25ECMJ207: Microprocessor and Interfacing

w. e. f. Academic Year:	**2026-27**
Semester:	**3**
Category of the Course:	**Program Core Course** (PCC).
Prerequisite:	Basic knowledge of digital electronics, logic gates, number systems (binary, hexadecimal), and fundamentals of computer organization and architecture.
Rationale:	This course provides a strong foundation in microprocessor architecture, programming, and interfacing techniques. It enables students to understand the internal operation of microprocessors like 8085 and 8086 and develop skills to design and interface peripheral devices. The course bridges theoretical concepts with practical applications such as real-time control systems and automation, preparing students for embedded systems and hardware design domains.

Course Outcomes:

After Completion of the Course, Student will able to:

	Course Outcome (CO)	**RBT Level (Cognitive Domain)**	**Marks % Weightage (Approx.)**
CO1	Explain the basic concepts, architecture, and working of microprocessors and memory interfacing.	Understand (L2)	15%
CO2	Describe the architecture, pin configuration, timing diagrams, and interrupt structure of 8085 microprocessor.	Understand (L2)	25%
CO3	Apply instruction set knowledge to develop programs using various programming techniques in 8085.	Apply (L3)	15%
CO4	Analyze interfacing techniques and design systems using peripheral devices with 8085.	Analyze(L4)	25%
CO5	Explain advanced microprocessor architectures (8086 family) and their applications in real-world systems.	Understand (L2)	20%

Teaching and Evaluation Scheme:

Teaching Scheme					**Examination Scheme**				
L	**T**	**P**	**C**	**Hrs/Week**	**IE**	**Theory**	**CIA**	**Practical**	**Total Marks**
2	0	4	4	6	40	60	30	20	150

IE: Internal Evaluation
CIA: Continuous Internal Assessment
Theory: Theory Exam (End Semester)
Practical: Practical Exam (End Semester)

Detailed Syllabus:

Topic		Hrs.	% of Weightage (Approx.)
UNIT: 1	**Fundamentals of Microprocessors and System Architecture:**	**05**	**15%**
Introduction to microprocessor, functional components of microprocessor, evolution of microprocessors, microprocessor systems with bus organization, microprocessor architecture and operations, instruction word size, types of memory, memory interfacing (RAM, ROM, EPROM) with 8085.			
UNIT: 2	**8085 Microprocessor Architecture and Operation:**	**08**	**25%**
Features of 8085 microprocessor, programming model of 8085, flag register, pin functions, demultiplexing of buses, generation of control signals, addressing modes, instruction cycle, machine cycles, T-states, timing diagram, interrupts in 8085.			
UNIT: 3	**8085 Instruction Set and Programming Techniques.**	**05**	**15%**
8085 instruction set: data transfer (copy) operations, arithmetic operations, logic operations, branch operations. Programming techniques: looping, counting and indexing, additional data transfer and 16-bit arithmetic instructions, arithmetic operations related to memory, logic operations (rotate), counters and time delays, stack and subroutines, conditional call and return instructions.			
UNIT: 4	**Interfacing and Applications of 8085**	**06**	**25%**
Interfacing concepts, ports, interfacing of I/O devices, interfacing of data converters (D/A and A/D), programmable interfacing devices: 8255A PPI, 8253/8254 timer, 8259A PIC, 8237 DMA controller, 8251A USART, LED interfacing and blinking program, traffic light control using 8085, time delay generation for real-time control.			
UNIT: 5	**Advanced Microprocessors and Applications:**	**06**	**20%**
Intel 8086 microprocessor architecture, addressing modes of 8086, 8086 pin configuration and function of each pin, introduction and advanced features of 8088, 80186, 80286, 80386, 80486, case study: use of microprocessors in automation systems.			
		30	**100%**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks in Percentage					
Remember	Understand	Apply	Analyse	Evaluate	Create
-	60	15	25	-	-

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

TEXT/REFERENCE BOOKS:

TEXT BOOKS:

1. Ramesh S. Gaonkar, Microprocessor Architecture, Programming and Applications with 8085, Wiley India.
2. A. P. Godse and D. A. Godse, Microprocessors and Interfacing, Technical Publications.
3. B. Ram, Fundamentals of Microprocessors and Microcontrollers, Dhanpat Rai.

REFERENCE BOOKS:

1. Douglas V. Hall, Microprocessors and Interfacing, McGraw-Hill.
2. Kenneth J. Ayala, The 8086 Microprocessor, Penram.

List of Practical:

Topic	Hrs
1. Study of 8085 Microprocessor Architecture and Pin Configuration	04
2. Write a Program to Add and Subtract Two 8-bit or 16 bit Numbers Using 8085.	04
3. Write a Program to Multiply Two 8-bit Numbers Using Repeated Addition.	04
4. Write a Program to Divide Two 8-bit Numbers Using Repeated Subtraction	04
5. Write a Program to Find the Largest of Two Numbers.	04
6. Write a Program to Find the Smallest of Two Numbers.	04
7. Write a Program to Transfer a Block of Data (Block Transfer).	04
8. Write a Program to Find the Sum of N Numbers.	04
9. Write a Program to Sort Numbers in Ascending Order.	04
10. Write a Program to Sort Numbers in Descending Order.	04
11. Write a Program to Count Number of 1s in a Byte.	04
12. Write a Program to Generate Time Delay Using Loop	04
13. Write a Program to Check Whether a Number is Even or Odd	04
14. Write a Program to Swap Two Numbers.	04
15. Write a Program to Interface 8255 with 8085 microprocessor.	04
TOTAL	**60**

Teaching Learning Method

- **Chalk & Talk with ICT Support**

→ used to explain core concepts like 8085/8086 architecture, instruction cycle, timing diagrams, and addressing modes using board work, presentations, and animations.

- **Demonstration-Based Learning (Hardware/Simulation)**

→ used to demonstrate microprocessor operations, pin functions, memory interfacing, and peripheral devices using trainer kits and simulation tools.

- **Hands-on Laboratory Practice**

→ used to develop programming and interfacing skills through experiments like assembly language coding, LED interfacing, delay generation, and peripheral control.

- **Problem-Based Learning (Programming Approach)**

→ used to solve real-world problems such as looping, counting, traffic light control, and arithmetic/logical program development.

• **Mini Projects / Application-Based Learning**
→ used to design simple systems like sensor interfacing, stepper motor control, and data acquisition systems for real-world applications.

Course Outcomes Mapping:

CO No.	Course Outcome (CO)	Pos/ PSOs Mapped	Cognitive Level (RBT)	Knowledge Category	Class Sessions (Lecture)
CO1	Explain the basic concepts, architecture, and working of microprocessors and memory interfacing.	PO1, PO2, PO5, PO11, PSO1	Understand (L2)	Conceptual	05
CO2	Describe the architecture, pin configuration, timing diagrams, and interrupt structure of 8085 microprocessor.	PO1, PO2, PO5, PO11, PSO1	Understand (L2)	Procedural	08
CO3	Apply instruction set knowledge to develop programs using various programming techniques in 8085.	PO1, PO2, PO3, PO5, PO8, PO11, PSO1, PSO2	Apply (L3)	Procedural	05
CO4	Analyze interfacing techniques and design systems using peripheral devices with 8085.	PO1, PO2, PO3, PO4, PO5, PO6, PO8, PO9, PO11,PSO1, PSO2	Analyze(L4)	Conceptual	06
CO5	Explain advanced microprocessor architectures (8086 family) and their applications in real-world systems.	PO1, PO2, PO5, PO11, PSO1, PSO2	Understand (L2)	Procedural	06

Mapping of Cos with Pos& PSOs:

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	0	0	3	0	0	0	0	0	3	0	3	0
CO2	3	3	0	0	3	0	0	0	0	0	3	0	3	0
CO3	3	3	2	0	3	0	0	2	0	0	3	0	3	3
CO4	3	3	2	1	3	1	0	2	1	0	3	0	3	3
CO5	3	3	0	0	3	0	0	0	0	0	3	0	3	3

3: High, 2: Medium, 1: Low

Sustainable Development Goals (SDG) Integration:
The course supports SDG 4 (Quality Education) by strengthening conceptual and practical knowledge of microprocessor systems and embedded programming. It also aligns **with** SDG 9 (Industry, Innovation and Infrastructure) by developing skills in microprocessor-based system design, interfacing, and automation applications. Additionally, it contributes to SDG 8 (Decent Work and Economic Growth) by enhancing employability through industry-relevant hardware and programming competencies.

SDG Mapping with Course Outcomes

CO	Course Outcome	Relevant SDGs	Justification
CO1	Explain the basic concepts, architecture, and working of microprocessors and memory interfacing.	SDG 4, SDG 9	Builds foundational technical knowledge and quality education (SDG 4) while supporting understanding of modern computing systems that drive industry and innovation (SDG 9).
CO2	Describe the architecture, pin configuration, timing diagrams, and interrupt structure of 8085 microprocessor.	SDG 4, SDG 9	Enhances technical literacy in microprocessor systems, strengthening engineering education and supporting development of reliable digital infrastructure.
CO3	Apply instruction set knowledge to develop programs using various programming techniques in 8085.	SDG 4, SDG 8, SDG 9	Promotes skill development and employability (SDG 8), strengthens programming competence, and supports innovation in automation and computing systems (SDG 9).
CO4	Analyze interfacing techniques and design systems using peripheral devices with 8085.	SDG 9, SDG 12	Encourages innovation in embedded systems and efficient electronic system design, promoting responsible use of electronic resources and sustainable system development.
CO5	Explain advanced microprocessor architectures (8086 family) and their applications in real-world systems.	SDG 9, SDG 4, SDG 8	Supports advanced technological education, industrial readiness, and understanding of real-world applications in automation, computing, and embedded industries.