Uka Tarsadia University

C. G. Patel Institute of Technology

B.Tech.

Semester - 4

030090406

Microprocessor based System Design

Syllabus version: 1.01

SEMESTER-4
Microprocessor based System Design
(030090406)

Credits: 4 **Contact Hours Per week: 3: Theory**

Objective of the Course:
The chief objective is to introduce the basic concepts of the digital architecture of a computer system. To provide comprehensive knowledge and understanding of microprocessor as a heart of computer system or any embedded systems. This course also offers the advancement in processors and controller that will be proven helpful for the students to understand the next generation technologies.

Student Learning Outcomes/Objectives:
At the closing stage of the course, students will be able to understand the concepts of basic architecture and working idea of computer system or any other embedded systems.

Instructional Methods and Pedagogy:
Faculty members shall explain in a class room using black board and multimedia projector through PowerPoint presentation.

Outline of the Course:

No.	Unit	Minimum No. of Contact Hours	Approx. Weight age %
1	Microprocessor System Architecture	4	14
2	Assembly Language programming with 8085A	6	20
3	The 8051 Microcontroller Architecture	6	14
4	Assembly Language Programming with 8051	6	20
5	Embedded High Level Programming for Processors and Controllers	8	18
6	ARM Architecture	6	14
	Total	**36**	**100**

B.Tech	Subject	Hours
Sem IV	030090406 Microprocessor based System Design	3hrs/week
	(Theory)	4 Credits

Sr. No.	Topic	Hours
	Unit – I	
1	**Microprocessor System Architecture:** History of microprocessors, Intel 4004 – in a brief, Introduction to digital architecture, The 8085A architecture and pin function. Registers, demultiplexing of data and address buses, control signal generation, bus timings. Interfacing – memory, Input and output devices.	4
	Unit – II	
2	**Assembly Programming with 8085A:** 8085A programming model, Instruction classification, Instruction, Data formats and storage. How to write, Assemble and execute a simple program. Overview of the 8085A Instruction set. Writing and assembling a program.	6
	Unit – III	
3	**The 8051 Microcontroller Architecture:** Introduction, Microcontroller Packaging, General Architecture – 8051 Internal Architecture, Pins and Signals, Program Memory Organization, Data Memory organization, System. Input and Output ports and special function registers – SFR Map, SFR Functions, Processor Status Word, Accumulator, Register B, Stack Pointer, Port Registers (P0, P1, P2 and P3), Power Management.	6
	Unit – IV	
4	**Assembly Language Programming with 8051:** Concept of IDE, Addressing modes and data move operations, Arithmetic operations, Program Branching, Subroutines and stack, Logical operations, Advanced Instructions. Serial Communication. Interrupts – External Interrupts, Timer and Counters Interrupts, Serial Interrupts. Interfacing – Basics, Input and Output Interfacing, General Peripheral Interfacing.	6
	Unit – V	
5	**Embedded High Level Programming for Processors and Controllers:** Introduction – Advantages and Disadvantages. 8051 with C – Declaring Variables, Data Types, Time-delay Generation, Input and Output Programming, Logical Operations, Serial Port programming,	8

	Code Conversions, Accessing code ROM space, Code Space.	
	Unit – VI	
6	**ARM Architecture:** Introduction – RISC design philosophy, ARM design philosophy, ARM Processor Family, ARM Architecture, Applications and design.	6

Practical

030090406

Microprocessor based System Design

Credits: 2 **Contact Hours Per week: 2**

Objective of the Course:

· To have practical understanding about

Student Learning Outcomes / objectives:

· To have practical exposure about

Instructional Method and Pedagogy:

· Experiments are to be performed in computer laboratory using various high – level languages and simulators.

Sr. No.	030090406 Microprocessor based System Design (Practical)	2 hrs. /week 2 Credits
1.	Write an 8085 assembly language program to: i. Two 8 – bit numbers ii. Two 16 – bit numbers	1
2.	Write an 8085 assembly language program to arrange data in: i. Ascending Order ii. Descending Order	1
3.	Write an 8051 assembly language program to copy byte starting from 60H to location 40H onwards.	1
4.	Write an 8051 assembly language program to shift a block of 8 bytes of data 1 byte up, presently located from 50H to 57H. So that the data is available from 51H to 58H.	2
5.	Twenty bytes of data are stored in location from 7FH to 6CH of internal RAM. Write an 8051 assembly language program to Count the number of those bytes, which contains 00H, and store this number of null bytes in RAM location 6BH.	2
6.	Sixteen consecutive bytes starting from 50H have unsigned integer. Develop an 8051 assembly code to add all these 16 integers and store the 8 – bit sum in memory location 60H.	2

7.	Develop an 8051 assembly language program to generate and store natural number starting from 1 to 'N' terms and also find the sum of these numbers. Assume that the value of 'N' is stored in location 30H. Store generated natural numbers from 40H. Leave the sum in the accumulator.	2
8.	Write an 8051 assembly code to create a new array by removing only those integers that are perfectly divisible by 4 from an array, starting from 31H. Location 30H contains number of terms of this array. The new array is to be created from the location 60H. At return, the accumulator should indicate number of terms found. Original locations with digits divisible by 4 should be replaced by null.	2
9.	Write an A.L.P. to check the status of the switch connected on pin P2.1 and perform the following: 1. If switch=1, send high to low pulse to activate a buzzer connected to pin P1.7. 2. Also send 55H on port P3.	1
10.	Write an 8051 C program to send values 00 – FF to port P1.	2
11.	Write an 8051 C program to toggle all the bits of P1 continuously.	2
12.	Write an 8051 C program to toggle all the bits of P0 and P2 continuously with a 250 ms delay.	2
13.	LEDs are connected to bits P1 and P2. Write an 8051 C program that shows the count from 0 to FFH (0000 0000 to 1111 1111, in binary) on LEDs.	2
14.	A door sensor is connected to the P1.1 pin, and a buzzer is connected to P1.7. Write an 8051 C program to monitor the door sensor, and when it opens, sound the buzzer. You can sound the buzzer by sending wave of a few hundred Hz.	2

Text Books:

1. Microprocessor Architecture, Programming, and Applications with the 8085 by Ramesh S. Gaonkar, Penram International
2. 8051 Microcontroller Internals, Instructions, Programming and Interfacing by Subrata Ghoshal. Person

Reference books:

1. Microcomputers and Microprocessors: The 8080,8085 and Z-80 Programming,

Interfacing and Troubleshooting by John E. Uffenbeck
2. Microprocessor and Microcontroller fundamentals. The 8085 and 8051 Hardware and Software by William Kleitz.
3. The 8051 Microcontrollers, Architecture, Programming and Applications by K. Uma Rao, Andhe Pallavi. Pearson
4. ARM System Developer's Guide Design and Optimizing System Software by Andrew N. Sloss, Dominic Symes, Chris Wright. Elesevier
5. The 8051 Microcontroller And Embedded System using assembly and C by Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay. Person