GUJARAT TECHNOLOGICAL UNIVERSITY

ELECTRONICS (10), ELECTRONICS & COMMUNICATION (11), ELECTRONICS & TELECOMMUNICATION ENGINEERING (12)
MICROPROCESSOR AND INTERFACING
SUBJECT CODE: 2141001
B.E. 4th SEMESTER

Type of Course: Micro Processor Architecture and Programming

Prerequisite: Students should have in depth knowledge of Digital Logic Design as well as logical ability and programming skills to develop the code

Rationale: Microprocessors are being excessively used in the field of automation in every field, so the knowledge of microprocessor is very essential for a student of BE in Electronics and Communication engineering. The students are studying the subject are supposed to learn the architecture and programming of a typical microprocessor. Students also understand the peripheral devices and interfacing it with microprocessor to design a digital system. The course will cover 8085, 8-bit Microprocessor in detail with sufficient exposure to design a digital system. The course will also deal with the architecture of 8086 and introduction to advance microprocessor.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	0	2	5	70	20	10	20	10	20	150

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	**Introduction To 8-bit Microprocessor :** History of Microprocessor, 8085 Microprocessor architecture, buses, register, flags. 8085 pin configuration & function of each pin. Fetch, Decode and execute operations. Op-code Fetch, execute cycle, T state, Machine cycle. Memory and I/O read and write cycles WAIT state, interrupt timing diagram.	7	20
2	**Intel 8085 Microprocessor Instruction Set and Programming:** Addressing modes of 8085. Data transfer, Arithmetic, Logical, Rotate, Branch and machine control instructions. Development of 8085 assembly language programs, time delays. Concept of stack and Instruction related to stack. 8085 interrupts, RST, RIM, SIM instructions. Subroutines and conditional call instruction	15	30
3	**Interfacing of Memory Chips & Input / Output Chips :** Memory mapped I/o and I/O mapped I/O. Address decoding, interfacing of memory chips with 8085. Interfacing of input/output chips with 8085	5	15
4	**Peripherals IC and Applications :** Block diagram, Pin description and Interfacing of 8255(PPI) with 8085 Microprocessor. Interfacing of keyboard, display, ADC and DAC to 8255. Block diagram, Pin description and Interfacing of 8253(PIT) with 8085 Microprocessor. Brief description and application of 8259	10	20

	PIC, 8251 USART and 8237 DMA Controller			
5	**Introduction advance Microprocessor :** Intel 8086 Microprocessor architecture, Addressing Modes, 8086 pin configuration & function of each pin. Introduction and advance features of 8088, 80186, 80286, 80386 and 80486microprocessor	**8**	**15**	

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
10	15	15	15	15

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's Taxonomy)

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.

Reference Books:

1. Microprocessor 8085 and its Interfacing, By Sunil Mathur, Second Edition, PHI Learning Pvt. Ltd.
2. Microprocessor Architecture, Programming, and Applications with the 8085 –Ramesh S. Gaonkar Pub: Penram International.
3. 8085 Microprocessor And its Applications, By A. Nagoor Kani, Third Edition,TMH Education Pvt. Ltd.

Course Outcomes:
After successful completion of the course students should be able to:

1. Understand the architecture of 8085 8-bit Microprocessor.
2. Describe the importance and function of each pin 8085 Microprocessor.
3. Write, Debug and Simulate assembly language program.
4. Interface Memory, Input/output with 8085 Microprocessor.
5. Summarize the functionality of various peripheral chips.
6. Describe the architecture of 8086 16-bit Microprocessor.
7. List the difference between 8-bit, 16-bit and advance Microprocessor

List of Experiments:

- Familiarization with 8085 simulator and trainer kit.
- Verification of assembly language programs using the simulator and trainer kit.
- Development of interfacing circuits for various applications based on 8085.

Minimum of 25 programs to be written making effective use of all the instructions. Among these at least 6 programs must be subroutine programs, 4 to 5 programs based on peripheral ICs.

Design based Problems (DP)/Open Ended Problem:
1. Assembly programs include the concept of Arrays and the concept of Multiplication/Division.
2. Design an 8085 microprocessor based system with 4 KB RAM having a word length of 8-bits with the starting address of 0000H and two 1KB EPROMs having word lengths of 4-bits each with starting address of 8000H.
3. Interface one 4K x 8 RAM and two 8K x 8 ROM with 8085 such that the starting address assigned to each memory chip is 6000H, 8000H and C000H

respectively using a 3 x 8 decoder IC.

4. Design an 8085 microprocessor based system with input device connected at I/O mapped address A0h. Three LEDs (common cathode): LED-1(Green) at D0 bit, LED-2 (Yellow) at D3 bit and LED-3 (Red) at D6 bit of the output device connected at I/O mapped address C0h. Write an assembly program to take data from input device,

                Glow LED-1 ; if data <=50H
                       LED-2 ; if 50H >data<=A0H
                       LED-3 ; if data>A0H.

   Take data from input device at every 10 mS time.

5. Design a digital system to display token number on a seven-segment displays (common anode) of Port-A and switch connected to Port-C of 8255 PPI. Display 1,2,3……9,0 and repeat as switch is pressed.

6. Interface stepper motor with 8085 microprocessor using 8255, rotate it counterclockwise.

7. Design a digital system to monitor room temperature using ADC connected with 8255.

8. Design a digital clock using 6 seven-segment displays (common cathode) using 8255 PPI and 8253 PIT (to generate time delay).

Major Equipments:

1. 8085 microprocessor trainer kit with peripheral devices.
2. Computer system.
3. CRO, Power supply

List of Open Source Software/learning website:

1. 8085 simulator.
2. nptel.ac.in
3. wikipedia.org/wiki.intel_8085

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.