1st SEM.

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
MCAP3- 101	Information Management	4	1	0	40	60	100	5
MCAP3- 102	Object Oriented Programming Using C++	4	1	0	40	60	100	5
MCAP3- 103	Computer Organization and Assembly Language	4	1	0	40	60	100	5
MCAP3- 104	Operating System	4	1	0	40	60	100	5
MCAP3- 105	Professional Communication	3	1	0	40	60	100	4
MCAP3- 106	Software Lab. – I (Based on MCAP3-102)	0	0	4	60	40	100	2
MCAP3- 107	Software Lab. – II (Based on MCAP3-104)	0	0	4	60	40	100	2
Total		19	5	8	320	380	700	28

2nd SEM.

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
MCAP3- 208	Data Communication and Networks	4	1	0	40	60	100	5
MCAP3- 209	Relational Database Management System	4	1	0	40	60	100	5
MCAP3- 210	Data Structures and Algorithms	4	1	0	40	60	100	5
MCAP3- 211	Web Technologies	4	1	0	40	60	100	5
MCAP3- 212	Software Lab – III (Based on MCAP3-209)	0	0	4	60	40	100	2
MCAP3- 213	Software Lab – IV (Based MCAP3-210)	0	0	4	60	40	100	2
MCAP3- 214	Software Lab – V (Based on MCAP3-211)	0	0	4	60	40	100	2
Total		16	4	12	340	360	700	26

3rd SEM.

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
MCAP3- 315	Computer Graphics	4	1	0	40	60	100	5
MCAP3- 316	Software Engineering	4	1	0	40	60	100	5
MCAP3- 317	OOPs Using JAVA Programming	4	1	0	40	60	100	5
MCAP3- 318	Data Analytics	4	1	0	40	60	100	5
MCAP3- 319	Software Lab – VI (Based on MCAP3-315)	0	0	4	60	40	100	2
MCAP3- 320	Software Lab – VII (Based on MCAP3-317)	0	0	4	60	40	100	2
MCAP3- 321	Minor Project	0	0	8	60	40	100	4
Total		16	4	16	340	360	700	28

4th SEM.

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
MCAP3-422	Programming with Python	4	1	0	40	60	100	5
MCAP3-423	Information Security	4	1	0	40	60	100	5
MCAP3-424	Theory of Computation	4	1	0	40	60	100	5
MCAP3-425	Data Warehousing & Mining	4	1	0	40	60	100	5
MCAP3-426	Software Lab – VIII (Based on MCAP3-422)	0	0	4	60	40	100	2
MCAP3-427	Major Project	0	0	8	120	80	200	4
Total		16	4	12	340	360	700	26

Total Credits: 28 + 26 + 28+ 26 = 108

INFORMATION MANAGEMENT

Subject Code: MCAP3-101 **L T P C** **Duration: 55 Hrs.**
4 1 0 5

Unit-I (12 Hrs.)

Introduction to Information Technology: Definition, Applications in various sectors, Different types of software, Generations of Computers, Input and output Devices, Various storage devices like HDD, Optical Disks, Flash Drives. Different Types of data file formats: Types and Applications.

Unit-II (15 Hrs.)

IT Infrastructure in India: Telecommunication, Internet research and Broadband DataCollection and Data Management, Data Models, Information vs. Knowledge, Various techniques to derive information, Information Management.

Unit-III (15 Hrs.)

Management Information System: Definition, Strategic Management of Information,Decision Making, Development Process of MIS, Strategic Design of MIS, Business Process Reengineering.

Unit-IV (13 Hrs.)

Understanding Knowledge Management: Designing a Knowledge Management System,Nature and Scope of Business Intelligence, Information Security- Meaning and Importance, Organizational Security Policy and Planning, Access Control and Operations Security.

Office Automation (Word processing, Spreadsheet, Presentation, E-Mail Clients), Content Management System and Architecture.

Recommended Books:

1. Turban, Efraim, Rex Kelly Rainer and Richard E. Potter, 'Introduction to Information Technology', John Wiley & Sons, New York, NY, **2001**.
2. Ponniah, Paulraj, 'Data Warehousing Fundamentals: A Comprehensive Guide for IT Professionals', John Wiley & Sons, **2004**.
3. Schou, Corey and Daniel Paul Shoemaker, 'Information Assurance for the Enterprise: A Roadmap to Information Security', McGraw Hill, Inc., **2006**.
4. Jawadekar, Waman S. 'Management Information Systems: Text and Cases: A Global Digital Enterprise Perspective', Tata McGraw Hill Education, **2013**.

OBJECT ORIENTED PROGRAMMING USING C++

Subject Code: MCAP3-102 **L T P C** **Duration: 55 Hrs.**
4 1 0 5

Unit-I (13 Hrs.)

Evolution of OOP, OOP Paradigm, advantages of OOP, Comparison between functional programming and OOP Approach, Characteristics of object oriented language- objects, classes, inheritance, reusability, user defined data types, polymorphism, overloading. Introduction to C++, Identifier and keywords, constants, C++ operators, type conversion, Variable declaration, statements, expressions, features of iostream.h and iomanip.h input and output, conditional expression loop statements, breaking control statements.

Unit-II (15 Hrs.)

Defining function, types of functions, storage class specifiers, recursion, preprocessor, header files and standard functions, Arrays, pointer arithmetic's, structures, pointers and structures, unions, bit fields typed, enumerations, Passing array as an argument to function.

Unit-III (15 Hrs.)

Classes, member functions, objects, arrays of class objects, pointers and classes, nested classes, constructors, destructors, inline member functions, static class member, friend functions, dynamic memory allocation. Inheritance, single inheritance, types of base classes, types of derivations, multiple inheritance, container classes, member access control.

Unit-IV (12 Hrs.)

Function overloading, operator overloading, polymorphism, early binding, polymorphism with pointers, virtual functions, virtual destructors, late binding, pure virtual functions, opening and closing of files, stream state member functions, binary file operations, structures and file operations, classes and file operations, random access file processing. Exception Handling.

Recommended Books:

1. Lafore, Robert. 'Object-Oriented Programming in Turbo C++'. Galgotia Publications, **2001**.
2. Stroustrup, Bjarne. 'The design and evolution of C++', Pearson Education India, **1994**.
3. Balagurusamy, Entrepreneurial. 'Object Oriented Programming with C++', 6th Edn., TataMcGraw Hill Education, **2001**.
4. S. Hallada and M. Wiebel, 'Object Oriented Software Engineering', BPB Publications, **1995**.

COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE

Subject Code: MCAP3-103 **L T P C** **Duration: 55 Hrs.**
4 1 0 5

Objectives: The objective of the course is to provide students with a solid foundation incomputer design. Examine the operation of the major building blocks of a computer system. To introduce students to the design and organization of modern digital computers & basic assembly language.

Unit-I (13 Hrs.)

Computer Organization: Basic Computer Organization, Bus & Memory Transfer, StoredProgram Organization, Computer Registers, Computer Instructions, Timing and Control, Hardwired based design of Control Unit, Instruction Cycle, Formats of Various types of Instructions- Memory Reference Instructions, Register Reference Instructions & I/O Instructions, General Register Organization-Control word, Design of Adder & Logic Unit, Stack Organization-Register Stack, Memory Stack, Reverse Polish Notation Addressing Modes, RISC vs CISC Architectures, Interrupts & types.

Unit-II (15 Hrs.)

Pipeline & Vector Processing: Parallel Processing, Pipelining-Arithmetic & InstructionPipeline, Vector Processing-Vector operations, Memory Interleaving, Array Processors. Input – Output Organization: Input-Output Interface- I/O vs Memory Bus, Isolated vs Memory mapped I/O, Synchronous Data Transfer, Asynchronous Data Transfer-Strobe Control, Handshaking, Asynchronous Communication Interface, Modes of Transfer-Programmed I/O, Interrupt Initiated I/O, Interrupt Cycle, Priority Interrupt Controller, and DMA Controller & DMA Transfer.

Unit-III (14 Hrs.)

Memory Organization: Main Memory-Memory Address Map, Memory connection to CPU,Associative Memory-Hardware organization, Match Logic, Cache Memory-Levels of Cache, Associative Mapping, Direct Mapping, Set-Associative Mapping, writing into Cache, Cache coherence, Virtual Memory-Address space & Memory space, Address

mapping using pages,Associative memory page table, Page replacement, Memory Management Hardware – Segmented page mapping, Multiport memory, Memory protection.

Unit-IV (13 Hrs.)

Multiprocessors: Characteristics of Multiprocessors, Interconnection Structures-TimeShared Common Bus, Crossbar switch, Multistage Switching Network, Hypercube interconnection, Interprocessor communication & synchronization.

Assembly Language Programming: Example of a typical 8-bit processor (8085microprocessor)-Registers, addressing modes, Instruction Set-Data Transfer Instructions, Arithmetic Instructions, Logical Instructions, Program Control Instructions, Machine Control Instructions, Use of an Assembly Language for specific programmes: Simple numeric manipulations, sorting of a list and use of I/O instructions.

Recommended Books:

1. Car Hamacher, Zvonks Vranesic, Safwat Zaky 'Computer Organization', 5th Edn., McGraw Hill.
2. M.M. Mano, 'Computer System Architecture', Prentice Hall of India, **1986**.
3. John Paul Hayes, 'Computer Architecture and Organization', McGraw Hill InternationalEdn.
4. A.S. Tanenbaum, 'Structured Computer Organization', Prentice Hall of India.

OPERATING SYSTEM

Subject Code: MCAP3-104 **L T P C** **Duration: 55 Hrs.**
4 1 0 5

Unit-I (13 Hrs.)

Basics of Operating Systems: Definition, Types of Operating Systems: Mainframe,Desktop, Multiprocessor, Distributed, Clustered, Real time, Embedded and Time sharing. Simple, Layered, Monolithic and Microkernel Operating Systems. Virtual systems. **Operating System Components:** Process Management, Memory Management component,I/O Management, File Management, Protection System and Network management. **Operating System Services:** Process Execution, I/O operations, File manipulations,Communications, Error detection and recovery, Resource allocation, Accounting, System, Protection, System Calls and System Call Execution; API.

Unit-II (15 Hrs.)

Process: Definition, Process Relationships, Process states, Process State transitions, ProcessControl Block, Context switching. Threads - Concept, Types and advantages of Multithreads. **Process Scheduling:** Definition, Scheduling objectives, Types of Schedulers, Schedulingcriteria, CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time, Scheduling algorithms - Pre-emptive and Non pre-emptive, FCFS, SJF and RR. Multiprocessor schedulers. Performance evaluation of schedulers.

Inter-process Communication and Synchronization: Definition, Shared Memory System,Message passing, Critical section, Mutual Exclusion, Semaphores.

Deadlocks: Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance,Deadlock detection and Recovery.

Unit-III (14 Hrs.)

Basic Memory Management: Definition, Logical and Physical address map, Memoryallocation, Contiguous, Fixed and variable partition. Internal and External fragmentation and Compaction; Paging - Principle of operation, Page allocation, Hardware support, Protection and sharing; Segmentation, Segmentation with Paging.

Virtual Memory Management: Basics of Virtual Memory, Hardware and control structures,Locality of reference, Page fault, Working Set, Dirty page/Dirty bit; Demand paging, Pagereplacement policies - Optimal (OPT), First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

Unit-IV (13 Hrs.)

Device Management: Hardware I/O organization, I/O control, Port and memory mappedI/O, DMA. Buffering and Caching. Device Drivers.

Disk Management: Disk Structure, Disk Formatting, Disk Scheduling and its algorithms,RAID.

Security: Authentication; Types of Threats, Detection, Prevention and correction of Threats.

File Management: File concept, File attributes - Name, Identifier, Type, Location, Size,Time, Date, user identification, File Operations, Directory Structure - Single level, two level, Tree Structure. Disk space allocation methods - Contiguous, Linked, Indexed. Access Methods - Sequential, Indexed, Random access, File system structure, Byte sequence, Record sequence and Tree-based. Disk formatting.

Security and Protection: Security threats, Security Policies and Mechanisms,Authentications.

Recommended Books:

1. William Stalling, 'Operating System Internals and Design Principle', 6th Edn., PearsonEducation, India, **2009**.
2. Peterbears Galvin, 'Operating System Principle', 7th Edn., Wiley India, **2009**.
3. J. Harris, 'Operating System SCHAUM'S OUTLINE', Tata McGraw Hill, Special Indian Edn., **2008**.
4. Pramod Chandra, 'An Introduction to Operating System', 3rd Edn., PHI, **2010**.

PROFESSIONAL COMMUNICATION

Subject Code: MCAP3-105 **LT P C** **Duration: 45 Hrs.**
3 1 0 4

Unit-I (10 Hrs.)

Basics of Technical Communication: Functions of Communication-Internal & ExternalFunctions, Models-Shannon & Weaver's model of communication, Flow, Networks and importance, Barriers to Communication, Essential of effective communication (7 C's and other principles), Non-verbal Communication.

Unit-II (13 Hrs.)

Basic Technical Writing: Paragraph writing (descriptive, Imaginative etc.), precise writing,reading and comprehension, Letters – Format & various types.

Unit-II (12 Hrs.)

Advanced Technical Writing: Memos, Reports, E-Mails & Net etiquettes, Circulars, PressRelease, Newsletters, Notices. Resume Writing, Technical Proposals, Research Papers, Dissertation and Thesis, Technical Reports, Instruction Manuals and Technical Descriptions, Creating Indexes, List of References and Bibliography.

Unit-IV (10 Hrs.)

Verbal Communication: Presentation Techniques, Interviews, Group Discussions,Extempore, Meetings and Conferences.

Technical Communication: MS-Word, Adobe Frame maker and ROBO Help.

Recommended Books:

1. Vandana R. Singh, 'The Written Word', Oxford University Press, New Delhi.
2. K.K. Ramchandran, et al, 'Business Communication', Macmillan, New Delhi.

3. Swati Samantaray, 'Business Communication and Communicative English', Sultan Chand,New Delhi.
4. S.P. Dhanavel, 'English and Communication Skills for Students of Science andEngineering (with audio CD)'.

SOFTWARE LAB.-I (BASED ON MCAP3-102)

Subject Code: MCAP3-106 **L T P C**
0 0 4 2

Note: Program should be fully documented with simple I/O data. Flow charts should be developed wherever necessary.

Write program in 'C++' language:
Using input and output statements using control statements.
Using functions.
Using array
Using Classes and implementation of Constructor and Destructor. Using files.
Using OOP's Concepts (Inheritance, Polymorphism, Encapsulation, Friend and Static Functions)

SOFTWARE LAB.-II (BASED ON MCAP3-104)

Subject Code: MCAP3-107 **L T P C**
0 0 4 2

This laboratory course will mainly comprise of exercises of the Course MCAP-104.

DATA COMMUNICATION AND NETWORKS

Subject Code: MCAP3-208 **L T P C** **Duration: 55 Hrs.**
4 1 05

Objectives: As part of this course, students will be introduced to Computer Networks andData Communication paradigms, about Network models and standards, Network protocols and their use, wireless technologies.

UNIT-I (13 Hrs.)

Introduction to Data Communication: Components of Data Communication, DataRepresentation, Transmission Impairments, Switching, Modulation, Multiplexing. **Review of Network Hardware:** LAN, MAN, WAN, Wireless networks, Internetworks. **Review of Network Software:** Layer, Protocols, Interfaces and Services. **Review of Reference Models:** OSI, TCP/IP and their comparison.

Physical Layer

Transmission Media: Twisted pair, Coaxial cable, Fiber optics, Wireless transmission(Radio, Microwave, Infrared). Introduction to ATM, ISDN, Cellular Radio and Communication Satellites.

UNIT-II (15 Hrs.)

Services provided by DLL: FRAMING, ERROR CONTROL, FLOW CONTROL,MEDIUM ACCESS

Medium Access Sub Layer: Channel Allocation, MAC protocols – ALOHA, CSMA protocols, Collision free protocols, Limited Contention Protocols, Wireless LAN protocols, IEEE 802.3, 802.4, 802.5 standards and their comparison.

UNIT-III (15 Hrs.)

Network Layer: Design Issues, Routing Algorithms (Shortest Path, Flooding, Distance Vector, Hierarchical, Broadcast, Multicast). Congestion Control Algorithms (Leaky bucket, Token bucket, Load shedding), Internetworking, IP Protocol, ARP, RARP.
Network Trouble Shooting: Using Ping, Traceroute, IPconfig, Netstat, nslooku.
Application Layer: Domain name system, E-mail, File transfer protocol, HTTP, HTTPS, World Wide Web.
Recommended Books:

1. Tanenbaum, Andrew S., 'Computer Networks', 4th Edn., PHI,**2009**.
2. B.A. Forouzan, 'Data Communications and Networking', 4th Edn., Tata McGraw Hill,**2009**.
3. Douglas E. Comer, 'Internetworking with TCP/IP (Vol.1, 4thEdition)', CPE 2004.
4. Stallings, William, 'Data and Computer Communications', 8th Edn., PHI,**2008**.
5. Nance, Bary, 'Introduction to Networking', 4th Edn., PHI, **1997**.

RELATIONAL DATABASE MANAGEMENT SYSTEMS

Subject Code: MCAP3-209 **L T P C** **Duration: 55 Hrs.**
4 1 0 5

Unit-I (14 Hrs.)

Review of DBMS: Basic DBMS terminology; Architecture of a DBMS: Data Independence - Physical and Logical Independence, Degree of Data Abstraction, Initial Study of the Database, Database Design, Implementation and Loading, Testing and Evaluation, Operation, Maintenance and Evaluation.
Conceptual Model: Entity Relationship Model, Importance of ERD, Symbols (Entity: Types of Entities, week Entity, Composite Entity, Strong Entity, Attribute: Types of Attribute, Relationship: Type of relationship, Connectivity, Cardinality).

Unit-II (12 Hrs.)

Database Models and Normalization: Comparison of Network, Hierarchical and Relational Models, Object Oriented Database, Object Relational Database, Comparison of OOD & ORD; Normalization and its various forms, De- Normalization, Functional Dependencies, Multi-valued Dependencies, Database Integrity: Domain, Entity, Referential Integrity Constraints.
Transaction Management and Concurrency Control: Client/ Server Architecture and implementation issues, Transaction: Properties, Transaction
Management with SQL, Concurrency; Concurrency Control: Locking Methods: (Lock Granularity, Lock Types, Two Phase Locking, Deadlocks), Time Stamping Method, Optimistic Method, Database Recovery Management.

Unit-III (15 Hrs.)

Distributed Databases: Centralized Verses Decentralized Design; Distributed Database Management Systems (DDBMS): Advantage and Disadvantages; Characteristics, Distributed Database Structure, Components, Distributed Database Design, Homogeneous and Heterogeneous DBMS.
Levels of Data and Process Distribution: SPSD (Single–Site Processing, Single-Site Data), MPSD (Multiple-Site Processing, Single Site Data), MPMD (Multiple –Site Processing, Multiple-Site Data), Distributed Database Transaction Features, Transaction Transparency, Client/ Server Vs DDBMS.

Unit-IV (14 Hrs.)

Business Intelligence and Decision Support System: The need for Data Analysis, Business Intelligence, Operational Data vs. Decision Support Data, DSS Database properties and importance, DSS Database Requirements.

OLAP and Database Administration: Introduction to Online Analytical Processing (OLAP), OLAP Architecture Relational, Star Schemas, Database Security, Database administration tools, developing a Data Administration Strategy.

Recommended Books:

1. Peter Rob Carlos Coronel, 'Data Base Systems', 8th Edn., Cengage Learning.
2. Henry F. Korth, Abraham, 'Database System Concepts', 4th Edn., McGraw Hill,
3. C.J. Date, 'An Introduction to Database Systems', 8th Edn., Pearson Education.
4. Ullman, 'Principles of Database Systems', 3rd Edn., Galgotia Publication.
5. Bipin C. Desai, 'An Introduction to Database Systems', Galgotia Publication.

DATA STRUCTURES

Subject Code: MCAP3-210 **L T P C** **Duration: 55 Hrs.**
4 1 0 5

Unit-I (13 Hrs.)

Introduction to Data Structure: Concept of data, problem analysis, data structures and datastructure operations, notations, mathematical notation and functions, algorithmic complexity, Big-O Notation and time space trade off.

Overview of Arrays, Recursion, Pointers, Pointer Arithmetic, Array of pointers, Arrays in terms of pointers, Static and Dynamic Memory Management, Garbage Collection. Understanding and Implementation of various Data Structures with applications.

Stack: Operations like push, pop and various applications like conversion from infix topostfix and prefix expressions, evaluation of postfix expression using stacks.

Queues: Operations like enqueue, dequeue on simple, circular and priority queues. LinkedLists: operations like creations, insertion, deletion, retrieval and traversal on single, circular and doubly linked list.

Unit-II (15 Hrs.)

Trees Definitions and Concepts: Root, Node, Leaf Node, Level, Degree, Height and Treerepresentation using Linked List and Array

Types of Trees: Binary trees, Binary search tree, Height balanced (AVL) tree, B- trees, B+Tree.

Tree Operations: Creation, insertion, deletion and traversals (Preorder, In-order, Post-ordered) and searching on various types of trees.

Heap: Definition, Structure, Algorithms and applications.

Unit-III (15 Hrs.)

Graph definitions and Concepts: Edge, Vertices and Graph representation using Adjacencymatrix, Adjacency lists.

Types of Graphs: Weighted, Unweighted, Directed, Undirected Graphs.

Graph Operations: Creation, insertion, deletion, traversals and searching (depth-first,breadth-first) of various types of graphs and Dijkstra's algorithm for shortest distance calculation.

Unit-IV (12 Hrs.)

Searching: Concept and efficiency of linear and binary search algorithms.

Sorting: Concepts, Order, Stability, Efficiency of various algorithms (Selection Sort, BubbleSort, Insertion Sort, Merge Sort, Quick Sort, Heap Sort, Radix Sort).

Hashing: Definition, Implementation and applications.

Note: Programs are to be implemented in C++.

Recommended Books:

1. Gilberg and Forouzan, 'Data Structures - A Pseudo Code Approach with C++', Cengage.
2. Hubbard John R., 'Schaum's Outline of Data Structures with C++', Tata McGraw Hill.
3. Langsam, Augenstein, Tanenbaum, 'Data Structures Using C and C++', PearsonEducation.

WEB TECHNOLOGIES

Subject Code: MCAP3-211 **L T P C** **Duration: 55 Hrs.**
4 1 0 5

Unit-I (15 Hrs.)

Internet and World Wide Web: Introduction, Internet Addressing, ISP, types of InternetConnections, Introduction to WWW, WEB Browsers, WEB Servers, URLs, HTTP, WEB Applications, Tools for web site creation.

HTML5: Introduction to HTML5, Lists, adding graphics to HTML5 page, creating tables,linking documents, forms, frames, Cascading Style sheets.

Unit-II (13 Hrs.)

Java Script: Introduction, programming constructs: variables, operators and expressions,conditional checking, functions and dialog boxes, JavaScript DOM, creating forms, introduction to Cookies, Jquery.

Unit-III (15 Hrs.)

AJAX: Introduction, HTTP Request, XML Http Request, AJAX Server Script.

Unit-IV (12 Hrs.)

PHP: Introduction, syntax, statements, operators, PHP and MySQL, PHP and AJAX.

Recommended Books:

1. Deitel, Deitel, Nieto, Lin and Sadhu, 'XML How to Program', Pearson Education.
2. Ivan Bayross, 'Web Enabled Commercial Application Development using HTML, DHTML, JavaScript, Perl CGI', BPB.
3. Steven M. Schafer, 'HTML, CSS, JavaScript, Perl, Python and PHP', Wiley India.
4. Paul S. Wang, G. Keller, S. Katila, 'An Introduction to Web Design + Programming', Cengage Learning.
5. Jeffery C. Jackson, 'Web Technologies: A Computer Science Perspective', PearsonEducation.
6. Robin Nixon, 'Learning PHP, MySQL and JavaScript', Shroff/O'Reilly.

SOFTWARE LAB. –III (BASED ON MCAP3-209)

Subject Code: MCAP3-212 **L T P C**
0 0 4 2

1. Comparative study of various Database Management Systems.
2. Data Definition Language (DDL), Data Manipulation Language (DML) and Data Control Language (DCL).
3. How to apply constraints at various levels?
4. View data in the required form using Operators, Functions and Joins.
5. Creating different types of Views for tailored presentation of data.
6. How to apply Conditional Controls in PL/SQL.
7. Error Handling using Internal Exceptions and External Exceptions.
8. Using various types of Cursors.

9. How to run Stored Procedures and Functions.
10. Creating Packages and applying Triggers.
11. Creating Arrays and Nested Tables.

SOFTWARE LAB. – IV (BASED ON MCAP3-210)

Subject Code: MCAP3-213 **L T P C**
0 0 4 2

1. Selecting suitable Data Structures for specific tasks.
2. Understanding various traversing techniques on various data structures.
3. Inserting and deleting elements in required data structures.
4. Searching data stored within various data structure using various search techniques.
5. Understanding memory-space trade off.
6. Sorting various data structures using different techniques.

SOFTWARE LAB. –V (BASED ON MCAP3-211)

Subject Code: MCAP3-214 **L T P C**
0 0 4 2

1. Creation of Web pages using HTML5.
2. Creation of Web pages using JavaScript.
3. Creation of Web pages using AJAX.
4. Creating web pages using PHP.

COMPUTER GRAPHICS

Subject Code: MCAP3-315 **L T P C** **Duration: 75 Hrs.**
4 1 0 5

Course Objectives: At the end of the course, the students should be able to:

1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
3. Use of geometric transformations on graphics objects and their application in composite form.

UNIT–I (19 Hrs.)

Computer Graphics- Introduction, Applications of computer graphics, Components of Computer Graphics System. Input & Output Devices- Keyboard, Touch panel, Light pens, Graphic tablets, Joysticks, Trackball, Data glove, Digitizer, Image scanner, Mouse, Voice Systems, Impact and nonimpact printers. Video Display Devices- CRT systems, Random and Raster Scan Systems, Direct view storage tube.
Flat panel displays – Emissive vs Non-Emissive displays, LCD displays, Plasma Panel displays, 3-D viewing devices, Virtual Reality.

UNIT–II (18 Hrs.)

Scan Conversion- DDA and Bresenham line algorithms, Midpoint circle algorithm, Midpoint ellipse algorithm, Area filling techniques (Boundary fill, Flood fill, scan line area fill algorithm), character generation, limitations of scan conversion.

2-Dimensional Graphics- 2D Cartesian and Homogeneous co-ordinate system, Geometric transformations (translation, Scaling, Rotation, Reflection, Shearing), Composite transformations, two dimensional viewing transformation and clipping (Cohen –Sutherland, Sutherland-Hodge man algorithms).

UNIT–III (19 Hrs.)

3-Dimensional Graphics- 3D Cartesian and Homogeneous co-ordinate system, Geometric transformations (translation, Scaling, Rotation, Reflection), Composite transformations. Mathematics of Projections – Perspective Projections, Anomalies of perspective projections, Parallel Projections, Introduction to 3D viewing pipeline and clipping.

UNIT–IV (19 Hrs.)

Hidden Line and Surface Elimination Algorithms- Z-buffer, scan-line, Painter's algorithm. Illumination Models- Diffuse reflection, Specular reflection, refracted light, texture surface patterns, Half toning, Dithering.

Recommended Books:

1. D. Hearn and M.P. Baker, 'Computer Graphics', 2nd Edn., Pearson, **2002.**
2. Andries van Dam, F. Hughes John, James D. Foley; Steven K. Feiner, 'Computer Graphics Principles and Practice in C', 2nd Edn., Pearson, **2002**.
3. Roy A. Plastock, 'Computer Graphics', 2nd Edn., McGraw Hill, **2000**.
4. F.S. Hill, 'Computer Graphics using OpenGL', 3rd Edn., PHI, **2009**.
5. Jeffrey McConnell, 'Computer Graphics: Theory into Practice', 1st Edn., Jones and Bartlett Publishers, **2005**.
6. William M. Newman, 'Principles of Interactive Computer Graphics', 2nd Edn., McGraw Hill, **2001**.

SOFTWARE ENGINEERING

Subject Code: MCAP3-316 **L T P C** **Duration: 75 Hrs.**
4 1 0 5

UNIT–I (19 Hrs.)

Introduction to Software Engineering: Evolution and impact of Software engineering, software life cycle models: Waterfall, prototyping, Evolutionary, and Spiral models. Feasibility study, Functional and Non-functional requirements, Requirements gathering, Requirements analysis and specification.

UNIT–II (18 Hrs.)

Basic issues in Software Design: modularity, cohesion, coupling and layering, function-oriented software design: DFD and Structure chart, object modeling using UML, Object-oriented software development, user interface design. Coding standards and Code review techniques.

UNIT–III (19 Hrs.)

Fundamentals of Testing: White-box, and black-box testing, Test coverage analysis and test case design techniques, mutation testing, Static and dynamic analysis, Software reliability metrics, reliability growth modeling.

UNIT–IV (19 Hrs.)

Software Project Management: Project planning and control, cost estimation, project scheduling using PERT and GANTT charts, cost-time relations: Rayleigh-Norden results,

quality management, ISO and SEI CMMI, PSP and Six Sigma. Computer aided software engineering, software maintenance, software reuse, Component-based software development.

Recommended Books:

1. Roger Pressman, "Software Engineering: A Practitioners Approach,(6th Edition), McGraw Hill, **1997**.
2. Sommerville,"Software Engineering, 7th edition", Adison Wesley, **1996.**
3. Watts Humphrey," Managing software process", Pearson education, **2003**.
4. James F. Peters and Witold Pedrycz, " Software Engineering – An Engineering Approach", Wiley, **1999**.

OOPS USING JAVA PROGRAMMING

Subject Code: MCAP3-317 **L T P C** **Duration: 75 Hrs.**
4 1 0 5

UNIT–I (19 Hrs.)

Object-Oriented Programming Concepts - Introduction, comparison between procedural programming paradigm and object-oriented programming paradigm, basic concepts of object oriented programming — concepts of an object and a class, interface and implementation of a class, operations on objects, relationship among objects, abstraction, encapsulation, data hiding, inheritance, overloading, polymorphism, messaging.

UNIT–II (18 Hrs.)

Classes and Objects - Specifying a class, creating class objects, accessing class members, access specifiers, static members, use of const keyword, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes.

UNIT–III (19 Hrs.)

Applets- Introduction to Applets, Types of Applets, Using Applet Applications, PassingParameters to Applets. Introduction to Graphic Programming- Applying 2-D transformations on Objects, Event Handling, Layouts, Frames, Panels, JDBC.

UNIT–IV (19 Hrs.)

Interfaces & Packages- Introduction, implementing multiple inheritance through Interfaces, Packages, Multithreaded Programming.
Exception Handling- Introduction, Handling System defined Exceptions, Creating and handling user defined exceptions.

Recommended Books

1. Y. Daniel Liang, 'Introduction to Java Programming', 9th Edn., Pearson, **2011**.
2. E. Balagurusamy, 'Object Oriented Programming with C++', Tata McGraw Hill.
3. Herbet Schildt, 'Java 2: The Complete Reference', 5 th Edn., McGraw Hill, **2002**.
4. Gary Cornell and Cay S. Horstmann, 'Core Java, Volume 2- Advanced Features', 8th Edn., Pearson**, 2008**. . Ed Roman, Rima Patel and Gerald Brose, 'Mastering Enterprise Java Beans', 3rd Edn., John Wiley & Sons Inc., **2004.**

DATA ANALYTICS

Subject Code: MCAP3-318 **L T P C** **Duration: 75 Hrs.**
4 1 0 5

UNIT-I (19 Hrs.)

Introduction: Collection of data- Secondary data, primary data, Internal data, presentation of data,Classification of data: Mean, Median Mode, Harmonic Mean, Deometric mean.

UNIT- II (18 Hrs.)

Measures of Variations: Significance of measuring variation, good properties of measuring variations, average deviation and standard deviation.
Regression & ANOVA: Regression ANOVA(Analysis of Variance).

UNIT- III (19 Hrs.)

Machine Learning: Introduction and Concepts Differentiating algorithmic and model based frameworks Regression : Ordinary Least Squares, Ridge Regression, Lasso Regression, K Nearest Neighbours Regression & Classification.

UNIT- IV (19 Hrs.)

Supervised Learning with Regression and Classification techniques -1 Bias-Variance Dichotomy Model ,Validation Approaches Logistic Regression, Linear Discriminant Analysis, Quadratic Discriminant Analysis, Regression and Classification Trees Support, Vector Machines.

Recommended Books:

1. Hastie, Trevor, et al.The elements of statistical learning. Vol. 2. No. 1. New York: springer, 2009.
2. Montgomery, Douglas C., and George C. Runger.Applied statistics and probability for engineers. John Wiley & Sons, 2010.

SOFTWARE LAB VI (BASED ON MCAP3-315)

Subject Code: MCAP3-319 **L T P C**
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper MCAP3-315.

SOFTWARE LAB VII (BASED ON MCAP3-317)

Subject Code: MCAP3-320 **L T P C**
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper MCAP3-317 Java Programming. Students are required to develop programs in JAVA programming language. Few programs are listed below:

1. Write a ***Class Date*** that takes day, month, and year while creating an object of this class. Find a new date when the number of days is given.

2. Write a program to Add, Subtract, multiply two matrices using switch statement. The program must also validate the sizes of two matrices before performing any operation and should raise exception in case the operation cannot be performed.
3. Write a program to find the ***area of all types of triangles*** using the principle of ***constructor overloading and Inheritance*** depending on the number of dimensions given in the input parameter list using ***super*** to call the super class constructor.
4. Write a program to find the ***area of rectangle*** using an ***abstract super*** class figure and also***override*** method use to compute the area of the rectangle.
5. Write a program to implement grow able and shrinkable ***Stack*** that can support operations like- push, pop, and view the top item with concept of dynamic allocation using ***finalize ()*** method. The program should also incorporate the concepts of ***private and public*** access methods to avoid accidental manipulations of stack.
6. Write a program to demonstrate ***static variables, methods and blocks***.
7. Write a program to swap two items belonging to an object using ***returning of object*** by a function.
8. Write a program to count the frequency of each vowel in a given string.
9. Demonstrate the use of ***static and non static nested*** classes.
10. Create a package containing a class to print your (name, roll no, marks) and use this package in another program using ***import*** statement.

PROGRAMMING WITH PYTHON

Subject Code: MCAP3-422 **L T P C** **Duration: 75 Hrs.**
4 1 0 5

UNIT-I (19 Hrs.)

Introduction to Python: Python Installation and Working with Python Understanding Python Variables Python Basic Operators, Understanding python blocks.
Data Types: Declaring and using Numeric data types: int, float, complex using string data type and string operations, Use of Tuple data type.

UNIT- II (18 Hrs.)

Program Flow Control: Conditional blocks using if, else and elif, loops in python programming, continue, break statements in python.

UNIT- III (19 Hrs.)

Functions Modules and Packages: Organizing python codes using functions, organizing python projects into modules, Importing own module as well as external modules.
String List and Dictionary Manipulations: Building blocks of python programs,understanding string in build methods, List manipulation using in build methods, Dictionary manipulation Programming using string, list and dictionary in build functions.

UNIT- IV (19 Hrs.)

File Operation: Reading config files in python Writing log files in python Understanding read functions, read (), read line () and read lines () Understanding write functions, write () and writelines () Manipulating file pointer using seek Programming using file operations.

Recommended Books:

1. Downey, Allen B. Think Python: How to Think Like a Computer Scientist (Version 1.6.6 Ed.), **2012**.
2. Hamilton, Naomi. "The A-Z of Programming Languages: Python", **2008**.

3. Lutz, Mark Learning Python (5th ed.). O'Reilly Media, **2013**.
4. Pilgrim, Mark Dive into Python 3. Apress, **2009**.

INFORMATION SECURITY

Subject Code: MCAP3-423 **L T P C** **Duration: 75 Hrs.**
4 1 0 5

Course Objectives

After completion of this course, the students would be able to:

1. Identify common network security vulnerabilities and attacks and explain the foundations of Cryptography and network security.
2. Impart knowledge on Encryption techniques, Design Principles and Modes of operation.
3. Be familiar with Firewall Design Principles and network security designs using available secure solutions.

UNIT-I (19 Hrs.)

Introduction - Security Attacks (Passive & Active Attacks), Security Services, Security Mechanisms, Model for Internetwork Security, Man in the middle attack, Conventional Encryption Principles, Monoalphabetic ciphers, Playfair Ciphers, Transposition Ciphers, Cipher block chaining mode, Approaches of message authentication.

UNIT-II (18 Hrs.)

Public Key Cryptography - Public Key Cryptography Principles, RSA algorithm, Digital Signatures, Digital Certificates, Certificate Authority and Key management Kerberos, X.509 Directory Authentication Service.

UNIT-III (19 Hrs.)

IP Security - Security Problems of IP, Security Objectives, IP Security Protocol Modes, Authentication Header, Security Payload. Firewall Characteristics, Types of Firewalls and their practical use, NAT.

UNIT-IV (19 Hrs.)

Email and Web Security - PGP, S/MIME, Security Socket Layer, Transport Layer Security, Secure Electronic Transaction.

Recommended Books:

1. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, 'Handbook of Applied Cryptography', Jaypee Medical, **1996**.
2. Bart Preneel, Christof Paar and Jan Pelzl , 'Understanding Cryptography', 1st Edn., Springer, **2010**.
3. Bernard Menezes, 'Network Security and Cryptography', 1st Edn., Cengage, **2010**.
4. William Stallings, 'Network Security Essentials Applications and Standards', 5th Edn., Pearson, **2013.**

THEORY OF COMPUTATION

Subject Code: MCAP3-424 **L T P C** **Duration: 75 Hrs.**
4 1 0 5

Course Objectives:

After completion of this course, the students would be able to:

1. Design a finite automaton to recognize a given regular language and transform a language into regular expression or finite automaton or transition graph.
2. Define deterministic and nondeterministic finite automata and prove properties of regular languages and their classification.

3. Build a context-free grammar for pushdown automata.
4. Design Turing machine and Post machine for a given language.

UNIT-I (19 Hrs.)

Finite Automata - Formal language, need for formal computational models, Non computational models, Deterministic finite Automata, Non deterministic finite Automata, Equivalence of NFA and DFA, 2-Way Finite Automata, Moore and Mealy Machine.

UNIT-II (18 Hrs.)

Regular Expression and Languages - Regular expression, Equivalence of finite Automata and Regular expressions, Conversion between regular expressions and finite Automata, Application of Regular Expressions, Lexical analysis, Finding pattern in text.

UNIT-III (19 Hrs.)

Regular Languages and Regular Sets - Pumping lemma for regular sets, Applications of pumping lemma. Closure properties of regular language, Minimization of finite Automata. Pushdown Automata - Pushdown Automata, Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context free grammar.

UNIT-IV (19 Hrs.)

Context Free Grammar and Languages - Context free Grammars, Derivation Trees, Leftmost and rightmost derivations, Ambiguity, Parsing techniques for parsing of general CFG's, Properties of Context free Languages, Normal forms for context free grammars, The

Pumping Lemna for context free Languages, Closure properties of context free languages. Turing Machine (TM) - One Tape, multi-tape.

Recommended Books:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, 'Introduction to Automata Theory, Languages and Computation', 3rd Edn., Pearson, **2006.**
2. Daniel I.A. Cohen, 'Introduction to Computer Theory', 2 nd Edn., Wiley, **2011.**
3. Adesh K. Pandey, 'Theory of Automata and Computation', S.K. Kataria & Sons, **2013.**
4. K.L.P. Mishra, 'Theory of Computer Science: Automata, Languages and Computation', 3rd Edn., Prentice Hall India Course Private Limited, **2006.**

DATA WAREHOUSING AND DATA MINNING

Subject Code: MCAP3-425 **L T P C** **Duration: 75 Hrs.**
4 1 0 5

Course Objectives :

After completion of this course, the students would be able to:

1. Understand operational database, data ware housing, need of database to meet industrial needs.
2. Identify the components in typical data warehouse Architecture and understand the multidimensional schemas for data warehouse.
3. Understand the knowledge about data mining, decision tree, generic algorithms and Fuzzy set approach.

UNIT – I (19 Hrs.)

Review of Data Warehouse- Need for strategic information, Decision support system, Knowledge discovery & decision making, need for data warehouse, Data warehousing and data mining, common characteristics of Data warehouse, Data Marts, Metadata, Operational versus analytical databases, trends and planning of Data warehousing.

UNIT - II (18 Hrs.)

Schemas and Architecture of Data warehouse- Multidimensional data model, Data cubes, Schemas for Multidimensional Database: stars, snowflakes and fact constellations. Data warehouse process & architecture, OLTP vs. OLAP, ROLAP vs. MOLAP, types of OLAP servers, 3-Tier data warehouse architecture, distributed and virtual data warehouses, data warehouse manager.

UNIT – III (19 Hrs.)

Introduction to Data Mining- Data Mining definition & task, Data mining query languages, data specification, specifying knowledge, hierarchy specification, pattern presentation & visualization specification. Data Mining Techniques- Association rules, Clustering techniques, Decision tree knowledge discovery through neural.

UNIT – IV (19 Hrs.)

Data Mining Classification- Rough Sets, Support Vector Machines and Fuzzy techniques. Mining Complex data objects, Spatial databases.

Recommended Books:

1. Jiawei Han, Micheline Kamber, Jian Pei, 'Data Mining: Concepts and Techniques', 3rd Edn., Morgan Kaufmann, **2011.**
2. George M. Marakas, 'Modern Data Warehousing, Mining, and Visualization', 1st Edn., Prentice Hall, **2001**.
3. Elzbieta Malinowski and Esteban Zimanyi, 'Advanced Data Warehouse Design: From Conventional to Spatial and Temporal Applications (Data-Centric Systems and Applications)', 1 st Edn., Springer, **2008.**
4. Matteo Golfarelli and Stefano Rizzi, 'Data Warehouse Design: Modern Principles and Methodologies', 1st Edn., McGra Hill Education, **2009.**
5. Alex Berson and Stephen J. Smith, 'Data Warehousing, Data Mining, & OLAP', 1st Edn., Tata McGraw Hill, **1997.**

SOFTWARE LAB VIII (BASED ON MCAP3-422)

Subject Code: MCAP3-426 **L T P C**
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper MCAP3-422 Programming with Python. Students are required to develop programs in python language. Few programs are listed below:

1. To Exchange the Values of Two Numbers Without Using a Temporary Variable.
2. To Check if a Number is a Palindrome.
3. To Print all Integers that Aren't Divisible by Either 2 or 3 and Lie between 1 and 50.
4. To Print Table of a Given Number.
5. To Print Sum of Negative Numbers, Positive Even Numbers and Positive Odd numbers in a List.

6. To Print Numbers in a Range (1, upper) Without Using any Loops.
7. To Find the Sum of Sine Series.
8. To Find the Sum of First N Natural Numbers.
9. To Search the Number of Times a Particular Number Occurs in a List.
10. To Find the Largest Number in a List.
11. To Find the Second Largest Number in a List.
12. To Find the Second Largest Number in a List Using Bubble Sort.
13. To Sort a List According to the Length of the Elements.
14. To Sort a List of Tuples in Increasing Order by the Last Element in Each Tuple.
15. To Swap the First and Last Value of a List.
16. To remove the ith Occurrence of the Given Word in a List where Words can repeat.