# 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:** | 4060100 |
| **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, CISCUNIT-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
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| 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.
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| **E-Resources** | 1. <https://nptel.ac.in/courses>
2. <https://freevideolectures.com/university/iitm>
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