Programme: MCA

Computer Applications

Scheme and Syllabi

w.e.f. Academic Session 2023-2024

BUEST

SCHOOL OF ENGINEERING & EMERGING TECHNOLOGIES

Semester – I

Sr.No	Code	Course Title	L	T	P	Credit
1	PCA-101	Programming in C	3	1	4	5.5
2	PCA-102	Introduction to Operating Systems and Linux	3	1	4	5.5
3	PCA-103	Computer Organization and Architecture	3	1	0	3.5
4	PCA-104	Relational Data Base Management System	3	1	4	5.5
5	PAM-105	Discrete Mathematics	3	1	0	3.5
6	PPD-101	Personality Development Programme	2	0	0	2
		Total	17	5	12	25.5

Semester – II

Sr.No	Code	Course Title	L	T	P	Credit
1	PCA-151	Advanced Data Structures and Algorithms	3	1	4	5.5
2	PCA-152	Theory of Computation	3	1	0	3.5
3	PCA-153	Software Engineering	3	1	0	3.5
4	PCA-154	Data Communication and Computer Networks	3	1	0	3.5
5	PCA-156	Object Oriented Programming	3	1	4	5.5
6	PPD-151	Personality Development Programme	2	0	0	2
		Total	17	5	8	25.5

Semester –III

Sr.No	Code	Course Title	L	T	P	Credit
1	PCA-201	Programming In Python	3	1	4	5.5
2	PCA-217	Web Technologies	3	1	4	5.5
3	PCA-224	Cloud Computing	3	1	0	3.5
4	PCA-204	Machine Learning	3	1	4	5.5
5	PXX-XXX	Department Elective	3	1	0	3.5
6	PPD-201	Personality Development Programme	2	0	0	2
		Total	17	5	12	25.5

	Department Elective					
1	PCA-215	Mobile Computing	3	1	0	3.5
2	PCA-216	Information Security	3	1	0	3.5
3	PCA-202	Computer Graphics	3	1	0	3.5
4	PCA-218	Mobile Application Development	3	1	0	3.5
5	PCA-219	Big Data Analytics	3	1	0	3.5
6	PCA-220	Cyber security	3	1	0	3.5
7	PCA-221	Internet of Things	3	1	0	3.5
8	PCA-222	Deep Learning	3	1	0	3.5
9	PCA-223	Artificial Intelligence	3	1	4	5.5

Semester-IV

Sr.No	Code	Course Title	L	T	P	Credit
1	PCA-251	Software Development Project	0	0	0	25

SEMESTER I

Course Name: - PROGRAMMING IN C
Course Code: - PCA-101

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L	T	P	Cr
3	1	4	5.5

Unit 1

Programming process: Problem definition, Algorithms, Flow Charts, C Character set, Identifiers and keywords, Data types, Declarations, Expressions, Statements and Symbolic Constants. Input-Output functions, Preprocessor commands: #include, #define C Program structure Operators and their procedure: Arithmetic, Unary, Logical and relational operators. Debugging: Tracking defects, debugging by code inspection, debugging by logs, debugging using step-by-step execution, using break points.

Unit 2

Control statements: Branching, looping using for, while and do-while Statements, Nested control structures, switch, break, continue statements, Comma Operators. Functions: Definition, Call, prototypes, and passing arguments to functions. Program structure: Storage classes, automatic, external and static variables, Recursion vs Iteration.

Unit 3

Arrays: Definition, Access of Elements, initialization, passing array elements as arguments and passing arrays as arguments; Multidimensional arrays, strings. Pointers: address and dereferencing operators, declaration, assignment, initialization, arithmetic, precedence of address and dereferencing operators, pointer comparison, conversion. Passing pointers to functions. Arrays as functions arguments, pointer arrays and pointers to pointers. Dynamic memory management.

Unit 4

Structure: Variable, initialization, accessing members, assignment, size of structure, scope of a structure, nesting, pointer to structures, scope of a structure type definition, structure as function arguments, function values: Arrays of structures, structures containing arrays, self-referential structures. Bitwise logical operators: AND, OR, complement precedence and Associating bitwise shift operators, File processing: opening and closing, data files, creation, processing & unformatted data files, random file access.

LIST OF PRACTICALS:

1. Write a program to take input of name, rollno and marks obtained by a student in 4 subjects of 100 marks each and display the name, rollno with percentage score secured.
2. Write a program to print whether a given number is even or odd.
3. Write a program to print positive integers from 1 to 10.
4. : Write a program to insert 5 elements into an array and print the elements of the array
5. Write a C program to create, declare and initialize structure
6. Write a Program to calculate and display the volume of a CUBE having its height (h=10cm), width (w=12cm) and depth (8cm).
7. Write a program to find whether a character is consonant or vowel using switch statement.
8. Write a program to display the following pattern.

```
*
* *
 * * *
 * * * *
 * * * * *
```

Text Book:

1. Let us C by Yashwant Kanetkar
2. The C programming Language, By Brian W. Kernighan and Dennis M. Ritchie, Published by Prentice-Hall

Course Name: -Introduction to Operating Systems and Linux
Course Code :- PCA-102

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L	T	P	Cr
3	1	4	5.5

Unit 1

Introduction: Introduction: Definition Of The Operating System, Functions Of An Operating System, Different Types Of Systems - Simple Batch System, Multi-Programmed Batched System, Time Sharing System, Personal Computer Systems, Parallel Systems, Distributed Systems, Real Time Systems, Computer System Structure- operation, I/O structure, storage structure, Operating System Services .Basic concept of multiprogramming, multitasking and multiprocessing, goals and major functions of operating system Memory management schemes with advantages and disadvantages- Paging, Segmentation and Paged Segmentation .

Unit 2

Process Management: Process, process state transition, Process control Block, Independent and cooperating process, Scheduling Algorithms, with necessary examples and demo on Windows **Process Synchronization:** The Critical Section Problem,, Semaphores, Classical Problems of Synchronization, Critical Regions. **Deadlocks:** Deadlock Characterization, Methods For Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery From Deadlock. **Inter-Process Communication**: Threads, Concurrency, Critical section, Mutual Exclusion, Semaphore.

Unit 3

File Management: introduction to File system, file types and file operations, file operation commands, file access rights, file storage management.

File System Interface: File Concept, Access Methods–sequential, direct, index, Directory Structure–single-level, two–level, tree-structured, acyclic-graph, general graph, Directory Implementation–linear list, hash table, Efficiency and Performance **Device Scheduling**: Illustrate the concept of I/O channels, interrupts and the structure of an I/O system with necessary examples and demo on Windows. Disk Structure, Disk Scheduling, FCFS, SSTF, SCAN, C-SCAN, Look Scheduling, Selection of A Scheduling Algorithm, Disk Management-disk formatting.

Unit 4

Linux: Linux Operating System Concepts and Architecture , User Space, Kernel Space, Processes and Daemons, Process Control, Linux File system, User, Group and Resource Management , Configuration Files, File system Permissions, Access Permissions and Security, , /proc file system , Common File system Commands, Partitioning and Disk Management, Installing and Selecting Software Introduction to shell and

Kernel programming : Why shell programming, Creating a script, Variables, Shell commands and control structures, Kernel Basics, General kernel responsibilities, Kernel organization, Kernel modules Using Kernel Services , System calls , Signals and interrupts , Managing memory , Address architecture, address space.

LIST OF PRACTICALS:

1. Write a Shell program to check the given number is even or odd
2. To write a C program for implementation of Priority scheduling algorithms.
3. To write a C program for implementation of Round Robin scheduling algorithms.
4. To write a C program for implementation of FCFS and SJF scheduling algorithms
5. To write a C-program to implement the producer – consumer problem using semaphores.
6. To write a c program to implement IPC using shared memory.
7. To write a C program to implement banker's algorithm for deadlock avoidance.
8. Write a Shell script that accepts a filename, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
9. Write a C Program that makes a copy of a file using standard I/O and system calls.

Text Books:

1. Silberschatz and Galvin, Operating System Concepts, John Wiley &Sons ,Sixth edition

Course Name: -Computer Organization & Architecture
Course Code:- PCA-103

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

3 1 0 3.5

Unit 1

Introduction: A Brief history of Processors, The VON NEUMANN model, The system Bus model, A Typical computer system. Digital Logic Circuits: Logic gates , Boolean algebra, K-maps , combinational circuits, flip-flops, sequential circuits. Digital Components: Integrated circuits, multiplexers, encoders, demultiplexers, decoders, shift registers, binary counters, memory units.

UNIT 2

Data Representation: Binary numbers, binary codes, fixed point representation, floating point representation, error detection codes. Computer Arithmetic: Introduction, addition and subtraction, multiplication algorithms, division algorithms, floating point arithmetic operation, decimal arithmetic unit, decimal arithmetic operations. RISC/CISC, Register Transfer and Micro operation: Register transfer language, register transfer, bus and memory transfer, arithmetic micro operations, logic micro operations, shift micro operations.

UNIT 3

Basic Computer Organization and Design: Instruction codes, computer registers, computer instructions, timing & control, instruction cycle, memory reference instructions, input- output and interrupt design of basic computer, design of accumulator logic. Micro programmed Control Unit : Control memory, address sequencing. Central Processing Unit: Introduction, general register organization, stack organization, instruction formats, addressing modes.

UNIT 4

Input – Output Organization: Peripheral devices, DMA, input – Output interface, asynchronous data transfer, modes of data transfer, priority interrupt, direct memory access, input – output processor. Memory Organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.

Text Books:

1. Morris Mano, Computer System Architecture, 3rd Edition, Prentice-Hall of India Private Limited, 1999.
2. WIliam Stallings, Computer Organization and Architecture, 4th Edition, Prentice Hall of India Private Limited, 2001

Reference Books:

1. Harry & Jordan, Computer Systems Design & Architecture, Addison Wesley, Delhi,2000.

Course Name: - RELATIONAL DATABASE MANAGEMENT SYSTEM
Course Code: - PCA-104

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

3 1 4 5.5

Unit I

Basic concepts Database & Database Users. Characteristics of the Database Approach advantages of using DBMS. Data Models, Schemas & Instances. DBMS Architecture & Data Independence. System Architecture for DBMS and Data Dictionary, Database Users Data Base languages & Interfaces. Data Modeling using the Entity-Relationship Model -Entity types, Entity Sets, Attributes and Keys, Relationship, Relationship Types, Week Entity Types, Structural Constraints, Enhanced ER Model- Specialization Generalization, Constraints on Specialization Generalization.

Unit II

Relational Model, Languages & Systems Relational Data Model Concepts and Constraints. Relational Algebra - select, project, set theoretic, join operations. Overview of Relational Calculas. SQL - A Relational Database Language. Data Definition commands, View and Queries, transaction commands, Specifying Constraints & Indexes in SQL.

Unit III

Relational Data Base Design Function Dependencies & Normalization for Relational Databases. Informal design guidelines for relation schemas, Functional Dependencies. Normal forms based on primary keys (INF, 2NF, 3NF& BCNF). Lossless join & Dependency preserving decomposition. Multivalued dependencies, join dependencies (4NF & 5NF), Denormalization

Unit IV

Transactions, Concurrency Control, Recovery Techniques Basic concept; ACID properties; transaction state; implementation of atomicity and durability; concurrent executions; basic idea of serializability; view and conflict serializabllity Recovery Techniques Failure Classification , Storage Structure, Recovery and Atomicity Log Based Recovery, Shadow Paging ,stable storage implementation, data access; recovery and atomicity - log based recovery, deferred database modification, immediate database modification, checkpoints. Emerging fields in DBMS Distributed databases; Basic idea; distributed data storage; data replication; data fragmentation horizontal, vertical and mixed fragmentation. Concepts of Multimedia databases, Object oriented data base management systems. Data Warehousing & mining.

LIST OF PRACTICALS:

1. Definition of Database (create, desc, alter, creating duplicate tables, constraints (primary key, foreign key, check, not null).
2. Creation and modification of Database (insert & interactive input, update, delete).
3. Retrieval of Database - select: where, distinct, in, between-and, like, is null, group by-having, order by, column: (format, heading, justify, wrap trunc), nested queries: (any, all, in, not in, exists), joins: (simple, self-join, outer join, between joins).
4. Views (create, update,drop),sequences(create,alter,drop), synonyms(create, drop), index(create, drop)
5. Transaction control (commit, rollback, save point).
6. Data control (grant, revoke).
7. PL/SQL programming: (Exceptions, cursors, records, tables, triggers, procedures, functions)

Text Books:

1. Elmsari and Navathe, "Fundamental of Database System", Addison Wesley. New York.
2. H.Korth & A. Silberschatz, “DATABASE SYSTEM CONCEPTS”, TMH.

Reference Books :

1. Date. CJ, "An Introduction to Database System", Narosa Publishing House. New Delhi.
2. Desai, B, "An Introduction to Database Concepts", Galgotia Publications**,** New Delhi.
3. Ullman. J.D, "Principles of Database Systems", Galgotia Publications, New Delhi.

Course Name: -Discrete Mathematics
Course Code:-PAM-105

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

3 1 0 3.5

Unit 1

Mathematical Logic: Statement and notations, Connectives, Conjunction, Disconjunction, Statement Formulas, Truth Tables, Tautologies, Conditional and Bi conditional ,Well Formed Formulas ,normal forms, theory and Inference for statement calculus, predicate calculus, Inference theory for predicate calculus. Lattices and boolean algebra: Relations to partial ordering, Lattices, Hasse Diagram, Axiomatic definition of Boolean Algebra as algebraic structures with two operations, Boolean Functions, Representing Boolean Functions, Switching Circuits, Gate Circuits,

Unit 2

Relations and Functions: Binary relations, Composition of relations; Equivalence relations and partitions; Transitive Closure, Partially ordered sets, Functions, Injection, Surjection and bijection; Composition of functions. Recursion and Recurrence Relations: Recursive functions, iteration, sequences and discrete functions, Recurrence relations, Generating function and their applications,

Unit 3

Graph and Tree: Directed and Undirected Graphs, Weighted Graphs, Circuits, Paths, Cycles, Connectivity, Adjacency and Incidence Matrices, Eulerian Path , Hamiltonian path and circuits, Trees, Rooted trees, Binary Search trees and Minimal Spanning Tree, Kruskal's algorithm and Prim's Algorithm.

Unit 4

Algebraic structures: Introduction to algebraic structures, semi groups, Groups, Permutation Groups, Subgroups, Cosets, Normal Subgroups, Cyclic Groups, Lagrangestheorem,Burnside theorem, Homomorphisms, Isomorphism, Automorphism, Congruencies, Applications of Congruences, Rings, Finite fields: Definition, Representation, Structure, Integral Domain, Irreducible Polynomial, Polynomial Roots, Splitting Field.

Text Books:

1. TrembleyJ.P.andManohar R., Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill (2003).
2. Alan Doerr And Kenneth Levaseur, Applied Discrete Structures For Computer Science, Galgotia Publications Pvt. Ltd., New Delhi.

Reference Books:

1. Seymour LipschutzAnd Marc Lars Lipson, Discrete Mathematics", Mcgrraw- Hill International Editions, Schaum's Series, New York.

Course Name: - Personality Development Programme
Course Code: -PPD-101

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

2 0 0 2

UNIT 1

Personal success factors: SWOT analysis, Handling Failure, Knowing yourself, Identifying one's strength and failures, Importance Of First Impression

UNIT 2

Managing self : Ego, Pride, Emotions, Achievements, Confidence improvement, Complex problem solving and creativity, Recognition of one's own limitations and deficiencies, Determining How Well You Perceive What's Going On Around You, Interpersonal Skills

UNIT 3

Creating Right Impression: Introduction, Basic etiquettes, Seek permission, Ask for help, Grooming, Professional Environment, Do's and Don'ts.

Text Book:

1. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGrawHill.
2. Stephen P. Robbins and Timothy A. Judge(2014), Organizational Behavior 16th Edition:Prentice Hall.
3. Andrews, Sudhir. How to Succeed at Interviews. 21st (rep.) New Delhi.Tata McGraw- Hill1988.
4. Heller, Robert.Effective leadership. Essential Manager series. Dk Publishing, 2002
5. Hindle, Tim. Reducing Stress. Essential Manager series. Dk Publishing, 2003
6. Lucas, Stephen. Art of Public Speaking. New Delhi. Tata -Mc-Graw Hill. 2001
7. Mile, D.J Power of positive thinking. Delhi. Rohan Book Company, (2004).
8. Pravesh Kumar. All about Self-Motivation. New Delhi. Goodwill Publishing House. 2005
9. Smith, B . Body Language. Delhi: Rohan Book Company. 2004

SEMESTER II

Course Name: -Advanced Data Structures and Algorithms
Course Code:- PCA-151

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

3 1 4 5.5

Unit 1

Basic Concepts and Notations, Data Structures and Data Structure Operations, Mathematical Notation and Functions, Complexity Analysis: Time and Space complexity of algorithms, asymptotic analysis, big O and other notations, importance of efficient algorithms, program performance measurement, data structures and algorithms. Basic Data Structures and Operations on them: Arrays, Stacks and Queues and Their Applications, Linked and Sequential Representation. Multi-Linked Structures.

UNIT 2

Searching and Sorting, use of Various Data Structures for Searching and Sorting, Linear and Binary Search, Bubble Sort, Insertion Sort, Shell Sort, Selection Sort, Merge Sort, Radix Sort, Quick Sort. Hashing: Introduction to hash table, hash function, resolving collision by chaining and open addressing, deleting items from a hash table.

UNIT 3

Backtracking, n-Queen's Problem, Hamiltonian Circuit problem, Branch and bound, Traveling salesman problem. Introduction to Computability, Polynomial time verification, NP-Completeness and Reducibility, NP-Completeness Proof, NP-Complete problems. File Organization: Sequential File Organization: Processing Sequential files, Operations on sequential files. Direct File Organization : Processing of Direct Files, Operations on sequential files.

UNIT 4

Trees-Definitions and Basic Concepts, Linked Tree Representation, Representations in Contiguous Storage, Binary Trees, Binary Tree Traversal, Searching, Insertion and Deletion in Binary Trees, Binary Search Tree, Heap and Heap Sort Algorithm, AVL Trees. Graphs and Their Application, Sequential and Linked Representation of Graph-Adjacency Matrix, Operations on Graph, Traversing a Graph, Dijkstra's Algorithm for Shortest Distance, Prim's Algorithm, Kruskal's Algorithm, DFS and BFS, Minimal Spanning Tree.

LIST OF PRACTICALS:

1. Write a program To display Fibonacci series up to a range
2. Write a program for searching, inserting and deleting in binary tree
3. To insert an element in an array.

4. To concatenate two strings.
5. Implementation of linked list using array
6. Implementation of stack using array
7. Write a program for Dijkstra's algorithm for shortest paths.
8. Implementation of binary search tree using array.
9. To Search an element using binary search.
10. Arrange the list of numbers in ascending order using Bubble Sort, merge sort, quick sort radix sort and heap sort

Text Books:

1. A. Tanenbaum, Y. Lanhgsam and A.J. Augenstein, "Data Structures Using C", Prentice Hall of India
2. Mary E. S. Loomis, "Data Management and File Structures", PHI, 1995.
3. Seymour Lipschultz, "Theory and Practice of Data Structures", McGraw-Hill, 1988.
4. E. Horowitz and S. Sahni, "Data Structures with Pascal", Galgotia, 3rd Edition, 1991.
5. Jon Kleinberg and Eva Tardos , Algorithm Design, Pearson Edition, 2006.
6. "Algorithms" SanjoyDasgupta , Christos Papadimitriou UmeshVazirani TMH

Reference Books:

1. Sedgewick, "Algorithms in C", Pearson Education.
2. M. J. Folk, B. Zoellick, G Riccardi, "File Structures", Pearson Education.

Course Name: - Theory of Computation
Course Code:- PCA-152

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L	T	P	Cr
4	0	0	4

Unit-1

Finite Automata and Regular Expression Finite State System Basic Definitions Non-Deterministic finite Automata (NDFA) Deterministic finite Automata(DFA) Equivalence of DFA and NDFA Finite Automata with E-moves, Regular expression, Equivalence of finite Automata and expression,Regular expression conversion and vice –versa.

Unit-2

Introduction to Machines Concept of basic machines Properties and limitation of FSM Moore and Mealy Machines Equivalence of Moore and Mealy Machines Conversion of NFA to DFA by Arden's method Properties of Regular Sets The Pumping Lemma for Regular sets Application of the pumping lemma Closure properties of regular sets Myhill-Nerode Theorem and minimization of Finite Automata Minimization Algorithm. Kleene's Theorem.

Unit-3

Grammars Definition Context Free and context sensitive grammar Ambiguity Regular grammar Reduced forms Removal of useless Symbols and unit production Chomsky Normal Form(CNF) Griebach Normal Form(GNF). Pushdown Automata Introduction to push-down machines Application of pushdown machines.

Unit: 4

Turing Machines Deterministic and Non-Deterministic Turing Machines Design of T.M Halting problem of T.M. CP problem. Chomsky Hierarchy Chomsky hierarchies of grammars unrestricted grammar Context sensitive Language Relation between language of classes. Computability Basic Concepts Primitive Recursive Functions

Text Books

1. Hopcroaft&O.D.Ullman, R.Motwani: Introduction to Automata Theory, languages & computations
2. K.L.P.Mishra& N.Chandershekaran: Theory of Computer Sc. (Automata, Language & Computation)
3. Peter Linz: Introduction to formal language &Automata
4. John C. Martin: Introduction to Languages and the Theory of Computation

Course Name: - SOFTWARE ENGINEERING
Course Code: - PCA-153

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

3 1 0 3.5

Unit1

The software problem, software engineering problem, software engineering approach.Software development process, project management process, software configuration management process, software requirement analysis and specification- software requirements, problem analysis, requirement specification and validation.

Unit 2

Software Planning: Cost estimation, function point and COCOMO models project schedule estimation, staffing and personnel planning, software configuration management plan, quality assurance, monitoring plans and risk management.

Unit 3

Software Design: Design concepts, abstraction, modularity, structure, concurrency, information hiding, modularization, coupling and cohesion, design notations, data flow diagrams, structure charts, procedure templates, pseudo code, decision tables, detailed
Design considerations, verification, complexity, data binding and cohesive metrics.

Unit 4

Implementation Issues: Structured coding techniques, coding style, standards and guidelines.
Verification and Validation Techniques: Quality assurance, static analysis, symbolic execution, unit testing and debugging, system testing, CASE tools, Software Reliability basic concepts, computation of system reliability, models, and estimation.

Text Books:

1. K. K. Aggarwal & Yogesh Singh, “Software Engineering”, 2nd Ed., New AgeInternational, 2005.
2. R. S. Pressman, “Software Engineering – A practitioner’s approach”, 5th Ed.,McGraw Hill Int. Ed., 2001.

Recommended Books:

1 Pankaj Jalote, “An Integrated Approach To Software Engineering.” Narosa Publishing House, 1991.

Course Name: - Data Communication & Computer Networks
Course Code: - PCA-154

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L	T	P	Cr
3	1	0	3.5

Unit 1

Introduction: Definition, Uses, Application, Structure, Network Software, Design Issues For The Layer, The O.S.I. Reference Model, Services, Example Networks - Public Networks, ARPANENT, MAP AND TOP, USENET, CSNET, BITNET, SNANET. **Physical Layer:** Theoretical Bases For The Data Communication, The Maximum Data Rate Of A Channel, Transmission Media, Magnetic Media, Twisted Pair, Base-band Coaxial Cable, Fiber Optics, Line Of Sight Transmission Communication Satellite, Analog Transmission, Digital Transmission, Transmission And Switching, Terminal Handling, ISDN, Digital Network.

Unit 2

Medium Access Layer: Local And Metropolitan Area Network, Aloha Protocol, LAN Protocol, IEEE Standard 802.4 For LAN'S, Fiber Optic Networks, Satellite Networks, Packet Radio Networks. **Data Link Layer:** Design Issues–Framing, Error Control, Flow Control, Link Management, Error Detecting Code and Error Correcting Codes, Elementary Data Link Protocols – An Unrestricted Simplex Protocol, A Stop And Wait Protocol, A Simplex Protocol For A Noisy Channel, Sliding Window Protocol – A One Bit Sliding Window Protocol, A Protocol Using Go Back n , Protocol Specification And Verification – Finite State Machine Models, Petri Net Models.

Unit 3

Network Layer: Design Issues, Routing Algorithms–Shortest Path Routing, Isolated Routing, Flooding, Distributed Routing, Optimal Routing, Flow Based Routing, Broadcast Routing, Congestion Control Algorithms–Pre-allocation of Buffers, Packet Discarding, Flow Control, Choke Packets, Deadlocks, Internetworking–Bridges, Gateways. **Transport Layer:** Design Issues, Connection Management–Addressing, Establishing a Connection, Releasing a Connection, Time–Based Connection Management, Flow Control And Buffering, Multiplexing, Crash Recovery.

Unit 4

Session Layer: Design Issues–Data Exchange, Dialog Management, Synchronization, Activity Management, Exception Reporting, Remote Procedure Call–The Client Server Model, Implementation Of RPC, Semantics of RPC, Orphans. **Presentation Layer: Design Issues**–Data Representation, Data Compression, Network Security And Privacy, Abstract Syntax Notation 1–Data Structure, Abstract Syntax, Transfer Syntax, Data Compression Techniques, Cryptography **Application Layer: Design Issues**–File Transfer, Access and Management, Electronic Mail, Virtual Machines and Other Application

Text Book:

1. A.S. Tanenbaum, Computer Networks, PHI.
2. Uyless D. Black, Data Communication and Distributed Networks, PH International.
3. Cannon and Luccke, Understanding Communication Systems, Texas Instruments.

Reference Books:

1. James Martin, Computer Networks and Distributed Processing, PHI.

Course Name: - Object Oriented Programming
Course Code: - PCA-156

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L	T	P	Cr
3	1	4	5.5

Unit-1

Introduction to OOP: Programming Paradigms, Basic Concepts of OOP: Class, Objects, Data Abstraction, Encapsulation, Information Hiding, Inheritance, Polymorphism, Message Passing, Dynamic Binding, Benefits of OOPs.

Introduction to C++: C++ Program Structure, I/O Statements, Keywords, Various Data Types, Variable Declaration, Operators, Scope Resolution Operator, Manipulators, Expressions, Control Structures, Functions, Arrays, Pointers, Pre-processor Directives.

Unit-2

Classes and Objects: Class Declaration, Access Specifiers, Member Function Definitions, Private and Public Member Function, Nesting of Member Function, Arrays within Class, Array of Objects, Objects as Function Arguments, Friend Function.

Constructor and Destructors: Constructors, Parameterized Constructors, Copy Constructor, Dynamic constructors, Destructors

Unit-3

Overloading: Function Overloading, Operator Overloading, Operator Function as Class Member Vs. Friend Function, Overloading Unary operator, Overloading Binary Operator, Type Conversions, String Class.

Inheritance: Base and Derived Classes, Visibility Modes, Single Inheritance, Multiple Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Method Overriding, Virtual Base Classes, Abstract Class, Nesting of Classes

Unit-4

Polymorphism: This Pointer, Virtual Functions, Dynamic Binding

File and I/O Streams: I/O Stream Classes, Console I/O Operations (Formatted and Unformatted), File Stream Classes, Various Operations on Files, File Pointers.

Templates and Exception Handling: Class Templates, Function Templates, Member Function Templates, Exception Handling, Try, Throw and Catch Block

LIST OF PRACTICALS:

1. To create the program to find total, average of given two numbers by using function with default arguments, static data members and friend function.
2. The program to implement complex number class with necessary operator overloading and type conversion such as integer to complex, complex to double.
3. Overload the new and delete operators to provide custom dynamic allocation of memory.
4. Develop a template of linked-list class and its methods
5. Design stack and queue classes with necessary exception handling.
6. Define point class and an Arc class.
7. Define a Graph class which represents graph as collection of point objects and Arc objects. Write a method to find a minimum cost spanning tree in a graph.
8. Develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc.
9. Design a simple test application to demonstrate dynamic polymorphism and RTTI.

Text Books:

1. The C++ programming language by Bjarne Stroustrup Addison Wesley
2. Object Moudling and design by James Rumbaugh, Michel Blha William Premerlani, Fredetrick Eddy and William Lorence, PHI
3. Object oriented programming in turbo C++ by RobbetLofre, Galgotia Publication
4. Programming with C++ By D.Ravichandern , Tata Mcgraw Hill

Course Name: - Personality Development Programme
Course Code: -PPD-151

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

2 0 0 2

UNIT 1

Leadership Skills: Leader: Introduction, Roles, Responsibilities, Vision and mission, Empowering and delegation, motivating others, Organizational skills, Team building, Organizing and conducting meeting, Decision making, giving support, Coaching / guiding, Mentoring and counselling, Appraisal, Feedback, Handling Conflicts, Power and politics.

UNIT 2

Public Speaking : Self-esteem, Thinking skills, Confidence, Critical thinking, Personal development, Communication skills, Social connections, Personal satisfaction, Expand your professional network

UNIT 3

Newspaper Report Writing: Committee reports and news-paper reports, Two topics should be given in the examination and students should attempt one out of two.

Text Book:

1. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGrawHill.
2. Stephen P. Robbins and Timothy A. Judge(2014), Organizational Behavior 16th Edition:Prentice Hall.
3. Andrews, Sudhir. How to Succeed at Interviews. 21st (rep.) New Delhi.Tata McGraw- Hill1988.
4. Heller, Robert.Effective leadership. Essential Manager series. Dk Publishing, 2002
5. Hindle, Tim. Reducing Stress. Essential Manager series. Dk Publishing, 2003
6. Lucas, Stephen. Art of Public Speaking. New Delhi. Tata -Mc-Graw Hill. 2001
7. Mile, D.J Power of positive thinking. Delhi. Rohan Book Company, (2004).
8. Pravesh Kumar. All about Self-Motivation. New Delhi. Goodwill Publishing House. 2005
9. Smith, B . Body Language. Delhi: Rohan Book Company. 2004

SEMESTER III

Course Name:- Programming in Python
Course Code: - PCA-201

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

3 1 4 5.5

Unit 1

Introduction to Python: The basic elements of Python, Objects, expressions and numerical Types, Variables and assignments, IDLE, Branching programs, Strings and Input, Iteration Structured Types, Mutability and Higher-order Functions: Tuples, Lists and Mutability, Functions as Objects, Strings, Tuples and Lists, Dictionaries.

Unit 2

Functions, Exception, Modules and Files Functions: Difference between a Function and a Method, Defining a Function, Calling a Function, Returning Results from a Function, Returning Multiple Values from a Function, Functions are First Class Objects, Pass by Object Reference, Formal and Actual Arguments, Positional Arguments, Keyword Arguments, Default Arguments, Variable Length Arguments, Local and Global Variables, The Global Keyword, Passing a Group of Elements to a Function, Recursive Functions, Anonymous Functions or Lambdas. Function Decorators, Generators, Structured Programming, Creating our Own Modules in Python. The Special Variable __name__ Exceptions: Errors in a Python Program. Exceptions, Exception Handling, Types of Exceptions, The Except Block, The assert Statement, UserDefined Exceptions, Logging the Exceptions

Unit 3

Classes and Object-oriented Programming: Classes: Creating a Class, The Self Variable, Constructor, Types of Variables, Namespaces, Types of Methods (Instance Methods, Class Methods, Static Methods), Passing Members of One Class to Another Class, Inner Classes Inheritance and Polymorphism: Constructors in Inheritance, Overriding Super Class Constructors and Methods, The super() Method, Types of Inheritance, Single Inheritance, Multiple Inheritance, Method Resolution Order (MRO), Polymorphism, Duck Typing Philosophy of Python, Operator Overloading, Method Overloading, Method Overriding Abstract Classes and Interfaces: Abstract Method and Abstract Class, Interfaces in Python, Abstract Classes vs. Interfaces,

Unit 4

Advanced Topics: Plotting and Data Science Plotting using PyLab, Plotting mortgages and extended examples Data Science Using Python: Data Frame (Creating Data Frame from an Excel Spreadsheet, Creating Data Frame from .csv Files, Creating Data Frame from a Python Dictionary, Creating Data from Python List of Tuples, Operations on Data Frames), Data Visualization : Bar Graph, Histogram, Creating a Pie Chart, Creating Line Graph.

LIST OF PRACTICALS:

1. Using for loop, print a table of Celsius/Fahrenheit equivalences. Let c be the Celsius temperatures ranging from 0 to 100, for each value of c, print the corresponding Fahrenheit temperature.
2. Using while loop, produce a table of sins, cosines and tangents. Make a variable x in range from 0 to 10 in steps of 0.2. For each value of x, print the value of sin(x), cos(x) and tan(x).
3. Write a program that reads an integer value and prints “leap year” or “not a leap year”.
4. Write a program that takes a positive integer n and then produces n lines of output shown as follows. For example enter a size: 5 * ** *** **** *****
5. Write a function that takes an integer input and calculates the factorial of that number.
6. Write a function that takes a string input and checks if it’s a palindrome or not.
7. Write a list function to convert a string into a list, as in list (‘abc’) gives [a, b, c].
8. Write a program to generate Fibonacci series.
9. Write a program to print factors of a given number.
10. Write a method to calculate GCD of two numbers

Text Book:

1. John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of India
2. R Nageswara Rao, Core Python Programming, 2nd Edition, Dreamtech Press
3. Gilbert, Stephan D. And William B. Hccarthy, “ Object Oriented Programming In Java “, 1997, The Waite

Reference Books:

1. Mary Compoine And Kathy Walrath ,” The Java Turtorial “, Addison-Wesley, 1996.
   Horstmann, Cay S. And Gary Cornell, “Core Java 1.1 : Fundamentals .” Addison – Wesley.

Course Name:- Web Technologies
Course Code:- PCA-217

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

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Unit 1

History of the Internet, Basic internet protocols, World Wide Web (W3C), HTTP: Hypertext Transfer Protocol. Markup languages-XHTML: Introduction to HTML, basics of XTHML, HTML elements, HTML tags, lists, tables, frames, forms, defining XHTML‘s abstract syntax, defining HTML documents. CSS style sheets: Introduction, CSS core syntax, text properties, CSS box model, normal flow box layout, other properties like list, tables, DHTML, XML, XML documents & vocabulary, XML versions & declarations, Introduction to WML.

Unit 2

Client Side Programming: JAVA Scripts, basic syntax, variables & data-types, literals, functions, objects, arrays, built-in objects, JAVA Script form programming, Intrinsic event handling, modifying element style, document trees, Server side programming – Java Servlets: Servlet architecture, life cycle, parameter data, sessions, cookies, servlets capabilities, servlets & concurrency. Introduction to JSP, JSP Tags, JSP life cycle, custom tags.

Unit 3

Security Threats, Security risks of a site, Web attacks and their prevention, Web security model, Session management, authentication, HTTPS and certificates, Application vulnerabilities and defenses. Client-side security, Cookies security policy, HTTP security extensions, Plugins, extensions, and web apps, Web user tracking. Server-side security tools, Web Application Firewalls (WAFs) and Fuzzers

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Unit 4

Introduction to Web 2.0 and Web 3.0, Concepts and Issues, Latest Trends in Web Technologies. Web Security concerns. Applications of Web Engineering Technologies in distributed systems etc. Case studies using different tools. Introduction to PHP: Origins and Uses of PHP, Overview of PHP -General Syntactic Characteristics - Primitives, Operations, and Expressions - Control Statements, Arrays, Functions, Pattern Matching, Form Handling, Cookies, Session Tracking.

LIST OF PRACTICALS:

1. Write a program to illustrate the use of text-level tags and block-level tags.
2. Create a document that takes format of business letter by using <p> and
tag.
3. Create a document (bill of sale) by using <pre> tag and complete with a aligned dollar ($) values and total.
4. Create an ordered list using Roman Numerals after the 5 th item increase the next list value by3.
5. Use the align attribute of image tag to align another image or text.
6. Create a webpage to demonstrate various types of linking.
7. Create a resume using HTML tag.
8. Create a web page which displays the map of our country. Link each city or state on the image map such that the respective html page of the city or state is displayed when user selects an area.
9. Create a table of contents in which each menu item or content should load a webpage.
10. To create a web page of your organization (college) using html tags and frames.
11. Write a simple PHP program that displays a welcome message.
12. Write a PHP program using the string comparison operators
13. Write a XHTML form for gathering user input in PHP
14. Write a PHP program obtaining user input through forms.
15. Write a PHP program using PHP arithmetic operators

Text Books:

1. Web Technologies: A Computer Science Perspective, Jackson, Pearson Education India, 2007.

2. Web Engineering: A Practitioner's Approach by Roger S Pressman, David Lowe, TMH, 2008

Course Name:- CLOUD COMPUTING
Course Code:- PCA-224

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

3 1 0 3.5

Unit-I: Cloud Computing Overview

Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling ,Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing.

Unit-II: Cloud Insights

Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security, Limitations – Sensitive information - Application development- security level of third party - security benefits, Regularity issues: Government policies.

Unit-III: Cloud Architecture- Layers and Models

Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption.

Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.

Unit-IV: Cloud Simulators- CloudSim and GreenCloud

Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture(User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim, Introduction to GreenCloud **Introduction to VMWare Simulator** Basics of VMWare, advantages of VMware virtualization, using Vmware workstation, creating virtual machines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine

Text & References:

Text:

1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010

2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

References:

1. Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010

2. Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011

Course Name: - MACHINE LEARNING
Course Code: - PCA-204

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

3 1 4 5.5

UNIT I

Introduction to Machine Learning, learning versus Designing, Training versus Testing, Characteristics of Machine learning tasks, Predictive and descriptive tasks, Machine learning Models: Geometric Models, Logical Models, and Probabilistic Models. Features: Feature types, Feature Construction and Transformation, Feature Selection. Classification: Binary Classification- Assessing Classification performance, Class probability Estimation- Assessing class probability Estimates, Multiclass Classification. Regression. Case study of Polynomial Regression. Theory of Generalization: Effective numbers of hypothesis, Bounding the Growth function, VC Dimensions, Regularization theory

UNIT II

LINEAR MODELS Least Squares method, Multivariate Linear Regression, Regularized Regression, Using Least Square regression for Classification. Perceptron, Support Vector Machines, Soft Margin SVM, Obtaining probabilities from Linear classifiers, Kernel methods for non-Linearity.

UNIT III

Linear Regression: Model representation for single variable, Single variable Cost Function, Gradient Decent for Linear Regression, Gradient Decent in practice. Logistic Regression: Classification, Hypothesis Representation, Decision Boundary, Cost function, Advanced Optimization, Multi-classification (One vs. All), Problem of Overfitting.

UNIT IV

Discussion on clustering algorithms and use-cases cantered around clustering and classification. Trends In Machine Learning: Model and Symbols- Bagging and Boosting, Multitask learning, Online learning and Sequence Prediction, Data Streams and Active Learning, Deep Learning, Reinforcement Learning.

LIST OF PRACTICALS:

1. Using Machine learning approach with R: Healthcare Analytics Case Study: Cancer survivability predictors
2. Social and Marketing Analytics Case Study: Tweets as predictors for the stock market: Step 1- Collecting data Step 2 – Exploring and preparing the Data
3. Apply Decision tree classification model on Healthcare Analytics
4. Apply Support Vector Machine model on Social and Marketing Analytics
5. Apply Naïve Bayes Classification Algorithm on Healthcare Analytics
6. Apply Linear Regression Algorithm on Social and Marketing Analytics
7. Develop and test the model for Healthcare Analytics
8. Develop and test the model for Social and Marketing Analytics
9. Visualize Data Classification results
10. Visualize the decision trees
11. Visualize the prediction

Text Books:

1. Introduction to Machine Learning by EthemAlpaydin PHI.
2. Saroj Kaushik, Artificial Intelligence, Cengage Learning, 1st Edition 2011.
3. Machine Learning: The Art and Science of Algorithms that Make Sense of Data Peter Flach Cambridge University Press, 2012.

Reference Links

1. https://cs.ccsu.edu/~markov/ccsu_courses/MachineLearning.html
2. https://www.javatpoint.com/machine-learning

Course Name: - Personality Development Programme
Course Code: -PPD-201

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

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Unit- I:

Seven C's Of Effective Communication: Completeness, Conciseness, Concreteness, Correctness, Consideration, Courtesy, Clarity

Unit- II:

Etiquettes and Mannerism: Professional Etiquettes, Etiquettes At Meeting, Etiquettes At Dining, PRO (Public Relation Office) Etiquettes, Managing Involuntary Awkward Actions, Technology Etiquettes – Phone , Email, Social Media Etiquettes, Video Conferencing Etiquettes, Interview Etiquettes.

Unit-III:

Soft Skills: Communication, Self-Motivation, Leadership, Responsibility, Teamwork, Problem Solving, Decisiveness, Ability to Work Under Pressure and Time Management

Text Book:

1. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGrawHill.
2. Stephen P. Robbins and Timothy A. Judge(2014), Organizational Behavior 16th Edition:Prentice Hall.
3. Andrews, Sudhir. How to Succeed at Interviews. 21st (rep.) New Delhi.Tata McGraw- Hill1988.
4. Heller, Robert.Effective leadership. Essential Manager series. Dk Publishing, 2002
5. Hindle, Tim. Reducing Stress. Essential Manager series. Dk Publishing, 2003
6. Lucas, Stephen. Art of Public Speaking. New Delhi. Tata -Mc-Graw Hill. 2001
7. Mile, D.J Power of positive thinking. Delhi. Rohan Book Company, (2004).
8. Pravesh Kumar. All about Self-Motivation. New Delhi. Goodwill Publishing House. 2005
9. Smith, B . Body Language. Delhi: Rohan Book Company. 2004

Department Elective

Course Name: - Mobile Computing
Course Code: - PCA-215

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

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Unit 1

Mobile Database: Introduction, Fully Connected Information Space, Types of Mobility.

Fundamentals of Database Technology: Conventional Database, Architecture, Database Processing, Serialization of Transaction, Advanced Transaction Model.

Unit 2

Concurrency Control Mechanism: Introduction, ways of locking data items. The Phantom Problem, Multigranularity locking, Heuristics approach in locking scheme, Non locking based schemes **Data Processing and Mobility:** Introduction, Effect of mobility on the management of data, Data Categorization, Location dependent data distribution.

Unit 3

Transaction management in Mobile Database systems: Mobile Database systems, Transaction execution in MDS, Mobile Transaction Model, Execution model on ACID transaction framework, pre-write transaction execution model, data consistency in intermittent connectivity.

Unit 4

Mobile database Recovery: Introduction, Log Management in Mobile Database systems, Mobile database recovery scheme.

Text Books

1. Mobile Database Systems By Kumar Vijay, John Willy &Sons

Course Name:- Information Security
Course Code:- PCA-216

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

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Unit-1

Overview: Computer Security Concepts, Requirements, Architecture, Trends, Strategy, Edge/boundary Security: Firewalls, Intrusion Detection, Intrusion Prevention systems, Honeypots.

Unit-2

User Authentication: Password, Password-based authentication, token based authentication, Biometric authentication, Remote User authentication.

Access Control: Principles, Access Rights, Discretionary Access Control, Unix File Access Control, Role Based Access Control Internet.

Authentication Applications: Kerberos, X.509, PKI, Federated Identity Management.

Unit-3

Cryptographic Tools: Confidentiality with symmetric encryption, Message Authentication & Hash Functions, Digital Signatures, Random and pseudorandom Numbers, Symmetric Encryption.

Message Confidentiality: DES, AES, Stream Ciphers, Cipher Block Modes of Operation, Key Distribution.

Internet Security Protocols: SSL, TLS, IPSEC, S/ MIME.

Unit-4

Database Security: The Need for Database Security, Database Management Systems, Relational Databases, Database Access Control, Inference, Statistical Databases, Database Encryption, Cloud Security.

Malicious Software: Types of Malicious Software (Malware), Propagation–Infected Content Viruses, Propagation–Vulnerability Exploit–Worms, Propagation–Social Engineering–SPAM E mail, Trojans,

Payload–System Corruption, Payload–Attack Agent–Zombie, Bots, Payload Information Theft–Keyloggers, Phishing, Spyware, Payload–Stealthing–Backdoors, Rootkits.

Text Books:

1. Computer Security: Principles and Practice, William Stalling &Lawrie Brown, 2008, Indian Edition 2010, Pearson
2. Chuck Easttom, "Computer Security Fundamentals" Pearson, 2011
3. M. Stamp, "Information Security: Principles and Practice," 2nd Edition, Wiley, ISBN: 0470626399, 2011.
4. M. E. Whitman and H. J. Mattord, "Principles of Information Security," 4th Edition, Course Technology, ISBN: 1111138214, 2011.
5. M. Bishop, "Computer Security: Art and Science," Addison Wesley, ISBN: 0-201-44099-7, 2002

Course Name: - Computer Graphics
Course Code: - PCA-202

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

3 1 0 3.5

Unit 1

Overview Display devices – video, refresh CRT, raster scan, random scan, color CRT, monitors raster scan systems, video controller, raster scan display processor, input devices– trackball and space ball, joysticks, digitizers, scanners, touch panels, light pen. Scan Conversion: Primitive drawing – DDA and Bresenham's algorithm for line, circle, ellipse, general curves, filling – scan line, polygon fill algorithm, inside-outside tests, flood-fill, boundary-fill, attributes – area fill attributes, line and text attributes.

Unit 2

Two-Dimensional and Three-Dimensional Transformations: Basic transformations, matrix representation and homogeneous co-ordinates, composite transformation, reflection and shear transformation. Three-Dimensional Object Representations: Polygon surfaces, polygon tables, plane equations, polygon meshes, curved lines and surfaces, quadric surfaces, spheres, curves, spline representations and spline specifications, Bezier and B-spline curves.

Unit 3

Clipping and Viewing: Line clipping – Cohen Sutherland, Liang-Barsky, polygon clipping –Sutherland – Hodgeman, Weiter-Atherton, projection and its transformations –parallel and perspective and, vanishing points

Unit 4

Visibility: Classification and detection algorithms, back face detection, depth – buffer,scan line, depth sorting and BSP tree, ray casting method and curved surfaces. Rendering: Shading – Gouraud ,Phong , ray tracing and antialised ray tracing.

Text Books:

1. Donald Hearn & M. Pauline Baker, “Computer Graphics.” Prentice Hall India.
2. F. S .Hill Jr., “Computer Graphics.” Macmillan Publishing Company.

Reference Books:

1. David F. Rogers, “Procedural Elements For Computer Graphics.”TataMacGraw Hill.

Course Name: - Mobile Application Development
Course Code: - PCA-218

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

3 1 0 3.5

Unit 1

Characteristics of mobile applications. Architecture and working of Android, iOS and Windows phone 8 operating system. User-interface design for mobile applications and managing application data. Integrating cloud services, networking, OS and hardware into mobile-applications. Addressing enterprise requirements in mobile applications: performance, scalability, modifiability, availability and security.

Unit 2

Introduction to Android Development Environment, What Is Android? Advantages and Future of Android, Frameworks, Tools and Android SDK. Installing Java, Android Studio, SDK Manager Components and updating its platforms

Unit 3

AVD Manager, Genymotion Plugin: Fastest Virtual devices,Understanding Java SE and the Dalvik Virtual Machine.The Directory Structure of an Android Project, Common Default Resources Folders, The Values Folder, Leveraging Android XML.

Unit 4

Introduction to iOS application development: Overview of iOS, iOS Development Environment,iOS Layers, basic of Swift, Building an application for IOS.Windows phone Environment: Overview of windows phone and its platform, Building windows phone applications.

Text Books:

1. Professional Mobile Application Development, JEFF MCWHERTER, SCOTT GOWELL, Wiley.
2. Android Studio Application Development, Belen Cruz, Zapata, Packt Publishing

Reference Books:

1. Professional Android 4 Application Development, Reto Meier, Wrox Publication
2. Beginning iPhone Development with Swift, David Mark, Apress Publication

Course Name:- Big Data Analytics
Course Code:- PCA-219

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

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3	1	0	3.5

Unit 1

INTRODUCTION TO BIG DATA Introduction– distributed file system–Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce

Unit 2

INTRODUCTION TO HADOOP AND HADOOP ARCHITECTURE Big Data – Apache Hadoop & Hadoop EcoSystem, Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce -, Data Serialization.

Unit 3

HDFS-Overview, Installation and Shell, Java API; Hive Architecture and Installation, Comparison with Traditional Database, HiveQL Querying Data, Sorting And Aggregating, Map Reduce Scripts, Joins & Sub queries

Unit 4

NoSQL What is it?, Where It is Used Types of NoSQL databases, Why NoSQL?, Advantages of NoSQL, Use of NoSQL in Industry, SQL vs NoSQL, NewSQL

Text Books:

1. Boris lublinsky, Kevin t. Smith, AlexeyYakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015
2. Chris Eaton,Dirkderooset al. , "Understanding Big data ", McGraw Hill, 2012.
3. BIG Data and Analytics ,Sima Acharya, Subhashini Chhellappan, Willey
4. . MongoDB in Action, Kyle Banker,PiterBakkum , Shaun Verch, Dream tech Press

Reference Books:

1. Tom White, "HADOOP: The definitive Guide", O Reilly 2012.
2. VigneshPrajapati, "Big Data Analyticswith R and Haoop", Packet Publishing 2013.

Course Name:- Cyber Security
Course Code: - PCA-220

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

3 1 0 3.5

Unit I

Cyber Security Concepts: Essential Terminologies: CIA, Risks, Breaches, Threats, Attacks, Exploits. Information Gathering (Social Engineering, Foot Printing & Scanning). Open Source/ Free/ Trial Tools: nmap, zenmap, Port Scanners, Network scanners.

Cryptography and Cryptanalysis: Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls- Types of Firewalls, User Management, VPN Security, Security Protocols: - security at the Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer- IPSec. Open Source/ Free/ Trial Tools: Implementation of Cryptographic techniques, OpenSSL, Hash Values Calculations MD5, SHA1, SHA256, SHA 512, Steganography (Stools)

Unit 2

Infrastructure and Network Security: Introduction to System Security, Server Security, OS Security, Physical Security, Introduction to Networks, Network packet Sniffing, Network Design Simulation. DOS/ DDOS attacks. Asset Management and Audits, Vulnerabilities and Attacks. Intrusion detection and Prevention Techniques, Host based Intrusion prevention Systems, Security Information Management, Network Session Analysis, System Integrity Validation. Open Source/ Free/ Trial Tools: DOS Attacks, DDOS attacks, Wireshark, Cain &abel, iptables/ Windows Firewall, snort, suricata, fail2ban

Vulnerabilities& Safe Guards :Internet Security, Cloud Computing &Security, Social Network sites security, Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Authorization, Unprotected Broadband communications, Poor Cyber Security Awareness. Cyber Security Safeguards-Overview, Access control, IT Audit, Authentication. Open Web Application Security Project (OWASP), Web Site Audit and Vulnerabilities assessment. Open Source/ Free/ Trial Tools: WinAudit, Zap proxy (OWASP), burp suite, DVWA kit. 5.

Unit 3

Malware: Explanation of Malware, Types of Malware: Virus, Worms, Trojans, Rootkits, Robots, Adware's, Spywares, Ransom wares, Zombies etc., OS Hardening (Process Management, Memory Management, Task Management, Windows Registry/ services another configuration), Malware Analysis. Open Source/ Free/ Trial Tools: Antivirus Protection, Anti Spywares, System tuning tools, Anti Phishing.

Security in Evolving Technology: Biometrics, Mobile Computing and Hardening on android and ios, IOT Security, Web server configuration and Security. Introduction, Basic security for HTTP Applications and Services, Basic Security for Web Services like SOAP, REST etc., Identity Management and Web Services,

Authorization Patterns, Security Considerations, Challenges. Open Source/ Free/ Trial Tools: adb for android, xcode for ios, Implementation of REST/ SOAP web services and Security implementations.

Unit 4

Cyber Laws and Forensics: Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013. Introduction to Cyber Forensics, Need of Cyber Forensics, Cyber Evidence, Documentation and Management of Crime Sense, Image Capturing and its importance, Partial Volume Image, Web Attack Investigations, Denial of Service Investigations, Internet Crime Investigations, Internet Forensics, Steps for Investigating Internet Crime, Email Crime Investigations. Open Source/ Free/ Trial Tools: Case Studies related to Cyber Law, Common Forensic Tools like dd, md5sum, sha1sum, Ram dump analysis, USB device.

Text Books:

1. P. Pfleeger, Shari LawerancePfleeger, "Analysing Computer Security", Pearson Education India.
2. V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India.

Course Name:- INTERNET OF THINGS (IOT)

Course Code: - PCA-221

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

3 1 0 3.5

Unit I

Introduction to IoT :M2M to IoT-The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics

M2M to IoT – A Market Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The International driven global value chain and global information monopolies.

Unit II

IoT Technology Fundamentals & Architecture :M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, M2M and IoT Analytics, Knowledge Management IoT Architecture-State of the Art – Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model, and architecture.

Unit III

Cloud Computing Basics : Cloud computing components- Infrastructure-services- storage applications-database services –Deployment models of Cloud- Services offered by Cloud- Benefits, and Limitations of Cloud Computing – Issues in Cloud security- Cloud security services and design principle.

Unit IV

IoT – Privacy, Security, and Governance: Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security .**IoT Applications:** Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.

Preferred Reading:

1. Vijay Madisetti and ArshdeepBahga," Internet of Things (a Hands-on-approach)", VPT 1st edition.2014
2. FrancisdaCosta,"Re thinking the Internet of Things: A Scalable Approach to Connecting Everything", ApressPublications,1stEdition. 2013.
3. CunoPfister,"Getting Started with the Internet of Things",OReillyMedia.2011

Course Name:- Deep Learning

Course Code: - PCA-222

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr

3 1 0 3.5

Unit I

INTRODUCTION: Introduction to machine learning- Linear models (SVMs and Perceptrons, logistic regression)- Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximates.

Unit II

DEEP NETWORKS: History of Deep Learning- A Probabilistic Theory of Deep Learning-Back propagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks- Convolution Networks- Generative Adversarial Networks (GAN), Semi-supervised Learning.

Unit III

IDIMENTIONALITY REDUCTION Linear (PCA, LDA) and manifolds, metric learning – Auto encoders and dimensionality reduction in networks - Introduction to Convent - Architectures –AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyper parameter optimization.

Unit IV

OPTIMIZATION AND GENERALIZATION : Optimization in deep learning– Non-convex optimization for deep networks- Stochastic Optimization Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational &Artificial Neuroscience.

Preferred Reading:

1. CosmaRohillaShalizi, Advanced Data Analysis from an Elementary Point of View, 2015.
2. Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013.
3. Ian Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning, MIT Press, 2016.
4. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015

Course Name: -Artificial Intelligence
Course Code:- PCA-223

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L	T	P	Cr
3	1	4	5.5

UNIT 1

Scope of AI-Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction. Problem solving-State space search; Production systems, search space control: depth-first, breadth-first search, heuristic search - Hill climbing, best-first search, branch bound. Problem Reduction, Travelling salesman problem. Constraint Satisfaction End, Means-End Analysis

UNIT 2

Linguistic aspects of natural language processing, A.I. And Quantum Computing, Applications of Artificial Intelligence (AI) in business. Bayesian Filtering; Recurrent Neural Networks, Deep Neural Networks, Deep Reinforcement Learning.

UNIT 3

Emotion Recognition using human face and body language, AI based system to predict the diseases early, Smart Investment analysis, AI in Sales and Customer Support. Self-Play Networks, Generative Adversarial Networks, Learning from Concept-Drifting Data Streams**.**

Optimized Hardware, Digital Twin i.e. AI Modelling, Information Technology &Security using AI. Architectures for second generation knowledge-based systems, Distributed AI and its applications.

UNIT 4

An introduction to neurocomputing and its possible role in AI, The role of uncertainty measures and principles in AI. Recent Topics in AI/ML: AI/ML in Smart solutions, AI/ML in Social Problems handling, Block chain and AI.

LIST OF PRACTICALS:

1. Solve any problem using breadth first search.
2. Solve any problem using depth first search.
3. Solve any problem using best first search.
4. Solve 8-puzzle problem using best first search.
5. Solve travelling salesman problem.
6. Write a program to find a factorial of a number.
7. Write a program to the maximum of two numbers.
8. Write a program to illustrate the use of predicate not/fail.
9. To find the various relationships of a family.

Text Books

1. E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
2. N.J. Nilsson, "Principles of AI", Narosa Publ. House, 1990
3. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.

Reference Books:

1. Peter Jackson, "Introduction to Expert Systems", AWP, M.A., 1992.
2. R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int Ed., Singapore