Total Contact Hours = 26 **Total Marks = 800** **Total Credits = 22**

SEMESTER 1st		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MCAP1-101	Introduction to Information Technology	3	1	0	40	60	100	4
MCAP1-102	Problem Solving and Programming using C	3	1	0	40	60	100	4
MCAP1-103	Digital Electronics	3	1	0	40	60	100	4
MCAP1-104	Mathematical Foundations of Computer Science	3	1	0	40	60	100	4
MHUM0-104	Business Communications - I	2	0	0	40	60	100	2
MCAP1-105	Software Lab-I (Introduction to Information Technology based on MCAP1-101)	0	0	2	60	40	100	1
MCAP1-106	Software Lab-II (Problem Solving and Programming using C based on MCAP1-102)	0	0	4	60	40	100	2
MHUM0-102	Business Communication Lab – I	0	0	2	60	40	100	1
Total		**14**	**4**	**8**	**380**	**420**	**800**	**22**

Total Contact Hours = 26 **Total Marks = 700** **Total Credits = 21**

SEMESTER 2nd		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MCAP1-207	Computer Organization & Architecture	3	1	0	40	60	100	4
MCAP1-208	Relational Database Management System	3	1	0	40	60	100	4
MCAP1-209	Data and File Structures	3	1	0	40	60	100	4
MCAP1-210	Software Lab-III (Relational Database Management System based on MCAP1-208)	0	0	4	60	40	100	2
MCAP1-211	Software Lab-IV(Data and File Structures based on MCAP1-209)	0	0	4	60	40	100	2
MHUM0 - 103	Soft Skills - I	0	0	2	60	40	100	1
Departmental Elective – I (Choose any one)		3	1	0	40	60	100	4
MCAP1-256	Software Engineering & Project Management							
MCAP1-257	System Analysis and Design							
MCAP1-258	Software Design Methodologies							
Total		**12**	**4**	**10**	**340**	**360**	**700**	**21**

Total Contact Hours = 26 **Total Marks = 700** **Total Credits = 21**

SEMESTER 3rd		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MCAP1-312	Computer Networks	3	1	0	40	60	100	4
MCAP1-313	Operating Systems	3	1	0	40	60	100	4
MCAP1-314	Object Oriented Programming using C++	3	1	0	40	60	100	4
MCAP1-315	Software Lab-V (Operating System Based on MCAP1-313)	0	0	4	60	40	100	2
MCAP1-316	Software Lab-VI (Object Oriented Programming using C++ based on MCAP1-314)	0	0	4	60	40	100	2
MHUM0 - 105	Soft Skills - II	0	0	2	60	40	100	1
Departmental Elective – II (Select any one)		3	1	0	40	60	100	4
MCAP1-359	Embedded Systems							
MCAP1-360	Multimedia Technologies							
MCAP1-361	Parallel and Distributed Computing							
Total		**12**	**4**	**10**	**340**	**360**	**700**	**21**

Total Contact Hours = 27 **Total Marks = 700** **Total Credits = 23**

SEMESTER 4th		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MCAP1-417	Computer Graphics	3	1	0	40	60	100	4
MCAP1-418	Programming in Java	3	1	0	40	60	100	4
MCAP1-419	System Programming	3	1	0	40	60	100	4
MCAP1-420	Software Lab-VII (Computer Graphics based on MCAP1-417)	0	0	4	60	40	100	2
MCAP1-421	Software Lab-VIII (Programming in Java based on MCAP1- 418)	0	0	4	60	40	100	2
Departmental Elective – III (Select any one)								
MCAP1-462	Data Warehousing and Data Mining	3	1	0	40	60	100	4
MCAP1-463	Business Intelligence & Digital Marketing							
MCAP1-464	Software Testing and Quality Assurance							
Open Elective - I		3	0	0	40	60	100	3
Total		**15**	**4**	**8**	**320**	**380**	**700**	**23**

Total Contact Hours = 31 **Total Marks = 700** **Total Credits = 25**

SEMESTER 5th		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MCAP1-522	Artificial Intelligence	3	1	0	40	60	100	4
MCAP1-523	Project (Planning & Design)	0	0	8	60	40	100	4
MCAP1-524	Theory of Computation	3	1	0	40	60	100	4
MCAP1-525	Information and Network Security	3	1	0	40	60	100	4
Departmental Elective – IV (Select any one)		3	1	0	40	60	100	4
MCAP1-565	LAMP Technologies							
MCAP1-566	Database Administration							
MCAP1-567	Software Lab-IX(LAMP Technologies based on MCAP1-565)	0	0	4	60	40	100	2
MCAP1-568	Software Lab-X (Database Administration based on MCAP1-566)							
Open Elective - II		3	0	0	40	60	100	3
Total		**15**	**4**	**12**	**320**	**380**	**700**	**25**

**Note: Students have to select a combination of subjects in Departmental Elective –IV as below:*

i) MCAP1-565 and MCAP1-567
ii) MCAP1-566 and MCAP1-568

Total Contact Hours = 35 **Total Marks = 500** **Total Credits = 23**

SEMESTER 6th		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MCAP1-626	Current Trends and Technologies	3	1	0	40	60	100	4
MCAP1-627	Project (Implementation & Execution)	0	0	20	60	40	100	10
Departmental Elective – V (Select any one)		3	1	0	40	60	100	4
MCAP1-669	Big Data							
MCAP1-670	Cloud Computing							
MCAP1-671	Dot Net Framework							
MCAP1-672	Mobile Computing & Android							
MCAP1-673	Soft Computing							
MCAP1-674	Software Lab-XI (Big Data based on MCAP1-669)	0	0	4	60	40	100	2
MCAP1-675	Software Lab-XII (Cloud Computing based on MCAP1-670)							
MCAP1-676	Software Lab-XIII (Dot Net Framework based on MCAP1-671)							
MCAP1-677	Software Lab-XIV(Mobile Computing & Android based on MCAP1-672)							
MCAP1-678	Software Lab-XV(Soft Computing based on MCAP1-673)							
Open Elective - III		3	0	0	40	60	100	3
Total		**9**	**2**	**24**	**240**	**260**	**500**	**23**

Note: Students have to select a combination of subjects in Departmental Elective -V as below:

i) MCAP1-669 and MCAP1-674
ii) MCAP1-670 and MCAP1-675
iii) MCAP1-671 and MCAP1-676
iv) MCAP1-672 and MCAP1-677
v) MCAP1-673 and MCAP1-678

Overall

Semester	Marks	Credits
1st	800	22
2nd	700	21
3rd	700	21
4th	700	23
5th	700	25
6th	500	23
Total	**4100**	**135**

INTRODUCTION TO INFORMATION TECHNOLOGY

Subject Code: MCAP1-101 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

1. This course will enable the student to gain and understanding of the core concepts and technologies which constitute Information Technology.
2. The intention is for the student to be able to articulate and demonstrate a basic understanding of the fundamental concepts of Information Technology and Office Tools.

UNIT-I (10 Hrs.)

Computer Fundamentals - Block structure of a computer, Characteristics of computers, Problem solving with computers, Generations of computers, Classification of computers on the basis of capacity, Purpose and Generation, Input devices, Output devices, Memories.

Number System - Bit, Byte, Binary, Decimal, Hexadecimal and Octal systems, Conversion from one system to the other.

Representation of Information - Integer and Floating point representation, Complement schemes, and Binary codes.

UNIT-II (11 Hrs.)

Operating System - Batch, Multi-programming, Time sharing, Network operating system, On-line and Real time operating system, Distributed operating system, Multi-processor, Multi-tasking

Windows - Installing windows with set-up, Starting and Quitting windows, Basic elements of windows, working with menus dialogue boxes, Window applications, Program manager, File manager, Print manager, Control panel, Write, Paint brush, Accessories including Calculator, Calendar, Clock, Card file, Note pad, Recorder etc.

UNIT- III (12 Hrs.)

Word Processing - Editing features, formatting features, Saving, Printing, Table handling, Page settings, Spell-checking, Macros, Mail-merge, and Equation editors.

Spreadsheet - Workbook, Worksheets, Data types, Operators, Cell formats, Freeze panes, Editing Features, formatting features, creating formulas, Using formulas, Cell References.

Presentation Graphics Software - Templates, Views, formatting slide, Slides with graphs, Animation, using special features, presenting slide shows.

UNIT- IV (12 Hrs.)

Computer Network and Communication - Network types, Network topologies, Network Communication devices, Physical communication media.

Internet and its Applications - E-mail, TELNET, FTP, World Wide Web, Internet chatting, Intranet, Extranet, Gopher, Mosaic, WAIS.

Security management tools - PC tools, Norton Utilities, Virus, Worms, Threats, Virus detection, Prevention and Cure utilities, Firewalls, Proxy servers.

Recommended Books

1. V. Rajaraman and Neeharika Adabala, 'Fundamentals of Computers', 6th Edn., PHI, **2014**.
2. Anita Goel, 'Computer Fundamentals', Pearson, **2010**.
3. P.K. Sinha, 'Computer Fundamentals', 6th Edn.,' BPB Publications, **2004**.
4. E. Balagurusamy, 'Fundamentals of Computers', 3rd Edn., McGraw Hill, **2009**.

PROBLEM SOLVING AND PROGRAMMING USING C

Subject Code: MCAP1-102 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

1. This course is designed to provide a comprehensive study of the C programming language.
2. It stresses the strengths of C, which provide students with the means of writing efficient, maintainable, and portable code.

UNIT-I (11 Hrs.)

Programming Process - Problem definition, Algorithms, Flow Charts, C Character set, Identifiers and Keywords, Constant and Variables, Data types, Declarations, Statements and Symbolic Constants.

Operators and Expressions - Arithmetic, Relational, Logical, Unary operators.

Bitwise Operators - AND, OR, Complement precedence and Associating bitwise shift operators

Input-Output - Standard, Console and String functions.

Coding Standards -Inline documentation, Indentation of code

Naming conventions -Variables, Global variables, Functions, Structures

Debugging - Tracking defects, Debugging by code inspection, Debugging by logs, Debugging using step-by-step execution, using break points.

UNIT-II (13 Hrs.)

Control Statements - Branching, Looping using for, While and Do-while Statements, Nested control structures, Switch, Break, Continue statements.

Arrays - Definition, Access of Elements, Initialization, Multidimensional arrays, Character arrays.

Pointers - Address and Dereferencing Operators, Declaration, Assignment, Initialization, Arithmetic, Precedence of address and Dereferencing operators, Pointer comparison, Conversion, Pointer Arrays and Pointers to Pointers. Pointers and Strings, Void Pointers, Dynamic Memory Management.

UNIT-III (10 Hrs.)

Functions - Definition, Call, Prototypes, Formal and Actual Parameters, Passing Arguments to Functions, Call by Value and Call by Address, Passing Array Elements as Arguments and Passing arrays as arguments, Recursion, Recursion v/s Iteration.

Program Structure - Storage Classes, Automatic, External and Static variables.

Pre-processor Directives - #include, #define, #undef, #if, #ifdef, #ifndef, #else, #elif, #endif, #error, #pragma, Predefine macros.

UNIT- IV (11 Hrs.)

Structure - Variable, Initialization, accessing members, Assignment, Size of structure, Scope of a structure, Nested structures, Pointer to structures, Scope of a structure, Type definition, Structure as function arguments, Arrays of structures, Structures containing arrays, Self-referential structures, Bit fields, Union, Enumerated data type.

File Processing - Opening and Closing, Data files, Creation, Processing & Unformatted data files, Random file access, Command line arguments.

Recommended Books

1. Shubhnandan Jamwal, 'Programming in C', 3rd Edn., Pearson, **2012**.
2. E. Balagurusamy, 'Programming in ANSI C', 2nd Edn., Tata McGraw Hill, **1992**.
3. Brian W. Kernighan and Dennis M. Ritchie, 'The C Programming Language', 2nd Edn., Pearson, **2015**.
4. Yashavant P. Kanetkar, 'Test Your C Skills', 5th Edn., BPB Publications, **2014**.

DIGITAL ELECTRONICS

Subject Code: MCAP1-103 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

1. Digital circuits which are the basic building blocks of a computer are introduced in this module to let the students know what activities it does behind the computing environment.
2. This course portrays excellent ideas of the logic gates available and data processing to make students understand the concept better with the analog and digital signals while computing.

UNIT-I (11 Hrs.)

Number System - Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number System, Signed and Unsigned number, Conversion from One Number System to another. Arithmetic Operation without Changing the Base, Floating Point Representation.

Binary Codes - Weighted Binary Codes, Non Weighted Codes, Reflective Codes, Sequential Codes, Alphanumeric Codes, BCD Code, Code Conversions, BCD Arithmetic.

Logic Gates - Introduction to Logic gates, Universal Gates, Logic Gates Applications.

UNIT-II (13 Hrs.)

Boolean Algebra - Introduction, Boolean Laws-Commutative Law, Associative Law, Distributive Law, AND Laws, OR Laws, Inversion Laws, Principle of Duality, Duality Theorem, De-Morgan's Theorem. Simplification of Boolean Expression using Boolean algebra, Sum of Products (SOP) & Product of Sums (POS) Forms, Realization of Boolean Expression using Gates, K-Maps, Simplification of Boolean Expression using K-Maps.

Combinational Logic Circuits - Half Adder & Half Subtractor, Full Adder & Full Subtractor, Parallel Binary Adder, Binary Adder/Subtractor, BCD Adder, BCD Subtractor. Multiplexers & Demultiplexers, Implementation of Boolean equations using Multiplexer and Demultiplexer, Encoders & Decoder.

UNIT-III (11 Hrs.)

Sequential Logic Circuits - Latch, Flip Flops- R-S Flip-Flop, J-K Flip-Flop, Master-Slave J-K Flip-Flop, Race Condition, Removing Race Condition, D Flip-Flop, T Flip-Flop, Applications of Flip-Flops, Registers.

Counters - Design of Asynchronous Counters, Design of Synchronous Counters.

Logic Families - RTL, DCTL, DTL, TTL, ECL and its various Types, Comparison of Logic Families.

UNIT-IV (10 Hrs.)

Memory Devices - Classification of memories, RAM organization, Write operation, Read operation, Memory cycle. Static RAM Cell-Bipolar, RAM cell, MOSFET RAM cell, Dynamic RAM cell. ROM Organization, PROM, EPROM, EEPROM, Field Programmable Gate Arrays (FPGA).

Signal Conversions - Analog & Digital signals, A/D and D/A conversion.

VLSI Design - Introduction, Process & Applications.

Recommended Books

1. Thomas C. Bartee, 'Digital Computer Fundamentals', 6th Edn., McGraw Hill, **1984**.
2. R.P. Jain, 'Modern Digital Electronics', 4th Edn., Tata McGraw Hill, **2009**.
3. M. Morris Mano, 'Digital Logic and Computer Design', 1st Edn., Pearson, **2004**.
4. William H. Gothmann, 'Digital Electronics: An Introduction to Theory and Practice', 2nd Edn., Prentice Hall, **1982**.
5. Albert Malvino, 'Digital Principles and Applications', 5th Edn., Tata McGraw Hill, **1994**.

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Subject Code: MCAP1-104 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

1. To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
2. To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

UNIT-I (10 Hrs.)

Mathematical Logic - Statements, logical operations, tautologies, contradictions, logical implications and equivalence, normal forms, theory and Inference for statement calculus, predicate calculus, Inference theory for predicate calculus.

UNIT- II (12 Hrs.)

Relations and Functions - Binary relations, computer representation of relations and diagraph, Equivalence relations, applications of congruence, Composition of relations, Transitive Closure, partially ordered sets, Hasse diagrams, lexicographic ordering, topological sorting, Lattices and special types of lattices, Types of functions, functions for computer sciences, growth of function and binary operations.

UNIT-III (11 Hrs.)

Permutations and Combinations - Basic concepts; Rules of counting, combinatorial distribution of distinct and non-distinct objects, generating functions for permutation and combinatorial enumeration.

Recursion and Recurrence Relation - Primitive recursive function, Polynomials and their recursion, Iteration, Sequence and discrete functions, Recurrence relations, Generating function.

UNIT-IV (12 Hrs.)

Trees and Graphs - Lattice and Algebraic System, Basic Properties of Algebraic Systems, Special Types of Lattices, Distributed, Complemented Lattices, Boolean Algebra, Boolean Expressions, Normal Form of Boolean Expressions, Boolean Function, Basic Circuits and Theorems, Logical Gates and Relations of Boolean Function, Introduction to Graphs, Graph Terminology, Graph Isomorphism, Directed and Undirected Graphs and Their Representations; Paths, Reachability and Connectedness; Basic Concepts of Trees And Spanning Tree.

Recommended Books

1. J.P. Tremblay, 'Discrete Mathematical Structures', Tata McGraw Hill, **1987**.
2. Kenneth H. Rosen, 'Discrete Mathematics and its applications', 7th Edn., Tata McGraw Hill, **2012**.
3. Ralph P. Grimaldi, 'Discrete and Combinatorial Mathematics', Pearson Education, **2002**.
4. Alan Doerr, 'Applied Discrete Structures for Computer Science', Galgotia Publications, **1991**.
5. C.L. Liu, 'Elements of Discrete Mathematics', 2nd Edn., Tata McGraw Hill, **1985**.

BUSINESS COMMUNICATIONS - I

Subject Code: MHUM0-104 **L T P C** **Duration - 28 Hrs.**
2 0 0 2

Course Objectives

1. This course is designed to give students a comprehensive view of communication, its scope and importance in business, the role of communication in establishing a favorable image of the organization.
2. The aim is to develop students' ability to communicate correctly and effectively on matters having relevance to day-to-day business operations.
3. This course will make student conversant with fundamentals of communication, help them honing oral, written and non-verbal communication skills and to transform their communication abilities.

UNIT- I (7 Hrs.)

Introduction to Communication - Meaning, Process, Importance of Communication in Business, Types of Information, Formal and Informal Communication, Internal and External Communication. Approaches to Effective Communication, Essentials of Effective Business Communication (7Cs model).

Written Communication - Advantages and Disadvantages, Covering letter, Need, Functions and Kinds, Layout of Letter Writing, Types of Letter Writing: Persuasive Letters, Request Letters, Sales Letters, Complaints and Adjustments.

UNIT –II (7 Hrs.)

Developing Reading Skills - Identify the Purpose of Reading, Factors Effecting Reading, Course How to Think and Read, Developing Effective Reading Habits, Reading Tactics and Strategies: Training Eye and Training Mind (SQ3R)

Developing Listening Skills - Importance, Purpose of Listening, Art of Listening, Factors Affecting Listening, Components of Effective Listening, Process of Listening, Principles and Barriers to Listening, Activities to Improve Listening

UNIT- III (7 Hrs.)

Oral Communication - Advantages and Disadvantages, Conversation as Communication, Art of Public Speaking, Group Communication Through Committees, Preparing and Holding Meetings, Overcoming Stage Fright, Ambiguity Avoidance.

Departmental Communication - Meaning, Need and Types: Interview Letters, Promotion Letters, Resignation Letters, Newsletters, Circulars, Agenda, Notice, Office Memorandums, Office Orders, Press Release

Report Writing - Structure, Types, Formats, Drafting of Various Types of Report. Nonverbal – Features, Understanding of Body Language, Posture, Gestures. Influences on Communication: Social Influences, Culture and Communication, Few Guidelines for Better Multicultural Communication, Business Etiquettes and Communication.

UNIT- IV (7 Hrs.)

Group Discussion - Nature, Uses and Importance, Guidelines for GD Presentations: How to Make Effective Presentations, Four P‟ S of Presentation, Structuring, Rehearsing and Delivery Methods.

Resume Writing - Planning, Organizing Contents, Layout, Guidelines for Good Resume. Interviews: Preparation Techniques, Frequently Asked Questions about How to Face an Interview Board, Proper Body Posture, projecting a Positive Image, steps to Succeed in Interviews, Practice Mock Interview in Classrooms.

The Case Method of Course - Dimensions of a Case, Case Discussion, Usefulness of The Case Method, Training of Managers, Use The Case Method. Report Writing: Structure, Types, Formats, Preparations and Presentation.

Recommended Books

1. Lesikar, Petit & Flately, 'Lesikar's Basic Business Communication', Tata McGraw Hill.
2. Raman Meenakshi, 'Prakash Singh, Business Communication', Oxford University Press.
3. Rizvi Ashraf, 'Effective Technical Communication', Tata McGraw Hill.
4. Krizan, Buddy, 'Merrier, Effective Business Communication', Cengage Course.
5. Diwan & Aggarwal, 'Business Communication', Excel.
6. Baugh, Frayer & Thomas, 'How to write first class Business Correspondence', Viva Book
7. Taylor, 'English Conversion Practice', Tata McGraw Hill.
8. Devaraj, 'Executive Communication', Tata McGraw Hill.
9. Ober, 'Effective Bossiness Communication', Cengage Course.

SOFTWARE LAB. – I
(INTRODUCTION TO INFORMATION TECHNOLOGY)

Subject Code: MCAP1-105 **L T P C**
0 0 2 1

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP1-101.

SOFTWARE LAB. – II
(PROBLEM SOLVING AND PROGRAMMING USING C)

Subject Code: MCAP1-106 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP1-102.

BUSINESS COMMUNICATION LAB. - I

Subject Code – MHUM0-102 **L T P C**
0 0 2 1

The students will have to perform the practicals in lab related to the syllabus of the subject "Business Communication – I" (MHUM0-104).

COMPUTER ORGANIZATION & ARCHITECTURE

Subject Code: MCAP1-207 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

1. To provide students with a solid foundation in computer design.
2. To examine the operation of the major building blocks of a computer system.
3. To introduce students to the design and organization of modern digital computers & basic assembly language.

UNIT-I (12 Hrs.)

Basic Computer Organization and Design - Common Bus System, Registers, Instruction codes, computer Instructions, Timing and Control, Instruction Cycle, Arithmetic, Logic & Shift micro operations instructions, Memory Reference Instructions, Design of Basic Computer and its working**.**

Programming & Controlling Basic Computer - Machine & Assembly Language, Programming Arithmetic and Logic Operations, Hardwired & Micro programmed control, Address Sequencing, Design of a control unit.

UNIT-II (10 Hrs.)

CPU Architecture - General register & stack organization, Instruction formats, Addressing Modes, Data Transfer and Manipulation, Program Control, ALU & Control Unit Architecture

I/O Organization - Peripheral Devices, input-output interface, Asynchronous Data Transfer, Modes of data transfer-programmed & interrupt initiated I/O, Priority Interrupt, DMA, I/O Processors.

UNIT-III (12 Hrs.)

Memory Organization - Main Memory-Memory Address Map, Memory connection to CPU, Associative Memory-Hardware organization, Cache Memory-Levels of Cache, Associative Mapping, Direct Mapping, Set-Associative Mapping.

Parallel & Multiprocessing Environment - Introduction to parallel processing, Pipelining, RISC Architecture, Vector & array processing, multiprocessing concepts, memory & resource Sharing, Inter processor communication & Synchronization.

UNIT- IV (11 Hrs.)

Overview of Assembly Language Programming - Architecture of a typical 8-bit processor (8085 microprocessor) - Registers, Instruction Set-Data Transfer Instructions, Arithmetic Instructions, Logical Instructions, Program Control Instructions, Machine Control Instructions.

Use of an Assembly Language for Specific Programs - Simple numeric manipulations, sorting of a list and use of I/O instructions.

Recommended Books

1. M. Morris Mano, 'Computer System Architecture', Prentice Hall, **1976**.
2. William Stallings, 'Computer Organization and Architecture', 9th Edn., Pearson, **2016**.
3. P.V.S. Rao, 'Computer System Architecture', 2nd Edn., PHI, **2009**.
4. John P. Hayes, 'Computer Architecture & Organization, 3rd Edn., McGraw Hill, **2012**.
5. Stone, 'Introduction to Computer Architecture', 2nd Edn., Galgotia, **1996**.

RELATIONAL DATABASE MANAGEMENT SYSTEM

Subject Code: MCAP1-208 **L T P C** **Duration: 45 Hrs.**

3 1 0 4

Course Objectives

1. The course aims at providing the students through insight on few DBMS principles and practices.
2. Students will learn and implement the operations for making and using databases with help of SQL and PL/SQL.

UNIT- I (12 Hrs.)

Introduction to DBMS - Overview of DBMS, Basic DBMS terminology, Data independence. Architecture of a DBMS, Introduction to data models: Entity relationship model, Hierarchical model, Network model, Relational model.

Relational Design - Relation scheme, Codd's Rule for RDBMS, Anomalies in a database, Functional Dependency: Dependencies and Logical implications, Closure set, Testing if FD is in closure, Covers, Non redundant and Minimum cover, Canonical cover, Functional dependencies and Keys.

Normal Forms - INF, 2NF, 3NF, BCNF, Multi valued dependencies and Joined dependencies, 4NF, 5NF.

UNIT-II (12 Hrs.)

Structured Query Language - Introduction to SQL, Oracle server and Oracle database, Oracle data types, Starting SQL*Plus, querying database tables, Conditional retrieval of rows, working with null values, matching a pattern from a table, Ordering the result of a query, Aggregate Functions, Grouping the result of a query.

Querying multiple Tables - Equi Joins, Cartesian Joins, Outer Joins, Self Joins; SET Operators - Union, Intersect, Minus.

Functions - Arithmetic functions, Character functions, Date functions, and Group functions.

UNIT-III (10 Hrs.)

Data Manipulation and Control - Data Definition Language (DDL), Creating Tables, creating a Table with data from another table, Inserting Values into a Table, Updating Column(s) of a Table, Deleting Row(s) from a Table, dropping a Column; VIEW - Manipulating the Base table, Rules of DML Statements on Join Views, Dropping a VIEW, Inline Views.

Database security and privileges - GRANT command, REVOKE command, COMMIT and ROLLBACK.

UNIT- IV (11 Hrs.)

PL/SQL - Introduction to PL/SQL, The Advantage of PL/SQL, PL/SQL Architecture, Fundamentals of PL/SQL, PL/SQL Data types, variables and constants, Assignments and expressions, Operator precedence, referencing Non-PL/SQL variables, built in functions, conditional and iterative control, SQL within PL/SQL, writing PL/SQL code. Cursor management in PL/SQL, Cursor manipulation, Triggers, Stored procedures, Exception handling in PL/SQL, Predefined exceptions, User defined exceptions, Triggers, Stored procedures.

Recommended Books

1. Bipin C. Desai, 'An Introduction to Database System', 3rd Edn., Galgotia Publications Private Ltd, **2012**.
2. Ivan Bayross, 'SQL, PL/SQL The Programming Language of ORACLE', 2nd Edn., BPB Publication, **2003**.
3. Henry F. Korth, 'Database Systems Concepts', 5th Edn., McGraw Hill Inc, **2005**.
4. Ramez Elmasri and Shamkant B. Navathe, 'Fundamentals of Database Systems', 4th Edn., Pearson, **2003**.

DATA AND FILE STRUCTURES

Subject Code: MCAP1-209 **L T P C** **Duration: 45 Hrs.**

3 1 0 4

Course Objectives

1. A study of advanced programming topics focused on logical structures of data, their physical representation, design and analysis of algorithms operating on the structures, and techniques for program development and debugging.
2. Emphasis is placed on the appropriate use and choice of standard data structures.

UNIT-I (12 Hrs.)

Introduction to Data Structure - Concept of data, Problem analysis, Data structures and Data structure operations, Notations, Mathematical notation and Functions, Algorithmic Complexity, Big-O Notation and time space trade off.

Arrays - 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 to postfix and prefix expressions, Evaluation of postfix expression using stacks.
Queues - Operations like Enqueue, Dequeue on Simple, Circular and Priority Queues.
Linked Lists - Operations like Creations, Insertion, Deletion, Retrieval and Traversal on Single, Circular and doubly linked list.

UNIT-II (11 Hrs.)

Trees - Definitions and Concepts: Root Node, Leaf Node, Level, Degree, Height and Tree representation using linked List and array.
Tree Operations - Creation, Insertion, Deletion and Traversals (Preorder, In-order, Post ordered) and searching on various types of trees. Types of Trees: Binary trees, Binary search tree, Height balanced (AVL) tree, B trees, B+ Tree.
Heap - Definition, Structure, Algorithms and applications.

UNIT-III (10 Hrs.)

Graphs - Graph definitions and Concepts: Edge, Vertices, and Graph representation using Adjacency matrix, 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.)

Sorting - Concepts, Order, Stability and Efficiency of various algorithms (Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Quick Sort, Heap Sort and Radix Sort).
Searching - Concept and Efficiency of linear and binary search algorithms.
Hashing - Definition, Implementation and Applications.

Recommended Books

1. Seymour Lipschutz, 'Data Structures', 1st Edn., McGraw Hill Education, **2014.**
2. E. Horowitz, and S. Sahni, 'Fundamentals of Data Structures in C++', 2nd Edn., Galgotia Publications Pvt. Ltd., **1999**.
3. A.V. Aho, Hopcroft, J.D. Ullman, 'Data Structures and Algorithms', 1st Edn., Pearson, **1983**.
4. Tanenbaum, 'Data Structures using C', 2nd Edn., Prentice Hall International, **2015**.

SOFTWARE LAB. – III
(RELATIONAL DATABASE MANAGEMENT SYSTEM)

Subject Code: MCAP1-210 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP1-208. Students are required to do at least 8 assignments based on the paper.

SOFTWARE LAB. – IV
(DATA AND FILE STRUCTURES)

Subject Code: MCAP1-211 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP1-209.

SOFTWARE ENGINEERING AND PROJECT MANAGEMENT

Subject Code: MCAP1-256 **L T P C** **Duration – 45 Hrs.**
3 1 0 4

Course Objectives

1. To help students to develop skills that will enable them to construct software of high quality.
2. To construct software that is reliable, easy to understand, modify and maintain**.**

UNIT-I (12 Hrs.)

Software Engineering - Evolution of Software Engineering, Goals of software engineering, Software Development vs. Software Engineering.

Software Process - Software Process, Waterfall, Spiral, Prototyping, Selection of appropriate process model Fourth Generation Techniques.

Software Requirements Analysis - Analysis Principles, SRS, Components of SRS, Requirement Elicitation Techniques- FAST and QFD.

UNIT-II (11 Hrs.)

Software Design - Design Objectives, Principles, Design Concepts, Design Process, Design Strategies and Methods, Architectural Design-Architectural Styles, Modular Design, Object oriented design, User-interface design. Principles of structured Analysis and Design Tools i.e. DFD, DD, Decision Tables and Decision Trees.

Software Project Management - Software Project Planning and its characteristics, Types of metrics, Effort Estimation- FP, LOC, FP vs. LOC, Schedule & Cost Estimation Models- Activity Networks- PERT/CPM, COCOMO-I, COCOMO-II Model.

UNIT- III (11 Hrs.)

Software Testing - Testing Fundamentals- Error/Fault/Failure, Testing Principles, Test Cases, Testing Techniques-White Box, Black-Box Testing & its Technique: Equivalence Class Partitioning, Boundary Value Analysis, White-Box Testing & its Techniques: Basis Path Testing, Structural Testing, Logic Based Testing, Fault Based Testing.

Software Testing Strategies - Unit Testing, Integration Testing, System Testing, Verification and Validation Testing, Acceptance Testing, Alpha and Beta Testing, Regression Testing.

UNIT-IV (11 Hrs.)

Quality Assurance - Overview of Software Quality, Software Quality Attributes, Factors Affecting Software Quality, Building, Software Quality Assurance Plan, Quality management Principles, Capability Maturity Model, Risk Assessment.

Software Maintenance - Types of software maintenance, Reverse Engineering, and Software maintenance process models.

System Configuration Management (SCM) - SCM principle, Change Management, Version and Release Management.

Recommended Books

1. Roger Pressman, 'Software Engineering: A Practitioner's Approach', 7th Edn., McGraw Hill, **2014**.
2. Rajib Mall, 'Fundamentals of Software Engineering', 4th Edn., PHI, **2014**.
3. Ian Sommerville, 'Software Engineering', 9th Edn., Pearson, **2010**.
4. K.K. Aggarwal and Yogesh Singh, 'Software Engineering', 3rd Edn., New Age International, **2008**.

SYSTEM ANALYSIS AND DESIGN

Subject Code: MCAP1-257 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

1. To teach the analysis and practicality of various systems on which software system can be developed.
2. After completing this course student will be able to design and develop systems.

UNIT-I (11 Hrs.)

System Development Life Cycle - System Definition, Characteristics, Elements & Types of system, Phases of SDLC, Information gathering tools, Structured Analysis tools, Role of System Analyst.

Software Requirements Analysis - Analysis Principles, SRS, Components of SRS, Requirement Elicitation Techniques - FAST and QFD.

UNIT-II (12 Hrs.)

System Design - Process and Stages of systems design, Input/output and File design, Documentation (User Manual, Design Documentation, Training Manual), Design objectives, Principles, Design Concepts, Design Process, Design Strategies and Methods, Architectural Design-Architectural Styles, Modular Design, Object oriented design, User-interface design. Principles of structured Analysis and Design Tools i.e. DFD, DD, decision tables and decision trees, Case Studies techniques in System Design.

UNIT-III (12 Hrs.)

Software Testing - Testing Fundamentals- Error/Fault/Failure, Testing Principles, Test Cases, Testing Techniques-White Box, Black-Box Testing & its Technique: Equivalence Class Partitioning, Boundary Value Analysis, White-Box Testing & its Techniques: Basis Path Testing, Structural Testing, Logic Based Testing, Fault Based Testing.

Software Testing Strategies - Unit Testing, Integration Testing, System Testing, Verification and Validation Testing, Acceptance Testing, Alpha and Beta Testing, Regression Testing.

UNIT- IV (10 Hrs.)

System Implementation - System Implementation Process, Implementation Methods.

Software Maintenance - Types of Software Maintenance, Reverse Engineering, and Software Maintenance Process Models.

Recommended Books

1. Elias M. Awad, 'Systems Analysis and Design', 2nd Edn., Galgotia Publications, **2010**.
2. Kendall and Kendall, 'Systems Analysis and Design', PHI, **2012**.
3. Chiang and Roger, 'Systems Analysis and Design: Techniques, Methodologies, Approaches and Architectures', Prentice Hall, **2009**.
4. V.K. Jain, 'System Analysis and Design', 1st Edn., Dreamtech Press, **2000**.

SOFTWARE DESIGN METHODOLOGIES

Subject Code: MCAP1-258 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

1. This course provides attendees with in-depth coverage of the concepts needed to effectively design and analyze software architecture.
2. After attending this course, participants will have a better understanding of the essential considerations in any architectural design process, methods for eliciting critical quality

attributes, the role of architecture evaluation, using the methods within a software development life cycle.

UNIT-I (12 Hrs.)

Basic concepts of Design - Introduction, Characteristics of design activities, Essential Elements of Designs.

Design Principles - Basic Rules of Software Design: Causes of difficulties, Vehicles to overcome difficulties, Basic Rules of Software Design.

Design processes - The Context of design in software Development process, Generic Design Process: Descriptive Models, Structure of Software Design Methods.

Design Quality - Software quality models: Hierarchical models, Relational models, The effect of design on software quality: efficiency, Correctness and reliability, Portability, Maintainability, Reusability, Interoperability.

UNIT- II (10 Hrs.)

Software Architecture - The Notion of Architecture: Architecture in The Discipline of Buildings, Architecture in The Discipline of Computer Hardware, The General Notion of Architecture: The Notion of Software Architecture: Prescriptive Models, Descriptive Models, Multiple View Models, The Roles of Architecture in Software Design, Software Architectural Style: Introductory Examples, The Notion of Software Architectural Style. Typical Architectural Styles**:** Data Flow: The General Data Flow Styles, Pipe and Filter Sub-Style, Batch Sequential Processing Sub-Style.

UNIT – III (12 Hrs.)

Using Styles in Design - Choices of Styles, Combinations of Styles, Hierarchical Heterogeneous Styles, Simultaneously Heterogeneous Styles, Locationally Heterogeneous Styles, Case Study: Keyword Frequency Vector: Specification of The Problem, Designs in Various Styles, Analysis And Comparison.

Architectural Design Space - Theory of Design Spaces: Structure of Design Spaces, Solving Design Synthesis and Analysis Problems, Design Space of Architectural Elements: Behavior Features, Static Features.

UNIT-IV (11 Hrs.)

Analysis and Evaluation - The Concept of Scenario, Scenarios for Evaluating Modifiability: Scenarios for Evaluating Reusability, Specification of Operational Profiles, Evaluation and Analysis of Performance, Scenarios for Evaluating Reusability: Analysis and Evaluation of Modifiability: The SAAM Method: The Input and Output, The Process (Activities In SAAM Analysis).

Model-Based Analysis - The HASARD Method: Representation of Quality Models, Construction of Quality Models, Hazard Identification, Cause- Consequence Analysis, Assembling Graphic Model, Identification of Quality Concerns.

Quality Trade- Off Analysis - The ATAM Method: ATAM analysis process, ATAM analysis activities.

Recommended Books

1. Hong Zhu, 'Software Design Methodology: From Principles to Architectural Styles', Butterworth-Heinemann, **2005**.
2. Jan Bosch, 'Design and Use of Software Architectures: Adopting and Evolving a Product – Line Approach', 3rd Edn. Addison Wesley, **2000**.
3. Nick Rozanski and Eoin Woods, 'Software Systems Architecture: Working with Stakeholders Using Viewpoints and Perspectives', 2nd Edn., Addison Wesley, **2011**.

COMPUTER NETWORKS

Subject Code: MCAP1-312 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

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

1. Independently understand basic computer network technology, data communication system and its components.
2. Identify the different types of network topologies, protocols, layers of the OSI model and TCP/IP.
3. Identify the different types of network devices and their functions within a network.
4. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

UNIT-I (12 Hrs.)

Introduction to Computer Networks - Data Communication System and its components, Data Flow, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model.

Physical Layer - Concept of Analog & Digital Signal, Bandwidth, Transmission Impairments: Attenuation, Distortion, Noise, Data rate limits: Nyquist formula, Shannon Formula, Multiplexing: Frequency Division, Time Division, Wavelength Division, Introduction to Transmission Media: Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (radio, microwave, infrared), Switching: Circuit Switching, Message Switching, Packet Switching & their comparisons.

UNIT-II (12 Hrs.)

Data Link Layer - Design issues, Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ, Data link protocols: HDLC and PPP.

Medium Access Sub-Layer - Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing, IEEE 802.3 frame format, Ethernet cabling, Manchester encoding, collision detection in 802.3, Binary exponential back off algorithm.

UNIT-III (10 Hrs.)

Network Layer - Design issues, IPv4 classful and classless addressing, subnetting, Routing algorithms: distance vector and link state routing, Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms

UNIT-IV (11 Hrs.)

Transport Layer - Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and de-multiplexing, crash recovery, introduction to TCP/UDP protocols and their comparison.

Application Layer - World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Introduction to Network security.

Recommended Books

1. Andrew S. Tanenbaum, 'Computer Networks', 5th Edn., Pearson Education, **2010.**
2. Behrouz A. Forouzan, 'Data Communications & Networking', 5th Edn., Tata McGraw Hill, **2012.**

3. James F. Kurose and Keith W. Ross, 'Computer Networking', 6th Edn., Pearson Education, **2013.**
4. Douglas E. Comer, 'Internetworking with TCP/IP, Volume-I', 6th Edn., Prentice Hall India, **2013.**

OPERATING SYSTEMS

Subject Code: MCAP1-313 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

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

1. Understand functions, Role, different structures and views of Operating system.
2. Understand Process management in operating system.
3. Understand Memory Management in operating system.
4. Understand Device Management in operating system.

UNIT-I (11 Hrs.)

Introduction - Introduction to Operating system, Role of Operating System as resource manager, function of kernel and shell, operating system structures, views of an operating system.

UNIT-II (11 Hrs.)

Process management - CPU scheduling, Scheduling Algorithms, PCB, Prices synchronization, Deadlocks, Prevention, Detection and Recovery

UNIT-III (11 Hrs.)

Memory Management - Overlays, Memory management policies, Fragmentation and its types, Portioned memory managements, Paging, Segmentation, Ned of Virtual memories, Page replacement Algorithms, Concept of Thrashing

UNIT-IV (12 Hrs.)

Device Management - I/O system and secondary storage structure, Device management policies, Role of I/O traffic controller, scheduler, File Management: File System Architecture, Layered Architecture, Physical and Logical File Systems, Protection and Security, Brief study to multiprocessor and distributed operating systems. Case Studies: LINUX / UNIX Operating System and Windows based operating systems. Recent trends in operating system.

Recommended Books

1. A. Silberschatz and Peter B. Galvin, 'Operating System Concepts', 2nd Edn., Wiley, **2013**.
2. Dhananjay M. Dhamdhere, 'Operating Systems', 1st Edn., McGraw Hill, **2008**.
3. Gary Nutt, 'Operating Systems Concepts', 2nd Edn., McGraw Hill, **2001**.
4. Stuart E. Madnick and John J. Donovan, 'Operating Systems', 1st Edn., McGraw Hill, **1974**.
5. William Stallings, 'Operating Systems: Internals and Design Principles', 6th Edn., Prentice Hall, **2008**.

OBJECT ORIENTED PROGRAMMING USING C++

Subject Code: MCAP1-314 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

After completion of this course, the students would be:

1. Able to learn basics and programming skills of high level language C++.
2. Able to learn how to manage the memory by using dynamic memory management.

3. Able to learn how to use reusability concept by using inheritance and templates.
4. Able to learn the skills of handing modular approach and exceptions.

UNIT-I (11 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.

Standard Input/output - Concept of streams, hierarchy of console stream classes, input/output using overloaded operators >> and << and member functions of i/o stream classes, formatting output, formatting using ios class functions and flags, formatting using manipulators.

UNIT-II (12 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.

Pointers and Dynamic Memory Management - Declaring and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation (static and dynamic), dynamic memory management using new and delete operators, pointer to an object, this pointer, pointer related problems - dangling/wild pointers, null n pointer assignment, memory leak and allocation failures.

UNIT-III (11 Hrs.)

Constructors and Destructors - Need for constructors and destructors, copy constructor, dynamic constructors, explicit constructors, destructors, constructors and destructors with static members, initialize lists.

Operator Overloading and Type Conversion - Overloading operators, rules for overloading operators, overloading of various operators, type conversion - basic type to class type, class type to basic type, class type to another class type.

UNIT-IV (11 Hrs.)

Inheritance - Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, object composition and delegation, order of execution of constructors and destructors.

Virtual functions & Polymorphism - Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract classes, virtual destructors.

Exception Handling - Review of traditional error handling, basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, re-throwing an exception, specifying exceptions.

Templates and Generic Programming - Template concepts, Function templates, class templates, illustrative examples.

Files - File streams, hierarchy of file stream classes, error handling during file operations, reading/writing of files, accessing records randomly, updating files.

Recommended Books

1. Robert Lafore, 'Object Oriented Programming in C++', 4th Edn., Waite Group, **2001**.
2. E. Balagurusamy, 'Object Oriented Programming with C++', 6th Edn., Tata McGraw Hill, **2013**.
3. R.S. Salaria, 'Object-Oriented Programming using C++', 4th Edn., Khanna Book Publishing, **2009**.
4. Bjarne Stroustrup, 'The C++ Programming Language', 3rd Edn., Addison Wesley, **1997**.
5. Herbert Schildt, 'C++: The Complete Reference', 4th Edn., McGraw Hill, **2009**.

SOFTWARE LAB. – V
(OPERATING SYSTEM BASED ON MCAP1-313)

Subject Code: MCAP1-315 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP1-313. Students are required to do at least 8 assignments based on the paper.

SOFTWARE LAB. – VI
(OBJECT ORIENTED PROGRAMMING USING C++ BASED ON MCAP1-314)

Subject Code: MCAP1-316 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP1-314.

EMBEDDED SYSTEMS

Subject Code: MCAP1-359 **L T P C** **Duration: 35 Hrs.**
3 1 0 4

Course Objectives

1. Describe the recent trends and design issues in embedded systems.
2. Design real time embedded system using the PIC microcontroller 16F877A.
3. Analyse assembly language programming in PIC Microcontroller 16F877A.
4. Understand the different applications of embedded systems.

UNIT-I (9 Hrs.)

Introduction to Embedded Systems - Overview of embedded systems, Features, Requirements and applications of embedded systems, Recent trends in the embedded system design, Common architectures for the ES design, Embedded software design issues, Introduction to development and testing tools.

UNIT-II (9 Hrs.)

Embedded System Architecture - Basics of PIC16F877A microcontroller, Pin Diagram, Architecture, Memory organization, Special Function Registers, GPIO, Timer Comparator, A/D Convertor, Bus Architecture, Data operations, Addressing modes, Timers and Counters.

UNIT-III (9 Hrs.)

Assembly Language Programming - Memory-Mapped I/O, Interrupt handling, PIC16F877A Instruction Set, Assembler Directives, Programming of PIC Microcontrollers.

UNIT-IV (8 Hrs.)

Applications of Embedded Systems - Industrial and control applications, Networking and telecom applications, Digital Signal Processing and multimedia applications, Applications in the area of consumer appliances.

Recommended Books

1. Steve Heath, 'Embedded Systems Design', 2nd Edn., Newnes, **2002**.
2. Jane W S Liu, 'Real-Time Systems', 1st Edn., Prentice Hall, **2000**.
3. John B. Peatman, 'Design with PIC Microcontrollers', 1st Edn., Pearson, **1997**.
4. PIC 16F877A Manual.

MULTIMEDIA TECHNOLOGIES

Subject Code: MCAP1-360 **L T P C** **Duration: 35 Hrs.**
3 1 0 4

Course Objectives

1. To acquire fundamental principles of multimedia, including digitization and data compression for non-textual information.
2. To understand core multimedia technologies and standards.
3. To gain hands-on experience in image, sound and video editing.
4. To design, capture, store and integrate sound, images and video to deliver multi-modal information.

UNIT-I (9 Hrs.)

Introduction - Overview of multimedia computing, Definitions, terms, terminologies, characteristics and requirements of different media, Components of multimedia systems.

Human's Visual and Audio System - Characteristics of human visual system, Light and visible light, Human retina structure and functions, Non-perceptual uniform color models and perceptual uniform color models, Characteristics of human's audio system, Frequency response and Magnitude range.

UNIT-II (9 Hrs.)

Multimedia data representation and analysis - Representation of sound/audio, image and video, Speech Generation, Analysis and software, Image analysis, Display and Printing.

UNIT-III (9 Hrs.)

Multimedia Coding and Compression - Coding requirements, Compression principles, Entropy and hybrid coding, Compression standards: JPEG and MPEG.

UNIT-IV (8 Hrs.)

Multimedia Technology Development - Multimedia history, Technology development, Challenging problem, Research difficulty, Multimedia industry.

Recommended Books

1. John F. Koegel Buford, 'Multimedia Systems', 1st Edn., Pearson, **2002**.
2. Ralf Steinmetz and Klara Nahrstedt, 'Multimedia: Computing, Communications and Applications', 1st Edn., Pearson, **2002**.
3. Judith Jeffcoate, 'Multimedia in Practice: Technology and Applications', 1st Edn., Prentice Hall, **1995**.

PARALLEL AND DISTRIBUTED COMPUTING

Subject Code: MCAP1-361 **L T P C** **Duration: 35 Hrs.**
3 1 0 4

Course Objectives

1. Recall the fundamental concepts, scope, design and model the parallelism.
2. To study performance matrices used for performance analysis and understand various parallel computing architectures.
3. To understand the scheduling process of the parallel computing.
4. To outline the fundamentals of parallel programming models.

UNIT-I (9 Hrs.)

Introduction - Parallel computing, Scope of parallel computing, Paradigms of parallel computing: Synchronous- Vector/Array, SIMD, Systolic, Asynchronous- MIMD, reduction paradigm.

Hardware Taxonomy - Flynn's classifications, Handler's classifications.

Software Taxonomy - Kung's taxonomy, SPMD.

UNIT II (9 Hrs.)

Abstract Parallel Computational Models - Combinational circuits, Sorting network, PRAM models, Interconnection RAMs.

Parallelism Approaches - Data parallelism, Control parallelism.

Parallel Programming Models - Shared memory programming, Distributed memory programming, Object oriented programming, Data parallel programming, Functional and dataflow programming.

UNIT III (9 Hrs.)

System Architectures - Taxonomy and topology – shared memory multiprocessors: UMA-Uniform Memory Architecture, NUMA-Non Uniform Memory Architecture, SMP distributed memory networks, Cache coherence protocols, CC-NUMA architectures, Consistency protocols, Data pre-fetching, CC-NUMA memory management, Message processing multiprocessors, Processor organization - Static and dynamic interconnections.

UNIT IV (8 Hrs.)

Scheduling and Parallelization - Scheduling, Types of scheduling algorithms, Load scheduling, Loop scheduling, Parallelization of sequential programs, Parallel programming support environments.

Recommended Books

1. Gregory R Andrews, 'Foundations of Multithreaded, Parallel, and Distributed Programming', Addison Wesley Professional, **1999**.
2. Michael J. Quinn, 'Parallel Computing: Theory and Practice', 2nd Edn., McGraw Hill, **2002**.
3. Vipin Kumar, Ananth Grama, Anshul Gupta and George Karypis, 'Introduction to Parallel Computing', 2nd Edn., Pearson, **2003**.

COMPUTER GRAPHICS

Subject Code: MCAP1-417 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

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 (11 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 non-impact 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 (12 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 (11 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 (11 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.**

PROGRAMMING IN JAVA

Subject Code: MCAP1-418 **L T P C** **3 1 0 4** **Duration: 45 Hrs.**

Course Objectives

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

1. Use the Java programming language in the development of small application programs that demonstrate professionally acceptable coding and performance standards.
2. Understanding of the basic principles of the object oriented development process and apply this understanding to the analysis and design of solutions for small scale problems.
3. Work with the JDBC technology and learn Java Generics and the development of Projects.

UNIT–I (11 Hrs.)

Introduction- Object Oriented Concept, Features and Applications of Java, Differences between Java and C++, Structure of Java Program, Literals, Tokens, Keywords, Constants, Variables & Data types, Scope of variables, Operators, Expressions, Flow control statements. Arrays, Vectors, Type Conversion, Command Line Arguments, Access specifiers, Constructors, Inheritance, Static Classes, Abstract Classes, Final Classes, Wrapper Classes, Garbage Collection & Finalize method, Handling String and String Buffer classes, Method Overloading and Overriding.

UNIT–II (11 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.
Managing I/O- Introduction to streams, Handling and using various Stream Classes.

UNIT–III (11 Hrs.)

Applets- Introduction to Applets, Types of Applets, Using Applet Applications, Passing Parameters to Applets.

Introduction to Graphic Programming- Applying 2-D transformations on Objects, Event Handling, Layouts, Frames, Panels, JDBC.

UNIT–IV (12 Hrs.)

Advanced Programming- Servlet Programming (Servlet Life Cycle, Generic Servlet, HttpServlet, HttpServletRequest, HttpServletResponse, Service method, doGET method, doPOST method, Servlet Exception).

Recommended Books

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

SYSTEM PROGRAMMING

Subject Code: MCAP1-419 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

1. The objective of this course is to understand the execution process of HLL programs and understand the working of scanners and parsers.
2. This will help the students to understand the basic design of various system software

UNIT-I (11 Hrs.)

Introduction to System Software - Definition, Features of system programming, system programming vs. application programming.

Scanning and Parsing - Programming Language Grammars, Classification of Grammar, Ambiguity in Grammatic Specification, Scanning, Parsing, Top Down Parsing, Bottom up Parsing.

UNIT-II (13 Hrs.)

Assembler - Single pass assembler, Two-pass assembler, Algorithm of Two Pass Assembler and General Design Procedure of an Assembler.

UNIT-III (10 Hrs.)

Compilers - Overview of compilation process, Lexical analysis, Syntax analysis, Semantic analysis, Intermediate code generation and Code optimisation techniques, Compiler vs. Interpreter.

Loaders - Loading, Schemes, Design of absolute loader, Design of direct linking loader and MS-DOS Linker, Text Editors, Line Editor, Steam Editors, Screen Editor, Word processors, Structure Editors.

UNIT-IV (11 Hrs.)

Operating System - Basic concepts, Operating System as Resource Manager, Concepts of Processor, Memory, I/O and File Managements. Introduction to Device Drivers, USB and Plug and Play systems.

Recommended Books

1. John. J. Donovan, 'Systems Programming', 1st Edn., McGraw Hill, **2001.**
2. A.V. Aho, Ullman Sethi R., I.D. 'Compilers: Principles, Techniques and Tools', 2nd Edn., Addison Wesley, **1999**.

3. D.M. Dhamdhere, 'Systems Programming and Operating System', 3rd Edn. Tata McGraw Hill, **2002**.

SOFTWARE LAB. – VII (COMPUTER GRAPHICS)

Subject Code: MCAP1-420 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP1-417.

SOFTWARE LAB – VIII (PROGRAMMING IN JAVA)

Subject Code: MCAP1-421 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP1-418.

DATA WAREHOUSING AND DATA MINING

Subject Code: MCAP1-462 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

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 (10 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 (11 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 (12 Hrs.)

Introduction to Data Mining- Data mining definition & task, KDD versus Data mining, Techniques, Tools and Applications of Data mining. 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 (12 Hrs.)

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

Multimedia databases, Time series and Sequence data, mining Text Data bases and mining Word Wide Web.

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)', 1st 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.**

BUSINESS INTELLIGENCE AND DIGITAL MARKETING

Subject Code: MCAP1-463 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

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

1. Understand the role of business intelligence and digital marketing within an organization.
2. Use decision-making tools/Operations Research techniques and manage business processes using analytical and management tools.
3. Analyse and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc.

UNIT – I (12 Hrs.)

Introducing the Technical Architecture- The value of architecture, Technical Architecture overview, Back room Architecture, Presentation Server Architecture, Front room Architecture, Infrastructure, Metadata, and Security.

Introducing Dimensional Modeling- Making the Case for Dimensional Modeling, Dimensional Modeling primer, Enterprise Data Warehouse Bus Architecture, More on Dimensions & Facts.

UNIT – II (10 Hrs.)

Designing the Dimensional Modeling- Modeling Process overview, Getting Organized, Four Step Modeling Process, Design the Dimensional Model.

UNIT – III (11 Hrs.)

Introducing Extract, Transformation & Load- Round up the requirements, the 34 subsystems of ETL, Extracting Data, Cleaning & Conforming data.

Introducing Business Intelligence Applications- Importance of B.I., Applications, Analytical cycle for B.I., Types of B.I. Applications, Navigating Applications via the B.I. portal.

UNIT – IV (12 Hrs.)

Designing & Developing B.I. Applications- B.I. Application resource planning, B.I. Application Specification, B.I. Application Development, B.I. Application maintenance.

Recommended Books

1. Sam Anahory and Dennis Murray, 'Data Warehousing in the Real World: A Practical Guide for Building Decision Support Systems', 1st Edn., Addison Wesley Longman Ltd., **1997**.

2. Ralph Kimball and Margy Ross, 'The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modelling', 3rd Edn., Wiley, **2013**.
3. Jiawei Han, Micheline Kamber, Jian Pei, 'Data Mining: Concepts and Techniques', 3rd Edn., Morgan Kaufmann, **2011**.
4. R.N. Prasad and Seema Acharya, 'Fundamentals of Business Analytics', 1st Edn., Wiley, **2011**.

SOFTWARE TESTING AND QUALITY ASSURANCE

Subject Code: MCAP1-464 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

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

1. Analyse different approaches to software testing and quality assurance, and select optimal solutions for different situations and projects;
2. Conduct independent research in software testing and quality assurance and apply that knowledge in their future research and practice;
3. Evaluate the work of peers constructively by following proven methods of peer-review, and by using the principles of research ethics.

UNIT-I (10 Hrs.)

Testing Principles- Need of testing, Basic concepts – errors, faults, defects, failures, test bed, unit testing, integration testing system, system testing, regression testing, alpha, beta and acceptance testing, functional testing, performance testing, white box testing, black box testing, verification and validation.

UNIT-II (12 Hrs.)

Test Management- Testing Life Cycle – Roles and activities, Test Planning, Develop test plan review, Test Cases design strategies. Black box approach: random testing, equivalence class partitioning and boundary value analysis. White box approach: test adequacy criteria, coverage and control flow graphs, paths, loop testing, mutation testing.

UNIT-III (12 Hrs.)

Software Metrics- Scope of software metrics, Classifying software measures, Measurement basics – representational theory, scales, meaningfulness, What to measure – GOM technique, Control flow structure, product quality metrics – MTTF, defect density, customer problems, customer satisfaction, function point.
Quality Assurance- Quality concepts – quality, quality control, quality assurance, cost of quality Software quality assurance – SQA activities, software reviews, inspections, audits, Software reviews, inspections, audits, Software reliability Quality Attributes: correctness, reliability, usability, integrity, portability, maintainability, interoperability. Ishikawa's Seven Basic Tools.

UNIT-IV (11 Hrs.)

Quality Standards- Basic concept of – ISO 9000 & 9001, CMM, six sigmas.
Development of CMM- CMM – Following KPAs: requirements management (RM), software project tracking and oversight (SPTO), software configuration management (SCM), organization process definition (OPD), software product engineering (SPE), peer reviews (PR), quantitative process management (QPM), process change management.

Recommended Books:

1. Kshirasagar Naik and Priyadarshi Tripathy, 'Software Testing and Quality Assurance: Theory and Practice', 1st Edn., Wiley, **2008**.
2. Jeff Tian, 'Software Quality Engineering: Testing, Quality Assurance, and Quantifiable, Improvement', 1st Edn., Wiley, **2005**.

3. William E. Perry, 'Effective Methods for Software Testing: Includes Complete Guidelines, and Checklists', 3rd Edn., Wiley, **2006**.
4. Glenford J. Myers, 'The Art Of Software Testing', 3rd Edn., Wiley, **2015**.

ARTIFICIAL INTELLIGENCE

Subject Code: MCAP1-522 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

After completion of this course the student will be able to understand the:

1. Different types of AI agents.
2. Various AI search algorithms.
3. The fundamentals of knowledge representation.

UNIT–I (11 Hrs.)

Basics of AI - What is Artificial Intelligence, what is an AI technique, Criteria for success, Problems, Problem spaces and search, Production system, Problem characteristics, Hill-climbing, Best-First search, AO algorithm, Constraint satisfaction.

UNIT–II (12 Hrs.)

Natural Language Processing - Introduction, Overview of linguistics, Grammars and language, Basic Parsing techniques, Semantic analysis and representation, Structure, Natural Language generation, Natural Language systems.

UNIT–III (11 Hrs.)

Knowledge Representation - Issues, Approaches to knowledge Representation, Representing simple facts in logic, Computable functions and predicates, Procedural vs declarative knowledge, Forward vs Backward Reasoning matching, Control knowledge.

UNIT–IV (11 Hrs.)

Expert Systems - Rule-Based system architecture, Non-production system Architecture, dealing with uncertainty, Knowledge acquisition and validation, Knowledge system Building tools.

Recommended Books

1. Elaine Rich and Kevin Knight, 'Artificial Intelligence', 5th Edn., Tata McGraw Hill, **2014**.
2. Dan. W. Patterson, 'Introduction to Artificial Intelligence and Expert Systems', 1st Edn., Prentice Hall India, **2015**.
3. Eugene Charniak and Drew McDermott, 'Introduction to Artificial Intelligence', 1st Edn., Pearson Education, **2002**.

PROJECT (PLANNING AND DESIGN)

Subject Code: MCAP1-523 **L T P C**
0 0 8 4

Students are encouraging for the Project Planning & Design which covers the schematic design phase of a project. They are also learning to building the layout design, review building codes and regulations, coordinate schematics etc.

THEORY OF COMPUTATION

Subject Code: MCAP1-524 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

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 (10 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, Crossing sequences, Moore and Mealy Machine, Application of finite automata i.e. Lexical Analyzers, text editors.

UNIT-II (10 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 (12 Hrs.)

Regular Languages and Regular Sets - Pumping lemma for regular sets, Applications of pumping lemma. Closure properties of regular language, The Myhill-Nerode Theorem, Minimization of finite Automata.

Pushdown Automata - Pushdown Automata, Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context free grammar.

UNIT-IV (13 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, The notions of time and space complexity in terms of T.M. Construction of simple problems, Computational complexity.

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', 2nd 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**.

INFORMATION AND NETWORK SECURITY

Subject Code: MCAP1-525 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

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 (10 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 (11 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 (12 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 (12 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**.

LAMP TECHNOLOGIES

Subject Code: MCAP1-565 **L T P C** **Duration: 45 Hrs.**

3 1 0 4

Course Objectives

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

1. Understand brief introduction to the open source technologies.
2. Understand interactive sessions enabling students to enhance their skills in contributing and implementing their technical knowledge.

UNIT-I (10 Hrs.)

Introduction - Open Source definition, Free Software vs. Open Source Software, Public Domain Software, Open Source history, Initiatives, Principle and Methodologies, Open Standards.

Open Source Development Model Licenses and Patents - What Is a License, Important FOSS Licenses (Apache, BSD, GPL, LGPL), Copyrights and Copy lefts, Patents Economics of FOSS: Zero Marginal Cost, Income-generation opportunities, Problems with traditional commercial software, Internationalization.

UNIT-II (12 Hrs.)

Programming on PHP and JavaScript - JavaScript: JavaScript variables, control structures, functions, arrays and objects. Cascading Style Sheets, Client Side Scripting - Java Script, PHP: Form processing and business logic, stream processing and regular expressions, viewing client/server environment variables, connecting to database and handling of cookies. SQL, Accessing databases with PHP.

UNIT-III (11 Hrs.)

Open Source Web Technologies - Two Tier and Three Tier Web based Application Architecture. Apache, Web server conceptual working, Installation and Configuration, httpd.conf file, Logging, Security, Running a website, MySQL, ER diagram, Relational database, Installation, Configuration, Administration, Common SQL queries, PHP, Dynamic

content, Server side scripting, Installation, Configuration, Administration, Language syntax, Built-in functions, PHP and MySQL connectivity.

UNIT- IV (12 Hrs.)

Open Source Ethics -Open source vs. closed source Open source government, Open source ethics. Social and Financial impacts of open source technology, shared software, Shared source.

Programming on XHTML and XML - Editing XHTML, W3C XHTML validation services, designing XHTML by using XHTML tables, frames, forms and other elements. CSS and its types. XML, XML namespaces, DTD, XML schema, XML vocabularies, DOM and its methods, SOAP.

R**ecommended Books**

1. B. Ware, B Lee J., 'Open Source Development with Lamp: Using Linux, Apache, MySQL, Perl, and PHP', 1st Edn., Addison Wesley Professional, **2003**.
2. E. Rosebrock, E. Filson, 'Setting Up LAMP – Getting Linux, Apache, MySQL, and PHP Working Together', 1st Edn., SYBEX Inc., **2004**.
3. Deitel, 'Internet and World Wide Web, How to Program', 4th Edn., Prentice Hall, **2008**.

DATABASE ADMINISTRATION

Subject Code: MCAP1-566 **L T P C** **Duration: 45 Hrs.**

3 1 0 4

Course Objectives

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

1. Learn install and configure various database packages. The student will also learn various database objects like tables, views and indexes.
2. Learn various database tasks like data migration, Importing and Exporting data.
3. Learn to create user accounts, grant privileges and implement database encryption.
4. Learn Database backup and recovery and perform database tuning and optimization.

UNIT-I (12 Hrs.)

Introduction - Understanding role and responsibilities of DBA, Database Environment management (network, CPU, disk and RAM), Installing and upgrading various database packages (MS SQL Server, Oracle, MySQL), Comparing various database packages, configuring various services and components, Understanding the client/server model, Communication protocols, Database instance management, Creating and managing various database objects (tables, views, indexes).

UNIT-II (12 Hrs.)

Managing Database Servers - Understating client tools for administrative tasks, Task Automation, implementing migration, consolidation and upgrade strategy, Hardware resource allocation, Business policy implementation, Monitoring and trouble-shooting, implementing database compression, Database Replication and multiple servers, Exporting and Importing data, Managing Data integrity.

UNIT-III (10 Hrs.)

Security and Availability - Understanding User Access and Security, Creating and modifying user accounts, Creating, Modifying and Using roles, Granting and Revoking Privileges, querying role information, Database backup, restoration and recovery, Types of failure, defining a backup and recovery strategy, Testing the backup and recovery plan, RAID implementation.

UNIT-IV (11 Hrs.)

Performance Tuning - Introduction to performance tuning and its requirement, performance tuning methodology, Monitoring status variables that affect performance, General Table

Optimizations, using indexes to improve performance, Monitoring and optimizing the performance of the database, identifying full-table scans, Re-writing SQL queries, tuning sub-queries, Database mirroring, clustering.

Recommended Books

1. Adam Jorgensen, Jorge Segarra, Patrick Leblanc, Jose Chinchilla and Aaron Nelson, 'Microsoft SQL Server 2012 Bible', Wiley India Pvt Ltd, **2012**.
2. Ken Simmons and Sylvester Carstarphen, 'Pro SQL Server 2012 Administration', 2nd Edn., Dreamtech Press, **2012**.
3. Sam R. Alapati, 'Expert Oracle Database 11g Administration', Dreamtech Press, **2009**.
4. Sheeri K. Cabral and Keith Murphy, 'MySQL Administrator's Bible', John Wiley & Sons, **2009**.

SOFTWARE LAB.-IX (LAMP TECHNOLOGIES)

Subject Code: MCAP1-567 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP1-565.

SOFTWARE LAB.-X (DATABASE ADMINISTRATION)

Subject Code: MCAP1-568 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP1-566.

CURRENT TRENDS AND TECHNOLOGIES

Subject Code: MCAP1-626 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

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

1. Recognise the concepts of emerging technologies.
2. Analyse the components of cloud computing.
3. Critically analyse case studies to derive the best practice model to apply when developing and deploying parallel, distributed, cloud and IoT based applications.

UNIT–I (10 Hrs.)

Introduction to Computing-Emerging Trends in Computing like Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Utility Computing, Cloud Computing, High Performance Computing, Autonomic Computing.

UNIT–II (11 Hrs.)

Cloud Computing-Introduction, Cloud Types, Uses of Cloud, Components of Cloud Computing - Software as a Service, Platform as a Service, Infrastructure as a Service, Virtualization in Cloud Computing, Concept of Green Clouds.

UNIT–III (12 Hrs.)

Soft Computing-Soft Computing VS Hard Computing; Introduction to Neural Networks – Intelligence, Neurons, Artificial Neural Networks, Application Scope of Neural Network, Brain VS Computer.

UNIT–IV (12 Hrs.)

IoT and Fog Computing-Topologies, Edge Routers, Client-Server Architecture, P2P, M2M, Introduction to Fog Computing, Benefits of Fog Computing.

Recommended Books

1. Joshy Joseph, Craig Fellenstein, 'Grid Computing', 1st Edn., Prentice Hall Professional, **2004**.
2. Rajkumar Buyaa, James Broberg, Andrzej Goscinski, 'Cloud Computing Principles and Paradigms', 1st Edn., Wiley, **2011.**
3. Tettamanzi, Andrea, Tomassini and Macro, 'Soft Computing', Springer, **2001**.
4. Rajkumar Buyaa, Vecchiola, Selvi, 'Mastering Cloud Computing', 1st Edn., McGraw Hill, **2013**.
5. Arshdeep Bahga, Vijay Madisetti, 'Internet of Things (A Hands -on- Approach)', 1st Edn., VPT, **2014**.

PROJECT (IMPLEMENTATION AND EXECUTION)

Subject Code: MCAP1-627 **L T P C** **0 0 20 10** **Duration: 45 Hrs.**

The Implementation of the Project is based on concepts build in **MCAP1-523 Project Planning & Design** and will help to put the project into an action. The Implementation phase consists of four sub phases: Execution, Monitoring & Control, and Move to Production. Project implementation where visions and plans become reality.

BIG DATA

Subject Code: MCAP1-669 **L T P C** **3 1 0 4** **Duration: 45 Hrs.**

Course Objectives

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

1. Model and implement efficient big data solutions for various application areas using appropriately selected algorithms and data structures.
2. Analyze methods and algorithms, to compare and evaluate them with respect to time and space requirements, and make appropriate design choices when solving real-world problems.
3. Apply non-relational databases, the techniques for storing and processing large volumes of structured and unstructured data, as well as streaming data.

UNIT-I (10 Hrs.)

Introduction to Big Data-Introduction – distributed file system – Big Data and Its Importance, Four Vs, Drivers for Big Data, Big Data Applications, Algorithms using Map Reduce, Matrix-Vector Multiplication by Map Reduce, Clustering

UNIT-II (10 Hrs.)

Big Data Technology Landscape-Fundamentals of Big Data Types, Big data Technology Components, Big Data Architecture, Big Data Warehouses, Functional vs. Procedural Programming Models for Big Data.

UNIT-III (10 Hrs.)

Big Data Analytics-Big Data Analytics, Framework for Big Data Analysis, Approaches for Analysis of Big Data, ETL in Big Data, Introduction to Hadoop Ecosystem, HDFS, Understanding Text Analytics and Big Data, Predictive analysis on Big Data, Role of Data analyst.

UNIT-IV (15 Hrs.)

Big Data Implementation-Big Data Workflow, Operational Databases, Graph Databases in a Big Data Environment, Real-Time Data Streams and Complex Event Processing, Applying Big Data in a Business Scenario, Security and Governance for Big Data, Big Data on Cloud, Best Practices in Big Data Implementation, Latest Trends in Big Data, Big Data Computation, More on Big Data Storage, Big Data Computational Limitations.

Recommended Books

1. Michael Minelli, Michele Chambers, Ambiga Dhiraj, 'Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses', Wiley, 1st Edn., **2013**.
2. White T., 'Hadoop: The Definitive Guide', O' Reilly Media, 3rd Edn., **2012.**

CLOUD COMPUTING

Subject Code: MCAP1-670 **L T P C** **Duration: 45 Hrs.**

3 1 0 4

Course Objectives

1. To understand the basic concepts Cloud Computing.
2. To understand the taxonomy and types of Cloud Computing.
3. To understand different hypervisors of Clouds for the Virtualization.

UNIT-I (10 Hrs.)

Evolution of Cloud Computing - Vision of Cloud Computing, Definition, Deployment models, Reference models, Benefits and Challenges to Cloud Computing, already using Cloud Computing; Electronic Faxing, Voice in the Cloud, Commerce in the Cloud, Distributed Hosting in the Cloud, Accounting and Online Banking in the Cloud, Cloud Computing Applications.

UNIT-II (10 Hrs.)

Cloud Service Providers and Cloud Vendor's - IaaS Providers, PaaS Providers, SaaS Providers, Specialized Cloud Software Providers. Cloud Vendor's IBM, Amazon AWS, HP, Oracle.

UNIT-III (13 Hrs.)

Securing the Cloud- Reliability, Availability and Security: FUDD Factor, DoS Attack, Trust, Standard and Vendor Selection, SAS70 and Cloud Computing, Cloud Security Alliance, SysTrust Certification, Cloud Audit.

UNIT-IV (12 Hrs.)

Demystifying the Cloud- A Case Study using Amazon's Cloud Service, Using Amazon's S3 Functionality, moving a Simple Application to the Cloud; Step1, Move Static Content to S3, Step 2; Move Web Servers and Backend, Moving the database, Eucalyptus, Nimbula.

Recommended Books

1. Rajkumar Buyaa, James Broberg, Andrzej Goscinski, 'Cloud Computing Principles and Paradigms' 1st Edn., Wiley, **2011.**
2. David E.Y. Sarna, 'Implementing and Developing Cloud Computing Applications', 1st Edn., CRC Press, **2011**.
3. Chris Wolf, Erick M. Halter, Virtualization: From the Desktop to the Enterprise, 1st Edn., A Press, **2005**.
4. George Reese, 'Cloud Application Architectures: Building Applications and Infrastructure in the Cloud', 1st Edn., O'Reilly Publishers, **2009**.

DOT NET FRAMEWORK

Subject Code: MCAP1-671 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

1. To know about basic goals of the .NET Framework.
2. A working knowledge of the C# programming language.
3. An understanding of how to use forms to develop GUI programs under .NET.
4. Knowledge of some of the tools available in the .NET Framework class library.

UNIT-I (10 Hrs.)

The .Net framework - Introduction, The Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In –Time Compilation, Framework Base Classes.

UNIT-II (10 Hrs.)

C - Sharp Language (C#) - Introduction, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, Object and Classes, Inheritance and Polymorphism, Operator Overloading, Interfaces, Delegates and Events, Type conversion.

UNIT-III (13 Hrs.)

C# Using Libraries - Namespace- System, Input-Output, Multi-Threading, Networking and sockets, Managing Console I/O Operations, Windows Forms, Error Handling.

UNIT-IV (12 Hrs.)

Advanced Features Using C# - Web Services, Window Services, ASP.NET Web Form Controls, ADO.Net. Distributed Application in C#, Unsafe Mode, Graphical Device interface with C#.

Recommended Books

1. E. Balagurusamy, 'Programming in C#', 3rd Edn., Tata McGraw Hill, **2010**.
2. Mark Michaelis, 'Essential C# 3.0: For .NET Framework 3.5', 2nd Edn., Addison Wesley, **2008.**
3. Kogent Course Solutions Inc, 'C# 2012 Programming Black Book Covers .NET 4.5', 1st Edn., Dreamtech Press, **2012.**

MOBILE COMPUTING & ANDROID

Subject Code: MCAP1-672 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

UNIT-I (12 Hrs.)

Introduction to Android - Installing Android Studio, Layouts, Views and Resources, Scrolling Views, Working with TextView Elements.

Activities and Intents - Create and Start Activities, Lifecycle and State Callbacks, Testing and Debugging, and Backwards Compatibility: Debugging and Testing app, Support libraries.

UNIT-II (9 Hrs.)

User Interaction and Navigation - User Input Controls: Use Keyboards, Input Controls, Alerts, and Pickers, Menus and Radio Buttons, Screen Navigation.

Themes and Styles: Theme, Custom Styles, Drawables, adapt layouts for multiple devices and orientations, Using Espresso to test UI

UNIT-III (13 Hrs.)

Connect to the Internet -Google APIs Explorer, JSON, Books API, Use AsyncTaskLoader

Triggering, Scheduling, and Optimizing, Background Tasks: Alarm Manager, Job Scheduler, Firebase Job Dispatcher.

UNIT- IV (11 Hrs.)

Data Saving, Retrieving, Loading - Storing Data using SQLite, Sharing Data: Implement a Content Provider, Loading Data using Loaders, publishing app: Permissions and Libraries, monetizing your app, Making and publishing APKs.

Windows Phone 7- Windows Phone 7 Project, Building an App in Windows Phone 7, Distribution.

Recommended Books

1. Jeff Mcwherter, Scott Gowell, 'Professional Mobile Application Development', 1st Edn., Wrox Publisher, **2012**.
2. Lauren Darcy and Shane Conder 'Teach Yourself Android Application Development in 24 Hrs', 1st Edn., Sams Publications, **2009.**
3. Himanshu Dwivedi, Chris Clark, David Thiel, 'Mobile Application Security', 1st Edn., Tata McGraw Hill, **2010**.

SOFT COMPUTING

Subject Code: MCAP1-673 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Objectives

1. To know about the basics of soft computing techniques and also their use in some real life situations
2. To learn the key aspects of Soft computing
3. To understand the features of neural network and its applications

UNIT–I (11 Hrs.)

Introduction - Introduction to Soft Computing, Introduction to biological and artificial neural network, Introduction to fuzzy sets and fuzzy logic systems, Introduction to Genetic Algorithm, Genetic Operators and Parameters, Genetic Algorithms in Problem Solving, Theoretical Foundations of Genetic Algorithms, Implementation Issues.

UNIT–II (11 Hrs.)

Artificial Neural Networks - Different artificial neural network models, Course in artificial neural networks, Neural network applications in control systems, Neural Nets and applications of Neural Network.

UNIT–III (12 Hrs.)

Fuzzy Systems - Fuzzy sets, Fuzzy reasoning, Fuzzy inference systems, Fuzzy control, Fuzzy clustering, Applications of fuzzy systems, Neuro-fuzzy systems, Neuro-fuzzy modeling, Neuro-fuzzy control.

UNIT–IV (11 Hrs.)

Applications - Pattern Recognitions, Image Processing, Biological Sequence Alignment and Drug Design, Robotics and Sensors, Information Retrieval Systems, Share Market Analysis, Natural Language Processing.

Recommended Books

1. S. Rajasekaran and G.A. Vijaylakshmi Pai, 'Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications', 1st Edn., Prentice Hall India, **2007**.
2. J.S.R. Jang, C.T. Sun and E. Mizutani, 'Neuro-Fuzzy and Soft Computing', 1st Edn., Pearson Education, **2015**.
3. Timothy J. Ross, 'Fuzzy Logic with Engineering Applications', 3rd Edn., Wiley, **2011**.

SOFTWARE LAB. - XI (BIG DATA)

Subject Code: MCAP1-674 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP1-669.

SOFTWARE LAB. - XII (CLOUD COMPUTING)

Subject Code: MCAP1-675 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP1-670.

SOFTWARE LAB. - XIII (DOT NET FRAMEWORK)

Subject Code: MCAP1-676 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP1-671.

SOFTWARE LAB - XIV (MOBILE COMPUTING & ANDROID)

Subject Code: MCAP1-677 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP1-672.

SOFTWARE LAB. - XV (SOFT COMPUTING)

Subject Code: MCAP1-678 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP1-673.