GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering
Level: UG
Subject Code: BE05000551
Subject Name: Microprocessor and Interfacing

w. e. f. Academic Year:	2024-25
Semester:	5
Category of the Course:	Professional Core Course

Prerequisite:	Fundamentals of Digital Logic Design and Computer Organization
Rationale:	The modern digital systems including computer systems are designed with microprocessor as central device connected to memory and I/O devices. The subject introduces the students with basics of microprocessor, microprocessor architecture and programming, interfacing microprocessor with memory and various I/O (Input/Output) devices

Course Outcomes:

Sr. No.	CO statement	Marks% weightage
CO-1	Demonstrate the various features of microprocessor, memory and I/O devices including concepts of system bus.	15
CO-2	Identify the hardware elements of 8085 microprocessor including architecture and pin functions and programming model including registers, instruction set and addressing modes.	25
CO-3	Select appropriate 8085 instructions based on size and functions to write a given assembly language program.	25
CO-4	Design a given interfacing system using concepts of memory and I/O interfacing.	20
CO-5	Demonstrate the features of advance microprocessors	15

Teaching and Examination Scheme:

Teaching / Learning Scheme (in Hours per semester)					Total Credits	Assessment Pattern and Marks					Total Marks
						Theory		Tutorial / Practical			
L	T	P	PBL	Total no of hours per semester		ESE (E)	PA / CA (M)	PA/CA (I)	PBL (I)	ESE (V)	
45	0	30	15	90	3	70	30	20	30	50	200

**** Problem-Based Learning (PBL) aims to accommodate learning beyond syllabus as per clause 9.4 of NBA manual.***

Content:

Sr. No.	Content	Total Hrs
1	Introduction to Microprocessor, Components of a Microprocessor: Registers, ALU and control & timing, System bus (data, address and control bus), Microprocessor systems with bus organization	5
2	Microprocessor Architecture and Operations, Memory, I/O devices, Memory and I/O operations	4
3	8085 Microprocessor Architecture, Address, Data and Control Buses, 8085 Pin Functions, Demultiplexing of Buses, Generation of Control Signals, Instruction Cycle, Machine Cycles, T-States, Memory Interfacing	6
4	Assembly Language Programming Basics, Classification of Instructions, Addressing Modes, 8085 Instruction Set, Instruction and Data Formats, Writing, Assembling & Executing A Program, Debugging the Programs	6
5	Writing 8085 assembly language programs with decision, making and looping using data transfer, arithmetic, logical and branch instructions	6
6	Stack & Subroutines, Developing Counters and Time Delay Routines, Code Conversion, BCD Arithmetic and 16-Bit Data operations	6
7	Interfacing Concepts, Ports, Interfacing Of I/O Devices, Interrupts In 8085, Programmable Interrupt Controller 8259A, Programmable Peripheral Interface 8255A	6
8	Advanced Microprocessors: 8086 logical block diagram, segmentation, Pin functions, Minimum and maximum mode, 80286/80386: Overview and architecture, Programming model, Data types and instruction set, segments and its types, segment descriptor, descriptor table and selector	6
	TOTAL	**45**

Suggested Specification table with Marks (Theory): (For B.E. only)

Distribution of Theory Marks in %					
R Level	U Level	A Level	N Level	E Level	C Level
30	**20**	**25**	**25**	**00**	**00**

R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create 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.

The syllabus of *Microprocessor and Interfacing* directly contributes to,

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Reference Books:

1. Microprocessor Architecture, Programming, and Applications with the 8085, Ramesh S. Gaonkar Pub: Penram International.
2. 8086 Programming and Advance Processor Architecture, Savaliya M. T., Wiley India
3. The 8088 and 8086 Microprocessors, Triebel & Singh, Pearson Education
4. Microprocessors and Interfacing, N. Senthil Kumar, M. Saravanan, S. Jeevanathan, S. K. Shah, Oxford
5. Advanced Microprocessors, Daniel Tabak, McGrawHill
6. Microprocessor & Interfacing - Douglas Hall, TMH

List of Experiments:
Practical list should be prepared based on the content of the subject and following guidelines should be useful
- 8085 assembly language programmes covering all the instructions.
- Interfacing practical using I/O instructions

Design based Problems (DP)/Open Ended Problem:
1. Develop an 8085 Assembly language program to implement the Booth's algorithm to multiply two 8-bit numbers.
2. Develop an 8085 Assembly language program to implement division of two 8-bit numbers.
3. Design a program for Digital Clock with format HH:MM:SS (Address and data field) using inbuild routines of monitor program of your system.
4. Compare the microprocessor and microcontrollers from hardware and software point of view.
5. Prepare a detail report on evaluating overall performance of a microprocessor chip.

Major Equipment:
- 8085 based microprocessor kit
- Modern desktop PC with open source 8085 Simulator

List of learning website:
1. Open-source simulator for 8085 processor
2. www.nptel.ac.in
3. www.intel.com
4. www.cpu-world.com

List of suggested activities for Problem-based Learning (PBL):

Sl. No	PBL category	Name of the activity	No. of hours	Evaluation Criteria
1	Case Study Analysis / Seminar	Seminar / Presentation	Duration for study and preparation=10h Report writing=3h Presentation=2h	Topic can be selected technical content beyond syllabus

			Total=15h	
2	Assignment / Technical Writing / Research Writing	Poster/chart/power point preparation on technical topics	Duration = 15h	Based on poster/chart preparation and presentation skills
3	Case Study Analysis / Seminar	Real world case studies-based learning	Duration of data collection/study = 5h Report preparation = 10h Total = 15h	Based on in-depth study, technical depth, data collected, fact finding, etc.
4	Self-Learning	Self-learning on-line course	Minimum duration of the course should be 15h.	Examination based assessment at the end of course. Based on the certificate produced.
5	Micro Project	Application/Software development (Mini Project)	Duration = 15 h	Depending on the complexity of the Application/Software
6	Video Based Learning	Technical Video based learning related to the subject	Duration of video = 5h Report preparation & Presentation = 10h Total = 15h	Report /presentation based on the video learning outcomes.

Note:

1. The hours allocated to specific activities should be proportionate to the total no. of PBL hours and marks.

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