Microprocessor and Microcontroller Laboratory Manual

Department of Electrical Engineering

Course Name: Microprocessor and Microcontroller Lab

Experiment

Subject Code: EEC375

Location of the Laboratory: Room No. 128, First floor, Academic Complex.



IIT (ISM), Dhanbad Jharkhand- 826004

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List of Experiments to be performed in Microprocessor and Microcontroller Laboratory

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Table A: Experiments for Sl. No. 1 & 2

	Aim of Experiment
a.	Find 1's complement of 8-bit number
b.	Find the largest number among a set of numbers
с.	Addition of n number of 8-bit data and store the result to a particular memory location
d.	Convert two BCD digits stored in memory to a binary number memory
e.	Block transfer of n number of 8-bit data stored in continuous memory locations to
	another set of continuous memory locations
f.	Generate Fibonacci series

Table B: Experiments for Sl. No. 3 & 4

	Aim of Experiment
a.	Block transfer of n number of 16-bit data stored in continuous memory locations to
	another set of continuous memory locations
b.	Arrange a set of 16 bit numbers in ascending order
с.	Arrange a set of 16 bit numbers in descending order
d.	Find smallest number in a data array
e.	Perform multi-byte addition

Table C: Experiments for Sl. No. 5

	Aim of Experiment
a.	Program to perform multiplication of two numbers. Taking two numbers in different
	Data Memory, and storing the result in another Data Memory
b.	Program to perform division of two numbers. Taking two numbers in different Data
	Memory. After division operations store the result in given Data memories.
с.	Program to convert ASCII to its HEX equivalent on the trainer display.

General instructions for every student

<u>Do's</u>

- Students will not be given entry to the laboratory without laboratory manual.
- Read and fully comprehend the lab procedure as set forth in the lab manual before beginning of any experiment. The instructor may be approached to understand the procedure for performing the experiment.
- Before performing any experiments make sure that the devices are not loosely connected.
- Work deliberately and carefully. No horseplay. Never work alone.
- Keep your work area clean.
- If an instrument or piece of equipment fails during use, or isn't operating properly, report the issue to the instructor.
- Immediately report any spills, equipment malfunctions, injuries to the Instructor.

<u>Don'ts</u>

- No open toed shoes; no loose fitting clothing.
- Never use lab equipment that you are not approved or trained by the instructor to operate.
- Don't use cell phone during laboratory work. Keep your cell phones in silent/vibration mode

Title of Experiment: Assembly language programming using 8085 Microprocessor kit

Aim of the Experiment: (To be chosen from Table A)

Brief Theory: (as per the aim of the experiment to be performed)

Apparatus required: 8085 Microprocessor kit; Regulated DC power supply

Experimental Procedure:

- 1. Steps to enter the program
 - Press "RESET"
 - Press "EXAMEM"
 - Enter the starting address of the program
 - Press "NEXT"
 - Start entering OPCODES of the mnemonics
 - Press "NEXT"
- 2. Steps to enter the data if required
 - Press "RESET"
 - Press "EXAMEM"
 - Enter the address of the input from users
 - Press "NEXT"
 - Enter the data
- 3. Steps to execute the program
 - Press "RESET"
 - Press "GO"
 - Enter the starting address of the program
 - Press "EXEC"
- 4. Steps to check the results
 - Press "RESET"
 - Press "EXAMEM"
 - Enter the address where result is stored
 - Press "NEXT"

Observation Table:

	Memory Location	Data
Input		
Output		

- a. State about the available memory spaces of the 8085 kit. Design possible Hardware circuitry in such case.
- b. Mention the various opcodes (instructions) used in each program.
- c. Mention about the different registers involved in each program.

Title of Experiment: Assembly language programming using 8085 simulator

Aim of the Experiment: (To be chosen from Table A)

Brief Theory: (as per the aim of the experiment to be performed)

Apparatus required: A desktop computer with 8085 simulator software

Experimental Procedure:

- i. Write the opcodes of the given problem in the "Assembler"
- ii. Click "ASSEMBLE" for the queuing of instruction codes
- iii. Rectify errors if any
- iv. Load the memory locations with input data
- v. Click "Run all at a time"
- vi. Check the results in the pre-specified memory.

Observation Table:

	Memory Location	Data
Input		
Output		

- a. What are the benefits of doing programming in 8085 simulator?
- b. State the disadvantages of doing programming in 8085 Simulator.

Title of Experiment: Assembly language programming using 8086 Microprocessor kit

Aim of the Experiment: (To be chosen from Table B)

Brief Theory: (as per the aim of the experiment to be performed)

Apparatus required: 8086 Microprocessor kit; Regulated DC power supply

Experimental Procedure:

- 1. Steps to enter the program
 - Press "RESET"
 - Press "EB"
 - Enter the starting address of the program
 - Press "NEXT"
 - Start entering OPCODES of the mnemonics
 - Press "NEXT"
- 2. Steps to enter the data if required
 - Press "RESET"
 - Press "EB"
 - Enter the address of the program
 - Press "NEXT"
 - Enter the data
- 3. Steps to execute the program
 - Press "RESET"
 - Press "GO"
 - Enter the starting address of the program
 - Press "EXEC"
- 4. Steps to check the results
 - Press "RESET"
 - Press "EB"
 - Enter the address where result is stored
 - Press "NEXT"

Observation Table:

	Memory Location	Data
Input		
Output		

- a. State about the available memory spaces of the 8086 kit used.
- b. Write about different general purpose and special purpose registers involved in each program.
- c. Write essential features of memory segmentation.
- d. What do you understand by physical addressing and actual addressing? What is "offset"?

Title of Experiment: Assembly language programming using 8086 debugging mode

Aim of the Experiment: (To be chosen from Table B)

Brief Theory: (as per the aim of the experiment to be performed)

Apparatus required: A desktop computer.

Experimental Procedure: Use MS DOS prompt to enter into the debugging mode

Observation Table:

	Memory Location	Data
Input		
Output		

Questions:

a. How a user utilize memory spaces in debugging mode?

b. Which segment of memory is preferably used in Debugger mode?

c. Write about different general purpose and special purpose registers involved in each program. Also mention the final status of each register after executing a program.

Title of Experiment: Assembly language programming using 8051 Microcontroller kit

Aim of the Experiment: (To be chosen from Table C)

Brief Theory: (as per the aim of the experiment to be performed)

Apparatus required: 8051 Microcontroller kit, Regulated DC power supply

Experimental Procedure:

Examine or modify memory command: EXAM MEM {PRG MEM | EXT DATA | BIT MEM |INT DATA} addr1 NEXT [[[data] NEXT | PREV]...] EXEC

Examine or modify register command: EXAM REG {reg key} [[[Data] NEXT | PREV]...] EXEC Executes a user program: SINGLE STEP [start addr] [NEXT count] EXEC [NEXT...] EXEC Transfers control from monitor to user program: Go [addr] EXEC

Searches a string of data in program or data memory: SEARCH {PRG MEM | EXT DATA | INT DATA} start addr NEXT end addr NEXT data1 [[[NEXT data2] NEXT data3] NEXT data4] EXEC

Note: Whenever a dot appears in the special field user has to enter the type of memory by pressing the following keys as the case may be.

Type of memory	Key to be pressed
To be selected	pressed
Program memory	PRG MEM
External data memory	EXT DATA
Bit memory	BIT MEM
Internal data memory	INT DATA

Observation Table:

	Memory Location	Data
Input		
Output		

- a. State about the available memory spaces of the 8051/8031Microcontroller kit used.
- b. Mention the function of DPTR and all other registers in 8051/8031. How they are different from the general purpose registers of 8085 CPU.
- c. Write the content of all the registers after the execution of each program.

Aim/Title of Experiment: Stepper motor interfacing

Brief Theory: (as per the aim of the experiment to be performed)

Apparatus required:

- 1. 8085 Trainer kit
- 2. Regulated DC power supply
- 3. Stepper motor interfacing kit

Experimental Procedure: The working procedure of this experiment is given below



Observation:

- a. What is the difference between full-step and half-step of stepper motor?
- b. What criteria's are necessary to consider when selecting a stepper motor?
- c. What is the role of driver circuit in interfacing of stepper motor with microcontroller?

Aim/Title of Experiment: Seven Segment Display Interfacing

Brief Theory: (as per the aim of the experiment to be performed)

Apparatus required:

- 1. 8085 Trainer kit
- 2. Regulated DC power supply
- 3. 7-Segment Display interfacing kit.

Experimental Procedure: Make a connection for a seven segment display with microprocessor through programmable I/O port 8255. D0-D7 connected to Port A, SSEG to PC0 and C0 to PC1.

Observation:

- a. What is the use of seven segment display?
- b. What is common anode 7 segment display?
- c. Do 7 segment displays need resistors?

Aim/Title of Experiment: Traffic Light Control

Brief Theory: (as per the aim of the experiment to be performed)

Apparatus required:

- 1. 8085/ 8086 Trainer kit
- 2. Regulated DC power supply
- 3. Traffic light interfacing kit

Experimental Procedure:

1. Connect power supply 5V & GND to both microprocessor trainer kit & Traffic light controller interfacing kit.

- 2. Connect data bus between microprocessor trainer kit & Traffic light controller interfacing kit.
- 3. Enter the program to control Traffic light.
- 4. Execute the program
- 5. Observe the LED's on traffic light controller PCB.

Observation:

- a. What triggers traffic lights to change?
- b. Can traffic lights be hacked?
- c. What do you do when a traffic light is out?