CE258: Microprocessor and Computer Organization

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	2	0	6	**5**
Marks	100	50	0	100	

Pre-requisite courses:

Digital Electronics

Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	Introduction to digital logic Circuit	03
2	Register Transfer and Microoperations	09
3	Basic Computer Organization and Design	08
4	**Central Processing Unit**	05
5	Pipeline and Vector Processing	05
6	Computer Arithmetic	06
7	Memory Organization	06
8	8086,80186, 80286 Processor	06
9	80386 Processors	10
10	Current Era of Microprocessors	02
	Total hours (Theory).	60
	Practical Hours:	20
	Total hours:	80

Detailed Syllabus:

1.	**Introduction to digital logic Circuit**	**03 Hours**	**07%**
	Digital Computers, Logic Gates, Combinational Circuits (Half adder, Full Adder), Flip-Flops(SR, D, JK, T, Edge-Triggered)		
2.	**Register Transfer and Microoperations**	**09 Hours**	**18%**
	Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperation, Logic Microoperations, Shift Microoperation, Arithmetic Logic Shift Unit.		
3.	**Basic Computer Organization and Design**	**08 Hours**	**18%**
	Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference ,		

	Instructions, Input-Output and Interrupt, Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic.		
4.	**Central Processing Unit**	**05 Hours**	**17%**
	Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes.		
5.	**Pipeline and Vector Processing**	**05 Hours**	**09%**
	Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.		
6.	**Computer Arithmetic**	**06 Hours**	**18%**
	Introduction: Binary, Octal, Decimal, Hexadecimal representation, Integer Numbers: Sign-Magnitude,1's complement,2's complement, Addition and Subtraction, Multiplication Algorithm.		
7.	**Memory Organization**	**06 Hours**	**13%**
	Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.		
8.	**8086, 80186, 80286 Processor**	**06 Hours**	**13%**
	Architectural differences of 8086, 80186 and 80286 Processors.		
9.	**80386 Processors**	**10 Hours**	**29%**
	System Architecture, Registers, Memory management: Segment Translation, Page Translation, Combining Segment and Page Translation.		
10.	**Current Era of Microprocessors**	**02 Hours**	**4%**
	Comparison of AMD and Intel Architecture, Features of current era of AMD and Intel processors; Tick-Tock: manufacturing pattern of Intel.		

Course Outcome (COs):

At the end of the course, the students will be able to

CO1	Recognize elements of digital logic circuit. Moving from design of single bit function to multibit function. (Flip flop, Logic Gates, Combinational Circuit). Design circuit for fixed function arithmetic function. Understand the notation of writing register transfer language.
CO2	Design and examine the different Arithmetic, Logic and Shift circuit & Design control unit of Arithmetic, Logic and Shift Circuit.

CO3	Conceptualize and evaluate various parallelism employed in microprocessor.
CO4	Demonstrate and evaluate computer arithmetic operations on integer and real numbers using hardwired algorithm.
CO5	Understand and differentiate n-way set associative memory.
CO6	Understand segment and page translation currently employed in microprocessor. Understand basics of architecture of current era of microprocessors.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	1	1	-	-	1	2	-
CO3	3	3	3	1	-	-	-	1	1	-	-	-	2	-
CO4	2	2	3	-	-	-	-	1	1	-	-	-	2	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	2	-
CO6	3	3	3	3	-	-	-	-	-	-	-	-	3	-

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

Recommended Study Material:

- **Text book:**
  1. Computer System Architecture, Morris Mano (3rd Edition) Prentice Hall.
  2. 80386 Programmer's Reference Manual from MIT.
  3. Microprocessors and Interfacing: Experiments Manual: Programming and Hardware by Douglas V. Hall.
- **Reference book:**
  1. William Stalling, Computer Organization & Architecture-Designing for Performance, Pearson Prentice Hall (8th Edition).
  2. A.S. Tananbum, Structured Computer Organization, Pearson Publisher.
  3. The Essentials of Computer Organization and Architecture Linda Null, Julia Lobur.
  4. John P Hayes, Computer Architecture & Organization, McGraw-Hill.

5. Computer Architecture: Pipelined and Parallel Processor Design Michael J. Flynn (4th edition).

❖ **Web Materials:**

1. www.nptel.iitm.ac.in
2. https://css.csail.mit.edu/6.858/2014/readings/i386.pdf (80386 Programmer Reference Material)

❖ **Simulators:**

1. 8085 &8086 Simulator.