MCS 101
COMPUTER ARCHITECTURE

Unit I
Representation of Information: Introduction to computer system, computer
generations, number systems (conversions and arithmetic operations), r's and (r-1)'s
complements, integer and floating point representation, overflow and underflow,
character codes (BCD, EBCDIC, ASCII, Gray, 2421 etc.), error detection and correction
codes (hamming code, checksum), Boolean Algebra (definition and axioms), Karnaugh-
map simplification (1-5 variables), logic gates.

Unit II
Combinational Circuits: (half adder, full adder, half subtractor, full subtractor,
encoders, decoders, multiplexers, demultiplexers, adder-subtractor).
Sequential circuits: types of sequential circuits, flip-flops, registers (buffer register,
shift register, controlled shift register, bi-directional shift register), counters (ripple
counter, synchronous counter, ring counter, up and down counter), construction of
combinational and sequential circuits.

Unit III
Memory Organization: Semiconductor Memory (RAM (static and dynamic),
ROM, PROM, EPROM, EEPROM), cache memory organization (associative mapping,
direct mapping, set associative mapping), associative memory, magnetic memory (floppy
disk, magnetic disks and tape), optical memory (CD-ROM, WROM, Erasable Optical
Disk). Virtual memory organization: Address space and memory space. Address mapping
using pages.

Unit IV
Introduction to Microprocessor 8085 and 8086: characteristics of microprocessor,
block diagram and pin diagram of 8085 and 8086, addressing modes and instruction set of
8085 and 8086, comparison of 8085 and 8086, assembly language of 8086 (variable
declaration, array, conditional statement, looping).

Unit V
Interfacing: Input-Output Interface (I/O bus and interface modules, I/O versus
memory bus, Isolated versus memory mapped I/O). Asynchronous data transfer (Strobe
Control, Hand Shaking). Modes of transfer (Programmed I/O, Interrupt Initiated I/O,
DMA (Direct Memory Access), Bit-slice microprocessor.

Text Books:
2. Digital Logic and computer design by M. Morris Mano.

Reference Books:
5. Advanced microprocessors and peripherals by Ray Ahd Bhuruchandi.
MCS 102  DISCRETE MATHEMATICS WITH DATA STRUCTURE

Unit I
Logic: propositions, the conditional and the biconditional statements, conjunctive and disjunctive normal forms and simplification. Sets: Introduction, Operations on sets, finite and infinite sets, countability of sets, mathematical induction and recursion, Principal of inclusion and exclusion.

Unit II
Introduction to data structures: concept of data structures, data structure operations, algorithms, time and space analysis of algorithms, memory representation of arrays. Stacks and Queues: Introduction to stack and operations on stack, stack applications: infix, postfix, prefix, recursion, Tower of Hanoi, Introduction to queues and operations on queues, circular queues, dequeue.

Unit III
Linked List: Introduction to linked list, Representation in memory, Header nodes, doubly linked list, circular linked list. Operations on linked list- traversing, insertion, deletion, searching and concatenation.

Unit IV
Trees: definition & concepts, binary trees, representation of binary tree in memory, traversal of binary tree: inorder, preorder & postorder, binary search tree, heap, general trees, conversion of general trees to binary trees, minimal spanning tree, Kruskal and Prim’s algorithm to find a minimal spanning tree.
Graphs: various definitions, digraphs, multigraphs and weighted graphs, path and circuits. Eulerian path and circuits, Hamiltonian paths and circuits, planner graphs.

Unit V
Searching & Sorting: sequential searching, binary searching, insertion sort, selection sort, quick sort, bubble sort, heap sort, merge sort, radix sort, comparison of sorting methods.
String processing: string storage, string operations, word processing: replacement, insertion, deletion, pattern matching algorithms.

Note:- Implementation of algorithms through C.

Text Books:
1. Data Structure and Program Design by Robert Kruse.
2. Data Structures by Seymour Lipschutz. Schaum Outline Series
3. Discrete Mathematics by K.D.Joshi
Unit I
Operating system: concept, definition, types: on-line system, off-line system, spooling, buffering, multiprogramming, multitasking, multiuser system, multiprocessing, batch processing system, time sharing systems, parallel systems, distributed systems, real time systems. Operating system services: system calls and system program.

Unit II
File concepts-file support, access methods, allocation methods, directory systems, process concept, process scheduling, scheduling concepts, algorithms evaluation techniques, NTFS, HTFS, AFS.

Unit III
Memory Management- monitors, swapping, MFT, MVT, compaction, paging, segmentation, paged segmentation, segmented paging, multilevel paging, Virtual Memory- demand paging, overlays, page replacement algorithms, thrashing, disk & drum scheduling. FCFS, SSTF, SCAN, C-SCAN, Look, C- Look.

Unit IV
Deadlock- problem, prevention, avoidance, detection, recovery, concurrent processes, precedence graph, critical section problem, semaphores & its implementations. introduction to networks and distributed systems, distributed coordination.

Unit V
Architecture of Unix O.S.: introduction to system concept buffer cache, buffer headers, structure of buffer pool, buffer retrieval, reading and writing disk blocks, advantage and disadvantage of buffer cache, i-node, structure of regular files, directories, conversion of path name to an inside, super block i-node assignment to new file, allocation of disk blocks.

Text Books:

1. Operating systems concepts by Silberschatz.
2. The design of the UNIX operating system by Maurice J. Bach.

Reference Book:

1. Operating systems by Andrew S. Tanenbaum.
Unit I
Oops fundamentals: Oops vs. procedural programming. Oops terminology, data abstraction, data-hiding, class, object and methods, inheritance, polymorphism.

Unit II
General C and C++ programs: including files, declaration and definition of variables, basic types, array, structures, conditional operators, operator precedence, and statements: if-else, case and loops. Functions, call by reference, call by value. Introduction to pointers, pointer arithmetic.

Unit III
Implementation of features of Oops in C++ (a): overloaded operator and functions, inline function, friend function, keywords eg. new, type conversions.

Unit IV
Implementation of features of Oops in C++ (b): derived classes, constructor and destructor, overriding, inherited member functions, multiple inheritance, this pointer, virtual functions and polymorphism.

Unit V
File Handling: classes for file stream operations, opening and closing a file, file opening modes, file pointers and their manipulations sequential access, random access, error handling, command line arguments. Exception Handling: basics of exception handling, handling mechanism, throwing mechanism, catching mechanism, rethrowing an exception.

Text Books:
1. ANSI C++ by Balagurswamy.
2. Let us C by Kanetkar.

Reference Books:
1. Object oriented programming in Microsoft C++ by Robert Lafore, Galgotia publication.
2. ANSI C by Balaguruswamy.