ADVANCED MICROPROCESSORS & MICROCONTROLLERS
(AEIE 3203)

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) 8086 μP exchanges data word with memory bank when
(a) $\overline{BHE}$ = 0 and A_0 = 0 (b) $\overline{BHE}$ = 0 and A_0 = 1
(c) $\overline{BHE}$ = 1 and A_0 = 0 (d) $\overline{BHE}$ = 1 and A_0 = 1.

(ii) MOV AX, [4501 H] instruction transfers
(a) 8 bit data from odd memory bank
(b) 8 bit data from even memory bank
(c) 16 bit data lower from even and higher from odd memory bank
(d) 16 bit data lower from odd and higher from even memory bank.

(iii) Address/data bus connected to odd memory bank is
(a) AD0 - AD7 (b) AD8 - AD15
(c) AD16 - AD19 (d) AD0 - AD19.

(iv) What physical address is represented by 2000: AA1EH?
(a) 2AA1EH (b) AAA1EH
(c) 20A1EH (d) 0AA1EH.

(v) Which register is used as the base location for all executable instructions?
(a) CS (b) IP (c) DS (d) SI.

(vi) What is the vector location for INT3 interrupt?
(a) 0006_H (b) 0012_H
(c) $000C_H$ (d) 0003_H.

(vii) The last instruction in an interrupt service routine should be
(a) JMP (b) HLT (c) RET (d) IRET.

(viii) Number of bit addressable RAM location in 8051 μC chip is
(a) 128 (b) 256 (c) 2K (d) 4K.

(ix) How many 16-bit Timer register are present in 8051 μC chip?
(a) 2 (b) 3 (c) 4 (d) 5.

(x) To select Bank 2 in 8051 μC chip register bank selection bits are
(a) RS1 = 0 RS0 = 0 (b) RS1 = 0 RS0 = 1
(c) RS1 = 1 RS0 = 0 (d) RS1 = 1 RS0 = 1.

Group – B

2. (a) Write a program for 8086 μP to find the 2's complement of word data stored at memory location.

(b) Discuss the function of following signals of 8086 μP (*any three*):
(i) NMI (ii) $\overline{DEN}$ (iii) DT/$\overline{R}$ (iv) $\overline{BHE}$

(c) Explain the function of following instructions of 8086 μP (*any three*):
(i) LOOP L1 (ii) STD (iii) XLAT (iv) CMPSB.

3 + (1.5 × 3) + (1.5 × 3) = 12

3. (a) What is the function of segment registers?

(b) If the contents of CS and IP registers are 2100H and 0FFFH, respectively, then calculate the 20 bit physical address.

(c) Write the functions of DF, IF and TF flag bits of 8086 μP.

(d) Write the different memory segments used in the 8086 μP and their functions.

2 + 2 + 3 + 5 = 12

Group – C

4. Design an interface between 8086 μP and two chips of 16K × 8 RAM and two chips of 16K × 8 ROM. The first address of RAM is 00000_H and the last address of ROM is $FFFFF_H$.

12

5. (a) What is the difference between absolute and partial address decodings?

(b) Design an interface between 8086 μP and 8 switches (SW_0-SW_7), where the I/O port address is $07F0_H$. Write a program to read the status of the switches and store 00_H in register BL if only SW_0 is open, else (if SW_0 is close) store FF_H in BL.

(c) What is the function of IN AX, DX instruction?

3 + 7 + 2 = 12

Group – D

6. (a) Distinguish between a microprocessor & microcontroller.

(b) Draw and discuss the flag register of 8051 μC.

(c) Discuss the function of following signals of 8051 μC (*any two*):
(i) $\overline{EA}$ (ii) $\overline{PSEN}$ (iii) TXD

(d) Explain the function of following instructions of 8051 μC (*any two*):
(i) DJNZ L1 (ii) SETB C (iii) CPL A

2 + 4 + (1.5 ×2) + (1.5 ×2) = 12

7. (a) Write a delay routine for 1ms using Timer 0 of 8051 μC. Consider the crystal oscillator frequency of 12 MHz.

(b) What is the difference between MOVC and MOVX instructions?

(c) Write short notes on (*any one*):
(i) Internal RAM organization of 8051 μC
(ii) Interrupts of 8051 μC
(iii) A/D converter interfacing with 8051 μC

5 + 2 + 5 = 12

Group – E

8. (a) Write the features of different PIC microcontrollers that come under the 16F87X family.

(b) Discuss the memory organization of PIC 16F877 microcontroller.

6 + 6 = 12

9. (a) Discuss the different ports of PIC 16F877 microcontroller.

(b) Write a PIC 16F877 ALP to add two data, 90_H and $8F_H$, and store the result in the internal register file in the addresses 50_H (Lower byte) and 51_H (Higher byte).

6 + 6 =12