

MRSPTU MCA SYLLABUS 2016 BATCH ONWARDS
(Approved in 1st MRSPTU Standing Committee of Academic Council on 20.12.2016)

MASTERS IN COMPUTER APPLICATIONS (1st Year)

Total Contact Hours = 28

Total Marks = 800

Total Credits = 23

SEMESTER 1 st		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MCAP1-101	Introduction to Information Technology	3	1	-	40	60	100	4
MCAP1-102	Problem Solving and Programming using C	3	1	-	40	60	100	4
MCAP1-103	Digital Electronics	3	1	-	40	60	100	4
MCAP1-104	Mathematical Foundations of Computer Science	3	1	-	40	60	100	4
MHUM0-104	Business Communication - I	2	-	2	40	60	100	3
MCAP1-105	Software Lab-I (Introduction to Information Technology based on MCAP1-101)	-	-	2	60	40	100	1
MCAP1-106	Software Lab-II (Problem Solving and Programming using C based on MCAP1-102)	-	-	4	60	40	100	2
MHUM0-102	Business Communication Lab – I	-	-	2	60	40	100	1
Total	Theory = 5 Labs = 4	14	4	10	380	420	800	23

Total Contact Hours = 26

Total Marks = 700

Total Credits = 21

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

Overall

Semester	Marks	Credits
1 st	800	23
2 nd	700	21
Total	1500	44

INTRODUCTION TO INFORMATION TECHNOLOGY

Subject Code: MCA1-101

L T P C
3 1 0 4

Duration: 45 Hrs.

Learning 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, 'Fundamentals of Computers', 3rd Edn., PHI.
2. Satish Jain, 'Information Technology Concepts', 4th Edn., BPB Publications.
3. P.K Sinha, 'Computer Fundamentals', 5th Edn..' BPB Publications.
4. Turban, Mclean and Wetherbe, 'Information Technology for Management', 3rd Edn., John Wiley & Sons.
5. G. Courter, 'Mastering MS Office 2000 Professional', 4th Edn., BPB Publication.
6. Steve Sagman, 'MS- Office 2000 for Windows', 5th Edn., Addison Wesley.

Learning Outcomes

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

1. Identify and understand the working of key components of a computer system and representation of numbers, alphabets and other characters.
2. Identify and understand the working of different operating systems and to install windows.
3. Become proficient in using the features of word processing in Word processing.
4. Students will be able to create technical and complex spreadsheets for data analysis using spreadsheet tools.
5. Students will become proficient to develop effective and professional business presentations using Power Point tools.
6. The students will learn about types of Communication networks, use of internet applications and security within the context of Information Technology.

PROBLEM SOLVING AND PROGRAMMING USING C

Subject Code: MCAP1-102

L T P C
3 1 0 4

Duration: 45 Hrs.

Learning Objectives

This course is designed to provide a comprehensive study of the C programming language. It stresses the strengths of C, which provide students with the means of writing efficient, maintainable, and portable code. The nature of C language is emphasized in the wide variety of examples and applications.

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., Pearsons.
2. E. Balagurusamy, 'Programming in ANSI C', 3rd Edn., Tata McGraw Hill.
3. Brian Kernighan and Dennis Ritchie, 'C Programming Language', 2nd Edn., PHI.
4. Byron Gottfried, 'Programming with C', 2nd Edn., Tata McGraw Hill.
5. ISRD Group, 'Programming and Problem Solving Using C', 3rd Edn., Tata McGraw Hill.
6. Yashvant P. Kanetkar, 'Let us C', 4th Edn., BPB Publications, New Delhi.
7. R.S. Salaria, 'Application Programming in C', 2nd Edn., Khanna Book Publishing.

Learning Outcomes

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

1. Understand the basic terminology used in computer programming. Students will be able to write, compile and debug programs in C language and use different data types in a computer program.
2. Design programs involving decision structures, loops, breaking control statements.
3. Design programs using arrays and understand the dynamics of memory by the use of pointers.
4. Design programs involving functions and learn to understand and analyse the use of storage classes and pre-processor directives.
5. Provide students with the means of writing efficient code using structures and learn file handling.

DIGITAL ELECTRONICS

Subject Code: MCAP1-103

L T P C
3 1 0 4

Duration: 45 Hrs.

Learning Objectives

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. This course portrays excellent ideas of the logic gates available and data processing to make students understand the concept better with the analogue 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

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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. T.C. Bartee, 'Digital and Electronic Circuits', 3rd Edn., McGraw Hill.
2. R.P. Jain, 'Modern Digital Electronics', 4th Edn., Tata McGraw Hill.
3. M. Morris Mano, 'Digital Logic and Computer Design', 4th Edn., Pearson.
4. William H. Gothmann, 'Digital Electronics: An Introduction to Theory and Practice', 2nd Edn., Prentice Hall.
5. Albert Malvino, 'Digital Computer Electronics', 2nd Edn., Tata McGraw-Hill.

Learning Outcomes

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

1. Acquired knowledge about basics of digital electronics and solving problems related to number systems.
2. Acquired knowledge about Boolean algebra.
3. Ability to identify, analyse and design combinational circuits.
4. Ability to design various synchronous and asynchronous sequential circuits.
5. Ability to understand Logic families.
6. Acquired knowledge about memory devices and signal Conversions.

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Subject Code: MCA1-104

L T P C
3 1 0 4

Duration: 45 Hrs.

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-3 (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-4 (12 Hrs)

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, Reach Ability and Connectedness; Basic Concepts of Trees And Spanning Tree.

Recommended Books

1. J.P. Tremblay and R. Manohar, 'Discrete Mathematical Structures with Applications to Computer Science', 2nd Edn., Tata McGraw Hill.
2. Kenneth H. Rosen, 'Discrete Mathematics and its Applications with Combinatorics and Graph Theory', 6th Edn., Tata McGraw – Hill Education Private Limited.
3. R.P. Grimaldi and B.V. Ramana, 'Discrete and Combinatorial Mathematics – An Applied Introduction', 2nd Edn., Pearson Education.
4. Doerr Alan., 'Applied Discrete Structures for Computer Science', 2nd Edn., Galgotia Publications.
5. C.L. Liu, 'Elements of Discrete Mathematics', 2nd Edn., Tata McGraw Hill.

BUSINESS COMMUNICATION

Subject Code: MHUM0-104

L T P C
2 0 0 2

Duration - 28 Hrs

Learning Objective: 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. The aim is to develop students' ability to

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communicate correctly and effectively on matters having relevance to day-to-day business operations. 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, Learning 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 Learning: 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.

Learning Outcome: After studying this course the students will enable to:

- Know the dynamics of communication in the business world
- Practice the different tools of communication
- Enable them to speak effectively suited to the situation
- Improve their competence in English

Recommended Books

1. Lesikar, Petit & Flatley, '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 Learning.
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 Learning.

SOFTWARE LAB – I
(INFORMATION TECH. & OFFICE AUTOMATION BASED ON MCAP1-101)

Subject Code: MCAP1-105

L T P C

0 0 2 1

Learning 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.

Windows Operating System - Installing WINDOWS with set-up, Starting and Quitting WINDOWS, Basic Elements of WINDOWS, working with menus dialogue boxes, Window Applications, Windows Explorer, My Computer, Recycle bin, Programs, Favorites, My Documents.

Settings - Control Panel, Printers, Taskbar and Start menu, Folder Options, Active Desktop, Find, Help, Run.

Accessories – Entertainment, Games, System tools, Internet Tools, Calculator, Calendar, Clock, Card file, Note pad, Write pad, Recorder etc.

Word Processing & Presentation Tool - Salient Features of Word, Installation of Word, Starting and Quitting of Word, File, Edit, View, Insert, Format, Tools, Tables, Window, Help options and all of their features, Options and Sub Options etc. Transfer of files between Word Processors and Software Packages. Salient Features of Power Point, Installation, Starting and Quitting, File, Edit, View, Insert, Format, Tools, Slide Show, Window, Help options and all of their features, Options and Sub Options etc. Transfer of files between Presentation Tool and Software Packages.

Spreadsheet Tool - Spread Sheet, getting started with Excel worksheet, entering data into Work Sheet, editing cell addressing, Ranges and range names, Commands, Menus, Copying and Moving cell contents, Inserting and Deleting rows and columns, Column width control, Cell protection, Printing reports, Creating and Displaying Graphs, Statistical functions.

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

Learning Outcomes:

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

1. Familiarize with PC and WINDOWS commands, File creation, Editing, Directory creation.

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2. Become proficient in using the features of word processing in Word.
3. Become proficient in using spreadsheet software and be able to create technical and complex spreadsheets for data analysis using spreadsheet tools.
4. Understand the use of Internet and its applications

SOFTWARE LAB – II
(PROBLEM SOLVING AND PROGRAMMING USING C BASED ON MCAP1-102)

Subject Code: MCAP1-106

L T P C
0 0 4 2

This laboratory course will mainly comprise of exercises on what is learnt under paper: MCAP1-102 (Computer Programming Using C)

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

Implement the following Concepts in C Programming:

Input-output statements: Formatted and Non-Formatted statements

Operators: Arithmetic, Logical, Conditional, Assignment, Bitwise, Increment/Decrement operators

Decision Making: Switch, if-else, nested if, else-if ladder, Break, Continue, Go to

Loops: While, Do-while, For

Functions: Definition, Declaration, Variable Scope, Parameterized Functions, return statement, call by value, Call by reference, Recursive functions

Pre-processor Directives: Pre-processor directives like INCLUDE, IFDEF, DEFINE, etc

Header Files: STDIO.H, MATH.H, STRING.H, PROCESS.H etc

Arrays: Array declarations, Single and Multi-dimensional, Memory limits, Strings and String functions

Pointers: Pointer declarations, Pointer to Function, Pointer to Array/String

Files: Creation and Editing of various types of files, closing a file (using functions and without functions).

Learning Outcomes

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

1. Apply and practice logical ability to solve the problems.
2. Understand C programming development environment, compiling, debugging, linking and executing a program using the development environment.
3. Analysing the complexity of problems, modularize the problems into small modules and then convert them into programs
4. Understand and apply the in-built functions and customized functions for solving the problems.
5. Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
6. Document and present the algorithms, flowcharts and programs in form of user-manuals

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”

COMPUTER ARCHITECTURE & ORGANIZATION

Subject Code: MCAPI-206

L T P C
3 1 0 4

Duration: 45 Hrs.

Learning Objective:

The objective of the course is to provide students with a solid foundation in computer design. Examine the operation of the major building blocks of a computer system and 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 it's 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', PHI.
2. William Stallings, 'Computer Organization and Architecture', 8th Edn., Pearson.
3. P.V.S. Rao, 'Computer System Architecture', 2nd Edn., PHI.
4. J.P. Hayes, 'Computer Architecture & Organization', 3rd Edn., McGraw Hill.
5. Stone, 'Introduction to Computer Architecture', 2nd Edn., Galgotia.
6. Tanenbaum, 'Structured Computer Organization', 3rd Edn., PHI.

Learning Outcomes

After Completion of the course students will be able to:

1. Understand the fundamentals of different instruction set architectures and their relationship to the CPU design.
2. Understand the principles and the implementation of computer arithmetic.
3. Understand the Basic architecture of CPU and I/O Organization.
4. Understand the operation of modern CPUs including pipelining, memory systems and buses and multiprocessor systems and parallel programming.
5. To Understand the Overview of Assembly Language Programming and to create an assembly language program to program a microprocessor system.

RELATIONAL DATABASE MANAGEMENT SYSTEM

Subject Code: MCA1-207

L T P C

Duration: 45 Hrs.

3 1 0 4

Learning Objective

The course aims at providing the students through insight on few DBMS principles and practices. 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 - 1NF, 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-3 (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

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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. B.C. Desai, 'An Introduction to Database Systems', 3rd Edn., Galgotia Publ. Private Ltd.
2. Ivan Bayross, 'PL/SQL The Programming Language of ORACLE', 2nd Edn.,, BPB Publication.
3. Henry F. Korth, Abraham, 'Database System Concepts', 3rd Edn., McGraw Hill Inc.
4. Ramez Elmasri, Shamkant Navathe, 'Fundamentals of Database Systems', 3rd Edn., Pearson.
5. Johannes Gehrke , Raghu Ramakrishnan, 'Database Management Systems', 4th Edn., McGraw Hill Education.
6. C.J. Date, 'Data Base Systems', Vols. I, II, 3rd Edn., Narosa Publications.
7. Mark L. Gillenson, 'Fundamentals of Database Management Systems', 2nd Edn., John Wiley and Sons.

Learning Outcomes

Students who complete this course would be able to perform the following tasks:

1. Master the basic concepts and appreciate the applications of database systems.
2. Be familiar with the relational database design.
3. Mater sound design principles for logical design of databases, including the E-R method and normalization approach.
4. Formulate data retrieval queries in SQL and the Relational Algebra and functions.
5. Understand analyse and apply Data Manipulation and Control and Database security and privileges.
6. Understand, analyse, and apply PL/SQL blocks using Cursors and Triggers.

DATA AND FILE STRUCTURES

Subject Code: MCAP1-208

L T P C
3 1 0 4

Duration: 45 Hrs.

Learning Objective:

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. 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. Lipschutz, Seymour, 'Theory & Problems of Data Structures', 2nd Edn., Schaum Series.
2. E. Horwitz, and S. Sahni, 'Fundamentals of Data Structures, Computer Science', 2nd Edn., Press.
3. Tremblay, 'An introduction to Data Structures with Applications', 3rd Edn., Tata McGraw.
4. A.V. Aho, Hopcroft, J.E. Ullman, 'Data Structures and Algorithms', 3rd Edn., Addison Wesley
5. A.M. Tanenbaum and M.J. Augenstein, 'Data Structures using C', 2nd Edn., Prentice Hall International.
6. A. Berman, Michael, 'Data Structure via C++', 2nd Edn., Oxford University Press.

Learning Outcomes

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

1. Design and apply appropriate data structure using simple algorithms for modelling and solving given computing problems
2. Understand, analyse and Develop algorithms to implement different data structures such as: arrays, linked lists, stacks, queues and Linked Lists
3. Understand, analyse and Develop algorithms to implement linear data structures such as trees.
4. Understand, analyse and Develop algorithms to implement graphs.
5. Identify, understand and determine the usage of sorting, searching and Hashing operations and their associated algorithms.

SOFTWARE LAB – III

(RELATIONAL DATABASE MANAGEMENT SYSTEM BASED ON MCAP1-207)

Subject Code: MCAP1-209

L T P C

Duration: 60 Hrs.

0 0 4 2

Learning Objective

Students will learn and implement the operations for making and using databases with help of SQL and PL/SQL

Implement the Following Concepts

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

Learning Outcomes

Students who complete this course would be able to perform the following tasks:

1. Understand, Appreciate and Effectively Explain The Underlying Concepts of Database Technologies.
2. Design & Implement a Database Schema for Given Problem Domain.
3. Populate & Query a Database Using SQL DML/DDL Commands.
4. Normalize a Database.
5. Programming PL/SQL Including Stored Procedures, Stored Functions, Cursors, Packages.

SOFTWARE LAB – IV

(DATA AND FILE STRUCTURES BASED ON MCAP1-208)

Subject Code: MCAP1-209

L T P C

0 0 4 2

List of practical exercises, to be implemented using object-oriented approach in C++ Language:

Array: Insert an element at end as well as at a given position, delete an element from a given position, find the location of a given element using linear search and display the elements of the linear array.

Linked List: Insert an element, delete an existing element, and Display all the elements

Stack: To implement PUSH& POP operation on stack.

Queue: Insert and Delete operation on circular queue represented using a linear array.

Bubble Sort: To sort an array of integers in ascending order using Bubble sort.

Selection Sort: To sort an array of integers in ascending order using Selection sort.

Insertion Sort: To sort an array of integers in ascending order using bubble sort.

Merge Sort: To sort an array of integers in ascending order using merge sort.

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Quick Sort: To sort an array of integers in ascending order using Quick sort.

Binary Search Tree: To demonstrate the use of binary search algorithm to search a given element in a Sorted array in ascending order. To insert, delete and display operations on a binary search tree.

Breadth-First Search: To illustrate the traversal of graph using breadth-first search.

Depth-first Search: To illustrate the traversal of graph using depth-first search.

Learning Outcomes

Students who complete this course will be able to:

1. Designing and applying appropriate data structure using simple algorithms for modelling and solving given computing problems.
2. Understand and implement the both array based and linked-list based data structures, including singly, doubly, and circular linked-lists.
3. Understand and implement the Stack data structure and stack operations.
4. Understand and implement the both array based circular queue and linked-list based queue implementations.
5. Understand and implement general tree data structures, including binary tree, both array based and reference based implementations;
6. Understand and implement binary search trees.
7. Understand and implement heaps using an array based tree data structure.
8. Understand and implement graph data structures

SOFTWARE ENGINEERING AND PROJECT MANAGEMENT

Subject Code: MCAP1-256

L T P C
3 1 0 4

Duration – 45 Hrs

Learning Objective

To help students to develop skills that will enable them to construct software of high quality software that is reliable, and that is reasonably 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.

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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. R.S. Pressman, 'Software Engineering: A Practitioner's Approach', 6th Edn., McGraw-Hill.
2. P. Jalote, 'An Integrated Approach to Software Engineering', 3rd Edn., Narosa Publishing House.
3. Mall, Rajiv, 'Fundamentals of Software Engineering', 4th Edn., McGraw-Hill.
4. K.K. Aggarwal and Y. Singh, 'Software Engineering', 2nd Edn., New Age International Publishers.
5. Deutsch, Willis, 'Software Quality Engineering: A Total Technical and Management Approach', 3rd Edn., Prentice Hall.
6. T.G. Lewis, 'Software Engineering', 3rd Edn., McGraw Hill.
7. P.G. Hibbard, 'Constructing Quality Software', 4th Edn., North Holland Publication.

Learning Outcomes

1. Ability to understand Goals of software Engineering, Software Process models and Software Requirement analysis.
2. Ability to understand Software Design in detail.
3. Ability to understand software project Management
4. Ability to identify, Analyse and understand software testing.
5. Students will be proficient to understand software Quality Assurance.
6. Ability to understand Software maintenance.

SYSTEM ANALYSIS AND DESIGN

Subject Code: MCAP1-257

L T P C
3 1 0 4

Duration: 45 Hrs

Learning Objectives

To teach the analysis and practicality of various systems on which software System can be developed. 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 N. Awad, 'System Analysis and Design', 2nd Edn., Galgotia Publications.
2. James A. Sen, 'Analysis and Design of Information System', 2nd Edn., Tata McGraw Hill.
3. Harry J. Rosenblatt, Shelly, 'Systems Analysis and Design', 3rd Edn., Cashman Series.
4. Scott Tilley, Harry J. Rosenblatt, 'System Analysis and Design', 3rd Edn., Wiley.

Learning Outcomes

1. Ability to understand characteristics of system, Software Process models and Software Requirement analysis.
2. Ability to understand Software Design.
3. Ability to identify, Analyse and understand software testing strategies.
4. Students will be proficient to understand implementation of software.
5. Ability to understand Software maintenance.

SOFTWARE DESIGN METHODOLOGIES

Subject Code: MCAP1-257

L T P C
3 1 0 4

Duration: 45 Hrs

Learning Objectives

This course provides attendees with in-depth coverage of the concepts needed to effectively design and analyze software architecture. 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 (9 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', 2nd Edn., Elsevier.
2. J. Bosch, ACM Press, 'Design and Use of Software Architectures-Adopting and Evolving a Product – Line Approach', 3rd Edn., Addison Wesley.
3. Nick Rozanski, Eoin Woods, 'Software Systems Architecture: Working With Stakeholders Using Viewpoints and Perspectives', 2nd Edn., Pearson.

Learning Outcomes

1. Ability to understand basic concepts, principles, processes and quality attributes of design.
2. Ability to identify, Analyse and understand architecture of software.
3. Students will be proficient in using Styles in design.
4. Ability to identify, Analyse and understand architectural Design space.
5. Students will be proficient in analysis and evaluation of software.