53 (IE 501) MPMC

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. *(a)* Answer the following questions in brief : 10×2=20

   (i) Define the terms Mnemonic and Instruction.

   (ii) State the function of Program Counter in 8085.

   (iii) Specify the Byte size of CMA and JMP instructions.

(iv) Specify the status of signals $IO/\overline{M}$, SL, SO, during Memory write operation.

(v) Specify the status of sign and zero flags after the execution of XRA A instruction.

(vi) Calculate the number of chips required to build a 32 *KByte* memory system if the size of each chip is 1024×2 *bits*.

(vii) Write the meaning of instructions — RAR, CALL.

(viii) Name and identify the Machine cycles in RST instruction.

(ix) If content of Accumulator is 08H, which interrupt pins will be enabled after execution of SIM instruction.

(x) Which bit of the control word in 8255 differentiates between BSR and I/O mode ?

2. (a) For the program given below, answer the questions that follow : 1+1+2=4

MVI A, 06 H ADI FD H ORA A MOV B, A OUT 02 H HLT	(i) If the program is assembled starting at DFF7 H, what will be the address of HLT ? (ii) What will be displayed at 02 H ? (iii) Specify the status of flags.

(b) Write an Assembly Language Program to add the contents of D000 H through D006 H and store the carry and result in D050 H and D051 H respectively. Also, show the flow chart. 6

(c) Define the terms Instruction Cycle and Machine Cycle. 2

(d) Draw the Bus timing diagram of STA F00A H and find the time required to execute this instruction if the system clock frequency is 2*MHz*. 8

3. (a) Design an 8 *KByte* memory system for 8085 μp using memory chips of size 2048×8 bits and specify the address range of each chip as per your design. 10

(b) For the program given below, answer the questions that follow — 5×2=10

```
D000 : LXI SP, DFFF H
       LXI B, FFOO H
       LXI H, DFFF H
       PUSH B
       PUSH H
       POP PSW
       POP PSW
       CALL D050 H
       HLT
```

(i) Contents of PC and SP after CALL instruction

(ii) Contents of affected registers.

(iii) Total number of memory locations affected in the stack and their final contents.

(iv) Status of flags.

(v) Can the program be assembled starting at DFFOH ? Justify.

4. (a) Draw a schematic to implement RST 7 instruction for 8085μp. Also, mention clearly the steps involved in executing the above instruction when the microprocessor gets a HIGH signal at INTR pin. 10

(b) Explain with the help of block diagram, the working of SAR based A/D converter. 10

5. (a) Draw the block diagram of 8254 Programmable Interval Timer and describe the function of each block. Also, list the different modes of operation of the 8254 device. 8

(b) Write an Assembly language program to count the even numbers present in a block of 20 memory locations. Also, the final count should be displayed via port 05H. 8

(c) For the program given below, find the value of COUNT to achieve a delay of 500 milliseconds if the system clock frequency is 2*MHz* 4

```
        LXI B, COUNT
LOOP :  DCX B
        MOV A, C
        ORA B
        JNZ LOOP
```

6. It is required to design a Temperature monitoring system for a process with the help of 8085 and a temperature sensor with an in-build 8-bit *ADC*. Following are the requirements and sensor specifications —

Requirement —

(i) Turn on Green LED as long as temperature in below 60°C.

(ii) If temperature exceeds 60°C, turn off Green LED and turn on RED LED.

(iii) Continue the monitoring process.

Sensor's Analog reading —

20°C — 1*volt*

40°C — 2*volt*

60°C — 3*volt*

80°C — 4*volt*

100°C — 5*volt*

Design the flow chart and write the program in Assembly Language as per the requirements given above and the sensor data provided. (Assume V_{ref} of *ADC* is 5*volts*).

Also, design the hardware showing only the I/O ports, LEDs and sensor being interfaced with 8085 and use the same port addresses in your program. 20

7. (a) Design an output port with address OF H to interface 1408 D/A converter with 8085 *μp*. 10

(b) Draw the block diagram of 8051 microcontroller and specify the function of each block. Also draw the Power-On Reset Circuit required to reset the microcontroller. 6+4=10
