SCHOOL OF COMPUTER SCIENCE & IT, DAVV, INDORE

Laboratory Manual

Computer Organization and Assembly Language Programming (CS-4022)

MCA/M.Sc.(CS)/M.Sc.(IT) /MBA(CM) I Semester

Mission:

- *To produce world-class professionals who have excellent analytical skills, communication skills, team building spirit and ability to work in cross cultural environment.*
- *To produce international quality IT professionals, who can independently design, develop and implement computer applications.*
- *Professionals who dedicate themselves to mankind, who are environment conscious, follow social norms and ethics.*

SCHOOL OF COMPUTER SCIENCE & IT
DEVI AHILYA VISWAVIDYALAYA
Takshashila Campus, Khandwa Road, Indore – 452017
Tel. (0731) – 2438518, Email: head.scs@dauniv.ac.in

Computer Organization and Assembly Language Programming (CS-4022)

Aim: To strengthen the assembly language programming.

Objectives:

i. To learn arithmetic operations on 8085.

ii. To understand the flags in 8085.

iii. To learn data transfer operations on 8085 by using direct memory addressing.

iv. To learn data transfer operations using indirect memory addressing

v. To learn block addition and subtraction.

vi. To learn sorting of data.

vii. To learn searching of data in an array.

Introduction to 8085 Microprocessor

INTEL 8085 is one of the most popular 8-bit microprocessor capable of addressing 64 KB of memory and its architecture is simple. The device has 40 pins, requires +5 V power supply and can operate with 3MHz single phase clock.

ALU (Arithmetic Logic Unit):

The 8085A has a simple 8-bit ALU and it works in coordination with the accumulator, temporary registers, 5 flags and arithmetic and logic circuits. ALU has the capability of performing several mathematical and logical operations. The temporary registers are used to hold the data during an arithmetic and logic operation. The result is stored in the accumulator and the flags are set or reset according to the result of the operation. The flags are affected by the arithmetic and logic operation. They are as follows:

- Sign flag

  After the execution of the arithmetic - logic operation if the bit D7 of the result is 1, the sign flag is set. This flag is used with signed numbers. If it is 1, it is a negative number and if it is 0, it is a positive number.

- Zero flag

  The zero flag is set if the ALU operation results in zero. This flag is modified by the result in the accumulator as well as in other registers.

- Auxiliary carry flag

  In an arithmetic operation when a carry is generated by digit D3 and passed on to D4, the auxiliary flag is set.

- Parity flag

After arithmetic – logic operation, if the result has an even number of 1's the flag is set. If it has odd number of 1's it is reset.

- Carry flag

  If an arithmetic operation results in a carry, the carry flag is set. The carry flag also serves as a borrow flag for subtraction.

Timing and control unit

This unit synchronizes all the microprocessor operation with a clock and generates the control signals necessary for communication between the microprocessor and peripherals. The control signals RD (read) and WR (write) indicate the availability of data on the data bus.

Instruction register and decoder

The instruction register and decoder are part of the ALU. When an instruction is fetched from memory it is loaded in the instruction register. The decoder decodes the instruction and establishes the sequence of events to follow.

Register array

The 8085 has six general purpose registers to store 8-bit data during program execution. These registers are identified as B, C, D, E, H and L. they can be combined as BC, DE and HL to perform 16-bit operation.

Accumulator

Accumulator is an 8-bit register that is part of the ALU. This register is used to store 8-bit data and to perform arithmetic and logic operation. The result of an operation is stored in the accumulator.

Program counter

The program counter is a 16-bit register used to point to the memory address of the next instruction to be executed.

Stack pointer

It is a 16-bit register which points to the memory location in R/W memory, called the Stack.

Assessment Policy

Examination	**Marks**
Lab Test I	3
Lab Test II	3
Attendance	3
Lab Diary	2
Final Lab Viva-Voce	4
Final Lab Test	5
Total	**20**

Computer Organization and Assembly Language Programming (CS-4022)

Week	Experiment
1	1) Write a program to load 05 in the register A and B. 2) WAP to copy the contents of register A into B 3) WAP to copy the contents of memory location 2000 into register A. 4) WAP to load 0A at the memory location 2000. 5) WAP to move the contents of memory location 2000 at memory location 3000. 6) WAP to add two 8 bit numbers. 7) WAP to add two 8 bit numbers and store the result at memory location 2000.
2	1) WAP to add the contents of memory location 2000 and 2001 and stores the result at memory location 2002. 2) WAP to multiply two numbers without using MUL instruction. 3) WAP to multiply two 8 bit numbers stored at memory location 2000 and 2001 and store the result at memory location 2000 and 2001. 4) WAP to perform the division of two numbers. 5) WAP to subtract two 8-bit numbers. Show the status of all flags.
3	**Lab Test –I**
4	1) WAP to add two 16-bit numbers. Store the result at memory address starting from 2000. 2) WAP which tests if any bit is '0' in a data byte specified at an address 2000. If it is so, 00 would be stored at address 2001 and if not so then FF should be stored at the same address. 3) Assume that 3 bytes of data are stored at consecutive memory addresses of the data memory starting at 2000. Write a program which loads register C with (2000), i.e. with data contained at Memory address 2000, D with (2001), E with (2002) and A with (2001).
5	1) WAP to store ten bytes of data at consecutive memory location. 2) Sixteen bytes of data are specified at consecutive data-memory locations starting at 2000. Write a program which increments the value of all sixteen bytes by 01. 3) WAP to add t 10 bytes stored at memory location starting from 3000. Store the result at memory location 300A.
6	**Lab Test –II**
7	**1)** Two data-bytes are stored at addresses 2000 and 2001. Interchange the data bytes at these two addresses using (i) indirect addressing (ii) direct addressing. 2) Write a program to compare the two numbers stored at 2000 and 2001 if the number that is stored on 2000 is greater than store 00 at memory address 2005 otherwise store 01 at 2005. 3) WAP to count the number of one’s and zeros in a given data byte. 4) WAP to determine the one’s and two’s complement of a given data byte.
8	1) WAP to perform the division of two numbers without using DIV instruction.

	2) WAP to divide a number by 2 without using DIV and SUB Instruction. 3) Eight bytes are stored at consecutive data-memory address starting from 2000. WAP to find out the smallest number. And store this number at data-memory address 3000. 4**)** Eight bytes are stored at consecutive data-memory address starting from 2000. WAP to find out the largest number. And store this number at data-memory address 3000.
9	1) WAP that has five different methods to clear the carry flag. 2) WAP which checks that given number is even or odd. If it is odd store 01 at memory location 2000.store 00 otherwise. 3) Eight bytes are stored at consecutive data-memory address starting from 2000.write a program to find out the odd numbers from given bytes. And store these odd numbers at consecutive data-memory address starting from 3000.
10	1) WAP to check the even or odd parity in a given data byte. 2) Eight bytes are stored at consecutive data-memory address starting from 2000. WAP to check the numbers that has even parity. And store these even parity numbers at consecutive data-memory address starting from 3000.
11	Final Lab Test and Vi-va

Faculty:

Er. S.L.Dawar