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Affiliated to Bikaner Technical University, Bikaner

LABORATORY CERTIFICATE

Name of the laboratory Microprocessor & Interface Lab Lab Code 4CS4-21

Section C Batch C2

Department Computer Science

This is to Certify that Mr./~~Ms.~~ Vaibhav Saran Wtih registration no. JIET/CS/18/177 has satisfactorily completed the course of experiments in the above practical Examination conducted by the University. Total number of experiments performed by him/~~her~~ .....

Date of University Exam .....

Signature of **Faculty in-charge**

Signature of **Head of Department**

Signature of **External Examiner**

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INDEX

Name of the laboratory ..... Lab Code .....

S.No.	Name of Experiment	Date of Allotment	Date of Completion	Page No.	Remarks	Signature of Teacher With Date
1	Assignment-1 Introduction	22/1/20	29/1/20		9	
2	Assignment-2 : Add two no.s & store at given location.	29/1/20	5/2/20		9	
3	Assignment-3 Adding two 16 bit no.s.	5/2/20	12/2/20		9	
4	Assignment-4. Add two 16.bit no.s without DAD Command.	12/2/20	19/2/20		9	
5	Assignment-5 Swap content of memory location.	19/2/20	26/3/20		9	

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Student Name ..... Roll No.: .....

Experiment No. ..... Date 22/1/20

Assignment-1

Introduction

→ VMC-850X series kit (VMC-8501/VMC-8502) is a single board microprocessor development kit.

→ VMC-850X communicates with the outside world through a keyboard having 28 keys & seven segment hexadecimal display.

→ VMC-850X provides 8 Kb/32 Kb of RAM & 8 Kb of EPROM. The total onboard memory can be very easily expanded to 64 Kb in an appropriate combination of RAM & ROM.

→ The onboard kit provides various powerful software commands like INSERT, DELETE, MOVE etc.

→ VMC-850X is configured around the internationally adopted STD Bus which is the most popular bus for process control and real time applications.

System Specification:

CPU → 8 bit μP, 8085

MEMORY → 64 Kb.

RAM → 8 Kb/32 Kb and space for further expansion

ROM → 8 Kb of EPROM loaded with powerful prog.

TIMER → 16 bit programmable counter using 8253

I/O → 24 I/O lines using 8255

Power Supply → +5 V, 1.5 A for kit.
±12 V, +5%, 250 mA for CRT/PC interface.

Page No. .....

Hardware Description

General

The system has got 8085 as the CPU. The clock frequency for the system is 3.07MHz and is generated from a crystal of 6.14 MHz.

Memory

VMC-850X provides 8Kb/32Kb of RAM using 6264/62256 chip and 8Kb of EPROM for monitor. Total onboard memory can be extended to 64Kb.

I/O devices.

The various I/O chips used in VMC-8501 are 8279, 8255 & 8253 and VMC-8502 are 8279, 8255, 8253 & 8155.

8279 (Keyboard & Display Controller).

8279 is general purpose programmable keyboard and display I/O interface device designed for use with the 8085 µP.

8255 (Programmable Peripheral Interface) (PPI)

8255 is a PPI designed to use with 8085 µP. This basically act as a general purpose I/O device to interface peripheral equipments to the system Bus.

8253. (Programmable Internal Timer)
This chip is a programmable interval timer/counter and can be used for the generation of accurate time delays under software control.

8155 (Programmable I/O port & timer interface).
8155 is a programmable I/O ports and timer interface designed to use with 8085 µP. The 8155 includes 256 bytes of R/W memory, three I/O ports and a timer.

Display.
VMC-850X provides six digits of seven segment display. Four digits are for displaying the address of any location or name of any register, whereas the rest of the two digits are meant for displaying the contents of a memory location or of a register. They are displayed in hexadecimal notation.

RESET	VCT INT	SHIFT	C	D	E	F
EXREG SI	INS DATA	DEL DATA	8 H	9 L	A	B
DEL GO	INS BM	REL EXMEM	4 PCH	5 PCL	6 SPH	7 SPL
STRING PRE	MEMC NEXT	FILL	0	1 TTY	2 CRT	3 I

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Student Name ..... Roll No.: .....

Experiment No. ..... Date .....

Keyboard Description: 28 Keys Model.

Reset → Reset the system.

VCT INT → Hardware interrupt via keyboard RST 5

SHIFT → Provides a second level command to all keys.

GO → To execute the program.

SI → To execute the program in single step mode.

EXREG → Examine register, allows user to examine and modify the contents of different registers.

EXMEM → Examine Memory, allows user to examine any memory location & modify any RAM location.

PRE → Previous is used as an intermediate terminator of examine memory.

NEXT → Increment is used as a intermediate terminator in case of examine memory, examine register etc.

"." → Terminator is used to terminate the command and write the data in data field at the location displayed in address field.

DEL → Delete the part of program or data, with relocation by one or more bytes.

INS → Inserts the part of the program or data with relocation, by one or more bytes.

B.M. → Allows user to move a blocks of memory to any RAM area.

FILL → Allows user to fill RAM area with a constant.

Page No. .....

Student Name ..... Roll No.: .....

Experiment No. .....Date .....

REL. → Relocates a prog. written for some memory area and to be transferred to other memory area.

INS DATA → Inserts one or more data bytes in the user's program/data area.

DEL DATA → Deletes one or more data bytes from the user's prog./data area.

STRING → Finds out the string of data lying at a particular address or addresses.

MEMC → Memory Compare: compares two blocks of memory for equality.

0-F → Hexadecimal keys.

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ADD → It adds the data of a given location with content of Accumalator and stores the result in Accumalator.

STA → Transfer the content accumalator to a given memory location.

HLT → To indicate end of program.

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Student Name ..... Roll No. .....

Experiment No. ..... Date 29/1/20

Assignment -2

Objective: Add the contents of memory location 3000 and 3001 & place the result in location 3002.

Hardware Requirement: Microprocessor training kit.

Program Address	Pnemonics		Hex Code
2000	LXI H.	3000	21
2003	MOV	A, M	7E
2004	INX	H	23
2005	ADD	M	86
2006	STA	3002	32
2009	HLT		76

Result:

	Address	Data
Input data:	3000	11
	3001	22
Output data:	3002	33

Viva:

Q What are LXI, MOV, INX, ADD, STA & HLT command?

LXI. → It is used to load data from memory location to a given Register pair.

MOV → To copy data from one register to another.

INX → It increments the content of Register pair by 1.

Page No. .....

Viva: What is DAD and SHLD command?

DAD → It is used to perform a 16 bit addition.

SHLD → To store the content of HL pair at a given location.

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Student Name ..... Roll No.: .....

Experiment No. ..... Date 5/2/20

Assignment-3

Objective: Add two 16 bit numbers and store result on another location.

Hardware Requirement: Microprocessor training Kit.

Program:

MNEMONIC

Address	opcode	operand	Hex Code
2000	LXI	H, 0101	21
2001			01
2002			01
2003	LXI	D 0101	11
2004			01
2005			01
2006	DAD	D	19
2007	SHLD	2500	22
2008			00
2009			25
200A	HLT		76

Result:

Input data: 0101

0101

Output data: 0202

Page No. .....

Result: Input data. 77 77
11 11
Output data 88 88

Viva: What is ADC command? How is it different from DAD?
It is used to add the content of register and accumulator and also accounts for carry if generated, which is discarded in case of DAD.

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Student Name ..... Roll No.: .....
Experiment No. ..... Date 12/2/20

Assignment-4.

Objective: To add two, 16 bit numbers without using DAD command.

Hardware Requirement: Microprocessor Training Kit

Program:

MNEMONIC

Address	OP code	Operand	Hex code
2000	LXI	H 7777	21
2001			77
2002			77
2003	LXI	D 1111	11
2004			11
2005			11
2006	MOV	A, C	7D
2007	ADD	E	83
2008	STA	2500	32
2009			00
200A			25
200B	MOV	A, H	7C
200C			
200D	ADC	D	8A
200E	STA	2501	32
200F			01
2010			25
2011	HLT		76

Page No. .....

Result: Input data: 3000
3001.
Output data: 3001
3000

Viva Question.

Q How many bits are there in Address Bus, Data Bus & Control Bus?
Address Bus → 16 bit
Data Bus → 8 bit
Control Bus → 8 bit

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Student Name ..... Roll No.: .....
Experiment No. ..... Date 19/2/20

Assignment-5

Objective: To swap the contents of two memory location.

Hardware Requirement: Microprocessor training kit.

Program:

	MNEMONIC		
Address	Opcode	operand	Hex Code
2000	LDA	3000	3A
2001			00
2002			30
2003	MOV	B, A	47
2004	LDA	3001	3A
2005			01
2006			30
2007	STA	3000	32
2008			00
2009			30
200A	MOV	A, B	78
200B	STA	3001	32
200C			01
200D			30
200E	HLT		76

Page No. .....

JIET GROUP OF INSTITUTIONS

Student Name ..... Roll No.: .....

Experiment No. ..... Date .....

Assignment -6

Objective: To copy a block of memory (5 bytes) in forward order and in reverse order at another location.

Hardware Required: Microprocessor training kit.

Program: FORWARD ORDER.

Address	OPCode	operand	Hex Code
2000	LXI	H 2500	21
2001			00
2002			25
2003	LXI	B 2600	01
2004			00
2005			26
2006	MVI	D 05	16
2007			05
2008	MOV	A, M	7E
2009	STAX	B	02
200A	INX	H	23
200B	INX	B	03
200C	DCR	D	15
200D	JNZ	2008	C2
200E			08
200F			20
2010	HLT		76

Page No. .....

JIET GROUP OF INSTITUTIONS

Student Name ..... Roll No.: .....

Experiment No. ..... Date .....

Reverse Order.

Address	OPcode.	operand	HexCode.
2000.	LXI	H 2500.	21
2001.			00
2002			25.
2003	LXI.	B 2604	01
2004			04.
2005			26
2006.	MVI	D 05	16.
2007			05
2008	MOV	A, M	7E
2009	STAX	B.	02.
200A	INX	H.	23
200B	DCR	B.	0B.
200C	DCR	D	15
200D	JNZ	2008.	C2
200E			08
200F			20
2010	HLT.		76

Page No. .....