MCA I AND II SEMESTER SYLLABUS

2023-2024

23PCA101C	**Mathematical Foundations for Computer Applications**	**Credits: 03**
Hrs/Week:L:T:P:S **3:0:0:0**		CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

UNIT-I	**10 Hrs.**

Set Theory: Sets and Subsets, Set Operations and the Laws of Set Theory, Counting and Venn Diagrams, Principles of Inclusion and Exclusion, Permutations and Combinations with repetition. **Fundamentalsof Logic :**Basic Connectives and Truth Tables, Logic Equivalence- the laws of Logic, Logical Implications, Rules of Inference, The use of Quantifiers, Quantifier Definitions, Proofs of Theorems.

UNIT–II	**10 Hrs.**

Functions: Cartesian products and Relations, Functions-Plain and One-to-One, Onto Functions, Stirling Numbers of the Second Kind, Special functions, The Pigeon-hole principle, Function composition and inverse functions. **Relations :**Properties of Relations, Computer recognition-Zero One Matrices and Directed graphs, Posets and Hasse Diagrams

UNIT–III	**10 Hrs.**

Linear Algebra: Introduction, types of matrices, elementary row operations, row echelon matrix, rank, consistency of a system of linear equations. Eigen values and eigen vectors. Largest eigen value using power method. Cayley-Hamilton theorem (without proof) – inverse of a matrix using Cayley-Hamiltonian theorem. **Algorithms to solve system of linear algebraic equations:** Gauss elimination, Gauss seidel and Jacobi iterative procedures.

UNIT–IV	**10 Hrs.**

Statistics: Introduction**,** Measures of central tendency (Arithmetic mean,Geometric mean, Harmonic mean, Median,Quartiles, Mode). Measures of dispersion (Range, Quartile deviation, mean deviation and standard deviation).**Random variable and probability distribution** Concept of random variable, discrete probability distributions, continuous probability distributions, Mean, variance and co-variance and co-variance of random variables. Binomial and normal distribution, Exponential and normal distribution with mean and variables and problems.

Reference Books *

1. Ralph P. Grimaldi, Discrete and Combinatorial Mathematics And Applied Introduction, 4th Edition, Pearson Education, 2003.

2. Richard A Johnson and C.B Gupta "Probability and statistics for engineers" Pearson Education.

3. Dr. K. S. Chandrashekhar, Engineering Mathematics- IV, Sudha Publications

Course Outcomes

After completion of the course student will be able to

1. Apply the fundamentals of set theory and mathematical logic to perform various set operations and logic to the real world problems.
2. Apply the concept of relations and functions on sets to determine their types and compositions.
3. Acquire ability to work with matrices.
4. Acquire ability to represent the data and calculate the measures of central tendency and dispersion.
5. Identify and list the different applications of discrete mathematical concepts in computer science.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2										2
CO2		2										2
CO3		2										2
CO4		3										2
CO5	3	2										3

23PCA102C	Python Programming	Credits: 04
Hrs/Week:L:T:P:S 4:0:0:0		CIEMarks:50
Total Hours/Week: 52 Hrs		SEEMarks:50

UNIT-I	**13 Hrs.**

Basics of Python Programming: Features of python, writing and executing first python program, Literal constants, variables and identifiers, data types, input operation, comments, reserved words, indentation, operators and expressions, operations on strings. Decision control statements. **Data Structures:** Creating, accessing, cloning, add, updating of lists, list methods. Introduction to Tuples. Dictionary &Set methods.

UNIT–II	**13 Hrs.**

Functions: Introduction, Function Definition, Function Call, Variable scope and lifetime, the return statement, more on defining functions. Lambda functions .**Modules:** The from…import statement, Name of Module, Making your own Modules, The dir() function. **Regular Expressions:** The match()function, The search() function, The sub() function, The findall(), finditer() functions, Meta characters in regular expressions, groups.

UNIT–III	**13 Hrs.**

Classes and Objects: Introduction, Classes and Objects, class method and self argument, The init method, Class Variables and Object Variables, The del() method, Other special methods, Public and Private data members, Private Methods, Calling a class method from another class methods,

Staticmethods.**OperatorOverloading:**Introduction,ConceptofOperatorOverloading,Reverse adding.

UNIT–IV	**13 Hrs.**

File Handling: Introduction, File Path, Types Of Files, Opening And Closing Files, Reading And Writing Files, File Positions, Renaming And Deleting Files, Directory Methods, Methods From OS Module. **Working with Database:** Connecting to a SQLite database, execute select statements, execute insert,update,and delete statements. Introduction to PySimpleGUI.

Reference Books

1. ReemaThareja,"PythonProgrammingusingproblemsolvingapproach",OxfordUniversity Press,2017.

2. Paul Gries, Jennifer Campbell, Jason, Practical Programming, An introduction to Computer Science using Python3.6,3rdEdition, Pragmetic Book shelf.

3.   Charles Dierbach,"Introduction to Computer Science using Python", Wiley India Edition.

Course Outcomes

After completion of the course student will be able to

1. Demonstrate core elements of Python Programming

2. Apply the knowledge of functions in building the python programs

3. Understand the basic concepts of object oriented programming

4. Demonstrate the concepts of file handling

5. Apply the knowledge in real time applications

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	1	3	1	1							
CO2	1	3	3	1	1							
CO3	1	2	3	1	1							
CO4	2	3	3	1	1							
CO5	2	3	3	1	1							1

23PCA103C		Credits: 03
Hrs/Week:L:T:P:S **3:0:0:0**	**Web Programming**	CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

Course Objectives:
1. Creating the small web page using xhtml5.
2. Use different tags of html to create web page.
3. Use of CSS and JavaScript.
4. Developing the dynamic document using JavaScript.

UNIT-I	**10 Hrs.**

Fundamentals of Web and XHTML: Internet, WWW, Web Browsers, and Web Servers; URLs; MIME; HTTP; Security; The Web Programmers Toolbox. XHTML: Origins and evolution of HTML and XHTML; Basic syntax; Standard XHTML document structure; Basic text markup; Images; Hypertext Links; Lists; Tables; Forms; Frames; Syntactic differences between HTML4,HTML 5 and XHTML, Introduction to HTML5.0 form elements and validations.

UNIT–II	**10 Hrs.**

CSS 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 <span> and <div> tags; Conflict resolution.

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; Constructor; Pattern matching using regular expressions; Errors in scripts; Examples.

UNIT–III	**10 Hrs.**

Dynamic Documents with JavaScript: The JavaScript execution environment; The Document Object Model; Element access in JavaScript. **Events and Event Handling:**Handling events from the Body elements, Button elements, Text box and Password elements. The DOM 2 event model.

Introduction to AJAX: Overview of AJAX, The basics of AJAX, Rails with AJAX.

Introduction to PHP: Overview of PHP, General syntactic characteristics, Primitives, operations and expressions, Output, Control statements, Arrays, Functions, Pattern matching, Form handling, Files.

UNIT–IV	**10 Hrs.**

Session Handling with PHP: Tracking users, Cookies, Sessions.CRUD Operations using databaseand Handling XML.

Introduction to Ruby on Rails: Origins and uses of Ruby, Scalar types and their operations, Simple input and output, Control statements, Arrays, Hashes, Methods, Classes, Code blocks and iterators, Pattern matching. **Introduction to Rails:** Overview of Rails, Document requests, Processing forms, Rails applications with Databases, Layouts.

Reference Books

1. Robert W. Sebesta, Programming the World Wide Web, 4th Edition, Pearson Education, 2008.

2. Chris Bates, Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2006.

3. Eric Ladd, Jim O' Donnel using HTML 4,XML and Java, Prentice Hall of India-QUE,1999.

Course Outcomes

After completion of the course student will be able to

1. Illustrate the fundamentals of web programming.

2. Apply the mark-up and layout design to build web applications.

3. Analyze appropriate content and scripting language concepts.

4. Design and implement user interactive web applications.

5. Apply the knowledge of web and can give solutions to the real world problems.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	2									
CO2	3	2	3		1							
CO3	3	2	3		1							
CO4	3	2	3		2							
CO5	3	2	3						2			1

23PCA104C	Operating Systems & Shell Programming	Credits: 03
Hrs/Week:L:T:P:S **3:0:0:0**		CIEMarks:50
Total Hours/Week:40Hrs		SEEMarks:50

UNIT-I	10 Hrs.

Introduction to Operating Systems: What Operating Systems do? Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and security; Kernel data structures, Computing environments and Open source operating systems.

System Structures: Operating System Services; User - Operating System interface; System calls; Types of system calls; System programs; Operating System design and implementation; Operating System structure; Operating System debugging, Operating System generation; System boot.

UNIT–II	10 Hrs.

Process Management: Process concept; Process scheduling **Multi-Threaded Programming**: Overview; Multi-core programming, Multithreading models; Thread Libraries; Implicit threading, threading issues. **Process Scheduling:** Basic concepts; Scheduling criteria; Scheduling algorithms; Thread scheduling, Multiple-Processor scheduling; Real time CPU scheduling. **Process Synchronization**: The Critical section problem; Peterson's solution; Synchronization hardware; Mutex locks, Semaphores; Classical problems of synchronization; Monitors.

UNIT–III	10 Hrs.

Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection, recovery from deadlock.

Memory Management Strategies: Background; Swapping; Contiguous memory allocation; Segmentation, Paging; Structure of page table.**Virtual Memory Management:** Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing.

UNIT–IV	10 Hrs.

Essential UNIX/LINUX commands: User Names and Groups, Logging In, Correcting Typing Mistakes, Format of Linux Commands, Changing Your Password.**Unix files:** Naming files,Basic file types/categories**,** Organization of files, Hidden files, Standard directories, Parent child relationship, The home directory and the HOME variable, Reaching required files- the PATH variable, manipulating the PATH, Relative and absolute pathnames.**Directory commands** – pwd, cd, mkdir, rmdir commands. The dot(.) and double dots (..) notations to represent presentand

parent directories and their usage in relative path names. **File related commands** – cat, mv, rm, cp, wc and od commands, File attributes and permissions and knowing them, The ls command with options. **Changing file permissions**: the relative and absolute permissions changing methods, Recursively changing file permissions, Directory permissions.

Reference Books

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Concepts, 9thedition, Wiley-India, 2016.
2. D.M Dhamdhere, Operating Systems: A Concept Based Approach 2ndEdition, Tata McGraw-Hill, 2002.
3. SumitabhaDas: Your UNIX The Ultimate Guide; TMH.

Course Outcomes

After completion of the course student will be able to

1. Explore the core structure and functionality of the Operating Systems.

2. Interpret the various process management and synchronization mechanisms.

3. Analyze the knowledge of occurring deadlock concepts and apply wide range of problem solving methods to solve deadlocks.

4. Identify and analyze the performance of different memory management techniques, page replacement and disk scheduling algorithms.

5. Demonstrate the basic UNIX commands.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	1									2
CO2	3	2	1									2
CO3	3	2	2									2
CO4	3	2	2									2
CO5	3											2

23PCA105C		Credits: 04
Hrs/Week:L:T:P:S **3:0:2:0**	**Computer Networks**	CIEMarks:50
Total Hours/Week:52 40Hrs + 12Hrs		SEEMarks:50

UNIT-I	**10 Hrs.**

Introduction: Uses of Computer Networks, Network Hardware. **Network Software**: Protocol Hierarchies, Design Issues for the Layers. **Reference Models**: The OSI Reference Model, The TCP/IP Reference Model, A Comparison of the OSI and TCP/IP Reference Models. **Physical Layer**-Guided Transmission Media, Digital Modulation and Multiplexing.

UNIT–II	**10 Hrs.**

Data Link Layer-Data link Layer Design issues, Framing, Flow Control and Error Correcting and Detection codes, Sliding Window Protocols (Stop and Wait, Go-Back-N (GBN) and Selective Repetitive (SR)), Medium Access Control-The Channel Allocation Problem, Multiple Access Protocols, and Ethernet. **Data Link Layer Switching:** Uses of bridges, repeaters, hubs, switches, routers and gateways.

UNIT–III	**10 Hrs.**

The Network Layer: Network Layer Design issues, Routing algorithms- The Optimality Principal, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical routing, Congestion Control Algorithms, Quality of Service, Internetworking.

The Network Layer in the Internet: The Network Layer in the internet- IP version 4 Protocol(IPv4),The Main IPv6 Header, Extension Headers, Internet Control Protocols: ICMP, ARP, DHCP.

UNIT–IV	**10 Hrs.**

The Transport Layer -The Transport Service: Services Provided to the Upper Layers, Berkeley Sockets, Elements of Transport Protocols, Internet transport protocols- TCP: Introduction to TCP, The Service Model, Protocol, Segment Header, UDP.

The Application Layer-The Domain Name System, Electronic Mail, The World-Wide-Web, Streaming Audio and Video.

Reference Books

1. Andrew S. Tanenbaum, David J Wetherall, "Computer Networks", Pearson Education, Pearson Publication, 5th Edition, 2012.

2. Behrouz A Forouzan, Firouz Mosharraf, "Computer Networks A Top-Down Approach", Tata McGraw-Hill Education Pvt. Ltd, 2011.

3. William Stallings, "Data and Computer Communication" ,8th edition, Pearson Publications,2007.

LIST OF LABORATORY ASSIGNMENTS:

Simulate the following experiments using the NS2 simulators.

1. Three node point to point network with duplex link between them.
2. Four node point to point network using TCP/UDP.
3. Different types on internet traffic such as FTP, Telnet and Analyze throughput.
4. Transmission of ping messages over network topology consisting of six nodes.
5. Ethernet LAN using N nodes (6 to 10), change error rate and data rate and also compare throughput.

Implement the following programs using C/C++ language:

6. Error detection using CRC-CCITT(16-bits).
7. Bits stuffing and de-stuffing of Binary data.
8. Distance vector algorithm to find a suitable path for transmission.
9. Congestion control using leaky bucket algorithm.
10. Demonstrate converting normal text to cipher text using simple techniques.

Course Outcomes

1. To comprehend basics of data communication system.
2. Enumerate the layers of the OSI, TCP/IP model and demonstrate functions of each layer and comprehend the concept of data link protocols.
3. To exhibit the ability to apply different error detection and correction technique to solve communication problem.
4. To exhibit the ability to understand issues related to transport layer and protocols.
5. Demonstrate the concept of internetworking, routing techniques of network layer.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3		2									2
CO2	3		2									1
CO3	3		2									1
CO4	3	1	2									1
CO5	3	2	2									2

23PCA106C	Research Methodology & IPR	Credits: 03
Hrs/Week:L:T:P:S 3:0:0:0		CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

UNIT-I	10 Hrs.

Research Methodology: Introduction, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, and Problems Encountered by Researchers in India. Defining the Research Problem: Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An

Illustration.

UNIT–II	10 Hrs.

Reviewing the literature: Place of the literature review in research, bringing clarity and focus to your research problem, improving research methodology, Broadening knowledgebase in research area, enabling contextual findings, How to review the literature, searching the existing literature, reviewing the selected literature, Developing a theoretical framework, Developing a conceptual framework, Writing about the literature reviewed.

UNIT–III	10 Hrs.

Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Designs. Design of Sample Surveys: Introduction, Sample Design, Sampling and Non-sampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs.

UNIT–IV	10 Hrs.

Data Collection: Experimental and Surveys, Collection of Primary Data, Collection of 02.03.2021 updated 17/ 104Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method. Interpretation and Report Writing: Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout. Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports. **Intellectual Property (IP) Acts:** Introduction to IP: Introduction to Intellectual Property (IP), different types of IPs and its importance in the present scenario, Patent Acts: Indian patent acts 1970.Design Act: Industrial Design act 2000. Copy right acts: Copyright Act 1957. Trade Mark Act, 1999.

Reference Books

1.   Research Methodology: Methods and Techniques, C.R. Kothari, Gaurav Garg New Age International 4th Edition, 2018.

2.   Research Methodology a step-by- step guide for beginners. Ranjit Kumar SAGEPublications Ltd 3rd Edition, 2011 Study Material.

3.   Conducting Research Literature Reviews: From the Internet to Paper Fink A Sage Publications, 2009.

Course Outcomes

1.   Identify the suitable research methods and articulate the research steps in a proper sequence for the given problem.

2.   Apply the functions of the literature review in research, carrying out a literature search, developing theoretical and conceptual frameworks and writing a review.

3.   Understand various research designs, sampling designs, measurement and scaling techniques.

4.   Perform the data collection from various sources segregate the primary and secondary data.

5.   Apply some concepts/section of Copy Right Act /Patent Act /Cyber Law/ Trademark to the given case and develop –conclusions.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2										2
CO2	3	2										2
CO3	3	2										2
CO4	3	2										2
CO5	3	2				1	1	2			1	2

23PCA107C	Introduction to Programming Languages	Credits: NA
Hrs/Week: L:T:P:S **3:0:0:0**		CIEMarks:100
Total Hours/Week: 40 Hrs		SEE Marks: NA

UNIT-I	**10 Hrs.**

Overview of C: Features of C, Structure of C program, process of compiling and executing the C program. **Constants, Variables and Data types:** Introduction, Character set, C tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of variables, Example programs. **Operators and Expressions:** Overview of operators, Evaluation of expressions, Type conversion in expressions. **Managing Input and Output Operations:** Formatted and Unformatted input and output statements **Decision making and Branching:** Decision making with if, if-else, Nesting of if-else statements, else-if ladders, switch statement, Conditional Operator ?:, goto statement.

UNIT–II	**10 Hrs.**

Looping: while statement, do-while statement, for statement, jumps in loops. **Arrays:** Introduction, One dimensional arrays, declaration and initialization of one-dimensional arrays, Two dimensional arrays, declaration and initialization of two-dimensional arrays. Operations on arrays. **Strings:** Introduction, Declaring and initializing string variables, String-handling functions, Array of String.

UNIT–III	**10 Hrs.**

User defined functions: Introduction, Elements of user defined function, Category of functions: Based on call by value, call by reference, recursive functions. **Structures:** Defining a structure, Declaring structure variables, Accessing structure members, Initialization.

UNIT–IV	**10 Hrs.**

Pointers: Introduction, Accessing the address of a variable, Declaring and initialization of pointer variables, Pointers as function arguments. **Classes and Object-Based Programming in C++:** Introductions to Object Oriented programming concepts (OOPS), Declaration, creation of class and object using C++, Accessspecifiers of a Class, Constructors and Destructors in a Class, Nested Classes.

Reference Books

1. E. Balaguruswamy, Programming in ANSI C**,** 7th Edition, Tata McGraw Hill Publications, 2017.

2. E. Balagurusamy,, Object Oriented Programming with C++, Tata McGraw Hill Education Pvt.Ltd, Fourth Edition 2010.

3. K R Venugopal, Rajkumar Buyya and T. Ravishankar, Mastering C++, Tata McGraw-Hill, 2006.

Course Outcomes

After completion of the course student will be able to:

1. Demonstrate the key concepts introduced in C programming by writing and executing the programs.

2. Demonstrate the concepts of structures and pointers for the given application/problem.

3. Implement the single/multi-dimensional array for the given problem.

4. Explore user-defined data structures like structures and pointers in implementing solutions like heterogeneous data processing.

5. Design and Develop Solutions to problems using modular/object oriented programming constructs using functions.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	2		2				1			
CO2		1	2		2				1			2
CO3		1	2						1			2
CO4		2	2						1			2
CO5		3	3	2					1			2

23PCA108L	**Python Programming Laboratory**	**Credits: 1.5**
Hrs/Week:L:T:P:S **0:0:3:0**		CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

1. Program on Decision Control Structure Statements.

2. Program on List and Dictionary of data.

3. Program on User Defined Functions.

4. Program on Regular Expressions.

5. Program on Object Oriented Concepts.

6. Program on Overloading Operator.

7. Program on File Handling Mechanism.

8. Program on Working with database.

9. Program on Exception Handling.

10. Creation of GUI application.

Course Outcomes (COs):

 After completion of the course student will be able to:

1. Understand the basic programming elements of Python.

2. Apply and analyze the different python data structures.

3. Understand the concepts of OOPS using Python.

4. Implement and debug the real world applications using GUI, file handling and Database.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1												
CO2												
CO3												
CO4												
CO5												

23PCA109L		Credits: 1.5
Hrs/Week:L:T:P:S **0:0:3:0**	**Web Programming Laboratory**	CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

1. Design and develop a static web page using basic HTML tags to demonstrate use of different color, font, table format, bold, italic etc.

2. Design and develop a web page to demonstrate different types of style sheets.

3. Design and develop external CSS style sheet to create a registration form and validate using JavaScript.

4. Write a JavaScript to demonstrate use of alert, prompt and confirm message box by considering general feedback form.

5. Using HTML and JavaScript design a web page to calculate a payroll of an employee.

   Note:

    1. Read employee details such as employee id, name, designation, dept, DOJ and basic salary.

    2. Read deduction in percentage such as PF (Employee side), LIC.

    3. Read allowance in percentage such as PF (Employer side), DA, and HRA.

    4. Calculate gross and net salary of an employee as output.

6. Demonstrate use of hyperlink to pass parameters and validate those parameters in second page using JavaScript.

7. Design and develop a Registration and login page. Forward the request to success and failure page by validating user credentials through AJAX.

8. Create an HTML form with Student Name, USN, DOB, Branch, Sem, Address and E-mail fields, on submitting the page store them in MySQL table. Retrieve and display the data based on USN using PHP.

9. Using Rails and MySQL, develop a program to accept book Information viz. Accession number, title, authors, edition and Publisher from a web page and store the information in a database And to search for a book with the title specified by the user and to Display the search results with proper headings.

10. Design and develop a responsive web site by considering any real time scenario.

Course Outcomes (COs):

After completion of the course student will be able to:

1. Design and develop static web pages.

2. Demonstrate use of different types of CSS.

3. Apply the knowledge of JavaScript/AJAX to develop interactive web pages.

4. Design and develop dynamic web pages using PHP.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1		3	3									3
CO2			2	2								3
CO3												3
CO4	3			2								3
CO5		3			1							

23PCA110S	Seminar	Credits: 02
Hrs/Week: L:T:P:S **0:0:0:2**		CIEMarks:50
Total Hours/Week: 28 Hrs		SEEMarks:50

Seminars are used as a course delivery mode to gather current trends in technology, research literature and self learn topics of their interests. Student has to search a technical topic, make presentation and give a detailed document on their findings in consultation with the guide.

Course Outcomes (COs):

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

1. Identify seminar topics based on contemporary technical, societal and environmental issues.

2. Conduct literature survey in the selected domain.

3. Explore advanced concepts and technologies.

4. Make oral and written technical presentation.

SEMINAR ASSESMENT:

CIE and SEE marks Award : The committee, constituted for the purpose by the Head of the Department, shall award the CIE and SEE marks for the seminar. The committee comprising of Guide/Co-Guide, Senior faculty of the department and HoD/HoD nominee.

CIE and SEE marks Evaluation: Based on technical papers, application development, emerging technology etc.

Presentation skill : 50% of Marks

Report Writing : 25% of Marks

Question and answering : 25% of Marks

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2									2		3
CO2										2		2
CO3										2		3
CO4								2				2
CO5								2				

MCA II SEMESTER SYLLABUS

23PCA201C		Credits: 03
Hrs/Week:L:T:P:S 3:0:0:0	**Data Structures and Algorithms**	CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

UNIT-I	**10 Hrs.**

Introduction to data structures: Information and meaning Stack**:** Definition and examples Primitive operation, Example, Testing for exceptional conditions, implementing the push operation. **Example**: Infix, postfix and prefix, Basic definitions and examples. Evaluating a postfix expression, Program to evaluate a postfix expression, converting an expression from infix to postfix, Program to convert an expression from infix to postfix. **Recursion:** Recursive definition and processes, Factorial function, Multiplication of natural numbers, Fibonacci sequence, Binary search, Properties of recursive definition or algorithms, Towers of Hanoi problem. **Queue:** The queue and its sequential representation, C implementation of queues, Priority queue, Array implementation of a priority queue, circular queue and its implementation, deque(doubly endedqueue)implementation.

UNIT–II	**10 Hrs.**

Lists: Linked lists, Inserting and removing nodes from a list, Linked implementation ofstacks, Get node and free node operations, Linked implementation of queues, Linked list as a data structure, Example of list operation, Header nodes, Array implementation of lists, Limitations of arrayImplementation,Allocatingandfreeingdynamicvariables,Linkedlistsusingdynamicvariable,Non integer and non- homogeneous lists. Other list structures, Circular lists, Stack as a circularlist, Queue as circular list, Primitive operations on circular lists, doubly linked lists.

UNIT–III	**10 Hrs.**

Binary Trees: Binary trees, Operations on binary trees, Applications of binary trees. Binary tree representation, Node representation of binary tree, Internal and external nodes, implicit array representation of binary trees, choosing a binary tree representation, binary tree traversal using C, threaded binary trees. Tree traversals using a father field, heterogeneous binary tree, **Representing list as binary tree:** finding the kth element, deleting an element, finding minimum and maximum element in a tree, evaluating general expressions using trees.

UNIT–IV	**10 Hrs.**

Sorting: Exchange sort**:** Bubble sort, Quick sort. Selection sort and Tree sorting: Straight Selection sort, Binary tree sorts, sorting using a heap. Insertion sorts: Simple Insertion, Shell sort,Merge and Radix sorts.   **Searching:** Sequential searching, Indexed sequential search, Binary

search, Interpolation search. Tree Searching: Insertion into a Binary search tree, Deleting from a Binary search tree. Optimum search trees, Balanced trees.

Reference Books

1. Data structures using C by Yedidyah Langsam and Moshe J.Augenstein and Aaron M. Tenanbaum, PHI.

2. Mark Allen Weiss, data Structures and Algorithm Analysis in C, 2nd Edition, Pearson Education Asia.

3. Anany Levitin, Introduction to design and analysis of algorithms, Pearson Education, 2003

Course Outcomes

After completion of the course student will be able to:

1. Understand the basic concepts of data structures like stack and queue

2. Analyze the logical representation of linked lists

3. Understand the working procedure of binary trees

4. Design and analyze sorting and searching techniques

5. Be able to compare functions and describe the relative merits of worst-, average-, and best-case analysis.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2		2										
CO3		2										
CO4			3									
CO5		2		1								

23PCA202C	Java and J2EE	Credits: 04
Hrs/Week:L:T:P:S 4:0:0:0		CIEMarks:50
Total Hours/Week: 52 Hrs		SEEMarks:50

UNIT-I	13 Hrs.
An Overview of Java: The Java Class Libraries, Data Types, Variables, Introducing to Object Oriented programming concepts Encapsulation using Classes: Class Fundamentals, data members, Declaring Objects, Assigning Object Reference Variables, Introducing to Polymorphism using Constructors and Methods, Abstract Classes and methods.	

UNIT–II	13 Hrs.
Inheritance: Types of Inheritance, Using overloading and overriding of constructors and methods , this and super keywords , Interfaces, Exception Handling.**J2EE-Overview:** Enterprise Architecture Types-Single tier, 2-tier,-3-tier, n-tier, objectives of Enterprise Applications, features of J2EE, introduction to servers-web servers vs Application servers. Working with **Servlets 3.1:** Exploring the features of servlet 3.1, request and response model, servlet with API-packages, web directory structure-packaging, deploying and running web applications, servlet-lifecycle, working with ServletConfig and ServletContext Objects, HttpServletRequest and HttpServletResponse Interfaces.	

UNIT–III	13 Hrs.
Handling Sessions in Servlet 3.1: Describing the session, Introduction to session tracking, Exploring session tracking mechanisms – using cookies, Hidden Form Fields, URLRewriting, session creation and tracking. **Java Server Pages 2.3(JSP):** Introduction to JSP technology, advantages of JSP over servlet, architecture of JSP- Model-1,Model-2,life cycle of JSP, JSP Basic tags – scripting , directive , action tags, JSP implicit objects , Java Beans API, Bean properties, declaring beans in JSP Pages, bean components.	

UNIT–IV	13 Hrs.
JDBC 4.0: Introducing JDBC- architecture, features , JDBC Driver Types, JDBC API- sql Packages, A Brief Overview of the JDBC process with java.sql packages- JDBC Database Connection; Associating the JDBC/ODBC Bridge with the Database, Describing Classes and Interfaces- Driver Manager class, Driver Interface, Connection Interface, Statement Interface, Prepared Statement ,Callable Statement Interface, Result Set, Batch Updates. Transaction Processing; Metadata, Data types; Exceptions. **J2EE Design Patterns**: Introducing Design Patterns, Role of design patterns, types of design patterns. **Spring Framework:** Introduction to Spring	

framework, Features and Spring framework architecture- core module, AOP module, ORM Module.

Reference Books

1.   Herbert Schildt: JAVA the Complete Reference, 7th/9th Edition, Tata McGraw Hill, 2020.

2.   Kogent Learning Solutions Inc and Dreamtech Press: Java Server Programming Java EE 7 Black Book, 2020

3.   Keogh, Jim (2002). J2EE: the complete reference. New Delhi : Tata McGraw-Hill.

Course Outcomes

After completion of the course student will be able to:
1. Demonstrate the basic programming constructs of Java and OOP concepts to develop Java programs.

2. Understand J2EE framework and technologies (Servlet/JSP).

3. Work with Java.sql.* package to design, implement and debug database applications.

4. Develop reusable software components using Java patterns.

5. Understand Spring framework and Develop Web based applications successfully.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2		3			2							
CO3					2							
CO4			3									
CO5			2									1

23PCA203C	Database Management System	Credits: 04
Hrs/Week:L:T:P:S 3:0:2:0		CIEMarks:50
Total Hours/Week: 40 Hrs + 12 Hrs		SEEMarks:50

UNIT-I	10 Hrs.

Databases and Database Users: Introduction, An Example, Characteristics of the Database Approach, Actors on the scene, Workers behind the scene, Advantages of using the DBMS approach, A brief history of database applications, When not to use a DBMS, **Database System Concepts and Architecture**: Data models, schemas and instances, Three-schema architecture and data independence, Database language and interfaces, The database system environment. **Data Modeling Using the Entity-Relationship(ER) Model:** Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationships, Relationship Types, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design for the COMPANY Database; ER Diagrams, Naming Conventions and Design Issues.

UNIT–II	10 Hrs.

The Relational Data Model and Relational Database Constraint: Relational Model Concepts, Relational Constraints and Relational Database Schemas, Update Operations, Transactions, and Dealing with Constraint Violations. Relational Algebra and Relational Calculus: Unary Relational Operations, Relational Algebra Operations from Set Theory, Binary Relational Operations, Additional Relational Operations; Examples of Queries in Relational Algebra. **Relational Database Design Using ER and EER to-Relational Mapping:** Relational Database Design Using ER to Relational Mapping. **SQL-99: Schema Definition, Constraints, Queries and Views:** SQL Data Definition and Data types, Specifying Constraints in SQL, Schema Change statement in SQL, Basic Queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL, Specifying Constraints as Assertion and Triggers, Views (Virtual Tables) in SQL, Additional Features of SQL.

UNIT–III	10 Hrs.

Functional Dependencies and Normalization for Relational Database: Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form. **Relational Database Design Algorithms and Further Dependencies:** Properties of Relational Decompositions, Algorithms for Relational Database Schema Design; Multi-valued Dependencies and fourth normal form, Join Dependencies and fifth normal form, Inclusion Dependencies; Other Dependencies and Normal Forms. **Overview of Query Evaluation** The System Catalog: Information in the Catalog;

Introduction to Operator Evaluation: Three Common Techniques, Access Paths; Algorithms for Relational Operations: Selection, Projection, Join, Other Operations; Introduction to Query Optimization: Query Evaluation Plans, Multi-operator Queries, Pipelined Evaluation, The Iterator Interface; Alternative Plans: A Motivating Example: Pushing Selections, Using Indexes; What a Typical Optimizer Does: Alternative Plans Considered, Estimating the Cost of a Plan.

UNIT–IV	10 Hrs.

Overview of Transaction Management: The ACID Properties: Consistency and Isolation, Atomicity and Durability; Transactions and Schedules; Concurrent Execution of Transactions: Motivation for Concurrent Execution, Serializability, Anomalies due to Interleaved Execution, Schedules Involving Aborted Transactions; Lock- Based Concurrency Control: Strict Two-Phase Locking, Deadlocks; Performance of Locking; Transaction Support in SQL: Creating and Terminating Transactions, What Should We Lock? Transaction Characteristics in SQL: Introduction to Crash Recovery: Stealing Frames and Forcing Pages, Recovery - Related Steps during Normal Execution, Overview of ARIES recovery algorithm, Atomicity: Implementing Rollback. Database Security, Introduction to Database Security; Access Control; Discretionary Access Control: Grant and Revoke on Views and Integrity Constraints; Mandatory Access Control: Multilevel Relations and Poly instantiation, Covert Channels, DoD Security Levels.

Reference Books

1. R. Elmasri and S. Navathe, Fundamentals of Database Systems, Fifht Edition, Pearson Education 2011.
2. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems,Third Edition, McGraw-Hill 2003.
3. Silberschatz,Korth and Sudarshan, Database System Concepts, Fourth Edition, McGraw-Hill.

Course Outcomes

After completion of the course student will be able to

1. Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS

2. Use Structured Query Language (SQL) for database manipulation and also demonstrate the basic of query evaluation.

3. Design and build simple database systems and relate the concept of transaction, concurrency control and recovery in database

4. Develop application to interact with databases, relational algebra expression.

5. Develop applications using tuple and domain relation expression from queries.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2										1
CO2					1		1					
CO3	1		3									1
CO4			3									
CO5					2							

DBMS Laboratory Assignments:

1. Demonstration of basic queries like create, update, drop and select (with aggregate and groupfunctions)
2. Design and demonstration of ER Module.
3. Use of Intermediate SQL queries based on inner queries, working on constraints, differenttypes of JOIN, filters etc.
4. Demonstrate use of subroutines
5. Demonstrate use of stored procedures.
6. Demonstrate use of triggers.
7. Database design and normalization.
8. Queries on database backup and Revoke.
9. User creation and authentication.
10. Use of advanced data types such as BLOG, Timestamp, Binary etc.

Course Outcomes (COs):

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

1. Understand the fundamental concepts like data, information, DBMS, Data Models.
2. Design and Create Databases.
3. Implement and Manipulate the data.
4. Optimize query performance.

23PCA204C		Credits: 03
Hrs/Week:L:T:P:S **2:2:0:0**	**Technical Communication**	CIEMarks:50
Total Hours/Week: 40Hrs		SEEMarks:50

Course Objective:
1. Develop Proficiency in Technical Communication
2. Enhance Listening and Presentation Skills
3. Master Business Writing Techniques
4. Understand and Apply Business Ethics
5. Gain Knowledge of Corporate Governance

UNIT-I	**10 Hrs.**

Fundamentals of Technical Communication: Technical Communication: Features; Distinction between General and Technical Communication; **Levels of Communication:** Extrapersonal Communication, Intrapersonal Communication, Interpersonal Communication, Organizational Communication and Mass Communication. **The Flow of Communication:** Downward Communication, Upward Communication, Lateral or Horizontal Communication, Diagonal or Crosswise Communication, The Importance of Technical Communication.

UNIT–II	**10 Hrs.**

Listening Skills: Types of Listening, Traits of a Good Listener, and Barriers to Effective Listening. **Effective Presentation Strategies:** Introduction, Defining Purpose, Analyzing Audience and Locale, Organizing Contents, Introduction Main Body, Conclusions, Preparing an Outline, Kinesics, Personal Appearance: Posture, Gesture, Facial Expression, Eye Contact, Proxemics, Paralinguistics, Quality, Volume, Pace/Rate, Pitch, Articulation Pronunciation, Voice

Modulation, Pauses, Chronemics.

UNIT–III	**10 Hrs.**

Letter Writing and Email: Business Letters, Significance, Purpose, Structure Layout, Principles, Types and Samples. **Emails:** Advantages and Limitations, Style, Structure, and Content. **Technical Reports:** Introduction, Importance of Reports, Objectives of Reports, Characteristics of a Report, Categories of Reports, Formats, Prewriting, Structure of Reports

(Manuscript Format), Types of Reports, Writing the Report, Revising, Editing, and Proofreading.

UNIT–IV	**10 Hrs.**

Introduction to business ethics and values: Meaning, Nature of business ethics, Importance of business ethics, Factors influencing business ethics, Arguments for and against business ethics, Types of ethical dilemmas. Values: Meaning, Types of values. **Introduction to Corporate**

Governance: Definition and Conceptual Framework of Corporate Governance, Business Ethics – an important dimension to Corporate Governance, Fair and Unfair Business Practices. Theoretical Basis of Corporate Governance, Mechanism- Corporate Governance Systems, Indian Model of Governance, Good Corporate Governance.

Reference Books

1. Meenakshi Raman, Technical Communication Oxford University Press, 2017.

2. C.S.V. Murthy, Business Ethics, Himalaya Publishing House; Mumbai, 2007.

3. Andrew Crane and Diark Matten, Business Ethics, Oxford Publication, New Delhi, 2007.

Course Outcomes

After completion of the course student will be able to:

1. Understand the fundamental principles of effective technical communications.
2. Understand the fundamental principles of good listening skills and effective presentation strategies.
3. Develop various types of technical reports/letters/emails and practice in their professional life.
4. Understand the Business Ethics and corporate governance.
5. Imbibe the ethical issues in corporate governance and to adhere to the ethical codes.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3									2		2
CO2										2		2
CO3										2		3
CO4								2				2
CO5								2				

23PCA205L	Data Structures Laboratory	Credits: 2
Hrs/Week:L:T:P:S **0:0:4:0**		CIEMarks:50
Total Hours/Week:25Hrs		SEEMarks:50

1. Write a C Program to demonstrate Stack operations using arrays.

2. Write a C Program to evaluate postfix expression, postfix expression contains single digit integers and the operators +,-,*and /.

3. Write a C Program to convert infix to postfix expression.

4. Write a C Program to demonstrate Queue operations using arrays.

5. Write a C Program to demonstrate different operations on singly linked list.

6. Write a C Program to demonstrate different operations on circular doubly linked list.

7. Write a C program to implement the following operation on binary treeusing array:

   i. Insert

   ii. Delete

   iii. Tree traversal

8. Write a C program to demonstrate binary search using recursion.

9. Write a C Program to perform the Merge sort.

10. Write a C Program to perform the Quick sort.

Course Outcomes (COs):

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

1. Evaluate the Expressions like postfix, prefix conversions.

2. Implementing various data structures viz. Stacks, Queues, Linked Lists, and Trees.

3. Implementing various searching techniques.

4. Implementing various sorting techniques.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1				2								
CO2			2									
CO3		2										
CO4			2									
CO5												

23PCA206L		Credits: 2
Hrs/Week: L:T:P:S 0:0:4:0	**Java and J2EE Laboratory**	CIEMarks:50
Total Hours/Week: 25Hrs		SEEMarks:50

1. Write a JAVA program to demonstrate use of class members and object members.

2. Write a JAVA program to demonstrate polymorphismusing constructor and methods

3. a) Write a JAVA program to demonstrate abstract class concept.

   b) Write a JAVA program to demonstrate the inheritance concept.

4. Write a Servlet program to demonstrate the basic servlet using doGet(), doPost() and service() methods.

5. Write a servlet program to demonstrate session tracking.

6. Write a JSP script to demonstrate scripting, directive and expression tags.

7. Write a JSP script to demonstrate bean concept.

8. Write a Servlet/JSP to demonstrate CRUD operations using JDBC.

9. Write a J2EE application to demonstrate complete login process.

10. Write a program to demonstrate spring framework.

Course Outcomes (COs):

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

1. Demonstrate OOPS concepts.
2. Demonstrate simple web applications using servlet and JSP.
3. Design and develop web applications to solve real world problems.
4. Demonstrate the basic use of spring framework.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2			2	1								
CO3			3									3
CO4												
CO5		2										

23PCA207P		Credits: 02
Hrs/Week: L:T:P:S 0:0:4:0	**Mini Project**	CIEMarks:50
Total Hours/Week:` 25 Hrs		SEEMarks:50

Students are expected to take up mini project with a team size not exceeding three. The objective of this course is to develop real time mini projects using latest technologies.

Course Outcomes (COs):

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

1. Apply the technical knowledge gained through different courses to solve the real world problems.
2. Exhibits the presentation and communication skills.
3. Prepare a technical report based on work carried out.
4. Exhibit the responsibilities in a team.

Mini Project Assessment:

CIE and SEE marks Award : The committee, constituted for the purpose by the Head of the Department, shall award the CIE and SEE marks for the Mini Project. The committee comprising of Guide/Co-Guide, Senior faculty of the department and HoD/HoD nominee.

CIE and SEE marks Evaluation :

 Application development, Presentation skill : 50% of Marks
 Report Writing : 25% of Marks
 Question and answering : 25% of Marks

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											2
CO2									1	3		1
CO3											2	
CO4									2		2	
CO5												

Professional Elective-I		Professional Elective-II	
Subject Code	Subject	Subject Code	Subject
23PCC208E	Data Mining	23PCC212E	Introduction to AI
23PCC209E	Cloud Computing	23PCC213E	DevOps
23PCC210E	Mobile Application Development	23PCC214E	Android Programming Concepts
23PCC211E	Computer Vision	23PCC215E	Natural Language Processing

23PCC208E	**Data Mining**	**Credits: 03**
Hrs/Week: L:T:P:S **3:0:0:0**		CIEMarks:50
Total Hours/Week: 40Hrs		SEEMarks:50

UNIT-I	**10 Hrs.**

Introduction to data mining: Definition of Data Mining, Motivating Challenges of DM, Data Mining Tasks. Data: Data Attributes, Types of Data, Quality of Data and Data Preprocessing, Measures of Similarity and Dissimilarity.

UNIT–II	**10 Hrs.**

Association Analysis: Definition of Association Analysis, Frequent Item Set Generation, Rule Generation, Compact Representation of Frequent Item Sets. Alternate Method of Generating Item Sets, FP Growth Algorithms, Evaluation of Association Pattern.

UNIT–III	**10 Hrs.**

Classification: Preliminaries, General Approach To Solving Classification Problem, Decision Tree Based Classifier, Rule Based Classifier, Nearest Neighbor Classifier. Cluster Analysis: Overview, K-means, DBSCAN.

UNIT–IV	**10 Hrs.**

Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.

Reference Books

1. "Introduction to Data Mining", Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Education.
2. "Data Mining – Concepts and Techniques", Jiawei Han and Micheline Kamber, Morgan Kaufman, 2006, 2nd Edition.
3. "Introduction to Data Mining with Case Studies", G K Gupta, PHI.

Course Outcomes

After completion of the course student will be able to:
1. Comprehend the fundamentals of Data mining.
2. Apply data preprocessing techniques.
3. Apply association rule mining techniques like a priory, FP tree and ECLAT and analyze the usefulness of rules.
4. Apply classification methods like decision tree, rule based and nearest neighbor, cluster analysis, K-MEANS etc.
5. Comprehend advanced mining applications and algorithms like web mining, search engines etc.,

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2					2							
CO3		2			1							
CO4				2								
CO5			1									

23PCC209E	**Cloud Computing**	**Credits: 03**
Hrs/Week: L:T:P:S **3:0:0:0**		CIEMarks:50
Total Hours/Week: 40Hrs		SEEMarks:50

UNIT-I	**10 Hrs.**

Introduction to Cloud Computing: Eras of computing, The vision of Cloud Computing, Defining a cloud, A closer look, Cloud computing reference model, Historical developments: Distributed systems, Virtualization, Web 2.0; Service oriented computing; Utility oriented computing. Architectures for parallel and distributed computing: Parallel Vs Distributed computing, Elements of distributed computing, Technologies for distributed computing.

UNIT–II	**10 Hrs.**

Virtualization: Introduction, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Virtualization and cloud computing, Pros and cons of virtualization, Technology examples: Xen: Para virtualization, VmWare: Full virtualization, Microsoft Hyper – V.

UNIT–III	**10 Hrs.**

Cloud computing architecture: Introduction, Cloud reference model: Architecture, IaaS, PaaS, SaaS, Types of Clouds: Public, Private, Hybrid and Community clouds, Economics of the cloud, Open challenges.

UNIT–IV	**10 Hrs.**

Cloud Access: authentication, authorization and accounting - Cloud Provenance and meta-data - Cloud Reliability and fault-tolerance - Cloud Security, privacy, policy and compliance- Cloud federation, interoperability and standards.

Reference Books

1. Rajkumar Buyya, Christian Vecchiola, and ThamaraiSelci, Mastering Cloud Computing, Tata McGraw Hill, New Delhi, India, 2013.
2. Barrie Sosinsky, " Cloud Computing Bible" John Wiley & Sons, 2010
3. Kai Hwang, Geoffrey C. Fox and Jack J. Dongarra, "Distributed and cloud computing from Parallel Processing to the Internet of Things", Morgan Kaufmann, Elsevier – 2012

Course Outcomes

After completion of the course student will be able to:

1. Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing.
2. Understand and Identify the basic concepts of Virtualization and types.
3. Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
4. Explain the core issues of cloud computing such as security, privacy, and interoperability.
5. Provide the appropriate cloud computing solutions and recommendations according to the applications used.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2	3											
CO3			2									
CO4				2								
CO5			2									

23PCA210E		Credits: 03
Hrs/Week: L:T:P:S **3:0:0:0**	**Mobile Application Development**	CIEMarks:50
Total Hours/Week: 40Hrs		SEEMarks:50

UNIT-I	**10 Hrs.**

Introduction: Preliminary Considerations – Cost of Development – Importance of Mobile Strategies in the Business World – Mobile Development Today - Mobile Myths - Third-Party Frameworks – Mobile Web Presence - Mobile Content -Mobile Browsers - Mobile Applications – Marketing. **Web Services for Mobile Applications:** What Is a Web Service? - Examples of Web Services - Advantages of Web Services - Web Services Languages (Formats) - eXtensible Markup Language (XML) - JavaScript Object Notation (JSON) - Transferring Non-textual Data - Creating an Example Web Service - Using the Microsoft Stack - Using the Linux Apache MySQL PHP (LAMP) Stack - Debugging Web Services - Tools - Advanced Web Service Techniques.

UNIT–II	**10 Hrs.**

MOBILE USER INTERFACE DESIGN: Understanding Mobile Applications Users – Understanding Mobile Information Design – Understanding Mobile Platforms – Using the Tools of Mobile Interface Design. Mobile Websites: Choosing a Mobile Web Option - Adaptive Mobile Websites - Dedicated Mobile Websites - Mobile Web Apps with HTML5.

MOBILE OPERATING SYSTEMS: Getting Started with Android Programming: Why Target Android? - Who Supports Android? - Android as Competition to Itself - Multiple Markets and Market Locks - Getting the Tools You Need - Installing Additional SDK Components – Development –Connecting to the Google Play - Android Development Practices- Building the Derby App in Android

UNIT–III	**10 Hrs.**

Getting Started With IoS :The iPhone Craze - Apple in Its Beauty - Apple Devices - **Getting the Tools You Need** - Hardware - xCode and the iOS SDK - The iOS Human Interface Guideline - **iOS Project** - Anatomy of an iOS App - Getting to Know the xCode IDE - **Debugging iOS Apps** - The iOS Simulator - Debugging Code - Instruments - **Objective-C Basics** - Classes - Control Structures - Try Catch - Hello World App - Creating the Project - **Creating the User Interface** - Building the Derby App in iOS - User Interface - Team Roster- Details - Leagues and Team Names - Other Useful iOS Things - Offline Storage – GPS.

Getting Started with Windows Phone : New Kid on the Block - Metro - Application Bar - Tiles - Tombstoning - Getting the Tools You Need - Hardware - Visual Studio and Windows Phone SDK - Windows Phone 7 Project - Silverlight vs. Windows Phone 7 - Anatomy of a Windows Phone 7 App - The Windows Phone 7 Emulator - Building the Derby App in Windows Phone 7 - Creating the Project - User Interface - Derby Names - Leagues - Distribution - Other Useful Windows Phone Things - Offline Storage - Notifi cations - GPS – Accelerometer - Web Services

UNIT–IV	**10 Hrs.**

GETTING STARTED WITH MONOTOUCH AND MONO FOR ANDROID: The Mono Framework - MonoTouch - Mono for Android - Assemblies - Why MonoTouch/Mono for Android? - Downsides -

Xamarin Mobile - Getting the Tools You Need - Mono Framework – Mono Touch - Mono for Android - Getting to Know Mono Develop - Debugging – Mono Touch Specifics - Mono for Android Specifics - Mono Projects - Anatomy of a Mono Touch App - Anatomy of a Mono for Android App - Building the Derby App with Mono – Mono Touch - Mono for Android - Other Useful Mono Touch/Mono Features - Local Storage – GPS.

Reference Books

1. Jeff & Scott, "Professional Mobile Application Development ", Wrox Publications.
2. Wei-Meng Lee, "Beginning Android Application Development", Wiley.

Course Outcomes

After completion of the course student will be able to:

1. Understand Various Mobile Application Architectures. (Understand)
2. Develop applications using software development kits (SDKs), frameworks and toolkits.
3. Implement suitable platform for mobile devices
4. Design and develop open-source software based mobile application to the given problem.
5. Build and deploy competent mobile application to solve the societal/industrial problems.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2					3							
CO3			2									
CO4					3							
CO5				2								1

23PCA211E		Credits: 03
Hrs/Week: L:T:P:S **3:0:0:0**	**COMPUTER VISION**	CIEMarks:50
Total Hours/Week: 40Hrs		SEEMarks:50

UNIT-I	10 Hrs.

Introduction & Fundamentals: Origin of DIP, examples of fields that use DIP, fundamentals of DIP, components of an DIP system, Image formation model, Spatial & Gray level resolution, Image enhancement in special domain: Piecewise transformation functions, Histogram equalization, Histogram specification, image averaging, spatial filters- smoothing and sharpening, Laplacian filter, Canny edge detector., image sampling and quantization, some basic relationships between pixels

UNIT–II	10 Hrs.

Enhancements in Spatial Domain: Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods. **Enhancements in Frequency Domain:** Introduction to the Fourier Transform and the Frequency Domain, Smoothing Frequency-Domain Filters, Sharpening Frequency Domain Filters, Homomorphism Filtering.

UNIT–III	10 Hrs.

Image Restoration: A Model of the Image Degradation/Restoration Process, Noise Models. Restoration in the Presence of Noise Only-Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Function, Inverse Filtering, Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering, Geometric Mean Filter, Geometric Transformations.

UNIT–IV	10 Hrs.

Morphological Image Processing and Segmentation: Preliminaries, Dilation and Erosion, Opening and Closing, The Hit-or-Miss Transformation. Some Basic Morphological Algorithms, Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, RegionBased Segmentation.

Reference Books

1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", Pearson Education.
2. Anil K. Jain, "Fundamentals of Digital Image Processing", Pearson Education.

Course Outcomes

After completion of the course student will be able to:
1. Understand the concept of image formation, digitization and the role human visual system plays in perception of image data.
2. Acquire an appreciation for spatial and frequency-based techniques for enhancing the appearance of an image duly applying them in different applications.

3. Discern the difference between noise models, realize different spatial and frequency-based filtering techniques for reduction and removal of noise.
4. Design and create practical solutions using morphological operators and segmentation techniques for common image processing problems.
5. Apply image processing knowledge in building real time applications.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2		2										
CO3				2								
CO4			2									
CO5					2							2

23PCA212E	Introduction to Artificial Intelligence	Credits: 03
Hrs/Week: L:T:P:S 3:0:0:0		CIEMarks:50
Total Hours/Week:40 Hrs		SEEMarks:50

UNIT-I	10 Hrs.

Introduction: Overview of Artificial Intelligence- Problems of AI, AI Technique, Tic - Tac - Toe Problem. Intelligent Agents: Agents & Environment, Nature of Environment, Structure of Agents, Goal Based Agents, Utility Based Agents, Learning Agents. Problem Solving: Problems, Problem Space & Search: Defining The Problem As State Space Search, Production System, Problem Characteristics, Issues In The Design Of Search Programs.

UNIT–II	10 Hrs.

Search Techniques: Solving Problems by Searching, Problem Solving Agents, Searching For Solutions; Uniform Search Strategies: Breadth First Search, Depth First Search, Depth Limited Search, Bi-directional Search, Comparing Uniform Search Strategies. **Heuristic Search Strategies:** Greedy Best-First Search, A* Search, Memory Bounded Heuristic Search: Local Search Algorithms & Optimization Problems: Hill Climbing Search, Simulated Annealing Search, Local Beam Search, Genetic Algorithms; Constraint Satisfaction Problems, Local Search For Constraint Satisfaction Problems.

UNIT–III	10 Hrs.

Knowledge & Reasoning: Knowledge Representation Issues, Representation & Mapping, Approaches to Knowledge Representation, Issues in Knowledge Representation. **Using Predicate Logic:** Representing Simple Fact in Logic, Representing Instant & ISA Relationship, Computable Functions & Predicates, Resolution, and Natural Deduction. **Representing Knowledge Using Rules:** Procedural Verses Declarative Knowledge, Logic Programming, Forward Verses Backward Reasoning, Matching, Control Knowledge.

UNIT–IV	10 Hrs.

Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, Bayesian Networks, Dempster-Shafer Theory. **Planning:** Overview, Components of A Planning System, Goal Stack Planning, Hierarchical Planning. **Learning:** Forms of Learning, Inductive Learning, Explanation Based Learning, Neural Net Learning & Genetic Learning.

Reference Books

1. Stuart J. Russell, Peter Norwig, Artificial Intelligence –A Modern approach, 3 rd Edition, Pearson Education, 2016.
2. Rich E. & Knight K. "Artificial Intelligence", 2nd Edition, TMH, New Delhi.
3. Parag Kulkarni, Prachi Joshi, Artificial Intelligence –Building Intelligent Systems, 1st ed., PHI learning, 2015.

Course Outcomes

After completion of the course student will be able to:

1. Understand the principles and approaches of artificial intelligence and different aspects of intelligent agent.
2. Apply different search techniques for solving real world complex problems and select the most appropriate solution by comparative evaluation.
3. Design AI based systems and their components with reasoning even in the presence of in-complete and/or uncertain information.
4. Develop knowledge-based systems with proper representation schemes.
5. Analyze the pros and cons of different AI systems and their design.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2				2								
CO3			2									
CO4			2									
CO5		2										1

23PCA213E		Credits: 04
Hrs/Week: L:T:P:S **3:0:0:0**	**DevOps**	CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

UNIT-I	10 Hrs.

What is DevOps?, Why is DevOps is needed? How is DevOps different from traditional IT? Why is DevOps used?, DevOps Lifecycle, DevOps Work Flow, DevOps Vs Agile, DevOps Principles, Roles, Responsibilities, and Skills of a DevOps Engineer, Various DevOps Tools Amazon Web Services - Cloud Web Computing, Advantages, Types of Cloud Computing, Amazon Overview, Services Cloud Platform Features of Elastic Compute Cloud (EC2), AWS Services, AWS Management Console, AWS Command Line Interface, Region, availability Zone and edge location, Amazon EC2 root device volume, Creating and Launching EC2 windows and Linux Instances, Connecting to Linux and Windows Instances, Managing Security Group, Identity access Management (IAM), Create IAM users and Group, Assign policy to IAM users and Groups, Configure IAM roles to access AWS resources.

UNIT–II	10 Hrs.

Version Control with Git - About Version Control, Local Version Control Systems, Centralized Version Control Systems, Distributed Version Control Systems, What is Git?, A Short History of Git, difference between Git and any other VCS, The Three States of Git - modified, staged, and committed, Why Git for your organization, Install and Using Git, Common commands in Git, Working with Remote Repositories

Container Technology - Introduction to Containers? Benefits of Containerization, How Do Containers Work?, Virtual Machines vs Containers, brief intro to Container Terminology, Overview of Container Architecture, Installing Container engine tool, Creating Containerized Services, Provisioning Containerized Services.

UNIT–III	10 Hrs.

Managing Containers - What is Container management, Benefits of Container management, Container management strategy, Pull Docker images from Docker hub, Managing the Life Cycle of Containers, Attaching Persistent Storage to Containers, Accessing containers, Managing Container Images - Accessing Registries (public and Private), Manipulating Container Images.

UNIT–IV	10 Hrs.

Security and Monitoring: Security in Jenkins and VSTS, Monitoring Jenkins and Microsoft Azure, Monitoring Jenkins, Azure Web Apps troubleshooting and monitoring, Azure App Services- CPU and memory consumption, Azure App Services- Activity log, Azure Application Insights for application monitoring, Azure web application monitoring, Diagnostics logs.

Reference Books

1. DevOps For Dummies 2ndIBMLimitedEdition by Sanjeev Sharma and Bernie Coyne.
2. Deepak Gaikwad, Viral Thakkar, DevOps Tools: from practioner's point of view, Wiley, 1 st Edition,2019.
3. Effective DevOps by Jennifer Davis & Katherine Daniels.

Course Outcomes

After completion of the course student will be able to:

1. Illustrate the importance and principles of DevOps
2. Utilize Principles and techniques of DevOps to solve problems
3. Demonstrate the usage of Application Lifecycle Management tools
4. Apply security tools used in DevOps to cloud applications
5. Effective use of DevOps tools like Git, Docker etc in various aspects of DevOps delivery model.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2					2							
CO3		2										
CO4					2							
CO5					2							2

23PCA314E	Android Programming Concepts	Credits:03
Hrs/Week: L:T:P:S **3:0:0:0**		CIEMarks:50
Total Hours/Week :40Hrs		SEEMarks:50

UNIT-I	**10Hrs.**

Overview-

Basics of Android, MVC, GUI, Components, Events, Layout Manager, Multiple Activities, Passing Data between Activities, Transitions, Persistent.

UNIT–II	**10Hrs.**

Creating Menus, SQlite, Managing Device Orientation, Touches and Swipe, Graphics, Animations, Sound and Gaming

UNIT–III	**10Hrs.**

Fragments, Using Libraries and their APIs, Using GPS and Location Services, Using Another App within the App

UNIT–IV	**10Hrs.**

XML and Contant Apps, AndroidWidget, In-App Advertising, Security and Encryption

Reference Books

1.HerveFranceschi,"AndroidApplicationDevelopment",JonesandBartlletLearning.

2.TrishCornezandRichardCornez,"AndroidProgrammingConcepts",JonesandBartlletLearning.

Course Outcomes

After completion of the course students will be able to:

1. Demonstrate the Understanding of fundamental of Android Programming.

2. Buildtheirabilitytodevelopsoftwarewithreasonablecomplexityonmobileplatform.

3. Discover the lifecycles of Activities, Applications, intents and fragments.

4. Design the Android apps by using Java Concepts.

5. Build and deploy mobile application.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2		2										
CO3				2								
CO4				2	1							
CO5				2							1	

23PCA215E		Credits: 03
Hrs/Week: L:T:P:S **3:0:0:0**	**Natural Language Processing**	CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

UNIT-I	**10 Hrs.**

Introduction to Natural Language Processing: Overview, What is Natural Language Processing, Origins of NLP, Language and Knowledge, The Challenges of NLP, Language and Grammar, Processing Indian Languages, NLP Applications, Some Successful Early NLP Systems, Information Retrieval

Language Modelling: Introduction, Various Grammar-based Language Models, Statistical Language Model.

Word Level Analysis: Chapter Overview, Introduction, Regular Expressions, Finite-State Automata, Morphological Parsing, Spelling Error Detection and Correction, Words and Word Classes, Part-of-Speech Tagging

UNIT–II	**10 Hrs.**

Syntactic Analysis: Introduction, Context-Free Grammar, Constituency, Parsing, Probabilistic Parsing, Indian Languages.

Semantic Analysis: Introduction, Meaning Representation, Lexical Semantics, Ambiguity, Word Sense Disambiguation.

Discourse Processing: Introduction, Cohesion, Reference Resolution , Discourse Coherence and Structure.

UNIT–III	**10 Hrs.**

Natural Language Generation : Introduction, Architectures of NLG Systems, Generation Tasks and Representations, Applications of NLG

Machine Translation: Introduction, Problems in Machine Translation, Characteristics of Indian Languages, Machine Translation Approaches, Direct Machine Translation, Rule-based Machine Translation, Corpus-based Machine Translation, Semantic or Knowledge-based MT systems, Translation involving Indian Languages.

Information Retrieval- Introduction, Design Features of Information Retrieval systems, Information Retrieval Models, Classical Information Retrieval Models, Non-classical models of IR, Alternative Models of IR , Evaluation of the IR System.

UNIT–IV	**10 Hrs.**

Information Retrieval- Introduction, Natural Language Processing in IR, Relation Matching, Knowledge-based Approaches, Conceptual Graphs in IR, Cross-lingual Information Retrieval.

Other Applications: Introduction, Information Extraction, Automatic Text Summarization, Question-Answering System.

Lexical Resources: Introduction, WordNet, FrameNet, Stemmers, Part-of-Speech Tagger, Research Corpora, Journals and Conferences in the Area.

Text Books

1. Tanveer Siddiqui, U.S.Tiwary Natural Language Processing and Information Retrieval.
2. DanielJurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", 2nd Edition, Prentice Hall, 2009.

3. Anne Kao and Stephen R. Poteet (Eds), "Natural Language Processing and Text Mining", Springer Verlag London Limited 2007.

Course Outcomes

After completion of the course student will be able to:

1. Extract information from text automatically using concepts and methods from natural language processing (NLP) including stemming, n-grams, POS tagging, and parsing.
2. Analyze the syntax, and semantic using computational methods.
3. Understand the concepts Text mining.
4. Illustrate information retrieval techniques.
5. Analyse and apply knowledge of NLP in designing real time applications and research.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2		2										
CO3				2								
CO4					2							
CO5		2										2

MCA III AND IV SEMESTER
SYLLABUS

23PCA301C		Credits: 03
Hrs/Week: L:T:P:S **3:0:0:0**	**Software Engineering and Agile Practices**	CIEMarks:50
Total Hours/Week: 40Hrs		SEEMarks:50

UNIT-I	10 Hrs.

Software Process & Software Development Methods: Professional Software Development, software engineering ethics, Software process models, Process activities, Coping with change. Agile Software Development: Agile methods, Plan-driven and agile development, Extreme programming, Requirements Engineering: Functional and non-functional requirements, The software requirements document, Requirements specification, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation. Requirements change.

UNIT–II	10 Hrs.

System Modeling: Context models, Interaction models, Structural models, Behavioural models, Architectural Design: Architectural design decisions, Architectural patterns.

UNIT–III	10 Hrs.

Software testing: Development testing, Test-driven development, Release testing, User testing. Project management: Risk management, Managing people, Teamwork, Project planning, Software pricing, Plan-driven development, Project scheduling, Agile planning, Estimation techniques. Quality management: Software quality, Software standards, Reviews and inspections, Software measurement and metrics.

UNIT–IV	10 Hrs.

Scrum Framework Foundation of Scrum, pillars of empiricism, Scrum Values, Identifying a Scrum Team; Scrum Events: Spring planning, Implementation and review, Scrum Artifacts: Creating, Managing and refining product backlog. Scrum in Action: Planning and Estimating with Scrum: Estimation Scale, Bucket method, Envisioning the product journey with a product roadmap; Sprint Journey: Refining the Product Backlog, Tracking progress with a Scrum Board, Defects in Sprint; Facets of Scrum: software development practices for Scrum, Source control model for continuous integration, Continuous delivery and continuous deployment, Leveraging testing methods for Scrum, Applying Scrum to remote teams.

Reference Books:

1. Ian Sommerville, Software Engineering, 10th Edition, Pearson India Education Services Pvt. Ltd., 2020.
2. Roger S. Pressman, Software Engineering-A Practitioners approach, 7th Edition, Tata

McGraw Hill.

3. Pankaj Jalote, An Integrated Approach to Software Engineering, Wiley India.

4. Fred heath, The Professional Scrum Master Guide, Packt Publishing, 2021.

5. Stacia Viscardi, The Professional Scrum Master's Handbook, Packt Publishing, 2013

6. Andrew T. Pham and David K. Pham, Business-Driven IT-Wide Agile (Scrum) and Kanban (Lean) Implementation, CRC Press.

Course Outcomes:

1. Comprehend software process and process models and decide which process model has to be adopted for the given scenarios.

2. For given case study List functional and nonfunctional requirements.

3. Ability to develop system model and architectural design.

4. Analyze the importance of various software testing methods and the role of project planning and quality management in software development.

5. Understand Scrum frame works and its utility in software development.

23PCA302C	Internet of Things	Credits: 04
Hrs/Week: L:T:P:S 3:0:2:0		CIEMarks:50
Total Hours/Week: 40 Hrs+12Hrs		SEEMarks:50

UNIT-I	13 Hrs.

Introduction to Internet of Things: Introduction, characteristics of IoT, IoT Ecosystem, IoT reference model, Transducers, Sensors and Actuators, IoT protocols, Domain Specific IoT. Internet of Things Platform Design Methodology, Introduction to python, logical design Using Python

UNIT–II	13 Hrs.

Programming with Arduino: Introduction to Arduino, Exploring Arduino Uno Learning Board, Arduino IDE, Understanding the eco system of Arduino, Pinout configuration, Digital input and output, Analog input and output, working with sensors and actuators Fundamentals of Arduino Programming, Arduino serial communication. Communication interfaces (SPI and I2C) wired and wireless communication with Arduino using Bluetooth modules, Examples Modules on Arduino.

UNIT–III	13 Hrs.

Programming with RaspberryPI: Introduction and Exploring RaspberryPI learning Board, Understanding the eco system of Raspberry Pi3/Pi4, Pinout configuration, RaspberryPI Operating System setup and commands, Programming RaspberryPI with Python: python modules like Rpi.GPIO and gpiozero, Raspberry Pi serial communication, Communication interfaces (SPI and I2C), wired and wireless communication with raspberry Pi, Serial communication from raspberry Pi3 to Arduino and vice versa, Monitoring and controlling between raspberry pi.

UNIT–IV	13 Hrs.

IoT Application Development: Integrating sensors with IoT Dashboards and micro services. Introduction to Flow based IoT Dashboard: Fundamentals of NodeRED, creating basic dashboard. Introduction to MQTT based IoT Dashboard: setup and configuration of dashboard like Things board. Introduction to hosted IoT dashboard services like Adafruit io or thing board hosted service. IoT alert integration: alert integration in the form of email, tweets or any social media post.

Reference Books

1.Srinivasa K.G, Siddesh G.M, Hanumantha Raju R, Internet of Things, Cengage,2017,ISBN:9789386858955

2.ArshdeepBahga, Vijay Madisetti, Internet of Things: A Hands-on Approach, Orient Blackswan Private Ltd, July 1st, 2015, ISBN: 8173719543.

3.Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017.

4.Maneesh Rao, Internet of Things with Rasberry Pi3,Packt Publishing April 2018

5.The Official Raspberry Pi Handbook by The Magpi Magazine, 2023

Course Outcomes

After completion of the course student will be able to:

1. Understand the fundamentals of electronics and hardware devices required for IoT including deployment levels, network protocols and standards.
2. Comprehendvariousdevelopmentboards,sensors,actuators,architectureofArduino,RaspberryPi, using IDE
3. Interact with Arduino, RaspberryPidevices.
4. Design, Setup, Configure and Develop IoT Applications (Dashboards) and integrate several essential micro services

LABORATORYASSIGNMENTS (Tentative)	
Practice Lab: Fundamentals of Electronics and Introduction to variety of devices and development boards used to develop IoT Applications Identifying the IoT Kit elements: sensors, actuators and development boards and other accessories Study about the principle of operations, operating conditions, cost, to lerance and durability study.	
1.	Assembling and Dissembling IoT Kit using Raspberry Pi/Arduino.
2.	Display college name, student name and good bye message on LCD.
3.	Demonstrate functioning of relay with different time interval.
4.	Demonstrate connection and functioning of LED and Switch.
5.	Display numbers from 0 to 99 on seven segment display board. .
6.	Demonstrate functioning of humidity sensor.
7.	Connect and demonstrate light sensor to raspberry pi.
8.	Connect and demonstrate use of ultra sonic sensor using raspberry pi.
9.	Connect and demonstrate use of soil moisture sensor using raspberry pi
10.	Demonstrate use of buzzer program with different time interval.

Course Outcomes

After completion of the course student will be able to:

1. To Introduce the terminology technology and its applications
2. To introduce the concept of machine to machine with necessary protocols

3. To introduce the python scripting language used for IoT devices

4. To introduce RaspberryPI platform that was used widely in IoT applications

5. To implement a various components and sensors services on IoT devices.

23PCA303C		Credits: 03
Hrs/Week: L:T:P:S **3:0:0:0**	**Web 2.0**	CIEMarks:50
Total Hours/Week: 40Hrs		SEEMarks:50

UNIT-I	**13 Hrs.**

Rich Internet Applications With Ajax: Limitations of Classic Web application model, AJAX principles, Technologies behind AJAX, Examples of usage of AJAX; Asynchronous communication and AJAX application model. Ajax with XMLHTTP object: Part 1 :Creating Ajax Applications: An example, Analysis of example ajax.html, Creating the JavaScript, Creating and opening the XMLHttpRequest object, Data download, Displaying the fetched data, Connecting to the server,

Adding Server-side programming, Sending data to the server using GET and POST. Module

UNIT–II	**13 Hrs.**

Ajax with XMLHTTP object: Handling multiple XMLHttpRequest objects in the same page, Using two XMLHttpRequest objects, Using an array of XMLHttpRequest objects, Using inner functions, Downloading JavaScript, connecting to Google Suggest, Creating google.php, Downloading from other domains with Ajax, HTML header request and Ajax, Defeating caching, Examples. Working with XML DOM in Ajax :Building XML and working with XML in JavaScript, Getting the document element, Accessing any XML element, Handling whitespace in Firefox, Handling cross-browser whitespace, Accessing XML data directly, Validating XML, Further examples of Rich Internet

Applications with Ajax.

UNIT–III	**13 Hrs.**

Working with PHP and Ajax :Working with PHP server variables, Getting the data in to array format, Wrapping applications in to a single PHP page, Validating input from the user, Validating integers and text, DOM, Appending new elements to a web page using the DOM and Ajax, Replacing elements using the DOM, Handling timeouts in Ajax, Downloading

images with Ajax, Example programs. Introduction to Bootstrap: What Is Bootstrap? Bootstrap File Structure, Basic HTML Template, Global Styles, Default Grid System, Basic Grid HTML, Offsetting Columns, Nesting Columns, Fluid Grid System, Container Layouts, Responsive Design. Typography, Emphasis Classes, Lists, Code, Tables, Optional Table Classes, Table Row Classes, Forms, Buttons, Images, Icons.

UNIT–IV	13 Hrs.

Bootstrap Layout components:Dropdown Menus, Button Groups, Button Groups as Radio Buttons and Checkboxes, Buttons with Dropdowns, Split Button Dropdowns, Dropup Menus, Navigation Elements, Tabular Navigation, Basic Pills Navigation, Stackable Navigation, Dropdowns, Navigation Lists, Tabbable Navigation, Navbar, Forms, Navbar Menu Variations, Breadcrumbs, Pagination, Pager, Labels, Badges, Typographic Elements. Bootstrap Javascript Plugins Programmatic API, Transitions, Modal, Dropdown, Dropdown Usage via JavaScript, Scrollspy, Toggleable Tabs,

Tooltips, Popover, Alerts, Buttons, Collapse, Carousel, Typeahead, Affix.

Text Books

1. Professional AJAX – Nicholas C Zakas et al, Wrox publications, 2008.

2. Steven Holzner: Ajax: A Beginner's Guide, Tata McGraw Hill, 2014.

3. Jake Spurlock: "Bootstrap: Responsive Web Development", O'Reilly Media, 2014

Course Outcomes

After completion of the course student will be able to:
1. Understand the rich internet concepts and applications.

2. Analyze the working of development models in web designing.

3. Illustrate appropriate component lifecycle techniques using frameworks.

4. Evaluate and implement state based systems using data models and data binding.

5. Design & Implement effective and responsive web applications

23PCA108L		Credits: 2
Hrs/Week: L:T:P:S **0:0:3:0**	**OOMD Laboratory**	CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

1. Design the Library system: Identify the use cases of the system. (Suggestive use cases: borrow book, return books, read newspapers, reference, and digital library). Develop the use case diagram, Packages and documentation for the same. Preferable use of uses & Extends relationships expected.

2. Design the Examination system: Identify the use cases. (Suggestive use cases:– Form filling, Get Hall Ticket, Write exam, get result ,Verify Hall Ticket) Develop the use case diagram, Packages and documentation for the same. Preferable use of uses & Extends relationships expected.

3. Analyze and design the system for ATM Transaction: Identify the use cases. (Suggestive use cases : Transaction, Approval process, Invalid PIN, Deposit Amount, Deposit savings, Deposit checking, withdraw Amount, withdraw checking, saving, withdraw saving denied, checking Transaction History, saving Transaction History). Develop the use case diagram, Packages and documentation for the same. Draw the essential class diagrams.

4. Analyze and design the system for voting system (The actors are presiding officer, 1st polling officer, 2nd polling officer,Election officer, voter, candidate; Processes : Voting, counting, and announcement of results). Develop the use case diagram, Packages and documentation for the same. Draw the essential sequence diagrams and state chart diagrams.

5. Analyze and design the system for Results section of autonomy, mainly responsible for CGPA, SGPA Calculation, Grade card generation. Develop the class diagrams and packages.

6. Analyze and design the system for Employee reference. (The Process HR Manager contacts Employees of his company and HR manager of other company to publicise about the vacancy. The person who has referred the right candidate, will be given bonus. Interview, Short listing, selection list announcement, Bonus for referred employees are all parts of the process.). Develop the use case diagram , sequence diagrams and state chart diagrams.

7. Analyze and design the system for autonomous education system. (Classes: students Teacher, courses, subjects, core, Electives, Labs). Develop the class diagrams, sequence diagrams and packages.

8. Analyze and design the system for Railway reservation, which includes the details of Boarding

a. station, classes of reservation, fare, Time table, concessions, No. of Seats, Seat No, State of reservation (confirmed, waiting, RAC). Develop the class diagrams, packages, component diagrams and deployment diagrams.

9. Analyze and design the system for Income Tax assessment. Develop the class diagrams, collaboration diagrams, state chart diagrams.

10. Analyze and design the system for Online shopping system. Develop the class diagrams, collaboration diagrams, state chart diagrams and packages.

    a. a.Check for the product.b.Place order.

    b. c.Track the order.
    d.Cancel the order.
    e.Feedback
    .

Professional Elective-III		Professional Elective-IV	
Subject Code	Subject	Subject Code	Subject
23PCA308E	Big Data Analytics	23PCA312E	Introduction to Machine Learning
23PCA309E	Cyber Security	23PCA313E	Block Chain Technologies
23PCA310E	Flutter Framework	23PCA314E	Android Programming Concepts
23PCA311E	Software Testing	23PCA315E	Software Project Management

23PCA308E		Credits: 03
Hrs/Week: L:T:P:S **3:0:0:0**	**Big Data Analytics**	CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

UNIT-I	**10 Hrs.**

Types of digital data: Classification of Digital Data, Structured Data, Semi-Structured Data, Unstructured Data. Introduction to Big Data: Characteristics, Evolution, Definitions and Challenges of big data, other characteristics of data which are not definitional traits of big data, Why big data? Are we just an information consumer or do we also produce information? Traditional Business Intelligence (BI) versus Big data, A typical Data Warehouse environment, A typical Hadoop environment, What is changing in the realms of big data? Big data analytics Where do we begin? What is big data analytics? What big data analytics isn't? Why this sudden hype around big data analytics? Classification of analytics, Top challenges facing big data, why is big data analytics important? Greatest challenges that prevent businesses from capitalizing on big data, what kind of technologies are we looking towards to help meet the challenges posed by big data? Data science, Data Scientist, Terminologies used in big data environment, BASE, Few top Analytics tools

UNIT–II	**10 Hrs.**

The big data technology landscape: NoSQL, Where is it used? What is it? Types of NoSQL databases, Why NoSQL? Advantages of NoSQL, What we miss with NoSQL? NoSQL Vendors, SQL Versus NoSQL , NewSQL, Comparison of SQL, NoSQL and NewSQL, Hadoop: Features of Hadoop, Key advantages of Hadoop,Versions of Hadoop, Overview of Hadoop Ecosystems, Hadoop Versus, SQL, Integrated Hadoop systems offered by leading market vendors, Cloud based Hadoop solutions. Hadoop: Introducing Hadoop, Why not RDBMS, Distributed Computing Challenges, History of Hadoop, Hadoop Overview, Hadoop Components, High Level Architecture of Hadoop, Hadoop Distributed File System(HDFS), HDFS Architecture, Daemons Related to HDFS, Working with HDFS Command, Special Features of Hadoop, Processing Data With Hadoop, Introduction, How Map Reduce Works? Map Reduce Example, Word Count Example using Java. Managing Resources and Applications with YARN, Introduction, Limitation of Hadoop 1.0, Hadoop 2: HDFS, Hadoop 2: YARN, Interacting with Hadoop EcoSystem, Hive,Pig, HBASE, Sqoop, Business Intelligence on Hadoop.

UNIT–III	10 Hrs.

NoSQL - MongoDB: What is MongoDB? Why MongoDB? Using JSON, Creating or generating a unique key, Support for dynamic queries, Storing binary data, Replication, Sharding, Updating information in-place, Terms used in RDBMS and MongoDB, Data types in MongoDB, MongoDB - CRUD (Insert(), Update(), Save(), Remove(), find()), MongoDB- Arrays, Java Scripts, Cursors, Map Reduce Programming, Aggregations. NoSQL - Cassandra: What is Cassandra? Why Cassandra? Peer to peer network, Gossip and Failure detection, Anti-Entropy & Read Repair, Writes in Cassandra, Hinted handoffs, Tunable consistency,Cassandra- CQLSH - CRUD, Counter, List, Set, Map, Tracing.
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UNIT–IV	10 Hrs.

Hadoop Hive: Introduction to Hive - The Problem, Solution - Hive Use Case, Data Growth, Schema Flexibility and Evolution, Extensibility, What is Hive, History of Hive and Recent Releases of Hive, Hive Features, Hive Integration and Work Flow, Hive Data Units, Hive Architecture, Hive Primitive Data Types and Collection Types, Hive File Formats, Hive Query Language - Statements, DDL , DML, Hive Partitions, Bucketing, Views, Sub Query, Joins, Hive User Defined Function, Aggregations in Hive, Group by and Having, Serialization and Deserialization, Hive Analytic. Functions. Hadoop - Pig: Introducing Pig, History and Anatomy of Pig, Pig on Hadoop, Pig Features, Pig Philosophy, Word count example using Pig, Use Case for Pig, Pig Primitive Data Types, Collection Types and NULL, Pig Latin Overview, Pig Latin Grammar - Comments, Keywords, Identifiers, Case sensitivity in Pig, Common Operators in Pig, Pig Statements, LOAD, STORE, DUMP, Interactive Shell -GRUNT, FILTER, SORT, GROUP BY, ORDER BY, JOIN, LIMIT, Pig Latin Script, Local Mode, Map Reduce Mode, Running Pig Script, Working with Field, Tuple, Bag, User Defined Function, Parameters in Pig.

Reference Books

1. Seema Acharya, Subhashini Chellappan, Big Data and Analytics, Wiley Publications,2nd Edition, 2015, ISBN:978-81-265-5478-2.

2. Raj Kamal, Preethi Saxena, Big Data Analytics, Introduction to Hadoop, Spark and Machine Learning, McGraw hill Education.

3. Cindi Howson, Successful Business Intelligence, McGraw-Hill Publications, E-ISSN:0-07-149851-6.

4. Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley and SAS Business Series, 2012.

5. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.

6. Paul Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch , James Giles, David Corrigan, "Harness the Power of Big data – The big data platform", McGraw Hill, 2012.

Course Outcomes:

After completion of the course student will be able to:

1. Differentiation of digital data and to define business intelligence, big data and analytics.
2. Apply different techniques for big data analytics.
3. Comprehend HDFS architecture and programming environment.
4. Device NoSQL statement to process unstructured data.
5. Understanding programming in Hive and Pig technologies.

23PCA309E		Credits: 03
Hrs/Week: L:T:P:S 3:0:0:0	**Cyber Security**	CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

UNIT-I	**10 Hrs.**

Introduction to Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, An Indian Perspective, hacking and Indian Laws., Global Perspectives.

UNIT–II	**10 Hrs.**

How Criminals Plan Them: Introduction, How criminals plan the attacks, Social Engineering, Cyber Stalking, Cybercafe & cybercrimes. **Botnets**: The fuel for cybercrime, Attack Vector. Tools and Methods used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key Loggers and Spywares

UNIT–III	**10 Hrs.**

Different Forms of attacks in Cybercrime: Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attackers, Attacks on Wireless networks. Phishing and Identity Theft: Introduction, methods of phishing, phishing, phishing techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft

UNIT–IV	**10 Hrs.**

Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, Need for Computer Forensics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts, network forensics.

Reference Books

1. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Pvt Ltd, 2011, First Edition.

2. Rajkumar Singh Rathore, Mayank Bhushan, "Fundamentals of Cyber Security", BPB; 2017, First Edition.

3. Anand Shinde, "Introduction to Cyber Security", 2020, Notion Press, First Edition.

4. Nilakshi Jain and Dhananjay R. Kalbande, "Cyber Security and Cyber Laws", Wiley India Pvt Ltd., 2020.

Course Outcomes

After completion of the course student will be able to
1. Understand cybercrime terminologies and laws.
2. Illustrate tools and methods used on Cybercrime.
3. Describe the different forms of attacks, Phishing and Identity Theft.
4. Comprehend cyber offences and Botnets.
5. Justify the need of computer forensics.

23PCA310E	Introduction to Flutter	Credits: 03
Hrs/Week: L:T:P:S **3:0:0:0**		CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

UNIT-I	**10 Hrs.**
Features of Flutter- Advantages of Flutter- Disadvantages of Flutter. Flutter Installation in Windows, Creating Simple Application in Android Studio - Architecture of Flutter Applications.	
UNIT–II	**10 Hrs.**
Flutter Basics: Widgets- Gestures- Concept of State- Layers- Introduction to Dart Programming- Variables and Data types- Decision Making and Loops. Functions- Object Oriented Programming. Introduction to Widgets- Widget Build Visualization.	
UNIT–III	**10 Hrs.**
Introduction to Layouts: Type of Layout Widgets- Single Child Widgets- Multiple Child Widgets- Advanced Layout Application-Introduction to Gestures- Statement Management in Flutter. Ephemeral State Management-Application State - scoped model- Navigation and Routing.	
UNIT–IV	**10 Hrs.**
Animation on Flutter: Introduction to Animation Based Classes-Work flow of the Flutter Animation- Working Application- Android Specific Code on Flutter- Introduction to Package- Types of PackagesUsing a Dart Package- Develop a Flutter Plugin Package- Accessing Rest API- Basic Concepts- Accessing Product service API. **Database Concepts:** SQLite- Cloud Fire store- Internalization on Flutter- Using intl Package-Testing on FlutterTypes of Testing- Widget Testing- Steps Involved- Working Example-Deployment- Android Application- IOS Application- Development Tools- Widget Sets- Flutter Development with Visual Studio Code- Dart DevTools- Flutter SDK	

Reference Books

1. Richard Rose , "Dart and Flutter", Oreilly.

2. Reto Meier, " Professional Android 4 Application Development ", Wrox Publications 2012.

Course Outcomes

After completion of the course student will be able to:
1. Understand concepts of Flutter architecture.
2. Build simple Flutter application using simple widgets and layouts
3. Build Animation on Flutter
4. Develop Flutter applications using Dart packages.
5. Construct Flutter application using database.

23PCA311E		Credits: 03
Hrs/Week: L:T:P:S **3:0:0:0**	**Software Testing**	CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

UNIT-I	**10 Hrs.**

BASICS OF SOFTWARE TESTING: Human Errors and Testing; Software Quality; Requirements, Behavior and Correctness; Correctness versus Reliability; Testing and Debugging; Test Metrics. Testing and Verification; Defect Management; Execution History; Test-generation Strategies, Static Testing. Types of Testing.

UNIT–II	**10 Hrs.**

TEST GENERATION FROM REQUIREMENTS: Introduction; The Test-Selection Problem; Equivalence Partitioning; Boundary Value Analysis; Category-Partition Method. Cause-Effect Graphing, Test generation from predicates.

UNIT–III	**10 Hrs.**

STRUCTURAL TESTING: Overview; Statement testing; Branch testing; Condition testing, Path testing; Procedure call testing; Comparing structural testing criteria; The infeasibility problem.

DEPENDENCE, DATA FLOW MODELS, AND DATA FLOW TESTING: Definition-Use pairs; Data flow analysis; Classic analyses; From execution to conservative flow analysis; Data flow analysis with arrays and pointers; Inter- procedural analysis; Overview of data flow testing; Definition-Use associations; Data flow testing criteria; Data flow coverage with complex structures; The infeasibility problem.

UNIT–IV	**10 Hrs.**

TEST CASE SELECTION AND ADEQUACY: Overview; Test specification and cases; Adequacy criteria; Comparing criteria; **PROCESS:** Integration and component-based software testing: Overview; Integration testing strategies; Testing components and assemblies. System, Acceptance and Regression Testing: Overview; System testing; Acceptance testing; Usability; Regression testing; Regression test selection techniques; Test case prioritization and selective execution.

Reference Books

1. Foundations of Software Testing Aditya P Mathur, Pearson Education, 2008. (chapter 1, 2)
2. Software Testing and Analysis Process Principles and Techniques Mauro Pezze, Michal Young, Wiley India,2008.
3. Software Testing Principles and Practices Srinivasan Desikan, Gopalaswamy Ramesh, 2ndEdition, Pearson, 2007.

After completion of the course student will be able to

1. Identify errors, faults, failures, test process, correctness, reliability, oracles.
2. Comprehend the various testing models, defect management, quality attributes and test generation strategies.
3. To generate requirement-based test cases (black box testing) and structural testing (white box testing).
4. Design the test cases to check data flow for the given program.
5. Develop test cases by using various adequacy criteria. 6. Apply various testing processes to test a given small application.

23PCA312E		Credits: 03
Hrs/Week: L:T:P:S **3:2:0:0**	**Introduction to Machine Learning**	CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

UNIT-I	**10 Hrs.**
Basics of Machine Learning; Introduction to Artificial Intelligence and Machine Learning, Types of Machine Learning and its comparisons, Applications of Machine Learning, Issues in Machine Learning	

UNIT–II	**10 Hrs.**
Preparing to Model: Introduction, Machine Learning Activities, Types of Data in Machine Learning, Exploring structure of data, Data Pre-processing (Dimension Reduction and Feature subset selection), Model Selection.	

UNIT–III	**10 Hrs.**
Supervised Learning: Introduction, Classification (Introduction, classification model, learning steps, Common classification algorithm), Regression (Linear Regression, Multivariable Regression, Logistic Regression).	

UNIT–IV	**10 Hrs.**
Unsupervised Learning: Introduction and its applications, Techniques in Unsupervised Learning (Clustering, K-Means). **Neural Network:** Introduction, Architecture of Artificial Neural Network.	

Reference Books

1. Saikat Dutt, Machine Learning, Pearson, 2019.
2. Tom Mitchell, Machine Learning (First Edition), McGraw- Hill, 1997
3. Anuradha Srinivasa Raghavan, Vincy JOdeph, Machine Learning, Wiley, 2019.
4. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press. 2016.

Course Outcomes

After completion of the course student will be able to:

1. Recognize major programming languages.
2. Identify potential applications of machine learning in practice.
3. Select the suitable machine learning tasks for given application.
4. Implement feature extraction and selection to represent data as features to serve as input to machine learning models.

23PCA313E	Block Chain Technologies	Credits: 03
Hrs/Week: L:T:P:S 3:0:0:0		CIEMarks:50
Total Hours/Week: 40Hrs		SEEMarks:50

UNIT-I	10 Hrs.
Introduction to Blockchain: Introduction to Blockchain, How Blockchain works, Blockchain vs Bitcoin, Practical applications, public and private key basics, pros and cons of Blockchain, Myths about Bitcoin.	
UNIT–II	**10 Hrs.**
Blockchain: Architecture, versions, variants, use cases, Life use cases of blockchain, Blockchain vs shared Database, Introduction to cryptocurrencies, Types, Applications.	
UNIT–III	**10 Hrs.**
Concept of Double Spending: Concept of Double Spending, Hashing, Mining, Proof of work. Introduction to Merkel tree, Privacy, payment verification , Resolving Conflicts , Creation of Blocks.	
UNIT–IV	**10 Hrs.**
Introduction to Bitcoin and Ethereum: Introduction to Bitcoin, key concepts of Bitcoin, Merits and De Merits Fork and Segwits, Sending and Receiving bitcoins, choosing bitcoin wallet, Converting Bitcoins to Fiat Currency. Introduction to Ethereum, Advantages and Disadvantages, Ethereum vs Bitcoin, Introduction to Smart contracts, usage, application, working principle, Law and Regulations. Case Study.	

Reference Books

1. Beginning Blockchain: A Beginner's Guide to Building Blockchain Solutions by Arshdeep Bikramaditya Signal, GautamDhameja (PriyansuSekhar Panda., APress.
2. Blockchain Applications: A Hands-On Approach by Bahga, Vijay Madisetti.

Course Outcomes

After completion of the course student will be able to:
1. Demonstrate the basics of Block chain concepts using modern tools/technologies.
2. Analyze the role of block chain applications in different domains including cybersecurity.
3. Evaluate the usage of Block chain implementation/features for the given problem.
4. Exemplify the usage of bitcoins and its impact on the economy.
5. Analyze the application of specific block chain architecture for a given problem.

23PCA314E	**Android Programming Concepts**	**Credits: 03**
Hrs/Week: L:T:P:S **3:0:0:0**		CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

UNIT-I	**10 Hrs.**
Overview - Basics of Android, MVC , GUI, Components, Events, Layout Manager, Multiple Activities, Passing Data between Activities, Transitions, Persistent.	

UNIT–II	**10 Hrs.**
Creating Menus, SQlite, Managing Device Orientation, Touches and Swipe, Graphics, Animations, Sound and Gaming	

UNIT–III	**10 Hrs.**
Fragments, Using Libraries and their APIs, Using GPS and Location Services, Using Another App within the App	

UNIT–IV	**10 Hrs.**
XML and Contant Apps, Android Widget, In-App Advertising, Security and Encryption	

Reference Books
Herve Franceschi, "Android Application Development ", Jones and Bartllet Learning. Trish Cornez and Richard Cornez, "Android Programming Concepts", Jones and Bartllet Learning.

Course Outcomes

After completion of the course student will be able to:

1. Demonstrate the Understanding of fundamental of Android Programming. (Understand)

2. Build their ability to develop software with reasonable complexity on mobile platform. (Apply)

3. Discover the life cycles of Activities, Applications, intents and fragments. (Evaluate)

4. Design the Android apps by using Java Concepts. (Create)

23PCA315E		Credits: 03
Hrs/Week: L:T:P:S **3:0:0:0**	**Software Project Management**	CIEMarks:50
Total Hours/Week: 40 Hrs		SEEMarks:50

UNIT–I	**10 Hrs.**

INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT: The importance of Software Project Management, Project Definition, Software Project versus Other Types of Project, Contract Management and Technical Project Management, Activities Covered By Software Project Management, Plans, Methods, and Methodologies, Stakeholders, Setting objectives, Management Control, Overview of Project Planning – Stepwise Project Planning.

UNIT–II	**10 Hrs.**

PROJECT EVALUATION: Project Portfolio Management, Evaluation of Individual Projects: Technical Assessment, Strategic Assessment, Cost Benefit Analysis, Cash Flow Forecasting, Cost Benefit Evaluation Techniques, Risk Evaluation. Programme Management, Managing the Allocation of Resources within Programmes, Strategic Programme Management, Creating a Programme, Aids to Programme Management and Benefits Management.

UNIT–III	**10 Hrs.**

ACTIVITY PLANNING AND RISK MANAGEMENT: Objectives, Project Schedules, Projects and Activities, Sequencing and Scheduling Activities, Network Planning Models, Formulating a Network Model, Forward Pass, Backward Pass, Identifying the critical path, Activity Float, Shortening the Project Duration, Activity on Arrow Networks, Risk Management – Introduction, categories of Risk, Risk Management Approaches, Risk identification, Risk Assessment, Risk Planning, Risk Management, Evaluating Risks to the schedule, Boehm's Top 10 Risks and Counter Measures.

UNIT–IV	**10 Hrs.**

MONITORING AND MANAGING CONTRACTS: Introduction, Creating Framework, Collecting the Data, Review, Visualizing Progress, Cost Monitoring. **Managing Contracts –** Introduction – Types of Contract – Stages in Contract Placement – Typical terms of a Contract – Contract Management – Acceptance**.**
MANAGING PEOPLE: Introduction – Understanding Behavior – Selecting The Right Person For The Job – Instruction in the Best Methods, Motivation, The Oldham-Hackman Job Characteristic Model, Stress, Stress Management, Health and Safety, Some ethical and Professional Concerns.

Reference Books
1. Bob Hughes, Mike Cotterell, and Rajib Mall: Software Project Management – Sixth Edition Tata McGraw Hill, New Delhi, 2006.   2. Royce, "Software Project Management", Pearson Education, 1999.   3. Jalote, "Software Project Management in Practice", Pearson Education, 2002.   4. Gopalaswamy Ramesh, "Managing Global Software Projects" – McGraw Hill Education (India) Fourteenth Reprint 2
Course Outcomes
After completion of the course student will be able to   1. Analyze the success of a software project in a real world environment.   2. Evaluate appropriateness of projects against Strategic, Technical, and Economic criteria.   3. Identify the risk factors and their effects in a software projects.   4. Design various charts and reports for visualizing project progress status.   5. Use the right human resources and their role in the software project management.