Con. 2856-07.   (REVISED COURSE)   ND-432

(3 Hours)   [Total Marks : 100

N.B (1) Question No. 1 is **compulsory**.
    (2) Attempt any **four** questions out of remaining **six** questions.
    (3) Assume **suitable additional data** if **necessary**.

1. (a) Convert $(1762 \cdot 46)_{10}$ to Octal, Binary and Hexadecimal.   6
  (b) Perform the following operations without converting to any other base.   8

      (i) $(BC5)_4 - (A2B)_H$

      (ii) $(63)_8 * (14)_8$

      (iii) $(102 \cdot 3)_4 + (212 \cdot 3)_4$

      (iv) $(11010)_2 \div (101)_2$

  (c) (i)   Write the truth table and exitation of J-K Flip Flop.   2
      (ii)   What is a Gray Code ? Give any application.   2
      (iii)   Write the Hamming Code for 1010.   2

2. (a) (i)   Subtract using 1's and 2's complement method $(64)_{10} - (31)_{10}$.   2
      (ii)   Addition of 275 and 496 to be performed using BCD addition rules.   2
      (iii)   Implement EX-OR gate using four, two input NAND gates only.   2
      (iv)   State De-Morgons Theorems.   2
  (b) Simplify using Boolean Theorems and draw Logic Diagram for the following :   12

      (i) $\bar{X}YZ + X\bar{Y}Z + XY\bar{Z} + XYZ$

      (ii) $P [Q + R] (\overline{PQ + PR})$

      (iii) $\bar{W}Y + \overline{\bar{W}XZ} + \bar{W}X\bar{Y}\bar{Z} + W\bar{X}Y$

      (iv) $A + \bar{A}B + (\bar{A} \cdot \bar{B}) C + ABCD$

3. (a) Given the logic expression—   12

      $AB + A\bar{C} + C + AD + A\bar{B}C + ABC$

    (i)   Express in standard SOP form
    (ii)   Draw the k-map for the equation
    (iii)   Minimize and realise using NAND gates only.
  (b) Realise the following using 16:1 MUX and 4:16 line decoder   8
      $f(A, B, C, D) = \Sigma m (1, 2, 4, 7, 11, 13)$

4. (a) Obtain minimal expression using Quine McClusky   10
      $f(A, B, C, D) + \Sigma m (0, 1, 3, 5, 7, 10, 11, 13, 14, 15)$
  (b) Design a 4-bit BCD Adder using IC 7483.   10

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5. (a) A panel light in the control room at the launching of a satellite is to go ON if and **12** only if the pressure in both fuel and oxidises tanks is equal to or above a required minimum and there are 10 minutes or less to lift off or if the pressure in the oxidiser tank is equal to or above a required minimum and pressure in fuel tank is below a required minimum but there are more than 10 minutes to lift off, or if the pressure in the oxidiser tank is below a required minimum but there are more than 10 minutes to lift off.

Design a two level combinational circuit to control panel light.

(b) Simplify $f(P, Q, R, S) = \pi M (0, 2, 5, 7, 8, 13, 15) \cdot d(10, 15)$ using K-map and **8** realise using NOR gates only.

6. (a) Design a 3 bit Up-Down Asychronous Counter with direction control M using **10** J-K Flip Flops.

(b) Design a Decade Synchronous Counter using J-K Flip Flops. **10**

7. (a) Draw neat diagram of two-input TTL NAND gate and explain its operation. Also **10** draw transfer characteristics.

(b) Write short notes on any **two** :— **10**

    (i) PAL and PLA

    (ii) ALU

    (iii) Priority Encoder.