MSCS102 COMPUTER ORGANIZATION AND ARCHITECTURE (3-0-0)

Module – I: (10 Hours)
Introduction: Basic architecture of computer, Functional units, Operational concepts, Bus structures,Von Neumann Concept. Basic Processing: Instruction code, Instruction set, Instruction sequencing, Instruction Cycle & Execution Cycle, Instruction format, Addressing modes, Micro instruction, Data path and control path design, Micro programmed vs. Hardwired controlled unit, RISC vs. CISC. Arithmetic: Design of ALU, Number systems, Binary numbers, Sign Magnitude & 2's complement representation. Fixed and Floating point, IEEE-754 Single Precision format, IEEE-754 Double Precision format, Precision and range, BCD code, ASCII, and EBCDIC, Addition and Subtraction of signed number, Multiplication of Positive number, Signed operand multiplication, Division, Floating point number representation and arithmetic, Digital Electronics: Boolean algebra, Digital Logic gates, Truth Tables, K map, Combinational circuits, Flip - Flop

Module – II: (10 Hours)
Pipelining: Basic concepts, Instruction and Arithmetic pipeline, Data hazards, Control hazards and Structural hazards, Techniques for handling hazards, Pipeline optimization techniques, Input-Output devices and characteristics, Input-output mechanism: Memory-mapped I/O, Programmed I/O, Interrupts, Direct Memory Access. Basic Multiprocessor Architecture: Flynn's Classification, UMA, NUMA, Distributed Memory Architecture, Array Processor, Vector Processors.

Module – III: (10 Hours)
Memory: Memory Hierarchy, RAM, ROM, Secondary Storage, Flash drives. Programmable Logic Devices- PLA, PAL, ROM. Sequential RTL components: Registers counters, Inclusion, Coherence and locality properties, Cache memory organizations, Data and Instruction caches, Multi-level caches, Cache memory mapping policies, Cache Coherence, Cache Performance, Techniques for reducing cache misses, Mapping techniques, Virtual memory, Memory Interleaving, Virtual memory organization, Mapping and Management techniques, Memory replacement policies, Memory Management hardware

Module – IV: (10 Hours)
General Register Organization, Stack Organization, Reverse Polish Notation, Machine Language instructions, addressing modes, Instruction types, Instruction set selection, Instruction cycle and execution cycle.8085 Microprocessor and Fundamental of assembly language Programming using 8085 microprocessor, Interconnection Networks: Static Networks, Dynamic Networks, Network Topologies.

Text Books:
1. Mano. M. "Computer System and Architecture" (3rd Ed) (PHI).
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2002.
3. Fundamentals of Computer Organisation by M V L N Raja Rao; Scitech publ.
4. Digital Electronics: Principles and Integrated Circuits Anil K. Maini ,Wiley

Reference Books:
1. David A. Patterson and John L. Hennessy, Computer Organization and Design, Elsevier.
2. Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw- Hill.
3. William Stalling,"Computer Organization and Architecture", Pearson Education
4. A.S. Tananbaum, "Structured Computer Organization", Pearson Education