BCSC1005: COMPUTER ORGANIZATION

Objective: *This course aims to introducing the concept of computer organization. In particular, it focuses on basic hardware architectural issues that affect the nature and performance of software.*

Credits: 04   **Semester III**   **L T P: 3 1 0**

Module No.	Content	Teaching Hours
I	**Introduction:** Basic organization of the computer and Block level description of the functional units, Number representation; 1's and 2's Complement, Integer Representation, Arithmetic Addition & Subtraction with overflow. fixed and floating-point number representation, IEEE standard floating point representation. Introduction to Combinational Circuit- half adder, full adder, binary adder/subtractor, carry look ahead adders. Multiplexer and De-multiplexer, Register, bus and memory transfer, **Central Processing Unit**: Addition and subtraction of signed numbers, Multiplication: Signed operand multiplication, Booths algorithm. Processor organization, general registers organization, stack organization, Three, Two, One & Zero address instruction. Addressing modes, Micro-operations (Arithmetic, Logical & Shift) and its applications.	20
II	**Multiprogramming and Multiprocessing**; Flynn's classification, Introduction to pipelined operation. Instruction types, formats, Instruction cycles. **Control Unit:** Execution of a complete instruction. Hardwired and micro programmed control unit. Unconditional and Conditional branching. Microinstruction with next address field, pre-fetching microinstructions, Concept of horizontal and vertical microprogramming. **Memory:** Basic concept of Memory and its hierarchy, RAM memories, 2D, 2 & 1/2D memory organization. ROM memories. Cache memories: concept and design issues, performance, address mapping and replacement. Virtual memory: concept and implementation. **Input/Output**: Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions. Buses, bus architecture, types of buses and bus arbitration. Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors. Standard communication interfaces.	20

Text Books:
- M. Mano (1996), "Computer System Architecture", 3rd Edition, PHI.

Reference Books:
- D.W. Patterson (2008) , "Computer Organization and Design", 4th**Edition**, Elsevier Publication.
- William Stalling (2011), "Computer Organization",8th Edition, PHI
- V. CarlHamacher, Zaky (1996), "Computer Organization",4th International Edition, TMH.
- John P Hays,"Computer Organization", 2nd Edition, TMH.
- Tannenbaum (2005),"Structured Computer Organization", 5thEdition, PHI.
- P Pal Chaudhry (2002),"Computer Organization & Design", 2ndEdition, PHI.

Outcome: After completion of the course, the student will be able to:
CO1- Understand the basics of digital computer system.
CO2- Demonstrate the principle of arithmetic operations on unsigned, signed integers and floating point numbers.
CO3- Understand the concepts of combinational and sequential circuits and their applications.
CO4- Understand the CPU architecture and organization.
CO5- Explain the basic concepts of pipelining.
CO6- Design the steps for the execution of the complete instruction for hardwired and micro-programmed control unit.
CO7- Explain the function of memory hierarchy.
CO8- Determine the interface of CPU with input/output devices and their modes of transfer.