MICROPROCESSORS and MICROCONTROLLERS LABORATORY

Course code: 17IS4DLMPM
L: P: T: S: 0: 2: 1: 0
Exam Hours: 03

Credits: 02
CIE Marks: 50
SEE Marks: 50

Course objective

1. To become familiar with the architecture and Instruction set of Intel 8086 and ARM processor.
2. To provide practical hands on experience with Assembly Language Programming.
3. To familiarize the students with interfacing of various peripheral devices with 8086 microprocessor.
4. To understand the working of a microcontroller

CO1	Analyze the architecture and memory organization of microprocessor.
CO2	Examine instruction formats to write well commented assembly level programs.
CO3	Elaborate the working of procedures and macros in 8086 programming
CO4	Analyze software/hardware interrupts and further write programs to perform I/O operations.
CO5	Analyze the working of special purpose processors like 8255, 8254 and investigate the interfacing external I/0 devices
CO6	Understand the working of ARM processor

Course Outcomes: At the end of the course, student will be able to:

Mapping of Course outcomes to Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	2	-	-	-	-	-	-	-	1	-	-
CO2	3	1	1	-	2	-	-	-	-	-	-	-	1	-	-
CO3	3	2	1	-	2	-	-	-	-	-	-	-	1	1	-
CO4	3	2	2	-	2	-	-	-	-	-	-	-	1	1	-
CO5	3	1	3	-	2	-	-	-	-	-	-	-	1	3	-
CO6	2	2	1	-	2	-	-	-	-	-	-	-	1	3	-

Experiment No.	Contents of the Experiment	Hours	COs
1a b	Design and develop an assembly language program to search a key element "X" in a list of 'n'16-bit numbers. Adopt Binary search algorithm in your program for searching Design and develop an assembly program to demonstrate BCD Up-Down Counter (00-99) on the Logic Controller Interface.	3	CO1, 2
2a b	Design and develop an assembly program to sort a given set of 'n' 16-bit numbers in ascending order. Adopt Bubble Sort algorithm to sort given elements. Design and develop an assembly program to display messages "FIRE" and "HELP" alternately with flickering effects on a 7-segment display interface for a suitable period of time. Ensure a flashing rate that makes it easy to read both the messages (Examiner does not specify these delay values nor is it necessary for the student to compute these values).	3	CO2, 3
3a b	Develop an assembly language program to reverse a given string and verify whether it is a palindrome or not. Display the appropriate message. Design and develop an assembly language program to Generate the Sine Wave using DAC interface (The output of the DAC is to be displayed on the CRO).	3	CO3
4a b	Develop an assembly language program to compute nCr using recursive procedure. Assume that 'n' and 'r' are non-negative integers. Generate a Half Rectified Sine waveform using the DAC interface. (The output of the DAC is to be displayed on the CRO).	3	CO3, 4
5a	Design and develop an assembly language program to read the current time and Date from the system and display it in the standard format on the screen.	3	CO4, 5

b	Design and develop an assembly program to drive a Stepper Motor interface and rotate the motor in specified direction (clockwise or counter-clockwise) by N steps (Direction and N are specified by the examiner). Introduce suitable delay between successive steps. (Any arbitrary value for the delay may be assumed by the student).		
6	To write and simulate ARM assembly language programs for data transfer, arithmetic and logical operations (Demonstrate with the help of a suitable program).	3	CO4, 5,6
7	To write and simulate C Programs for ARM microprocessor using KEIL (Demonstrate with the help of a suitable program)	3	CO4, 5,6
8	Design and develop an assembly program to read the status of two 8-bit inputs (X & Y) from the Logic Controller Interface and display X*Y.	3	CO4
9	To interface LCD with ARM processor-- ARM7TDMI/LPC2148. Write and execute programs in C language for displaying text messages and numbers on LCD	3	CO4, 5,6
10	To interface Stepper motor with ARM processor-- ARM7TDMI/LPC2148. Write a program to rotate stepper motor	3	CO4, 5,6

Text books:

1. Barry B Brey: The Intel Microprocessors, 8th Edition, Pearson Education, 2009.
2. Microcomputer systems-The 8086/8088 Family – Y.C.Liu and G.A Gibson, 2E PHI-2003.

Reference books:

1. Douglas V. Hall: Microprocessors and Interfacing, Revised 2nd Edition, TMH, 2006.
2. K. Udaya Kumar & B.S. Umashankar : Advanced Microprocessors & IBM-PC Assembly Language Programming, TMH 2003.
3. James L. Antonakos: The Intel Microprocessor Family: Hardware and Software Principles and Applications, Cengage Learning, 2007.