**23124**

**3 Hours / 70 Marks**          Seat No. 

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**Instructions :**   (1)   All Questions are *compulsory.*

(2)   Illustrate your answers with neat sketches wherever necessary.

(3)   Figures to the right indicate full marks.

(4)   Assume suitable data, if necessary.

**Marks**

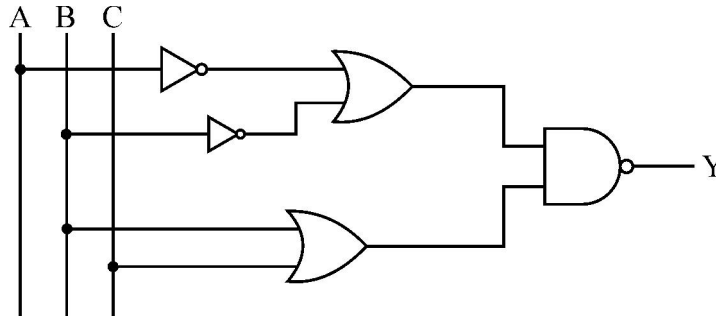1.   **Attempt any FIVE of the following :**                                **10**

(a)   Define following terms :

(1)   Fan in

(2)   Power dissipation

(b)   Define following terms :

(1)   Minterm

(2)   Maxterm

(c)   List the difference between level triggering and edge triggering.

(d)   Draw symbol and truth table of

(1)   AND gate

(2)   NOR gate

(e)   Identify the use of Index Register, Base Pointer and Instruction Pointer.

(f)   List any four features of 8086.

(g)   List any four addressing modes of 8086 and give one example of each.

**2.** **Attempt any THREE of the following :** **12**

(a) Convert the following :

(i) $(105)_{10} = (?)_2$        (ii) $(126)_8 = (?)_{16}$

(b) Explain rules to simplify Boolean expression using K-map.

(c) Draw and explain the working of D flip flop with truth table.

(d) Implement basic gates using NAND gate only.

**3.** **Attempt any THREE of the following :** **12**

(a) Interpret De Morgan's theorem with its statement & proof.

(b) Describe any four logical instructions with example.

(c) Describe JK flip flop with its truth table and logic diagram.

(d) Design half adder using K-map and basic gates.

**4.** **Attempt any THREE of the following :** **12**

(a) Write 8086 assembly language program with algorithm to add two 16 bit numbers.

(b) Simplify following equation using K-map and realize expression using basic gates $f(A, B, C, D) = \Sigma m\ (1,3,4,5,7,9,11,13,15)$.

(c) Differentiate between sequential and combinational circuits (4 points).

(d) Describe pipelined architecture concept of CISC, which helps in improving system throughput.

**5.** **Attempt any TWO of the following :** **12**

(a) Interpret the given program and specify the o/p for following situations :

MOV AX, 3459 H

MOV BX, 3A69 H

(i) Masking of lower nibble of AX

(ii) Rotate right through carry contents of BX by 4 positions

(iii) Shift left contents of BX by 6 positions

(iv) XOR AX, BX

(b) Refer given figure and write the o/p for each of the following input :



| A | B | C | Y |
|---|---|---|---|
| 0 | 0 | 0 | |
| 0 | 0 | 1 | |
| 0 | 1 | 0 | |
| 0 | 1 | 1 | |
| 1 | 0 | 0 | |
| 1 | 0 | 1 | |
| 1 | 1 | 0 | |
| 1 | 1 | 1 | |

(c) Draw maximum mode configuration of 8086 and explain any four control signal generated by bus controller.

**6. Attempt any TWO of the following :**      **12**

(a) Calculate the physical address of following :

(1) 4370 H : 561 E H

(2) 7 A 32 : 6028 H

Also explain the process of calculating the physical address.

(b) Design 32:1 Mux using 8:1 mux

(c) Identify the addressing mode for the following instruction :

(1) MOV AL, [3000 H]

(2) Add AL, [BX + 04]

(3) MOV AX, [BX + SI]

(4) MOV BX, 0354 H

(5) MOV AL, BL

(6) MOV AX, [BX + SI + 04]

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