

Branch Name:	Electrical Engineering
Program Code:	ET109
Course Name:	Microprocessor and Interfacing
Course Code:	1ET1090405
Pre-requisite Course:	Digital Electronics and Analog Electronics

Course Objectives:

1. To expose the architecture and instruction set of typical 8-bit microprocessor to the students.
2. To deals with Assembly Language Programming using a macro-assembler.
3. To learn and discuss the Input-output techniques and important programmable support chips used in microprocessor-based systems.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)								
Lecture	Tutorial	Practical	Credit	Theory				Practical				Total
				University Assessment		Continuous Assessment		University Assessment		Continuous Assessment		
				Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	-	2	4	28	70	12	30	12	30	08	20	150

Course Contents:

Sr. No.	Topic	Total Hours	Weightage (%)
1	Introduction of Microcomputer System: CPU, I/O devices, clock, memory, bussed architecture, tristate logic, address bus, data bus and control bus Digital Computer, Microprocessor, Microcomputer, Microcontroller, Van- Neumann and Harvard Architecture, CISC and RISC Processor.	02	05
2	Review of Logic Devices and Memories: Latches, Flip flops, Buffers, Controller buffer registers, Decoders Memory Cell, Internal organization of Memory Chips, Types of Memories, RAM, SRAM, DRAM, ROM, PROM, EPROM, EEPROM, Flash memory.	04	10
3	Basics of Microprocessor based Systems and Architecture of 8-bit Microprocessor: Intel 8085A microprocessor, Pin description and internal architecture.	03	07
4	Operation and Control of Microprocessor: Timing and control unit, multiplexing of address/data bus, Generation of control signals, Op Code fetch machine cycle, Memory Read/Write machine cycles, I/O Read/Write machine cycles, interrupt acknowledge machine cycle, state transition diagram.	05	12
5	Instruction Set: Addressing modes; Data transfer, arithmetic, logical, branch, stack and machine control groups of instruction set, macro RTL and micro RTL flow	08	19

	chart of few typical instructions; Unspecified flags and instructions. Example Programs.		
6	Assembly Language Programming: Assembler directives, simple examples; Subroutines, parameter passing to subroutines.	04	09
7	Interfacing: Interfacing of memory chips, address allocation technique and decoding; Interfacing of I/O devices, LEDs and toggle-switches as examples, Interfacing of Data Converters (D-To-A and A-To-D), Programmable Interfacing Devices Like 8279 Keyboard/Display Interface, 8255A PPI, 8253/8254 Timer, 8259A PIT, Serial I/O Concepts, SID and SOD, 8251A USART. Interfacing of above chips with 8085, Programming them in Different Modes, Practical Applications.	10	24
8	Interrupts: Interrupt structure of 8085A microprocessor, processing of vectored and non-vectored interrupts, latency time and response time; Handling multiple interrupts.	06	14

Text Books:

1. Hall D.V., "Microprocessor and Interfacing-Programming and Hardware", 2nd Ed., Tata McGraw-Hill Publishing Company Limited, 2008.
2. Gaonkar R.S., "Microprocessor Architecture, Programming and Applications", 5th Ed., Penram International, 2007.
3. Stewart J, "Microprocessor Systems- Hardware, Software and Programming", Prentice Hall International Edition, 1990.

Reference Books:

1. Short K. L., "Microprocessors and Programmed Logic", 2nd Ed., Pearson Education, 2008.
2. Fundamentals of Microprocessor and Microcomputers by B. RAM – 4th Edition – Dhanpat Rai Publications.

List of Experiments:

1. To study about 8085 Microprocessor using Dyna - 8085 kit.
2. Experiments based on Data Transfer Operations.
3. 8-bit addition - subtraction, multiplication, division.
4. 16-bit addition - subtraction, multiplication, division.
5. Find largest and smallest number from an array.
6. Arrange data bytes in ascending / descending order.
7. sum of positive number from an array and store the result at some memory location.
8. Experiments based on Data Conversion (Hex to Binary, Hex to BCD, ASCII to Decimal, etc.).
9. Generation of Square waveform at different frequencies.
10. Experiments based on Interfacing LEDs and Toggle Switches.
11. Experiments based on Interrupts.

List of Open Source Software/learning website:

- GNU 8085 simulator
- NPTEL (www.nptel.ac.in)
- www.infineon.com
- www.silabs.com

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Apply the concept of buses, microprocessor architecture and interrupts.	3 Applying
CLO2	Understand the interface memory and I/O devices with 8 bit microprocessor.	2 Understanding 4 Analyze
CLO3	Program the assembly language programming.	6 Creating
CLO4	Design microprocessor based small system.	6 Creating 4 Analyze
CLO5	Understand the generation of Square waveform at different frequencies.	2 Understanding
CLO6	Identify, formulate and solve largest and smallest number from an array.	4 Analyze 5 Evaluate

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1						L		H		M					M	L
CLO2	L			H				L					L	M		M
CLO3			M			L				M					L	
CLO4				L		H		M		M				M		L
CLO5					M			L				M	M			
CLO6	H				L	M		M		M			L		M	L

H: High, M: Medium, L: Low