

EE-313 DIGITAL ELECTRONICS

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer any **FIVE** questions.
Draw neat diagrams wherever required.
Assume suitable missing data, if any.

- 1 A combinational circuit has four inputs and one output. The output is equal to 1 when (i) all the inputs are equal to 1 or (ii) none of the inputs are equal to 1 or (iii) an odd No. of inputs are equal to 1.
[a] Obtain the truth table.
[b] Find the simplified output function in sum of products. Also draw the logic diagram.
4
- 2 Simplify the Boolean function F using the don't care conditions 'd', in
[a] Sum of products
[b] Product of sums
 $F(w, x, y, z) = \sum(1, 3, 7, 11, 15)$ and don't care conditions:
 $d(w, x, y, z) = \sum(0, 2, 5)$
4
- 3 Simplify the Boolean function
 $F = A'C + A'B + AB'C + BC$
Using Karnaugh map in sum of minterms form. Also draw the logic diagram.
4
- 4 Implement the following function with either NAND or NOR gates. Use only four gates. Only the normal inputs are available.
 $F = w'xz + w'yz + x'yz' + wxy'z$
 $d = wyz$.
4
- 5 Express the following functions in a sum of minterms and a product of maxterms.
 $F(A, B, C, D) = D(A' + B) + B'D$.
4

- 6 Implement the Boolean function

$$F = A(B + CD) + BC'$$

Using (a) AND-OR Gates

(b) NAND Gate only

4

- 7 Derive the Boolean functions for the two outputs of half subtractor.
Implement half subtractor using either NAND or NOR Gates.

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