Total number of printed pages–8

2018

MICROPROCESSOR AND MICROCONTROLLERS

Paper : IE 501

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer Question No. 1 and **any four** from the rest.*

1. Answer the following questions in brief :
   10×2=20

   (a)   Mention *two* advantages of Assembly Language over Machine Language.

   (b)   What is the need of Microcontrollers when we already have powerful Microprocessors ?

   (c)   How can we identify the size of an instruction of 8085 ?

(d) Specify the meaning of the instructions —
   INR M and DCX H.

(e) If the size of a memory chip is 256×4 *bits*, how many such chips will be required to build a 16 *kbyte* memory system?

(f) Specify the Machine cycles and T-states for the instructions — ADD B and MOV A, M.

(g) In a memory mapped I/O, can an I/O Device have the same address as a memory register. Justify.

(h) For detecting an emergency situation and performing its related task, which pin of the 8085 should be used and why?

(i) State the function of stack pointer register.

(j) Specify the status of flags after the execution of instruction XRA.

2. *(a)* Write an Assembly Language Program to compare the data in memory locations D000H and D001H, and display the larger data at port 01H and smaller data at port 02H.

4

(b) For the program given below, answer the questions that follow —

5

```
              MVI A, FOH
NEXT→         ADI 08H
              JNC NEXT
              ADD A
              JZ DISPLAY
              SUB A
DISPLAY→ Out 02H
              HLT
```

(i) No. of times the instruction ADI is executed

(ii) Status of flags after execution of ADD A

(iii) Value displayed at 02H

(c) A memory chip with 2^N registers require 'N' number of address lines. Explain with the help of a diagram.

5

(d) Explain the meaning of instruction LDA D050 H with the help of its bus timing diagram.

6

3. (a) State the functions of the following pins — 4

ALE, IO/$\overline{\text{M}}$, INTR, $\overline{\text{INTA}}$

(b) Draw the external logic circuit required to generate the control signals $\overline{\text{MEMR}}$, $\overline{\text{MEMW}}$, $\overline{\text{IOR}}$ and $\overline{\text{IOW}}$ by combining the pins IO/$\overline{\text{M}}$, $\overline{\text{RD}}$ and $\overline{\text{WR}}$. 4

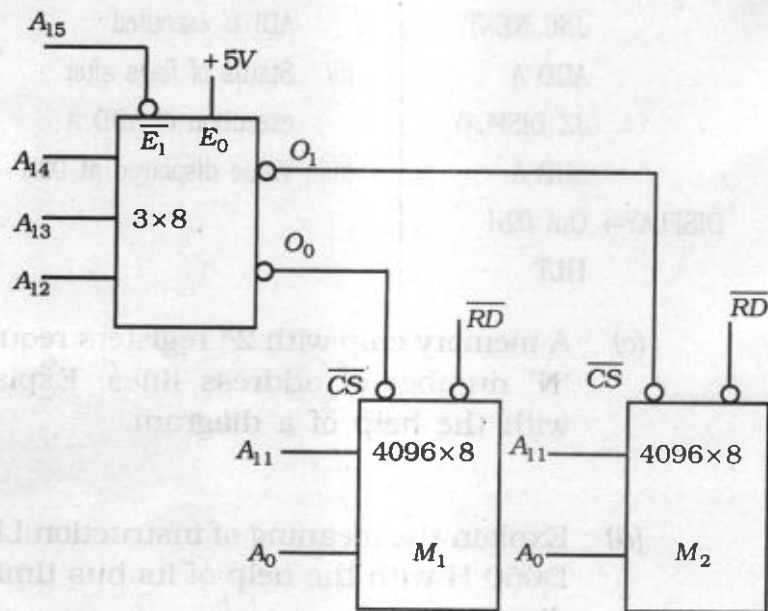(c) In the *figure* given below, answer the following — 8

Fig : (1)

(i) Total memory capacity of the system in Bytes.

(ii) Additional no. of similar chips required to make up 32 *kbytes*.

(iii) Address range of both M_1 and M_2 chips.

(iv) What would be the Address range if A_{15} had been connected via a NOT gate ?

(d) Mention *at least four* differences between peripheral I/O and memory mapped I/O techniques. 4

4. (a) It is required to count the number of data equal to 00 H from memory locations starting at C000H to C00F H and store the total count in D000 H. Draw the required flowchart and write the corresponding program in Assembly Language. 8

(b) For the given program, answer the following questions :

(E000H – E00A H) = (01, 05, 08, 09, FF, F0, 42, A0, 57, 65, 40) H

	LXI H, E000H		
	MVI B, 0A H		
	MVI C, 00H	(i)	Task performed by the program
NEXT→	MOV A, M	(ii)	Value displayed at 02 H
	INX H	(iii)	No. of times loop 'NEXT' is executed
	RAR		
	JNC CHECK		
	INR C	(iv)	Time required to execute the whole program if the clock frequency is 2MHz.
CHECK→	DCR B		
	JNZ NEXT		
	MOV A, C		
	OUT 02H		
	HLT		2+2+2+6=12

5. (a) Explain the meaning of following instructions with suitable examples —

$3 \times 3 = 9$

PUSH B, POP PSW, CALL F000H

(b) With a suitable diagram, show how the instruction RST 6 (F7 H) is implemented.   5

(c) State the functions of all the pins present in control logic of 8255 A peripheral device.   **6**

6. (a) Explain the working of a typical successive Approximation A/D converter with the help of its block diagram.   **10**

(b) Specify the no. of times the following loop is executed.   **5×2=10**

   (i)   MVI A, 00H
   Loop→ DRA A
            JNZ Loop

   (ii)   MVI A, 15H
   Loop→ DCR A
            JNZ Loop

   (iii)   LXI H, 0005 H
   Loop→ DCX H
            JNZ Loop

   (iv)   MVI A, 02H
   Loop→ RLC
            JNC Loop

   (v)   MVI A, FE H
   Loop→ INR A
            JNZ Loop

7. (a) Explain how the 8237 DMA controller is used for high speed data transfer between system memory and a peripheral device. 10

(b) Write an Assembly Language program for 8085 to blink on LED continuously with a delay of 100 ms. 10

OR

Draw the block diagram of 8279 Programmable Keyboard/Display Interface Device and explain the function of each of the major blocks.