Roll No.: .....

National Institute of Technology, Delhi

Name of the Examination: B. Tech

Branch	**: ECE**	**Semester**	**: III**
Title of the Course	**: Digital Electronics**	**Course Code**	**: ECB 202**

Time: 2Hours **Maximum Marks: 25**

Note:

- **Questions are printed on BOTH sides. Answers should be CLEAR, TO THE POINT AND LEGIBLE.**
- **All parts of a single question must be answered together and in the same sequence as given in question paper. ELSE QUESTION SHALL NOT BE EVALUATED.**
- **All questions are compulsory.**

Q 1 Simplify the following Boolean expressions using K-map **(1×3)**

(a) $F(x, y, z) = \sum(0,1,5,7)$

(b) $F(w, x, y, z) = x'z + w'xy' + w(x'y + xy')$

(c) $F(A, B, C, D) = \sum(0,2,4,5,6,7,8,10,13,15)$

Q 2 Find all the prime implicants for the following Boolean functions, and determine which are essential

(a) $F(w, x, y, z) = \sum(0, 2, 4, 5, 6, 7, 8, 10, 13, 15)$ **(2)**

(b) $F(A, B, C, D) = \sum(0, 2, 3, 5, 7, 8, 10, 11, 14, 15)$ **(2)**

Q 3 Simplify the following Boolean expressions to (1) sum of products and (2) products of sums

(a) $x'z' + y'z' + yz' + xy$ **(2)**

(b) $(A + C' + D')(A' + B' + D')(A' + B + D')(A' + B + C')$ **(2)**

Q 4 Solve the following questions **(1×4)**

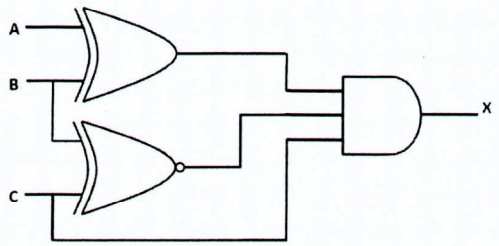
(a) Subtract the decimal number 72532 from 3250 using 10's complement and interpret the result.

(b) Assume the Binary numbers X = 1010100 and Y = 1000011. Perform the operation X-Y and Y-X using 1's complement method with necessary interpretation of the results.

(c) Express the following numbers $(16.5)_{16}$ and $(26.24)_8$ in decimal.

(d) Find the minimum decimal equivalent of number $(11C)_r$.

Q 5 (a) In the circuit shown below, find out the logic level of inputs A, B and C to get the output X as logic 1. **(2)**



(b) If $A \oplus B = C$, then show that $A \oplus C = B$ and $B \oplus C = A$. **(2)**

Q 6 (a) Simplify the k-map into minimal sum of product **(2)**

yz \ wx	00	01	11	10
00	0	X	0	0
01	0	X	1	1
11	1	1	1	1
10	0	X	0	0

(b) Simplify the k-map into minimal sum of product **(2)**

yz \ wx	00	01	11	10
00	0	X	0	X
01	X	1	X	1
11	0	X	1	X
10	0	1	X	0

Q 7 Implement the XOR function using NAND gate. **(2)**

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