MCAC104: COMPUTER SYSTEMS ARCHITECTURE [4-1-0]

Course Outcomes:

On completion of this course, the student will be able to:

CO1: describe the basic organization of computer hardware.

CO2: represent and manipulate data – number systems, conversion between different number systems, perform binary arithmetic.

CO3: design simple combinational and sequential logic circuits - flip-flops, counters, shift registers, adders, subtractor, multiplexer, de-multiplexer, and Arithmetic/Logic unit.

CO4: design a CPU simple computer / microprocessor: instruction format, instruction set, addressing modes, bus structure, input/output architecture, memory unit, Arithmetic/Logic and control unit, data, instruction and address flow.

Syllabus:

Unit-I Basic Building Blocks: Boolean logic and Boolean algebra, tri-state logic; flip-flops, counters, shift registers, adders, subtractor, encoders, decoders, multiplexors, de-multiplexors.

Unit-II Register Transfer and Micro Operations: Bus and memory transfers, arithmetic, logic shift micro operations; basic computer organization: common bus system, instruction formats, instruction cycle, interrupt cycle, input/output configuration, CPU organization, register organization, stack organization, micro programmed control unit, RISC architecture; microprocessor architecture, modern computing architectures.

Unit-III Memory Unit: Primary memory, secondary memory, associative memory, sequential access, direct access storage devices.

Unit-IV Input-Output Architecture: Input/Output devices; data transfer schemes - programmed I/O and DMA transfer; data transfer schemes for microprocessors.

Readings:

1. M. Morris Mano, **Computer System Architecture,** Revised 3rd Edition, Pearson, 2018.

2. W. Stallings, **Computer Organization and Architecture: Designing for Performance**, 9th Edition, Pearson Education, 2012.

3. A.S. Tanenbaum**, Structured Computer Organization**, 6th Edition, Prentice-Hall of India, 2012.

4. J.P. Hayes, **Computer System Architecture & Organization**, 3rd Edition, McGraw-Hill Education, 2017.