53 (IE 501) MPMC

2019

MICROPROCESSOR AND MICROCONTROLLERS

Paper : IT 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. 10×2=20

(a) Write *two* differences between an Interpreter and a Compiler.

(b) Can a microprocessor function without external memory ? Justify.

(c) What is the function of Address Bus in 8085 ?

(d) State the meaning of the following instructions —

(i) MOV A,M

(ii) LHLD 2050 H

(e) Identify the Machine cycles for the given instructions —

(i) MVI A, 05 H

(ii) STAX B

(f) Specify the status of Address and Data Bus in 8th T-state during the execution of OUT 05 H.

(g) Specify the status of sign and zero flag after execution of SUB A.

(h) What is the function of $\overline{\text{INTA}}$ signal ?

(i) The resolution of an n-bit D/A converter is given by ______ .

(j) Name *any two* applications of the 8254 peripheral device.

2. (a) Write an Assembly Language Program to exchange the contents of memory locations D001 H, D002 H with that of E001 H and E002 H respectively. 4

(b) For the program given below, answer the questions that follow : 1+1+2+2=6

```
        MVI A, FD H
NEXT →  INR A
        MOV C, A
        JNZ NEXT
        MVI A, FF H
        MOV A, C
        STA C050 H
        HLT
```

(i) Value of NEXT if the program is assembled starting at DOFE H.

(ii) Memory consumed by the program in Bytes.

(iii) What will be stored in C050 H ?

(iv) What will be the status of carry flag during the execution of the program ?

(c) It is required to build an 8-KByte memory system for 8085μP with the help of memory chips of size 4096 × 8 Bytes.

(i) Calculate the number of such memory chips required for the system.

(ii) Design the system with the help of any logic gates or devices as per your choice.

(iii) Show the memory address range of each memory chip as per your design. 2+6+2=10

3. (a) With a suitable diagram, show the arrangement for generating the control signals $\overline{\text{MEMR}}$, $\overline{\text{MEMW}}$, $\overline{\text{IOR}}$ and $\overline{\text{IOW}}$. 5

(b) Draw the bus timing diagram of the instruction MVI D, 03 H. 7

(c) Draw the flowchart and write the program to find the data with even parity from a block of Ten memory locations. 8

4. (a) Design a counter that starts at 00 H and resets itself at the count of 15 H. Each count should be displayed via port 02 H with a delay of 50 milliseconds between each count. (Assume block frequency to 2*MHz*). 10

(b) What are RST (Restart) instructions in 8085 ? Explain how an RST instruction can be executed with the help of external hardware. 2+4=6

(c) State the functions of SIM instruction and show its Accumulator Bit pattern. 4

5. (a) Explain the working principle of *any one* type of A/D converter. 10

(b) State the function of following pins of 8085 μP — 5×2=10

(i) ALE

(ii) CLK (OUT)

(iii) TRAP

(iv) SOD

(v) $\overline{\text{RESET IN}}$

6. *(a)* For the program given below, answer the questions that follow :

```
C000 → LXI SP, D000 H      C100 → MVI, C, FF H
       LXI H, C050 H       LOOP → DCR C
       LXI D, C070 H              JNZ LOOP
       MVI B, 06 H                RET
LOOP → MOV A, M
       OUT 02 H
       STAX D
       CALL C100 H
       DCR B
       JNZ LOOP
       HLT
```

(i) Explain the function of the program (main) in brief.

(ii) Function of the subroutine.

(iii) Contents of Program Counter and Stack Pointer after CALL instruction.

(iv) Contents of affected stack locations. 4+2+2+2=10

(b) Explain with the help of diagram how the control logic of 8155 PPI can be designed to eliminate the need of externally demultiplexing the low order AD_7-AD_0 lines and generate control signals for memory and I/O devices. 10

7. It is required to design an automatic water level monitoring system for a water tank which will continuously check the water level in the tank such that, as soon as the water level goes below a certain level, it will open a valve to allow water to be filled in the tank and upon reaching a sufficient level, the valve will be closed. Assume that the level sensor has an in-built A/D converter of 8-bit and answer the following questions :

(i) Draw the schematic diagram of the system.

(ii) Draw the flowchart.

(iii) Write the program in Assembly language for 8085 μP by assuming *any two* different levels of water and V_{ref} as 5 volts for the A/D C. 5+5+10=20