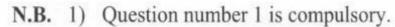
Q.P. Code: 541000 1612116

(3 Hours)

[Total Marks: 80]



- 2) Attempt any 3 questions from the remaining 5 questions.
- 3) Each question carries 20 marks.
- 4) Within a question, each sub-question carries equal marks.
- 1. a) Convert decimal number 151.33 into binary, base-4, octal, hexadecimal system.
 - b) A 7 bit even parity hamming code is received as 1000010. Correct it for any errors & extract 4 bit data.
 - c) Express the equation in standard SOP form: $F(A, B, C) = \bigcap M$ (0, 2, 5, 7).
 - d) Compare TTL & CMOS with respect to speed, power dissipation, fan-in & fan-out & also define these terms.
 - e) Draw JK flip-flop using SR flip-flop & additional gates. Explain briefly the race around condition in JK flip-flop.
- a) Simplify the following equation using K-map to obtain minimum SOP equation & realize the minimum equation using two level NAND gates only.

 $F(A, B, C, D) = \prod M(1, 3, 4, 6, 9, 11, 12, 14)$

b) What is Multiplexer? Implement the following function using 4:1 multiplexer and few gates.

 $F(A, B, C, D) = \Sigma m(0, 1, 2, 3, 6, 7, 9, 10, 13, 15)$

3. a) Reduce using Quine McClusky method & realize the equation using only NAND gates.

 $F(P, Q, R, S) = \Sigma m (0, 1, 2, 8, 10, 11, 14, 15)$

- b) Prove using boolean algebra: "NAND gate is universal gate".
- a) Develop the truth table for 2-bit binary multiplier & design it using a suitable decoder & additional gates.
- Design MOD-7 synchronous up-counter. Show all the design steps.

(TURN OVER)

- 5. a) Develop the truth table of 3 bit binary to gray code converter and design it by using 3:8 decoder with active low outputs & additional gates.
 - b) Draw a circuit diagram for MOD-10 asynchronous binary up counter using master-slave JK flip-flops. Show the output of each of the flip-flop with respect to the clock applied, write the state transition table and explain the operation in brief.
- 6. a) What is shift register? Draw a 4-bit universal shift register & explain PISO & SIPO operations.
 - b) Draw & explain the working of 4-bit twisted ring counter with timing diagram.
