II B.Tech I Sem

15ACS07-COMPUTER ORGANIZATION

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Course Objective:

- To gain methodical understanding of the basic structure and operation of a digital computer.
- To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- To make the students understand the structure and behavior of various functional modules of a computer.
- To explore the hardware requirements for cache memory and virtual memory for better understanding of memory management
- To understand the techniques that computers use to communicate with I/O devices
- To study the concepts of pipelining and the way it can speed up processing.
- To understand the basic characteristics of multiprocessors

Course Outcomes:

- Optimize the algorithms to exploit pipelining and multiprocessors
- Algorithm design for bit level arithmetic
- Ability to use memory and I/O devices effectively

UNIT - I :

Introduction to Computer Organization and Architecture

Basic Computer Organization – CPU Organization – Memory Subsystem Organization and Interfacing – I/O Subsystem Organization and Interfacing – A Simple Computer Levels of Programming Languages, Assembly Language Instructions, Instruction Set Architecture Design, A simple Instruction Set Architecture

UNIT – II:

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction formats –Addressing Modes – Data Transfer and Manipulation – Program Control.

Computer Arithmetic: Addition and Subtraction – Multiplication Algorithms – Division Algorithms –Floating-Point Arithmetic Operations – Decimal Arithmetic unit

UNIT – III :

Register Transfer: Register Transfer Language – Register Transfer – Bus and Memory Transfers –Arithmetic Micro operations – Logic Micro operations – Shift Micro operations.

Control Unit: Control Memory – Address Sequencing – Micro program Example – Design of Control Unit

UNIT – IV :

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

Input/output Organization: Input-Output Interface – Asynchronous Data Transfer – Modes of Transfer– Priority Interrupt – Direct Memory Access (DMA).

UNIT – V :

Pipeline: Parallel Processing – Pipelining – Arithmetic Pipeline – Instruction Pipeline.
Multiprocessors: Characteristics of Multiprocessors – Interconnection Structures – Inter Processor Arbitration – Inter Processor Communication and Synchronization

Text Books :
1. "Computer Systems Organization and Architecture", John D. Carpinelli, PEA, 2009.
2. "Computer Systems Architecture", 3/e, M. Moris Mano, PEA, 2007

Reference Books :
1. "Computer Organization", Carl Hamacher, ZvonksVranesic, SafeaZaky, 5/e, MCG, 2002.
2. "Computer Organization and Architecture", 8/e, William Stallings, PEA, 2010.
3. "Computer Systems Architecture a Networking Approach", 2/e, Rob Williams.
4. "Computer Organization and Architecture" Ghoshal, Pearson Education, 2011.
5. "Computer Organization and Architecture", V. Rajaraman, T. Radakrishnan.
6. "Computer Organization and Design", P. Pal Chaudhuri, PHI
7. "Structured Computer Organization", Andrew S. Janenbaum, Todd Austin
8. "Computer Architecture" Parahmi, Oxford University Press