Program	Bachelor of Technology (B.Tech)	**Semester - 3**
Type of Course	-	
Prerequisite		
Course Objective	-	
Effective From A.Y.	2025-26	

Teaching Scheme (Contact Hours)				Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
Lecture	Tutorial	Lab	Credit	SEE TH	IAT	SEE P	CCE	
3	0	2	4	70	-	50	-	170

***SEE** - Semester End Examination, **IAT** - Internal Assessment Test, **CCE** - Continues & Comprehensive Evaluation*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Fundamentals of Computer Organization:** Basic computer data types(binary, octal, hexadecimal),Complements (1's and 2's complements),Fixed-point representation,Floating-point representation,Register Transfer Language (RTL),Register Transfer operations (bus, memory transfers), Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations,Arithmetic logical shift unit	6	10
2	**Basic Computer Organization and Design:** Instruction codes and computer registers, Types of computer instructions, Timing and control (control signals), Instruction cycle (fetch, decode, execute), Memory-reference instructions, Input-output and interrupt mechanisms, Complete computer description (components like ALU, registers), Design of a basic computer system, Design of Accumulator Unit.	9	20
3	**Instruction Execution and Microprogrammed Control:** Machine and assembly language fundamentals,Assembler structure and operations,Programming logic (loops, conditions, arithmetic, logic operations),Subroutines and I/O programming,Control memory and address sequencing,Microinstructions and microprogramming, Design of control units using microprogramming	9	20
4	**Pipeline And Vector Processing :** Flynn's taxonomy, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction, Pipeline, RISC Pipeline, Vector Processing, Array Processors	6	20
5	**Central Processing Unit (CPU):** Introduction to CPU organization, General register organization, Stack organization and usage, Instruction formats (fixed and variable), Addressing modes (direct, indirect, register, indexed), Data transfer and manipulation (MOV, ADD, SUB, etc.), Program control (branches, jumps, loops), Introduction to RISC (Reduced Instruction Set Computer) architecture and CISC(Complex Instruction Set Computer. Difference between RISC and CISC.	9	20
6	**Computer Arithmetic, Memory, and Input-Output Organization:**	6	10

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
	Introduction to computer arithmetic, Addition and subtraction techniques, Multiplication algorithms (Booth's multiplication), Memory Hierarchy (Main memory, auxiliary memory, cache memory, virtual memory), Input-output interface, Asynchronous data transfer, Priority interrupt, DMA (Direct Memory Access), I/O processor (IOP), CPU-I/O communication, Serial communication.		
		Total	**45**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	40	40	20	0	0	0

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

At the end of this course, students will be able to:	
CO1	Understand the components, data types, and register-transfer operations in computer systems.
CO2	Design the control and datapath structure of a basic computer system.
CO3	Implement assembly-level programs and microprogrammed control units.
CO4	Explain pipelining techniques and vector processing in parallel architectures.
CO5	Analyze CPU architecture, instruction formats, addressing modes, and modern RISC processors.
CO6	Explore computer arithmetic, memory hierarchy, and I/O systems, including DMA and interrupt handling.

CO PO Mapping

CO	CO - 1	CO - 2	CO - 3	CO - 4	CO - 5	CO - 6
PO - 1						
PO - 2						
PO - 3						
PO - 4						
PO - 5						
PO - 6						
PO - 7						
PO - 8						
PO - 9						
PO - 10						
PO - 11						

CO PSO Mapping

CO	CO - 1	CO - 2	CO - 3	CO - 4	CO - 5	CO - 6
PSO - 1	-	-	-	-	-	-
PSO - 2	-	-	-	-	-	-
PSO - 3	-	-	-	-	-	-

Reference Books

1.	J. P. Hayes, Computer Architecture and Organization, McGraw Hill Education (TextBook)
2.	Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", 5/E, McGraw-Hill, 2002 (TextBook)
3.	John L. Hannessy, David A. Patterson, "Computer organization and Design", 3/E, Morgan Kaufmaan, reprint -2003
4.	Andrew S. Tanenbaum, "Structured Computer Organization", 6/E, PHI EEE, reprint 1995
5.	Morris Mano, "Computer Systems Architecture", 3/E, PHI, reprint 1997
6.	William Stallings, "Computer Organization & Architecture: Designing For Performance", 6/E, PHI, 2002

List of Practical

1.	To study and implement the fundamental data concepts in computer organization including binary number systems, 1’s and 2’s complements, fixed-point and floating-point data representations
2.	To understand and perform register transfer operations and micro-operations including arithmetic, logic, and shift operations using Register Transfer Language (RTL).
3.	A study practical on understanding instruction codes, computer registers, types of instructions, and the instruction cycle including fetch, decode, and execute phases
4.	To write an assembly language code to implement addition operation.
5.	To write an assembly language code to implement subtraction operation.
6.	To write an assembly language code to implement logical instructions.
7.	To write an assembly language program to implement program loops.
8.	To write an assembly language program to implement flow control (IF-ELSE) structures to control the execution of code based on conditions.
9.	To write an assembly language code to implement subroutine call.
10.	Case studies and examples illustrating the differences between RISC and CISC instruction sets.