RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, IV-Semester

IT402 - Computer Architecture

Course Objectives

The objective of course is to understand the basic structure and operation of computer system. Students will be able to know the operation of the arithmetic unit including the algorithms & Implementation of fixed-point and floating-point addition, subtraction, multiplication & division.

To study the different ways of communicating with I/O devices and standard I/O interfaces, Hierarchical memory system including cache memories and virtual memory, concept of pipeline.

Unit-I

Computer architecture and organization, computer generations, von Neumann model, CPU organization, CPU organization, Register organization, Various CPU register, Register Transfer, Bus and Memory Transfers, Arithmetic, Logic and Shift micro-operations, Arithmetic logic shift unit.

Unit–II

The arithmetic and logic unit, Fixed-Point representation: integer representation, sign□magnitude, 1's and 2's complement and range, Integer arithmetic: negation, addition and subtraction, multiplication, division, Floating-Point representation, Floating-Point arithmetic,Hardwired micro-programmed control unit, Control memory, Micro-program sequence.

Unit–III

Central Progressing Unit (CPU), Stack Organization, Memory Stack, Reverse Polish Notation. Instruction Formats, Zero, One, Two, Three- Address Instructions, RISC Instructions and CISC Characteristics, Addressing Modes, Modes of Transfer, Priority Interrupt, Daisy Chaining, DMA, Input-Output Processor (IOP).

Unit–IV

Computer memory system, Memory hierarchy, main memory: RAM, ROM chip, auxiliary and associative memory, Cache memory: associative mapping, direct mapping, set-associative mapping, write policy, cache performance, Virtual memory: address space, memory space, address mapping, paging and segmentation, TLB, page fault, effective access time, replacement algorithm.

Unit–V

Parallel Processing, Pipelining General Consideration, Arithmetic Pipeline, and Instruction Pipeline, Vector Operations, Matrix Multiplication, and Memory Interleaving, Multiprocessors, Characteristics of Multiprocessors.

Course Outcomes

At the end of the course student will be able to :

1. Understand basic structure of computer system, arithmetic operations,

2. Understand the arithmetic operations, Study of hardwired and micro-programmed control units.

3. Develop the concepts of memory management, interleaving and mapping.

4. Analyze the arithmetic and instructional pipelines.

Reference Books:-

1. M. Morris Mano, “Computer System Architecture”, Pearson.

2. Dr. M. Usha, T.S. Srikanth, “Computer System Architecture and Organization”,Wiley India.

3. William Stallings, ”Computer Organization and Architecture”, Pearson.

4. V. Rajaraman, T. Radhakrishnan, “Computer Organization and Architecture”, PHI