

PC-CS-307A Computer Organization & Architecture							
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
2	0	0	2	75	25	100	3 Hrs.
<b>Purpose</b>	Student will be able to understand the basic concepts of computer architecture and organization, and understand the key skills of constructing cost-effective computer systems.						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	Be familiar with the internal organization and operations of a computer.						
<b>CO2</b>	Be familiar with the design trade-offs in designing and constructing a computer processor.						
<b>CO3</b>	Be aware with the CPU design including the RISC/CISC architectures.						
<b>CO4</b>	Be acquainted with the basic knowledge of I/O devices and Select the appropriate interfacing standards for I/O devices.						

### Unit- I

**Data representation and Computer arithmetic:** Introduction to Computer Systems, Organization and architecture, Von Neumann Architecture, evolution and computer generations; Fixed point representation of numbers, digital arithmetic algorithms for Addition, Subtraction, Multiplication using Booth's algorithm and Division using restoring and non restoring algorithms. Floating point representation with IEEE standards and its arithmetic operations.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

### Unit-II

**Basic Computer organization and Design:** Instruction codes, stored program organization, computer registers and common bus system, computer instructions, timing and control, instruction cycle: Fetch and Decode, Register reference instructions; Memory reference instructions. Input, output and Interrupt: configuration, instructions, Program interrupt, Interrupt cycle, Micro programmed Control s organization, Control Memory, address sequencing, Micro program Example, micro instruction format, Horizontal Vs Vertical micro-programming, design of control Unit, microprogram sequencer, Hardwired v/s Micro-programmed Control Unit.

### Unit-III

**Central Processing Unit:** General register organization, stack organization, instruction formats (Zero, One, Two and Three Address Instruction), addressing modes, Data transfer and manipulation, Program control. CISC and RISC: features and comparison. Pipeline and vector Processing , Parallel Processing, Flynn's taxonomy, Pipelining, Instruction Pipeline, Basics of vector processing and Array Processors.

### Unit-IV

**Input-output organization:** I/O interface. I/O Bus and interface modules, I/O versus Memory Bus. Asynchronous data transfer: Strobe control, Handshaking, Asynchronous serial transfer. Modes of Transfer: Programmed I/O, Interrupt driven I/O, Priority interrupt; Daisy chaining, Parallel Priority interrupt. Direct memory Access, DMA controller and transfer. Input output Processor , CPU-IOP communication, Serial communication.

### Suggested Books:

- William Stallings, "Computer Organization and Architecture – Designing for Performance", Sixth Edition, Pearson Education, 2003.
- Morris Mano, M., "Computer System Architecture," 3/e, Pearson Education, 2005.
- John P. Hayes, "Computer Architecture and Organization," 3/e, TMH, 1998.
- David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software interface", Third Edition, Elsevier, 2005.
- V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", Second Edition, Pearson Education, 2004.
- Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2002.