MICROPROCESSORS & MICROCONTROLLERS
(AEIE 3105)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

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

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) LDA 2050_H is a ____ instruction.
(a) 1 byte (b) 2 byte (c) 3 byte (d) 4 byte

(ii) After DCX D instruction execution, which of the following flag bit is effected
(a) carry flag (b) zero flag
(c) sign flag (d) none of these.

(iii) In 8085 µP top of the stack memory address is pointed by which register?
(a) PC (b) SP (c) HL pair (d) W and Z.

(iv) Which of the following signals indicate a 8 bit data transfer from odd address bank
(a) $\overline{BHE}$ = 0, A_0 = 0 (b) $\overline{BHE}$ = 0, A_0 = 1
(c) $\overline{BHE}$ = 1, A_0 = 0 (d) $\overline{BHE}$ = 1, A_0 = 1.

(v) If the crystal frequency connected with 8085 is 2 MHz, then the time required to execute an instruction of 10T states is
(a) 5 µsec (b) 10 µsec
(c) 15 µsec (d) 20 µsec.

(vi) PIC 16F877 has _____ size of program memory.
(a) 2 KB (b) 4 KB (c) 8 KB (d) 16 KB

(vii) MOVX A, @R_0 instruction performs
(a) data transfer from external RAM 8 bit address specified by R_0 to accumulator
(b) data transfer from internal RAM 8 bit address specified by R_0 to accumulator
(c) data transfer from external ROM 8 bit address specified by R_0 to accumulator
(d) data transfer from internal ROM 8 bit address specified by R_0 to accumulator.

(viii) The 8051 microcontroller has
(a) 128 byte on chip RAM & 4KB ROM
(b) 128 byte on chip ROM & 4KB RAM
(c) 4 KB on chip RAM & 128 byte ROM
(d) 128 byte on chip RAM & 128 byte ROM.

(ix) Number of internal 16 bit timers in 8051 µC chip is
(a) 2 (b) 3 (c) 4 (d) 5.

(x) 8051 µC will read instruction from its internal program memory if
(a) RST pin is at logic 0 (b) RST pin is at logic 1
(c) $\overline{EA}$ pin is at logic 0 (d) $\overline{EA}$ pin is at logic 1.

Group – B

2. (a) Write the name of register pairs in 8085 µP. Discuss the function of SP register in 8085 µP with one suitable example.

(b) Discuss the function of following signal of 8085 µP (*any one*) –
(i) ALE (ii) HOLD.

(c) What is the difference between SUB B and CMP B instruction?

(d) Write a program to transfer (cut paste) a block of N byte data starting from 8000_H to 8100_H in reverse order. The number of data (i.e. N) needs to be transferred is stored in memory location 9000_H.

(1 + 2) + 2 + 2 + 5 = 12

3. (a) Design a memory interfacing of 2KB RAM with 8085 microprocessor and consider the starting address is 8000H, find the final address. Write down two instructions related to memory.

(b) Compare all the interrupts in 8085 microprocessor with the help of following basis like-edge and level triggered, and vectored and non vectored type.

(4 + 2 + 1) + 5 = 12

Group – C

4. (a) What are the functions of BIU and EU in 8086 µP?

(b) Draw the flag register of 8086 µP. With one suitable example discuss the function of D flag.

(c) Discuss the function of following signals in 8086 µP (*any two*) –
(i) $\overline{BHE}$ (ii) S_3 and S_4 (iii) DT/$\bar{R}$.

(d) What is the function of instruction queue in 8086 µP?

2 + (2 + 2) + (2 × 2) + 2 = 12

5. (a) Explain the following addressing modes of 8086 microprocessor with an example-base addressing, based index addressing, string addressing and machine control addressing.

   (b) What is the difference between effective (segment and offset) and physical address? Calculate physical address if CS = 5000H, IP = 0500H.

(2 × 4) + (2 + 2) = 12

Group – D

6. (a) Distinguish between microprocessor & microcontroller.

   (b) Draw and discuss the internal architecture of 8051 μC.

   (c) What is the function of $\overline{EA}$ signal of 8051 μC?

3 + (2 + 5) + 2 = 12

7. (a) Describe the TMOD and TCON registers bit significance in 8051 Microcontroller.

   (b) How many numbers of ports, addressing modes and number of instructions in 16F877 PIC microcontrollers?

(2 × 4) + 4 = 12

Group – E

8. (a) What do you mean by Mode 0, Mode 1 and Mode 2 operation of 8255 PPI?

   (b) One LED is connected at PC_7 line of 8255 PPI. Write an assembly language program for 8085 μP to blink the LED using BSR mode. Assume a delay subroutine is available at memory location 9000_H.

   (c) Draw the block diagram of interfacing circuit to connect one 7 segment display with 8085 μP using 8255 PPI. Write a program to display the last digit of your registration number.

3 + 3 + (2 + 4) = 12

9. Write down an ALP in 8085 microprocessor to display last three numbers of your college postal PINCODE using 8255 and 7 segment display. Draw the necessary circuit diagram.

(8 + 4) = 12