

This question paper contains 3 printed pages.

3289

Your Roll No.

B. Tech. (EEE) / II

J

Paper III— DIGITAL ELECTRONICS

(EEE-203)

Time : 3 hours

Maximum Marks : 70

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

*Question No. 1 is compulsory. Answer
any four out of the rest.*

1. (a) What is concept of duality? State the duality for $(x + \bar{x}y)$.
 - (b) Convert $(56)_{10}$ into Binary code and excess-3 code.
 - (c) Simplify $A(\overline{AB+C}) + \overline{AC}$
 - (d) Express $y = (A+B+C)$ in canonical SOP form.
 - (e) Realise $Y = (A+B+C)$ by using NAND gate only.
 - (f) What is race-around condition in J-K Flip-Flop? State the method to overcome it.
 - (g) What is the function of an encoder? Give an example of it. 7×2
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2. (a) Perform the subtraction by using 2's complement and 1's complement.

P. T. O.

(i) $11010 - 1101$

(ii) $100 - 110000$ 8

- (b) Give the representation of decimal digits in 3321 weighted code. The representation should be such as to qualify for reflected code. 6

3. (a) Express the following functions in a sum of minterms and a product of maxterms:

(i) $F(A, B, C, D) = (A + \bar{B} + C)(A + \bar{B})(A + \bar{C} + \bar{D})(\bar{A} + B + C + \bar{D})(B + \bar{C} + \bar{D})$

(ii) $F(W, X, Y, Z) = \bar{Y}Z + WX\bar{Y} + WX\bar{Z} + \bar{W}\bar{X}Z$ 8

- (b) Simplify the boolean function F in sum of products using don't care conditions 'd':

$$F = \bar{Y} + \bar{X}\bar{Z}, \text{ with } d = YZ + XY. \quad 6$$

4. (a) Design a combinational circuit that converts BCD numbers to Ex-3 numbers. 7

- (b) Design a combinational circuit that checks the number of 1's present in four bit code to be even. 7

5. (a) With neat diagram discuss the operation of a BCD adder. 7

- (b) Implement the function $F(A, B, C, D) = \sum (0, 1, 3, 4, 8, 9, 15)$ by using 8 : 1 MUX 7

6. (a) Design a counter with the following binary sequence : 0, 1, 3, 2, 6, 4, 5, 7 and repeat. Use RS Flop-Flop. 7

- (b) Design a Mod-8 counter by cascading two counters. Give the state table and state whether this Mod-8 counter is Synchronous or Asynchronous. 7
7. (a) Show the NAND gate version of J-K Flip-Flop with preset and clear input. Give the truth table and excitation table for this FF. Also justify that preset and clear inputs are Asynchronous input. 7
- (b) With neat block diagram, explain the working of a 4 bit up-down counter. Give its timing diagram. 7
8. Write notes on the following:
- (i) SISO Shift Register
- (ii) ECL NOR Gate. 7,7