DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECB231 – DIGITAL ELECTRONICS

II YEAR/ III SEMESTER

UNIT 1 – MINIMIZATION TECHNIQUES AND LOGIC GATES

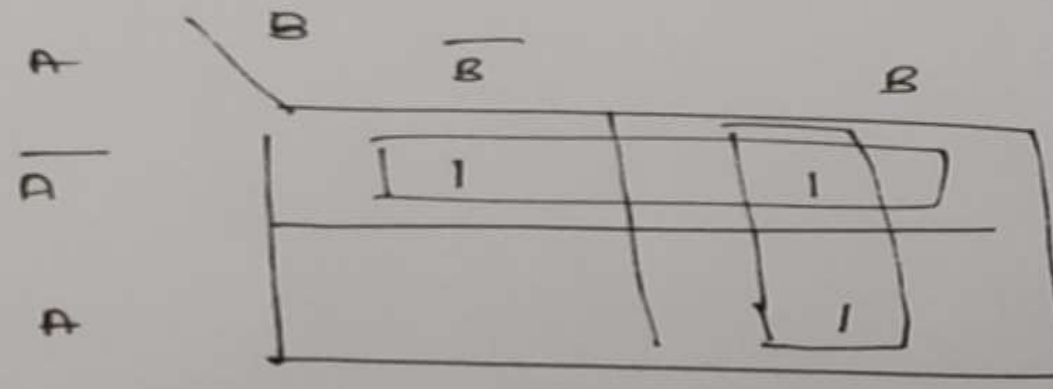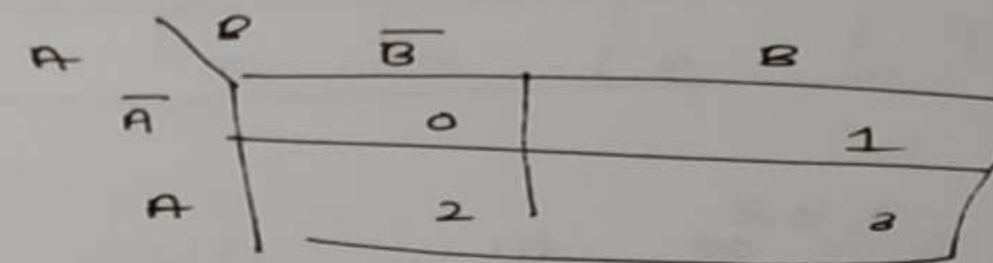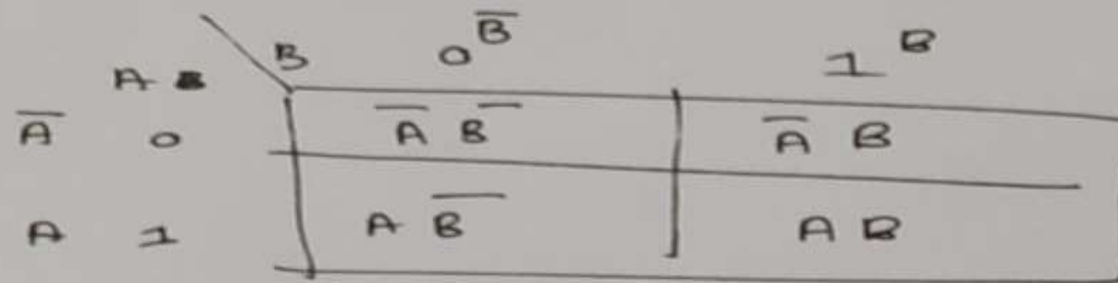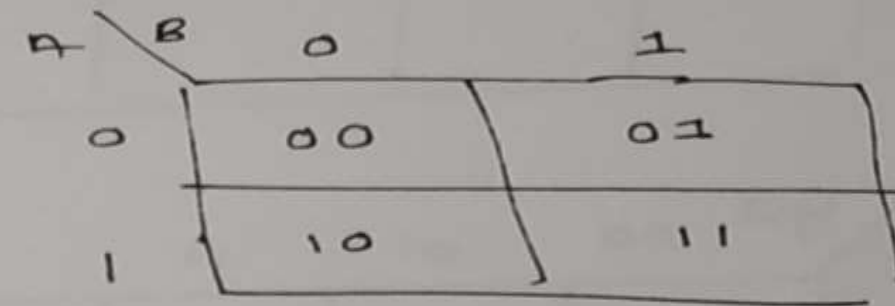## TOPIC 6 - KARNAUGH MAP MINIMIZATION ,DON'T CARE CONDITIONS- Problems
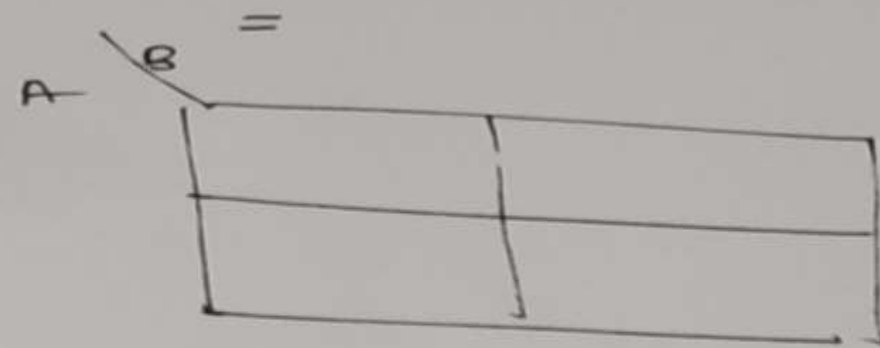
Two variable k-map

i) $F = \bar{A}\bar{B} + \bar{A}B + AB$.

n = number of variables

n = 2.

No of columns in k-map $= 2^n = 2^2 = 4$

$F = \bar{A} + B$

Three variable k-map.

$$F(x, y, z) = \Sigma (2, 3, 4, 5)$$

n = 3

No. of columns $= 2^3 = 8$

so

$$f(x, y, z) = \Sigma (2, 3, 4, 5) = \overline{x}y + x\overline{y}$$

3. Minimize the following standard POS expression using k-map.

$$y = \Pi M (0, 2, 3, 5, 7)$$

Sol:-
n = 3, $2^3 = 8$

x \ yz	00	01	11	10
0	0	1	3	2
1	4	5	7	6

x \ yz	00	01	11	10
0	0₀	1	0₃	0₂
1	4	0₅	0₇	6

Group 1

x \	yz 00	yz̄ 01	ȳz̄ 11	ȳz 10
x̄ 0	0₀	1	0₃	0₂
x̄ 1	4	0₅	0₇	6

Group 2

x \	yz 00	yz̄ 01	ȳz̄ 11	ȳz 10
x 0	0₀	1	0₃	0₂
x̄ 1	4	0₅	0₇	6

Group 3

$$y = (x+z) \cdot (\bar{y} + \bar{z}) \cdot (\bar{x} + \bar{z})$$

4. Simplify the expression Y=∑m(7,9,10,11,12,13,14,15),using the K- map method.

$$Y = AB + AC + AD + BCD$$

5. Plot the logical expression ABCD+AB'C'D'+AB'C+AB on a 4 variable K- map and obtain the simplified expression from the K- map.

$$Y = AB + AC + A\overline{D}$$

Don't Care Conditions

➤ Don't Care conditions allow us to replace the empty cell of a K-Map to form a grouping of the variables.

➤ While forming groups of cells, we can consider a "Don't Care" cell as either 1 or 0 or we can simply ignore that cell.

➤ Don't Care condition can help us to form a larger group of cells.

Don't Care Conditions

THANK YOU