# 19CS2101 - 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 about the number systems, gates to design digital circuits. * To optimize circuits using gate level minimization. * To design sequential and combinational logic systems. * To understand the design of control unit, memory unit, I/O and Pipelining | | |

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| **Course Outcomes** | Upon successful completion of the course, the students will be able to: | |
| CO1 | Represent numbers in number systems and to perform primitive Boolean algebraic operations. |
| CO2 | Describe digital circuits and design Combinational circuits. |
| CO3 | Understand the Sequential Digital Systems and RTL concepts. |
| CO4 | Design a Basic Computer and know about different addressing modes. |
| CO5 | Understand the Control Mechanisms and Memory hierarchies. |
| CO6 | Acquire knowledge in I/O Organization and Parallel processing. |
| **Course Content** | UNIT-I  **Digital Systems:** Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers.  **Boolean Algebra And Logic Gates:** Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean functions - canonical and standard forms, Digital logic gates.  UNIT-II  **Gate - Level Minimization:** The map method, Four-variable map, Product of sums simplification, Don’t-care conditions.  **Combinational Logic:** Analysis Procedure, Design Procedure, Binary adder – subtractor, Decimal Adder, Binary Multiplier, Decoder, Encoder, Multiplexer.  UNIT-III  **Synchronous Sequential Logic:** Sequential circuits, latches, Flip-Flops, Analysis of clocked sequential circuits, Registers, Shift Registers, Counters.  UNIT-IV  **Basic Computer Organization and Design**: Review of Basic Structure of Computers, Digital Computers, Review of Data Representation, Instruction Codes, Computer Instructions, Instruction Cycle.  **Central Processing Unit:** Instruction Formats, Addressing Modes, RISC, CISC  UNIT-V  **Micro programmed Control:** Control Memory, Address Sequencing, Design of Control Unit and Hardwired Control.  **Memory System:** Memory Hierarchy, Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Cache Memories-Mapping Functions.  UNIT-VI  **Input-Output Organization:** Peripheral Devices, Input-Output Interface, Direct Memory Access.  **Pipeline Processing:** Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline. | |
| **Text Books and References:** | Text Books:   1. Digital Design –Fourth Edition, M.Morris Mano, Pearson Education/PHI. 2. Computer Systems Architecture – M.Moris Mano, 3rd Edition, Pearson, PHI 3. Computer Organization – Carl Hamacher, Zvonko G. Vranesic, Safwat G. Zaky | |
| Reference Books:   1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill. 2. Switching and Logic Design, C.V.S. Rao, Pearson Education. 3. Digital Principles and Design – Donald D.Givone, Tata McGraw Hill, Edition. 4. Fundamentals of Digital Logic & Micro Computer Design , 5TH Edition, M. Rafiquzzaman John Wiley 5. Computer Organization and Architecture– William Stallings, 7th Edition. 6. Computer Organization and Design– P Paul Chowdary, 2rd Edition. 7. Computer Systems Design and Architecture – Vincent P and Harry F Jordan, 2nd Edition. | |
| **E-Resources** | 1. <https://nptel.ac.in/courses> 2. <https://freevideolectures.com/university/iitm> | |