

## **23AD21T2 - DIGITAL LOGIC & COMPUTER ORGANIZATION**

(Common to CSE and IT)

<b>Course Category:</b>	Professional Core	<b>Credits:</b>	3
<b>Course Type:</b>	Theory	<b>Lecture-Tutorial-Practical:</b>	3-0-0
<b>Prerequisite:</b>	Basic Mathematics and Fundamentals of Electronics	<b>Sessional Evaluation:</b> <b>Univ. Exam Evaluation:</b> <b>Total Marks:</b>	30 70 100
<b>Objectives:</b>	<ul style="list-style-type: none"><li>• To provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals</li><li>• To describe memory hierarchy concepts</li><li>• To explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices</li></ul>		

<b>Course Outcomes</b>	Upon successful completion of the course, the students will be able to:	
	CO1	Differentiate between combinational and sequential circuits based on their characteristics and functionalities. (L2)
	CO2	Demonstrate an understanding of computer functional units. (L2)
	CO3	Analyze the design and operation of processors, including instruction execution, pipelining, and control unit mechanisms, to comprehend their role in computer systems. (L3)
	CO4	Describe memory hierarchy concepts, including cache memory, virtual memory, and secondary storage, and evaluate their impact on system performance and scalability. (L3)
	CO5	Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices, including interrupts, DMA, and I/O mapping techniques. (L3)
<b>Course Content</b>	<p style="text-align: center;"><b><u>UNIT-I</u></b></p> <p><b>Data Representation:</b> Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes.</p> <p><b>Digital Logic Circuits-I:</b> Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions, K-Map Simplification, Combinational Circuits, Decoders, Multiplexers.</p> <p style="text-align: center;"><b><u>UNIT-II</u></b></p> <p><b>Digital Logic Circuits-II:</b> Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters.</p> <p><b>Basic Structure of Computers:</b> Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von-Neumann Architecture.</p>	

	<p style="text-align: center;"><b><u>UNIT-III</u></b></p> <p><b>Computer Arithmetic:</b> 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.</p> <p><b>Processor Organization:</b> Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control.</p> <p style="text-align: center;"><b><u>UNIT-IV</u></b></p> <p><b>The Memory Organization:</b> Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.</p> <p style="text-align: center;"><b><u>UNIT-V</u></b></p> <p><b>Input /Output Organization:</b> Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.</p>
<b>Text Books &amp; References Books</b>	<p><b>TEXT BOOKS:</b></p> <ol style="list-style-type: none"> <li>1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 6th edition, McGraw Hill, 2023.</li> <li>2. Digital Design, 6thEdition, M. Morris Mano, Pearson Education, 2018.</li> </ol> <p><b>REFERENCE BOOKS:</b></p> <ol style="list-style-type: none"> <li>1. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson, 2022.</li> <li>2. Computer Systems Architecture, M. Moris Mano, 3rd edition, Pearson, 2017.</li> <li>3. Computer Organization and Design, David A. Paterson, John L. Hennessy, Elsevier, 2004.</li> <li>4. Fundamentals of Logic Design, Roth, 5th edition, Thomson, 2003.</li> </ol>
<b>E-Resources</b>	<ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in/courses/106/103/106103068/">https://nptel.ac.in/courses/106/103/106103068/</a></li> </ol>