22320

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

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

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. **Attempt any <u>FIVE</u> of the following:**   **10**

a) List the octal and hexadecimal numbers for decimal number 0 to 15.

b) Convert $(159)_{10} = (?)_8$

Convert $(380)_{10} = (?)_{16}$

c) Draw symbol, truth table of NAND gate.

d) Define min-term and max-term with respect to K-map.

e) List the types of DAC.

f) State two features of ADC IC0809.

g) List the types of semiconductor memories.

Marks

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

    a)   Perform the subtraction using 2's complement methods.

       $(10110)_2 - (11010)_2$

    b)   Explain the following characteristics with respect to logic families -

       i)   Power dissipation

       ii)   Fan-in and fan-out

       iii)   Noise margin

       iv)   Speed of operation

    c)   Draw logic diagram of half adder using K-map simplification and write truth table.

    d)   Describe the working of J-K flip-flop and state the race around condition.

    e)   Give classification of memory and compare RAM and ROM. (Any four points)

3.   **Attempt any FOUR of the following:**   **16**

    a)   Convert $(53)_{10}$ = (BCD)

               $(34)_{10}$ = (Excess-3)

               $(100111)_2$ = (Gray)

               $(11010)_2$ = (2's complement)

    b)   State and explain De-Morgan's theorems.

    c)   Draw 16:1 mux tree using 4:1 mux.

    d)   Describe the operation of R-S flip-flop using NAND gate.

    e)   Describe the operation of 4 bit serial in serial out shift register.

    f)   Draw and explain the block diagram of Programmable Logic Array (PLA).

Marks

4. **Attempt any TWO of the following:** **16**

a) Design 1 : 8 demultiplexer using 1 : 4 demultiplexer. Also write truth table.

b) Explain the role of counters in digital circuits and design Mod -> counter using IC 7490.

c) Draw and explain the block diagram of dual slope ADC. Also write it's specifications.

5. **Attempt any TWO of the following:** **16**

a) Design basic logic gates using NAND and NOR gate.

b) Minimize the following expression using K-map.

$f(A, B, C, D) = \Sigma m (0, 1, 2, 4, 5, 7, 8, 9, 10)$

Also explain SOP and POS form.

c) Draw and explain 4-bit universal shift register. Also explain the necessity of register in digital circuits.

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