101 MCA: INTRODUCTION TO INFORMATION TECHNOLOGY

UNIT 1 - Basic concepts of IT, concepts of Data & Info, data processing, history of computers (generation, type of languages), organization of computers, I/O devices, storage devices, system software, application software, utility packages, numerical based on storage devices. Concept of communication and network technology. Applications of IT.

UNIT 2 - Assembler: Elements of assembly language programming, a simple assembly scheme, pass structure of assembler, design of two pass assemblers, a single pass assemblers. Macros & Macro Processors: Macro definition & Call, Macro expansion Nested macro calls, advanced macro facilities, design of macro processors.

UNIT 3 - Compilers & Interpreters: aspects of compilation, memory allocation, compilation of expression compilation of control structures, code optimization, interpreters. Software Tools: Software tools for program development, editors, debug monitors, programming environment, user interfaces.

UNIT 4 - Linker & Loaders: Relocation & linking concepts, design of linkers, self relocating programs, a linker for MS DOS, linking for overlays, loaders: A two pass loader scheme, Relocating loaders, subroutine linkage, Direct linkage loader, Binders overlays.

UNIT 5 - Sequential file organisation, random file organisation, index structure, indexed file organisation, alternate key indexed sequential files, multi key organisation, multi key access, multi list file organisation, inverted files & their definition, insertion, deletion, operations with optimum utilization of memory, comparison of various type of file organization.

References:

2. J.Donovan“System Programming"THM.
102MCA : MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

UNIT 1-Sets Relations and Functions: Sets, Subsets, Power-Sets, Complement, Union and intersection. Demorgan's law Cardinality, relations: Cartesian Products, relations relational Matrices, properties of relations, equivalence relation Functions: Injection, Surjection, Bijection Composition of Functions, Permutations. Cardinality, the characteristic functions Recursive definitions, finite induction. Lattices & Boolean Algebra.

UNIT 2-Axiomatic definition of Boolean algebra as algebraic structures with two operations. Proposition & Prepositional functions, Logical connections Truth values and Truth Table the algebra of prepositional functions-the algebra of truth values-Applications (switching circuits, Basic Computer Components).

Groups and Fields:

UNIT 3- Groups: Group axioms-permutation groups; Subgroups, Co-sets, Normal Subgroups, Free semi groups; Modular arithmetic grammars, language.

UNIT 4-Fields : Definition; structure; minimal polynomials; irreducible polynomials; primitive Elements, polynomial roots; Applications (Error Correcting Codes Sequence generation).

UNIT 5-Graphs: Finite graphs; incidence and degree, isomorphism, sub graphs and union of graphs; Connectedness; walks paths and circuits Eulerian graphs. Trees properties of trees; pendant vertices in a tree, Center of tree Spanning trees and Cut vertices; Binary tree Matrix representation of a graph, Incidence, Adjacency matrices and their properties. Applications of graphs in Computer Science.

REFERENCES:

3. "Discrete Mathematical Structures for Computer Science" by Bernard Kolman & Robert C. Busby
103MCA: PROGRAMMING AND PROBLEM SOLVING IN 'C' 

UNIT 1: An Overview : Problem identification, analysis, design, coding, testing & debugging, implementation, modification & maintenance; algorithm & flowcharts; Characteristics of a good program-accuracy, simplicity, robustness, portability, minimum resource & time requirement, modularization; Rules/Conventions of coding, documentation, naming variables; Top down design; Bottom up design.

UNIT 2: Fundamentals of C Programming: History of C; Structure of a C program, Data types, Constants & Variables, Operators & expressions; Control structures - if-else, for, while, do-while, Case statement, Arrays; Formatted and unformatted I/O; Type modifiers & storage classes; Ternary operator; Type conversion & type casting; Priority & associativity of operators.

UNIT 3: Modular Programming: functions; Arguments; Return value; Parameter passing - call by value, call by reference; Return statement; Scope visibility and life-time rules for various types of variables, static variable; Calling a function; Recursion - basics, comparison with iteration, tail recursion, when to avoid recursion examples.

UNIT 4: Advanced Programming techniques: Special constructs - break, continue, exit, goto & level; pointers & and * operator, pointer expression, pointer arithmetic, dynamic memory management functions like malloc(), calloc(), free(), string(); pointer v/s array; pointer to pointer, array of pointer and its limitations; function returning pointer, pointer to function, function as parameter; structure-basic, declaration, membership operator, pointer to structure, referential operator, self referential structure, structure within structure, array in structure, array of structure; Union - basic, declaration, enumerated data type; Typedef; command line arguments.

UNIT 5: Miscellaneous Features: File handling and related functions, printf and scanf family C preprocessor basics, include, define, undef. Conditional compilation directive like #if, #else, #elif, #endif, ifndef; and #ifndef; variable argument list functions.

References:
1. The C Programming Language - B.W. Kernighan & D.M. Ritchie
2. The Spirit of C - Cooper, Mullish
3. Kanetkar Y: Let us C
4. Kanetkar Y: Pointers in C
104MCA: COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING

UNIT 1 - Representation of Information: number system, integer and floating point representation, character codes (ASCII, EBCDIC), error detection and correction codes.

UNIT 2 - Basic Building Blocks: Boolean algebra, combinational blocks: gates, multiplexers, decoders etc. Sequential building blocks: flip flops, registers, counters, ALU, Random Access Memory etc.

UNIT 3 - Register Transfer Language and micro operations: concept of bus, data movement among registers, a language to represent conditional data transfer, data movement from/to memory, arithmetic and logical operations along with register transfer, timing in register transfer.

UNIT 4 - Architecture of a simple processor: A simple computer organization and instruction set, instruction format, addressing modes, instruction execution, in terms of micro instructions, concept of interrupt and simple I/O organization, implementation of processor using the building blocks.

UNIT 5 - Assembly Language Programming: detailed study of 8086/8088 assembly language instruction set, loops and comparisons, condition and procedure, arithmetic operator assembly language, illustrations using typical programs like: table search, subroutines, symbolic and numerical manipulations and I/O.

Memory Organization: basic cell of static and dynamic RAM, building large memories using chips, associative memory, cache memory organizations, virtual memory organization.

References:

2. Liu and Gibson, "8086/8088 Microprocessor Assembly Language.
3. Bartee, "Digital computer Fundamentals".
4. Malvino, "Digital computer Electronics".