# 20AD2101 - COMPUTER ORGANIZATION

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| Course Category: | Program Core | Credits: | 3 |
| Course Type: | Theory | Lecture-Tutorial-Practical: | 3-0-0 |
| Prerequisite: | Basic knowledge in identifying components, structure and internals of a computer. | Sessional Evaluation:  Univ. Exam Evaluation:  Total Marks: | 40  60  100 |
| Objectives: | * 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 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. | | |

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| Course Outcomes | Upon successful completion of the course, the students will be able to: | |
| CO1 | Understand computer architecture concepts related to the design of modern processors, memories and I/Os |
| CO2 | Understand the importance and trade-offs of different types of memories. |
| CO3 | Design algorithms to exploit pipelining and multiprocessors |
| CO4 |  |
| CO5 | To understand the structure and behaviour of various functional modules of a computer. |
| CO6 | Identify pipeline hazards and possible solutions to those hazards |
| Course Content | UNIT-I  **Basic Structure of Computer:** Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer.  **Machine Instructions and Programs:** Numbers, Arithmetic Operations and Characters, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines, Additional Instructions.  UNIT-II  **Input/Output Organization:** Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.  UNIT-III  **The Memory System:** Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.  UNIT-IV  **Arithmetic:** Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.  UNIT-V  **Basic Processing Unit:** Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, and Multi programmed Control.  UNIT-VI  **Pipelining**: Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets, Datapath and Control Considerations, Superscalar Operation. | |
| Text Books &  References  Books | **TEXT BOOKS:**   1. “Computer Organization”, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 5th Edition, McGraw Hill Education, 2013.   **REFERENCE BOOKS:**   1. “Computer System Architecture”, M.Morris Mano, 3rd Edition, Pearson Education. 2. “Computer Organization and Architecture”, Themes and Variations, Alan Clements, CENGAGE Learning. 3. “Computer Organization and Architecture”, Smruti Ranjan Sarangi, McGraw Hill Education. 4. “Computer Architecture and Organization”, John P.Hayes, McGraw Hill Education. | |
| E-Resources | 1. <https://nptel.ac.in/courses/106/103/106103068/> 2. <https://freevideolectures.com/university/iitm> | |