Modifying a String - Input/Output: The I/O Classes and Interfaces – File - Byte Streams - Character Streams.

Unit – III

The Applet Class: Basic Architecture - Applet Skeleton - Display methods - Status Window – Passing Parameters. Introducing GUI Programming with Swing– Introducing Swing - Components and Containers - The Swing Packages - A Simple Swing Application.

Unit- IV

Java Beans: Introduction - Advantages of Beans – Introspection - The JavaBeans API - A Bean Example. Servlets: Life Cycle Simple Servlet-Servlet API-Packages-Cookies session tracking.

Unit – V

Network Programming: Working with URLs- Working with Sockets - Remote Method Invocation. Introduction to Database Management Systems - Tables, Rows, and Columns - Introduction to the SQL SELECT Statement - Inserting Rows - Updating and Deleting Existing Rows - Creating and Deleting Tables - Creating a New Database with JDBC - Scrollable Result Sets.

Text Books:

1. Herbert Schildt, "Java the Complete Reference", 10th edition, McGraw Hill Publishing Company Ltd, New Delhi, 2017.
2. Tony Goddis, "Starting out with Java from Control Structures Through Objects" 6th Edition, Pearson Education Limited, 2016

Reference books :

1. Herbert Schildt, Dale Skrien, "Java Fundamentals – A Comprehensive Introduction", TMGH Publishing Company Ltd, New Delhi, 2013
2. John Dean, Raymond Dean, "Introduction to Programming with JAVA – A Problem Solving Approach", TMGH Publishing Company Ltd, New Delhi,2012.

Course Outcomes

On the successful completion of the course, students will be able

CO1:	To Understand the Object Oriented Program including classes and methods; inheritance and exception handling	K1-K6
CO2:	To Complete comprehension of String functions and I/O Streams	K1-K6
CO3:	To Creation of graphical representation using Applet	K1-K6
CO4:	To Application of Servlets for designing Web based applications	K1- K6
CO5:	To Usage of JDBC connectivity and implementation of the concept to get desired results from database	K1-K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	-	M	S	-	-	-	S	M	-
CO2	S	S	S	-	M	S	-	-	-	L	M	-
CO3	S	S	M	-	L	S	-	-	-	M	M	-
CO4	M	S	M	-	S	S	-	-	-	M	S	-
CO5	S	M	M	-	M	L	-	-	-	M	M	-

S- Strong; M-Medium; L-Low

23P3CA12 **CC-VIII Dot Net Technologies**

Course Objectives:

- To get strong understanding of .NET Framework and C# programming.
- To get advanced programming skills in Visual Studio with C# language.
- To get advanced methods of manipulating data using Microsoft SQL Server.
- To get clear idea of how to developing real-time standalone, web applications using .NET Technologies.
- To get clear understanding and get experience in Microsoft Azure.

Unit-I

Introducing C#: .NET Framework - C# language - Visual Studio 2017 - Writing a C# Program: Visual Studio 2017 Development Environment - Console Applications - Desktop Applications - Variables and Expressions: Basic C# Syntax - Basic C# Console Application Structure - Variables - Expressions - Flow Control: Boolean Logic – Branching - Looping.

Unit-II

More About Variables: Type Conversion - Complex Variable Types - String Manipulation – Functions: Defining and Using Functions - Variable Scope - The Main Function - Struct Functions - Overloading Functions - Using Delegates - Debugging and Error Handling: Debugging in Visual Studio - Error Handling - Introduction to Object Oriented Programming: Object-Oriented Programming - OOP Techniques - OOP in Desktop Applications.

Unit-III

Defining Classes: Class Definitions in C# - System. Object - Constructors and Destructors - OOP Tools in Visual Studio - Class Library Projects - Interfaces Versus Abstract Classes - Struct Types - Shallow Copying Versus Deep Copying - Defining Class Members: Member Definitions - Additional Class Member Topics - Interface Implementation - Partial Class Definitions - Partial Method Definitions - The Call Hierarchy Window.

Unit-IV

Basic Cloud Programming: Cloud, Cloud Computing, and the Cloud Optimized Stack - Cloud Patterns and Best Practices - Using Microsoft Azure C# Libraries to Create a Storage Container - Creating an ASP.NET 4.7 Web Site That Uses the Storage Container - Advanced Cloud Programming and Deployment: Creating an ASP.NET Web API - Deploying and Consuming an ASP.NET Web API on Microsoft Azure - Scaling an ASP.NET Web API on Microsoft Azure.

Unit-V

.NET Standard and .NET Core: Cross-Platform Basics and Must Know Terms – Need of .NET - Referencing and Targeting Frameworks - .NET Core - Building and Packaging a.NET Standard Library - Building a .NET Core Application with Visual Studio - Porting from .NET Framework to .NET Core - ASP.NET and ASP.NET Core: Overview of Web Applications – Use of ASP.NET - ASP.NET Web Forms - Creating ASP.NET Core Web Applications.

Text book:

1. Benjamin Perkins, Jacob Vibe Hammer, Jon D. Reid, "Beginning C#7 Programming with Visual Studio 2017", Wiley Publishing, 2018.Chapters: 1 to 10, 16 to 23, and 25.

Reference books:

1. Nagel, Christian, "Professional C 7 and .NET Core 2.0 ", Wrox Publishing, 2018.
2. Mehboob Ahmed Khan, Ovais, "C# 7 and .NET Core 2.0 High Performance", Packt Publishing, 2018

Course Outcome:

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

CO1	To Understand and learn .NET Framework and C# .NET	K1, K2	LO
CO2	To Apply the concepts to develop the applications for real-time problem in C# .NET and ASP .NET	K3	IO
CO3	To Analyze the feasibility of using .NET for real time problems	K4,K5	HO

K1- Remember, K2 - Understand, K3 - Apply, K4 - Analyze, K5 - Evaluate, K6 -Create

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	L	M	L	L	L	-	-	-	-	-	L
CO2	S	M	L	M	M	L	-	L	-	L	-	L
CO3	S	S	S	M	M	L	-	L	-	L	-	L

L - Low, M- Medium, S – Strong

23P3CA13 **CC-IX Relational Database Management System**

Course Objectives:

- Understand the basic concepts and the applications of database systems. Master the basics of SQL and construct queries using SQL.
- Understand the relational database design principles.
- Familiar with the basic issues of transaction processing and concurrency control.
- Familiar with database storage structures and access techniques.
- Understand how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS

UNIT I

Introduction to DBMS: Data and Information – Database – Database Management System – Applications – Purpose of Database Systems – Advantages and Disadvantages – View of Data: Data Abstraction – Instances and Schemas – Data Models – Database Languages – Database Architecture – Query Processor – Storage Manager – Transaction Manager.

UNIT II

Database Design: Design Phase – ER Model: Entity, Attributes and its types, Relationship and its types or Degree of Relationship – Entity set and its types – Entity Relationship Diagram(ER Diagram) – Merits and Demerits of ER Diagram. Relational Database Design: Objectives – Functional Dependency – Decomposition – Redundancy and Data Anomaly – Normalization: 1NF – 2NF – 3NF – BCNF – Database Security.

UNIT III

Structure of Relational Database: Basic Structure – Database Scheme – Keys – Query Language – Relational Algebra: Fundamental Operations – Select, Project, Rename, Cartesian Product, Union and Set-difference – Extended Operations – Join, Intersection and Divide – NULL Value.

UNIT IV

Introduction to SQL: SQL – Characteristics of SQL –Advantages of SQL – Basic Domain Types – Basic Structure of SQL – Rename Operation – String Operation – Set Operations – Aggregate Functions – Group by Clause – Having Clause – Sub Query – Modification. SQL Schemas – Advantages of Using Schema – SQL Integrity Constraints.

UNIT V

File Organization: Sequential Access, Direct Access – Methods of File Organization: Sequential Organization – Advantages and Disadvantages of Sequential Access – Indexed-Sequential Organization – Direct Organization.

TEXTBOOK:

Abraham Silberchatz, Henry F. Korth, S.Sudarshan, –Database System Concepts‖, McGrawHill 2019, 7th Edition.

REFERENCEBOOKS:

1. S.Sumathi, S.Esakkirajan, – Fundamentals of Relational Database Management System‖,Springer International Edition2007.

2.AlexisLeon & MathewsLeon, –Fundamentals of DBMS‖, Vijay Nicole Publications 2014, 2nd Edition.

Course Outcomes:

- On the successful completion of the course, students will be able to

CO1	To provide an introduction to the basic concepts of database system and Relational Model	K- 1 K2	LO
CO2	To get familiar with Design a Data model and Schemas in RDBMS	K3	IO
CO3	To understand the Structure of Relational Database and Functional Dependency and SQL: Commands – Data types	K3- K4	HO
CO4	To Develop the skills to gain a basic understanding of Aggregate Functions	K4	IO
CO5	To Ability to learn PL/SQL: Structure and Handling- Triggers.	K5	HO

Mapping with Programme Outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	S	M	S	M	S	S	S	M	S	M	S	S
CO2	M	S	M	S	M	M	M	S	M	S	S	M
CO3	M	M	S	S	S	M	M	S	S	S	S	S
CO4	S	S	M	M	M	S	S	S	S	M	M	M
CO5	S	S	S	S	S	M	S	M	M	S	S	M

S- STRONG; M-MEDIUM; L-LOW

23P3CAP5 **CP-V LAB – V: Advanced Java Programming**

Course Objectives:

- To implement object oriented concepts in JAVA
- To Develop the program using concepts Network programme
- To learn how to create a program in java beans.
- To learn how to connect relational database to Java
- To develop the program using concepts Applet

List of Experiments:

1. Implementation of and Exception handling concepts with different type of Exception.
2. Build a Swing application to implement metric conversion.
3. Use Grid Layout to design a calculator and simulate the functions of a simple calculator.
4. Create a Color palette with a matrix of buttons using Applet.
5. To invoke a servlet from HTML forms.
6. To invoke servlet from Applets.
7. To invoke servlet from JSP.
8. Implement message communication using Network Programming.
9. Write a program to connect databases using JDBC.
10. Implementation of Java Beans.

Course Outcomes

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

CO1:	Implement classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem	K1, K2	LO
CO2:	Apply Applets and Swing programs	K3	IO
CO3:	Develop Servlets and JSP for creating Web based applications using JDBC	K4, K5	HO

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	S	S	S	M	M	S	M	M	S	S
CO2	S	S	M	M	M	S	S	S	S	S	S	S
CO3	S	S	S	S	S	M	S	M	M	S	M	M

S- Strong; M-Medium; L-Low

23P3CAP6 **CP-VI LAB – VI: Dot Net Technologies**

Course Objectives:

- To get strong understanding of .NET Framework and C# programming.
- To get advanced programming skills in C# .NET OOPs Concepts
- To get advanced methods of manipulating data using Microsoft SQL Server.
- To get clear idea of how to developing real-time standalone, web applications using ASP .NET.
- To get clear understanding and get experience in Microsoft Azure.

Implement the following problems using C# with Visual Studio 2017

1. Demonstrate method overloading and method overriding
2. Class and Objects
3. Multilevel Inheritance
4. Interfaces
5. Demonstrate multiple type of Exceptions
6. Azure Storage Container Using the Microsoft Azure Storage Client Library
7. Demonstrate Read and Write a Data using Random Access Files
8. Employee management database using LINQ
9. Student management system using ASP.NET
10. Demonstrates simple Universal App.

Course Outcomes:

On the successful completion of the course, students will be able

CO1	Design dynamic web pages using JavaScript, Jquery and Angular Java script	K1	LO
CO2	Develop Web pages using HTML, CSS and XML	K2	IO
CO3	Create web application using PHP and MySQL	K3, K4	HO
CO4	Develop interactive web pages using Jquery	K2,K3	HO
CO5	To design dynamic web pages using Angular javascript	K4,K5	HO

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	S	S	S	M	M	S	M	M	S	M
CO2	S	S	M	S	S	S	M	S	S	S	M	S
CO3	S	S	S	M	M	S	M	M	S	M	M	S
CO4	S	M	S	M	S	M	M	S	S	M	S	M
CO5	M	M	S	M	S	S	M	S	M	M	S	M

S- STRONG; M-MEDIUM; L-LOW

23P3CA14EC **EC-V Principles of Compiler Design**

Course Objectives:

- To get knowledge about the lexical, syntactic and semantic structures
- To develop compiler to undertake language translation.
- To learn parser, and semantic analyzer without the aid of automatic generators.
- To learn source code for a novel language into machine code for a novel computer.
- To develop techniques for intermediate code and machine code optimization.

Unit I

Introduction on the phase of the complier – Lexical Analysis, Regular Expression, Non-deterministic Automata, Deterministic Automata equivalent to NFA's. Minimizing the states of DFA, Implementation of Lexical Analyzer.

Unit II

Syntax Analysis – Context free grammars - Top down Parsing Concepts, Recursive Descent Parsing, Predictive Parsers, Non recursive Pedictive Parsing – Bottom Up Parsing, Handle pruning, Shift reduce parsing – Operator Predence Parsing – Error recovery in Parsing, Parser Generators – YACC.

Unit III

Intermediate Code Generation: Syntax directed Definitions, Construction of Syntax trees – Top down Translation, Bottom up Evaluation of inherited Attributes, Recursive Evaluators, Assigning Space at Complier Construction time – Type checking.

Unit IV

Storage Organization : Storage Organization, Storage Allocation Strategies, Parameter Passing, Symbol tables, Dynamic Storage Allocation, Intermediate Languages – Representation of Declarations, Assignment Statement, Boolean Expression, Back patching, Procedure calls.

Unit V

Code Generation and Optimization: Design of the code generators, Runtime storage Management, Basic blocks and flow graphs, Register Allocation and Assignment, DAG representation of Basic blocks, Peephole optimization, Code optimization – The principle sources of optimization, Optimization of basic blocks, Global data flow Analysis, Loop optimizations.

Text Book(s)

1. Alfred V.Aho, Ravi Sethi, Jeffrey D.Ullman, "Compilers – Principles, Techniques and Tools", 2007, Pearson Education.

2. Dhamdhere D.M., "Compiler Construction Principles and Practice", 1981, Macmillan India.

References

1. Reinhard Wilhlm, Director Mauser, "Compiler Design", 1995, Addison Wesle

Course Outcomes:

On the successful completion of the course, students will be able

CO1	Acquire knowledge of different phases and passes of the compiler and also able to use the compiler tools like LEX, YACC, etc. Students will also be able to design different types of compiler tools to meet the requirements of the realistic constraints of compilers.	K3, K6	LO
CO2	Understand the parser and its types i.e. Top-Down and Bottom-up parsers and construction of LL, SLR, CLR, and LALR parsing table.	K2, K6	IO
CO3	Implement the compiler using syntax-directed translation method and get knowledge about the synthesized and inherited attributes.	K4, K5	HO
CO4	Acquire knowledge about run time data structure like symbol table organization and different techniques used in that.	K2, K3	HO
CO5	Understand the target machine's run time environment, its instruction set for code generation and techniques used for code optimization.	K2, K4	HO

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	M	S	M	M	M	M	M	M	S	S
CO2	S	S	M	S	M	M	M	M	M	S	M	S
CO3	S	S	M	S	M	S	M	M	M	M	M	S
CO4	M	S	S	M	S	M	M	M	M	M	S	S
CO5	S	S	M	S	M	S	M	M	M	M	S	S

S- STRONG; M-MEDIUM; L-LOW

23P3CA15EC **EC-VI Cloud Computing**

Course Objectives:

- To understand the various distributed system models and evolving computing paradigms.
- To gain knowledge in virtualization of computer resources.
- To realize the reasons for migrating into cloud.
- To introduce the various levels of services that can be achieved by a cloud.
- To describe the security aspects in cloud and the services offered by a cloud.

UNIT I

Cloud computing in a Nutshell – Roots of Cloud Computing – Layers and types of Clouds – Desired features of a Cloud – Cloud Infrastructure Management – Challenges and Risks – Migrating into a Cloud: - Introduction – Broad Approaches – The Seven step model – Enriching the 'Integration as a Services' Paradigm for the Cloud Era: - Introduction – The Evolution of SaaS – The Challenges of SaaS Paradigm – Approaching the SaaS Integration Enigma.

UNIT II

Virtual Machine Provisioning and Migration Services Introduction – Background – Manageability – Migration Services – Management of Virtual Machines for Cloud Infrastructures: - Anatomy of Cloud Infrastructures – Distributed Management of Virtual Infrastructures – Scheduling techniques for Advance Reservation of Capacity – Enhancing Cloud Computing Environments Using a Cluster as a Service: - Introduction – related Work – RVWS Design – The Logical Design.

UNIT III

Introduction – Technologies and Tools – Aneka Cloud Platform - Aneka Resource Provisioning Service – Hybrid Cloud Implementation – Comet Cloud: An Autonomic Cloud Engine: - Introduction – Comet Cloud – Architecture – Autonomic Behavior of Comet Cloud – Overview of Comet Cloud - based Applications – implementation and Evaluation

UNIT IV

Introduction – Enterprise Demand of Cloud Computing – Dynamic ICT Service – Importance of Quality and Security in Clouds – Dynamic Data Centre Producing Business - ready; Dynamic ICT Services – The Map Reduce Programming Model and Implementations: - Introduction – Map Reduce Programming Model – Map Reduce implementations for the Cloud

UNIT V

Introduction – A typical Use case – The Basic Principles of Cloud Computing – A Federated Cloud Computing Model – Security Considerations – Service Providers Perspective of SLA Management in Cloud Computing: - Traditional Approaches to SLO Management – Types of SLA – Life Cycle of SLA – SLA Management in Cloud – Automated Policy - based Management.

Text Book:

Rajkumar Buyya, James Broberg, Andrzej Goscinsky, "Cloud Computing Principles and Paradigms", Wiley India Pvt. Ltd., 2011.

References:

1 Cloud Computing: A Practical Approach, Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, Tata McGraw Hill,rp2011.

2 Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese, O'reilly, SPD,rp2011.

Course Outcomes:

On the successful completion of the course, students will be able

CO1	To provide an introduction to the basic concepts Roots of Cloud Computing	K- 1 K2	LO
CO2	To get familiar with Virtual Machine Provisioning and Migration Services	K3	IO
CO3	To understand the Technologies and Tools – Aneka Cloud Platform	K3- K4	HO
CO4	To Develop the Enterprise Demand of Cloud Computing – Dynamic ICT Service	K4	IO
CO5	To Ability to learn typical Use case and the Basic Principles of Cloud Computing	K5	HO

Mapping with Programme Outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	S	M	S	M	S	S	S	M	S	M	S	S
CO2	M	S	M	S	M	M	M	S	M	S	S	M
CO3	M	M	S	S	S	M	M	S	S	S	S	S
CO4	S	S	M	M	M	S	S	S	S	M	M	M
CO5	S	S	S	S	S	M	S	M	M	S	S	M

S- STRONG; M-MEDIUM; L-LOW

MCA – SECOND YEAR

23P4CA16 **SEMESTER - IV**

CC- X Python Programming

Course Objectives:

- To acquire programming skills in core Python
- To learn Strings and function
- To develop object oriented skills in Python
- To comprehend various Python Packages
- To develop web applications using Django

Unit I

Introduction : Fundamental ideas of Computer Science - Strings, Assignment, and Comments - Numeric Data types and Character sets – Expressions – Loops and Selection Statements: Definite iteration: the for Loop - selection: if and if-else statements - Conditional iteration: the while Loop

Unit II

Strings and Text Files: Accessing Characters and substrings in strings - Data encryption-Strings and Number systems- String methods – Text - Lists and Dictionaries: Lists – Dictionaries – Design with Functions: A Quick review - Problem Solving with top-Down Design - Design with recursive Functions - Managing a Program's namespace - Higher-Order Functions

Unit III

Design with Classes: Getting inside Objects and Classes – Data - Modeling Examples – Building a New Data Structure – The Two – Dimensional Grid - Structuring Classes with Inheritance and Polymorphism - GraphicalUser Interfaces - The Behavior of terminal - Based programs and GUI - Based programs - Coding Simple GUI - Based programs - Windows and Window Components - Command Buttons and responding to events

Unit IV

Working with Python Packages: NumPy Library-Ndarray – Basic Operations – Indexing, Slicing and Iteration – Array manipulation - Pandas –The Series – The DataFrame - The Index Objects – Data Vizualization with Matplotlib – The Matplotlib Architecture – pyplot – The Plotting Window – Adding Elements to the Chart – Line Charts – Bar Charts – Pie charts

Unit V

Django: Installing Django – Building an Application – Project Creation – Designing the Data Schema - Creating an administration site for models - Working with QuerySets and Managers – Retrieving Objects – Building List and Detail Views.

Text Book:

1. K.A. Lambert, " Fundamentals of Python: first programs", Second Edition, Cengage Learning, 2018 **(Unit - I, II and III)**
2. Fabio Nelli, "Python Data Analytics: With Pandas, NumPy, and Matplotlib", Second Edition, Kindle Edition, 2018 **(Unit - IV)**
3. Antonio Mele, "Django 3 By Example", Third Edition, 2020 **(Unit - V)**

Course Outcomes

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

CO1	Comprehend the programming skills in python and develop applications using conditional branches and loop	**K1- K6**
CO2	Create python applications with strings and functions	
CO3	Understand and implement the Object Oriented Programming paradigm with the concept of objects and classes, Inheritance and polymorphism	
CO4	Evaluate the use of Python packages to perform numerical computations and data visualization	
CO5	Design interactive web applications using Django	

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	S	M	S	S	S	S	M	S	S
CO2	S	S	S	M	S	S	S	S	S	S	M	S
CO3	S	M	S	S	M	S	M	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	M	M	S

S- Strong; M-Medium; L-Low

23P4CAP7 **CP-VII LAB – VII: Python Programming**

Course Objectives:

This course enables the students:

- To master the fundamentals of writing python scripts
- To create program using elementary data items
- To implement Python programs with conditionals and loops
- To use functions for structuring Python programs
- To develop web programming with Django

Implement the following in Python:

1. Program using elementary data items, lists, dictionaries and tuples
2. Program using conditional branches, loops
3. Program using functions
4. Program using classes and objects
5. Program using inheritance
6. Program using polymorphism
7. Program using Numpy
8. Program using Pandas
9. Program using Matplotlib
10. Program for creating dynamic and interactive web pages using forms

Course Outcomes

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

CO1	Comprehend the programming skills in python and write scripts	**K1- K6**
CO2	Create python applications with elementary data items, lists, dictionaries and tuples	
CO3	Implement the Object Oriented Programming programming concepts such as objects and classes, Inheritance and polymorphism	
CO4	Assess the use of Python packages to perform numerical computations and perform data vizualization	
CO5	Create interactive web applications using Django	

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	S	S	S	S	S	S	M	S	S
CO2	S	S	S	S	S	S	S	S	S	S	M	S
CO3	S	S	S	S	S	S	M	S	S	M	L	S
CO4	S	S	S	S	S	S	S	M	S	S	S	S
CO5	S	S	S	S	L	S	M	S	S	M	M	S

S- Strong; M-Medium; L-Low

23P4CA17SEC **SEC-I Professional Competency Skill**

Course Objectives:

- To help learners develop their soft skills.
- To develop their personality together with their technical skills.
- Developing professional, social and academic skills to harness hidden strengths.
- Knowledge equips them to excel in real work environment and corporate life.
- Understand various issues in personal and profession communication and learn to overcome them.

Unit I

Introduction to Soft Skills and Hard Skills: Personality Development: Knowing Yourself, Positive Thinking, Johari's Window, Communication Skills, Non-verbal Communication, Physical Fitness. **Emotional Intelligence:** Meaning and Definition, Need for Emotional Intelligence, Intelligence Quotient versus Emotional Intelligence Quotient, Components of Emotional Intelligence, Competencies of Emotional Intelligence, Skills to Develop Emotional Intelligence. **Etiquette and Mannerism:** Introduction, Professional Etiquette, Technology Etiquette.

Unit II

Communication Today: Significance of Communication, GSC's 3M Model of Communication, Vitality of the Communication Process, Virtues of Listening, Fundamentals of Good Listening, Nature of Non-Verbal Communication, Need for Intercultural Communication, Communicating Digital World. **Academic Skills - Employment Communication:** Introduction, Resume, Curriculum Vitae, Scannable Resume, Developing an Impressive Resume, Formats of Resume, Job Application or Cover Letter. **Professional Presentation:** Nature of Oral Presentation, Planning a Presentation, Preparing the Presentation, Delivering the Presentation.

Unit III

Job Interviews: Introduction, Importance of Resume, Definition of Interview, Background Information, Types of Interviews, Preparatory Steps for Job Interviews, Interview Skill Tips, Changes in the Interview Process, FAQ During Interviews. **Group Discussion:** Introduction, Ambience/Seating Arrangement for Group Discussion, Importance of Group Discussions, Difference between Group Discussion, Panel Discussion and Debate, Traits, Types of Group Discussions, topic based and Case based Group Discussion, Individual Traits.

Unit IV

Professional Skills - Creativity at Workplace: Introduction, Current Workplaces, Creativity, Motivation, Nurturing Hobbies at Work, The Six Thinking Hat Method. **Ethical Values:** Ethics and Society, Theories of Ethics, Correlation between Values and Behavior, Nurturing Ethics, Importance of Work Ethics, Problems in the Absence of Work Ethics. **Capacity Building: Learn, Unlearn and Relearn**: Capacity Building, Elements of Capacity Building, Zones of Learning, Ideas for Learning, Strategies for Capacity Building.

Unit V

Leadership and Team Building: Leader and Leadership, Leadership Traits, Culture and Leadership, Leadership Styles and Trends, Team Building, Types of Teams. **Decision Making and Negotiation:** Introduction to Decision Making, Steps for Decision Making, Decision Making Techniques, Negotiation Fundamentals, Negotiation Styles, Major Negotiation Concepts. **Stress and Time Management:** Stress, Sources of Stress, Ways to Cope with Stress

Text Book:

1. *Soft Skills: an Integrated Approach to Maximise Personality*, Gajendra S. Chauhan, Sangeeta Sharma, Wiley India

Additional References:

1. *Personality Development and Soft Skills*, Barun K. Mitra, Oxford Press
2. *Business Communication*, Shalini Kalia, Shailja Agrawal, Wiley India
3. *Soft Skills - Enhancing Employability*, M. S. Rao, I. K. International
4. *Cornerstone: Developing Soft Skills*, Sherfield, Pearson India

Course Outcomes

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

CO1	To know about various aspects of soft skills and learn ways to develop personality	**K1- K6**
CO2	Understand the importance and type of communication in personal and professional environment.	
CO3	To provide insight into much needed technical and non-technical qualities in career planning.	
CO4	Learn about Leadership, team building, decision making and stress management	

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	S	S	S	S	S	S	M	S	S
CO2	S	S	S	S	S	S	S	S	S	S	M	S
CO3	S	S	S	S	S	S	M	S	S	M	L	S
CO4	S	S	S	S	S	S	S	M	S	S	S	S
CO5	S	S	S	S	L	S	M	S	S	M	M	S

S- Strong; M-Medium; L-Low