MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : EE-504C

MICROPROCESSORS AND MICROCONTROLLERS

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) The number of register pairs of 8085 microprocessor is

   a) 3 b) 2

   c) 4 d) 5.

   ii) Number of machine cycles in JMP is

   a) 3 b) 2

   c) 4 d) 5.

iii) Which of the following interrupts is both level and edge sensitive ?

a) RST 5.5 b) RST 6.5

c) RST 7.5 d) TRAP.

iv) What is the restart address for RST 4 ?

a) 0024H b) 0020H

c) 0028H d) 0000H.

v) The address lines required for 16 k-byte memory chip are

a) 13 b) 14

c) 15 d) 16.

vi) When the instruction LDA is executed, the number of T-states required is

a) 10 b) 14

c) 13 d) 15.

vii) STA 9000H is a/an

a) data transfer instruction

b) logical instruction

c) I/O & machine control instruction

d) none of these.

viii) In 8085 microprocessor, the number of address lines present for peripheral-mapped is I/O

a) 8. b) 10

c) 16 d) 256.

ix) For 8255 PPI, the bi-directional mode of operation is supported in

a) Mode 1 b) Mode 2

c) Mode 0 d) either (a) or (b).

x) 8086 microprocessor is called a 16-bit microprocessor because

a) data bus is 16 bit

b) address bus is 16 bit

c) accumulator is 16 bit

d) its memory is 16 bit.

xi) The total I/O space available in 8085 microprocessor if used peripheral - mapped - I/O is

a) 8 b) 10

c) 16 d) 256.

xii) If the crystal with 8085 is 2 MHz, the time required to execute an instruction of 20 T - states is

a) 20 μs b) 10 μs

c) 40 μs d) 5 μs.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following $3 \times 5 = 15$

2. How are DMA operations performed by INTEL 8237 A ?

3. Explain the control words of 8255 and write down the Mode 0 control words for the following two cases :

Port A = Input port, Port B = not used,

Port C (Upper) = Output port

Port C (lower) = Input port ;

Port A = Output port, Port B = Input port,

Port C = Output port.

4. Discuss the memory organization of 8051 microcontroller

5. Write a program to shift 8-bit numbers left by two bits and then store the number in another memory location.

6. What is the difference between SIM & RIM instructions.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Draw and explain the timing diagram of LDA 4078_H.

   b) What are the differences between CALL and JMP instructions of 8085 microprocessor ?

   c) Explain the functions of HOLD and READY signals.

   d) Calculate the total time delay for the following loop in the 8085 microprocessor, assuming the clock period is 0.5 microsecond :

```
        LXI   B,238H        10T
LOOP:   DCX   B             6T
        MOV   A,C           4T
        ORA   B             4T
        JNZ   LOOp          10/7T   5 + 3 + 2 + 5
```

8. a) Why is a decoder circuit needed ? Using 74LS138, explain the interfacing of memory and IO devices.

   b) Define Stack. Explain function of PUSH and POP instructions.

   c) Specify the register contents and the Flag status as the following instructions are executed. Specify also the data at PORT0.

```
MVI A, F2H
MVI B, 7AH
ADD B
OUT PORT0
HLT
```

Initial contents : A=00_H, B=FF_H, S=0, Z=1, CY=0. 7 + 5 + 3

9. a) Discuss the internal structure of 8051 microcontroller.

   b) Explain the PSW bits, TMOD bits and TCON bits of 8051 controller.

   c) Write an 8051 assembly language program to add two 16 bit nos. 5 + 5 + 5

10. a) Describe the different addressing modes of the 8086 microprocessor.

    b) How is pipelining achieved in the 8086 microprocessor ?

    c) Draw the architecture of 8086. What are the main functions of BIU and EU unit of 8086 microprocessor ? 5 + 5 + 5

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11. Write short notes on any *three* of the following : 3 × 5

a) 8259 interrupt controller

b) 8251 USART

c) Handshaking mode of 8255

d) Square Wave Generator mode of 8253

e) Absolute decoding vs. partial decoding.

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