Semester - I

CBCS Course Outline MCA Semester-I

Semester-I (24 Credit Semester)						
Course Code	**Course name**	**Paper category**	**Hours / Week**			**Credits**
			L	T	P	
16 Core Credit Unit s						
MCA-1T1-C	Advanced Programming Concepts in C / C++	Core	3	0	2	4
MCA-1T2-C	Database Management System	Core	3	0	2	4
MCA-1T3-C	Discrete Mathematics	Core	4	0	0	4
MCA-1T4-C	Computer Organization and Architecture	Core	4	0	0	4
6 Elective Credit Un its						
MCA-1E1-DCE	Technical Communication	DCE	3	0	0	3
MCA-1E2-DCE	Computer Fundamentals	DCE	3	0	0	3
MCA-1E3-DCE	Digital Electronics	DCE	3	0	0	3
MCA-1E4-DCE	Programming Languages and Paradigms	DCE	3	0	0	3
2 credit units to be taken from outside departments						

Course No: MCA-1T1-C

Course Title: Advanced Programming Concepts in C / C++

UNIT I

C programming language: Evolution, Features & Importance. Basic Structure of C programs, Character Set, Identifiers, Reserved Words, Data Types, Constants, Variables, Symbolic Constants, Casting, and Standard Libraries.

Logical and Control Structures: Assignment, Arithmetic, Relational, Logical, Compound, Increment, Decrement, Bitwise Operators & Special Operators.

IF, IF – ELSE, ?:, SWITCH CASE.

Looping Constructs: FOR, WHILE, DO-WHILE, EXIT, BREAK, CONTINUE

UNIT II

Functions: Concepts, Elements, Prototypes & Types. Storage classes. Recursion. Command-line arguments. Multifile programming. Preprocessing.

Arrays: Types of arrays, initialization, passing arrays to functions, dynamic arrays. Character Arrays & Strings. String-handling functions.

Pointers: Concepts, Variables, swapping data, swapping address v/s data, pointers & arrays, pointers to pointers, pointer to strings, pointer arithmetic, additional operators, pointers to functions, void pointers

UNIT III

Structures and Unions: Syntax & use, members, structures & pointers, array of structures, structures & functions, structure within structures.

OOPS: Evolution and need of C++, Advantages over Procedural programming
Introduction to classes and objects, Basic OOPS programming Constructors
and Destructors, Copy Constructors.

UNIT IV

Inheritance and Polymorphism: Inheritance. Polymorphism (static and dynamic),function overloading, function overriding, virtual functions, & operator overloading.

Files: File processing in C & C++.

Templates: Concepts, Function & Class templates, Standard Template library: Containers, Algorithms, Iterators and Function objects.

TEXT BOOKS:

1. Dietel & Dietel, "How to program", Pearson Education
2. Robert Lafore**,** "Object Orientation with C++ Programming", **Waite Group**

REFERENCES:

1. Herbert Schildt, "C++ The Complete Reference", Tata McGraw Hill
2. Dennis Richie & Kernighan**, "**C Programming Language", **Prentice Hall**

Course No: MCA-1T2-C
Course Title: Database Management System

UNIT I

Basic Concepts and Conceptual Database Design: Database Users, Characteristics of the Database, Advantage of using Database Systems, Data Models, schemas and instances, Three Tier Architecture & Data Independence, Database Languages & Interfaces. Overview of Legacy Data Base Management Systems. Data Modeling Using The Entity-Relationship Model – Entities, Attributes and Relationships, Cardinality of Relationships, Strong and Weak Entity Sets, Translating your ER Model into Relational Model.

UNIT II

Relational Model, Languages & Systems: Relational Data Model, Relational Model Concepts, Relational Model Constraints, Relational Algebra, SQL – A Relational Database Language, Data Definition & Manipulation in SQL, Queries in SQL, Specifying Constraints in SQL, Practicing SQL commands using ORACLE. Case Study – ORACLE.

UNIT III

Functional Dependencies & Normalization for Relational Databases: Functional Dependencies, Normal Forms based on primary keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependencies.

Case Study – Table Normalization.

UNIT IV

Transaction Management: Transaction Concept and State, Desirable Properties of a Transaction, Characterizing Schedules based on Serializability and Recoverability, Concurrency Control Techniques: Lock-Based Protocols, Timestamp-based Protocols, Validation–based Protocols. Database Recovery Techniques: Recovery Concepts, Recovery based on Deferred Update and Immediate Update. Shadow Paging. Overview of Object Oriented Database Management Systems, Distributed Data Base Management Systems.

REFERENCES:

3. Korth, Silberschatz, “Database System Concepts”, TMH
4. Steve Bobrowski, “Oracle 8 Architecture”, TMH
5. Date C. J., “An Introduction to Database Systems”,Narosa Publishing
6. Elmsari and Navathe, “Fundamentals of Database Systmes”, A. Wesley
7. Ullman J. D., “Principles of Database Systems”, Galgotia Publications
8. William Page, “Using Oracle 8i – Special Edition”, Que/PHI
9. Ivan Bayross, ”SQL & PL/SQL Using Oracle 8i & 9i with SQLJ”, BPB
10. Desai.B, "An introduction to Database Concepts", Galgotia Publications

Course No: MCA-1T3-C
Course Title: Discrete Mathematics

UNIT I

Proposition, Logic, Truth tables, Propositional Equivalence, Logical Equivalence, Predicates and Quantifiers, Sets: operations on sets, Computer representation of sets, Functions: Domain, Range, One-to-One, Onto, Inverses and Composition, Cardinality of a Set, sequences and summations, The growth of functions . Methods of Proof: Different methods of proof, Direct Proof, Indirect Proof, Mathematical Induction for proving algorithms.

UNIT II

Discrete probability, Advanced Counting Techniques: Inclusion-Exclusion, Applications of inclusion-exclusion principle, recurrence relations, solving recurrence relation. Relations: Relations and their properties, Binary Relations, Equivalence relations, Diagraphs, Matrix representation of relations and digraphs, Computer representation of relations and digraphs, Transitive Closures,

Warshall's Algorithm.

UNIT III

Partially Ordered Sets (Posets), External elements of partially ordered sets, Hasse diagram of partially ordered set, isomorphic ordered set, Lattices: Properties of Lattices, complemented Lattices. Graph theory: Introduction to graphs, Graph Terminology Weighted graphs, Representing Graphs, Connectivity of Graphs: Paths and Circuits, Eularian and Hamiltonian Paths, Matrix representation of graphs. Graph Coloring.

UNIT IV

Trees: Rooted trees, Application of trees: Binary Search Trees, Decision Trees, Prefix Codes, Tree traversal, trees and sorting, spanning trees, minimal spanning trees.

Finite Boolean algebra, Functions on Boolean algebra, Boolean functions as Boolean polynomials. Groups and applications: Subgroups, Semigroups, Monoids, Product and quotients of algebraic structures, Isomorphism, Homomorphism

REFERENCES:

1. KENNETH H. ROSEN "Discrete Mathematics and Its Applications" The Random House/Birkhauser Mathematics series
2. LIU "Elements of Discrete Mathematics " Tata McGraw Hill
3. SCHAUMS "Discrete Mathematics " Tata McGraw Hill
4. KOLMAN/REHMAN "Discrete Mathematical Structures " Pearson Education
5. NICODEMI "Discrete Mathematics " CBS

Course No: MCA-1T4-C
Course Title: Computer Organization and Architecture

UNIT 1

Fundamental concepts of computer architecture and organization, Register Organization.

Interconnection Structures, Bus Interconnections, Integer/Floating Point Arithmetic & Representation, Instruction Cycle & Interrupts. Instruction Set Characteristics & Functions.

Addressing Modes & Formats.

Processor Organization: ALU, Design of Arithmetic Circuit, Design of Logic Circuit & Design of ALU.

UNIT 2

Control Organization: Hardwired / Micro-Programmed Control, Control Memory, Address Sequencing, Design of Control Unit & Micro-Program Examples. Memory Hierarchy, Main Memory: RAM/ROM Chips. Memory Address Map, Memory Connection to CPU, Associative Memory. Hardware Organization – Match Logic, Read/Write Operation, Cache Memory, Virtual Memory, Memory Management – Associated Hardware, I/O Organization. Peripheral Devices: I/O Interfaces, Asynchronous Data Transfer, Modes of Transfer, Direct Memory Access.

UNIT 3

Microprocessor evolution and types, the 8086/8088 microprocessor family-Overview, 8086 internal architecture and software design of 8086/88, Memory address space and data organization, register circuitry, memory segmentation: generating memory address. 8086/88 minimum and maximum mode. System clock, bus cycle and unit states, hardwired organization of memory address space, read and write bus cycles, I/O data transfers and instruction, I/O bus cycles. Pin out diagram of 8086 microprocessor.

UNIT 4

Introduction to Parallel Processing, Basic Parallelization Techniques. Pipelining – Arithmetic & Instruction Pipelining, Vector & Array Processors. RISC , CISC

REFERENCES:

1. V.C. Hamacher, A.G. Vranesic & S.G. Zaky, “Computer Organization”, Tata McGraw Hill
2. J.P Hayes, “Computer Architecture & Organization”, Tata Mcgraw Hill 3. Morris Mano, “Computer System Architecture”, PHI.
4. W. Stallings, “computer organization and architecture”.
5. M. J. Flynn, “Computer Architecture”, Narosa
6. David A. Patterson, John L. Hannessey, ” Computer Organization”
7. Govainda Rajalu, “Computer Architecture & Design” TMH

Course No: MCA-1E1-DCE
Course Title: Technical Communication

UNIT I

Technical Communication: Basics of Technical Communication, Barriers to Communication & Technology in Communication. Communicating in the Workplace: Problem Solving in Workplace Communication, Human factors in the communication failure. Guidelines for ethical communication. Active Listening: Introduction, types of listening, traits of a good listener, Active vs. Passive listening & implications of good listening.

UNIT II

Introduction to Effective Presentation strategies: defining purpose, analyzing audience and locale, organizing contents, preparing outline, visual-aids, understanding nuances of delivery, kinesics, proxemics, paralinguistics, chronemics. Interviews: introduction, objectives, types of interviews & job interviews, guidelines for surviving a job interview. Group Communication: Introduction, Group discussion, Organizational Group discussions & meeting conferences.

UNIT III

Paragraph Development: Central components of a paragraph, length of a paragraph and techniques for paragraph development. The art of condensation, steps for effective précis writing, samples & guidelines. Memo reports: Purpose of memo reports, elements of a usable memo, interpersonal considerations in writing a memo, common types of memo report. Letters & Employment correspondence: Application letters and business correspondence, How applicants are screened for personal qualities, electronic job hunting.

REFERENCES:

1. Meenakshi Raman and Sangeeta Sharma, "Technical Communication", Oxford University Press
2. William Pfeiffer, Padmaja,"Technical Communication A Practical Approach", Pearson Education.

Course No: MCA-1E2-DCE
Course Title: Computer Fundamentals

UNIT I

Computers: History, Generations & Classification. Structure of a Computer System: Basic Components & Block Diagram. I/O devices & Storage Devices. H/W and S/W Concepts, Transforming data into information. Number System. Logic Gates, Boolean Algebra & K-Map. Combinational circuits, Sequential circuits, & Flip Flops. Digital Components: Integrated Circuits, Multiplexers/Demultiplexers. Operating System: Overview, functions, features & types, Overview of Different Operating Systems. Introduction Disk Operating System (DOS) & Windows. Understanding DOS prompt, working with DOS commands, Config.sys and Autoexec.bat files.

UNIT II

Personalizing Windows, Installing and Removing Applications; Boot Options & Concept of Registry. Essential components of the Desktop. Data Communications and Networking: Overview, features & types. Internet and WWW: Overview, importance, features and applications (Sharing, Browsers, E-Mails, Attachments, Search Engines, & Group Communications).

UNIT III

File Systems: Concepts & types. Databases: Overview, features & types. Programming languages & paradigms: Overview, features & types. Flowcharting. Control structures: conditional, looping & branching logic. Errors & their types. Introduction to Office Tools: Fundamentals of MS-Word, MSExcel, MS-PowerPoint. PC Management: Disc Management Tools, PC tools, Norton utilities, Disk Doctor. Introduction to Computer Security: Types of infections, Viruses & Bombs, Virus Detection, Prevention & Cure Utilities.

REFERENCES:

1. Taxali, “PC Software, 2005”, Tata McGraw Hills, New Delhi.
2. Suresh K. Basandra,”Computers Today, 2005”, Galgotia Publications.
3. P. K. Sinha , “Computer Fundamentals, 2005”, BPB, New Delhi.
4. Peter Norton, “Inside the PC, 2001”, SAMS Tech Media.
5. Sanjay Saxena, “MS Office for Everyone, 2005”, Vikas Publications.
6. Peter Dyson, “Understanding PC Tools”, AET Publications.
7. Peter Dyson, “Understanding Norton Utilities”, AET Publications.
8. Peter Norton, “Introduction to computers”, TMH
9. V. RajaRaman, ”Introduction to computers”, TMH

Course No: MCA-1E3-DCE
Course Title: Digital Electronics

UNIT I

Introduction- Digital Systems; Data representation and coding. Number Systems and Codes- Positional number system; Binary, octal and hexadecimal number systems; Methods of base conversions; Binary, octal and hexadecimal arithmetic; Representation of signed numbers; Fixed and floating point numbers; Binary coded decimal codes; Gray codes; Error detection and correction codes - parity check codes and Hamming code.

UNIT II

Combinatorial Logic- Definition and specification; Truth table; Basic logic operation and logic gates. Boolean Algebra and Switching Functions- Basic postulates and fundamental theorems of Boolean algebra;Standard representation of logic functions - SOP and POS forms; Simplification of switching functions - K-map and Quine-McCluskey tabular methods; Synthesis of combinational logic circuits.

UNIT III

Sequential Logic - Definition and Basic sequential circuits- latches and flip-flops: SR-latch, D-latch, D flip-flop, JK flip-flop, T flip-flop; Timing hazards and races; timing specifications, asynchronous and synchronous counters, counter design with state equations, Registers , serial in serial out shift registers, tri-state register.

TEXTBOOKS:

1. Morris Mano, "Digital Design" PHI
2. "Digital Electronics", Bignill& Donovan.
3. "Digital Integrated Circuit" A.K.Gautam-Katson Publication.

REFERENCES:

1. Taub and Schilling "Digital Integrated Electronics",TMH
2. Bartee , Thomas C. / "Fundamentals of Digital Computers"/ Tata McGraw-Hill
3. Gopalan, K. "Gopal" / "Introduction To Digital Microelectronic Circuits" / Tata McGraw-Hill
4. Millman, Jocob&Taub, Herbert / "Pulse, Digital & Switching Waveforms" / Tata McGraw-Hill
5. Malvino, A.P. & Leach, Donald P. / "Digital Principles & Applications" / Tata McGraw-Hill
6. Tokheim, H. Roger L. /"Digital Electronics Principles & Application"/ Tata McGraw-Hill / 6th Ed.

Course No: MCA-1E4-DCE
Course Title: Programming Languages and Paradigms

UNIT I

The role of Programming Languages: Towards Higher Level Languages programming paradigms, Language implementation. Language Description: Syntactic Structures, Expression Notations, Abstract Syntax trees, Lexical Syntax. Data Representation: The role of types, basic types, arrays, unions and variant records, Sets, Pointers, Two String tables, types and error checking. Procedure Activations: Introduction to Procedures, parameter passing methods, nested scope in source text, activation records, lexical scope: procedures as in C.

UNIT II

Object oriented Programming: class declarations in C++, dynamic allocation in C++, Information hiding. Functional Programming : Language of expressions , types, values and operations , approaches to expression evaluation, lexical scope, type checking, Function declaration by cases , Functions as first-class values, Implicit types, data types exception handling. Introduction to Prolog, data structures in Prolog, Programming techniques, controls in Prolog, Cuts

UNIT III

An introduction to concurrent Programming: Parallelism in hardware, Streams: implicit synchronization, concurrency as interleaving, Liveliness properties, safe accesses to shared data concurrency in ADA. Language Description: Semantic Methods, Synthesized attributes, Attribute grammars, natural semantics, Denotational Semantics.

REFERENCES:

1. Ravi Sethi,“ Programming Languages ,Concepts and Constructs”, Pearson Education
2. Freidman, Wand ,Haynes, ”Essentials of Programming Languages”, PHI.