

Microprocessor (Unit-2 :: Lecture – 10)

(BEI – I/II & BCT – II/II)

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Sample 8085 Programs – [1]

- Write a program to load memory locations 7090 H and 7080 H with data 40H and 50H and then swap these data.

MVI H, 70H	MOV M, B
MVI L, 90H	MOV D, M
MVI A, 40H	MOV M, C
MOV M, A	MVI L, 90H
MOV C, M	MOV M, D
MVI L, 80H	HLT
MVI B, 50H	

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Sample 8085 Programs – [2]

- The data 20H and 30H are stored in 2050H and 2051H. Transfer the data to 3000H and 3001H using LHLD and SHLD instructions.

```
MVI A, 20H
STA 2050H
MVI A, 30H
STA 2051H
LHLD 2050H
SHLD 3000H
HLT
```

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Sample 8085 Programs – [3]

- Pair B contains 1122H and pair D contains 3344H. Exchange the contents of B and D pair using XCHG instruction.

```
LXI B, 1122H
LXI D, 3344H
MOV H, B
MOV L, C
XCHG
MOV B, H
MOV C, L
HLT
```

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Sample 8085 Programs – [4]

- Register **BC** contains 8538H and register **DE** contain 62A5H. Write instructions to subtract the contents of **DE** from the contents of **BC** and Place the result in **BC**.

```
MOV A,C
SUB E
MOV C,A
MOV A,B
SBB D
MOV B,A
HLT
```

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Sample 8085 Programs – [5]

- Register **BC** contain 2793H and register **DE** contain 3182H. Write instruction to add these two 16 bit numbers and place the sum in memory locations 2050H and 2051H.

```
MOV A,C
ADD E
MOV L,A
MOV A,B
ADC D
MOV H,A
SHLD 2050H
HLT
```

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Sample 8085 Programs – [6]

- Add two 4 digit **BCD** numbers (7342)_{BCD} and (1989)_{BCD} and store the result in **BC** register.

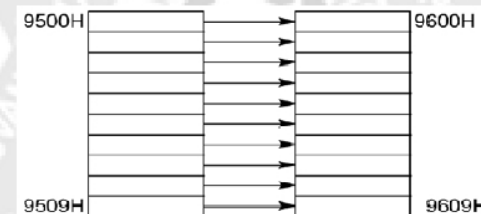
LXI H, 7342H	MOV A, H
LXI B, 1989H	ADC B
MOV A, L	DAA
ADD C	MOV B, A
DAA	HLT
MOV C, A	

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Sample 8085 Programs – [7]

- Move 10 bytes of data from starting address 9500 H to 9600H.



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Sample 8085 Programs – [7] (Cont...)

Memory Address	Code
2000 H	MVI B, 0AH
2002 H	LXI H, 9500H
2005 H	LXI D, 9600H
2008 H	MOV A, M
2009 H	STAX D
200A H	INX H
200B H	INX D
200C H	DCR B
200D H	JNZ 2008H
2010 H	HLT

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Sample 8085 Programs – [8]

- Transfer 30 bytes of data starting from 8500H to 9500H if data is odd else store 00H.

MVI B, 1EH	L1: MOV A, M
LXI H, 8500H	L3: STAX D
LXI D, 9500H	INX D
L2: MOV A, M	INX H
ANI 01H	DCR B
JNZ L1	JNZ L2
MVI A, 00H	HLT
JMP L3	

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Sample 8085 Programs – [9]

- Write a 8085 program to add two 8-bit numbers using a subroutine and store the result in register B.

Main Program	
Memory Address	Code
2000 H	MVI B, 4AH
2002 H	MVI C, A0H
2004 H	CALL 3000H
2007 H	MOV B, A
2008 H	HLT

Subroutine	
Memory Address	Code
3000 H	MOV A, B
3001 H	ADD C
3002 H	RET

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Sample 8085 Programs – [10]

- Perform multiplication of two 8-bit numbers stored at 4150H and 4151H. Store the product in memory locations 4152H and 4153H.

MVI D, 00 H	MOV C, M	JNZ LOOP
MVI A, 00 H	LOOP: ADD B	STA 4152 H
LXI H, 4150H	JNC NEXT	MOV A, D
MOV B, M	INR D	STA 4153 H
INX H	NEXT: DCR C	HLT

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Sample 8085 Programs – [11]

- Perform division of two 8-bit numbers stored at 4150H (divisor) and 4151H (dividend). Store the remainder in 4152H and the quotient in 4153H.

	LXI H, 4150H		SUB B
	MOV B, M		INR C
	MVI C, 00H		JMP NEXT
	INX H	LOOP:	STA 4152H
	MOV A, M		MOV A, C
NEXT:	CMP B		STA 4153H
	JC LOOP		HLT

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Sample 8085 Programs – [12]

- Find the largest number in an array of data. The count of the number of elements is given in 4200H. The numbers are stored starting from 4201H. Store the largest number in 4300H.

	LXI H, 4200H	LOOP:	INX H		JNZ LOOP
	MOV B, M		CMP M		STA 4300H
	INX H		JNC AHEAD		HLT
	MOV A, M		MOV A, M		
	DCR B	AHEAD:	DCR B		

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Sample 8085 Programs – [13]

- Sort 10 bytes of data stored in memory starting at 1120H in ascending order.

START:	LXI H, 1120H		MOV B, M		JNZ L2
	MVI D, 00H		MOV M, A		MOV A, D
	MVI C, 09H		DCX H		RRC
L2:	MOV A, M		MOV M, B		JC START
	INX H		INX H		HLT
	CMP M		MVI D, 01H		
	JC L1	L1:	DCR C		

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Sample 8085 Programs – [14] (Concept of BCD to Binary Conversion)

- Convert $(72)_{BCD}$ into its Binary equivalent:

Step-1:	$(72)_{BCD} = (0111\ 0010)_{BCD}$	0000 0010 (Unpacked BCD-1) 0000 0111 (Unpacked BCD-2)
Step-2:	Multiply BCD-2 by 10	$(7 \times 10)_{10} = (70)_{10} = (1000110)_2$
Step-3:	Add BCD-1 to result of Step-2	$(70 + 2)_{10} = (72)_{10} = (1001000)_2$

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Sample 8085 Programs – [14] (Cont...) (Example: BCD to Binary Conversion)

- A BCD number between 0 and 99 is stored at 4000H. Write a subroutine called BCDBIN to convert the BCD number into its equivalent binary number. Store the result in memory location 4010H.

Main Program	
START:	LXI SP, 3000H
	LXI H, 4000H
	LXI B, 4010H
	MOV A, M
	CALL BCDBIN
	STAX B
	HLT

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Sample 8085 Programs – [14] (Cont...) (Example: BCD to Binary Conversion)

Subroutine Program			
BCDBIN:	PUSH B	RRC	DCR D
	PUSH D	RRC	JNZ SUM
	MOV B, A	RRC	BCD1: ADD C
	ANI 0FH	RRC	
	MOV C, A	MOV D, A	POP D
	MOV A, B	XRA A	RET
	ANI 0FH	MVI E, 0AH	
JZ BCD1	SUM:	ADD E	

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Sample 8085 Programs – [15] (Concept of Binary to BCD Conversion)

- Conversion of binary to BCD is performed by dividing the number by powers of ten
- The division is performed using the subtraction method
- Assume the following Binary number is to be converted to BCD:

Binary	Hexadecimal	Decimal
1111 1111	FF	255

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Sample 8085 Programs – [15] (Cont...) (Concept of Binary to BCD Conversion)

- To represent the number $(255)_{10}$ requires 12 bits or three BCD digits
- Let the three BCD digits be called BCD3, BCD2, BCD1

BCD3	BCD2	BCD1
0010	0101	0101

- The number $(255)_{10}$ can be represented as follows:

$$-(255)_{10} = (2 \times 100) + (5 \times 10) + (5 \times 1)$$

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Sample 8085 Programs – [15] (Cont...) (Concept of Binary to BCD Conversion)

Step	Division	Quotient
1	255	
	255 – 100 = 155	1
	155 – 100 = 55	1
Remainder = 55		

Step	Remainder from Step-2
3	5

Step	Division	Quotient
2	55	
	55 – 10 = 45	1
	55 – 10 = 35	1
	35 – 10 = 25	1
	25 – 10 = 15	1
	15 – 10 = 5	1
Remainder = 5		

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Sample 8085 Programs – [15] (Cont...) (Example: Binary to BCD Conversion)

- A binary number is stored at 4000H. Convert the number into BCD and store each BCD digit in separate memory locations starting at 5000H.

Main Program	
START:	LXI SP, 3000H
	LXI H, 4000H
	MOV A, M
	CALL PWRTEN
	HLT

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Sample 8085 Programs – [15] (Cont...) (Example: Binary to BCD Conversion)

Subroutine Program (PWRTEN)	
PWRTEN:	LXI H, 5000H
	MVI B, 64H
	CALL BINBCD
	MVI B, 0AH
	CALL BINBCD
	MOV M, A
	RET

Subroutine Program (BINBCD)	
BINBCD:	MVI M, FFH
NEXT:	INR M
	SUB B
	JNC NEXT
	ADD B
	INX H
	RET

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