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section: C

Q1

a) $\bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}\bar{C} + \bar{A}\bar{B}\bar{C}$

Ans:

A	B	C	Output
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

Simplifying:

$\bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}\bar{C}$

As $A + A = A$

So: $\bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}\bar{C} = \bar{A}\bar{B}\bar{C}$

$\bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}\bar{C}$

$\bar{A}\bar{C}(\bar{B}+B) + A\bar{B}\bar{C}$

$B + \bar{B} = 1$

$\bar{A}\bar{C} + A\bar{B}\bar{C}$

$\bar{C}(\bar{A} + A\bar{B})$ $\quad \therefore A' + AB' = A' + B$

$\bar{C}(\bar{A} + \bar{B})$

$\bar{A}\bar{C} + \bar{C}\bar{B}$

Truth table of simplified expression

A	B	C	Output
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

Verified

B) $A\bar{B}C + \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}C(\bar{A}BD)$

sol: Demorgan theorem

$A\bar{B}C + \bar{A}B\bar{C}\bar{D} + \bar{A}C(A+\bar{B}+\bar{D})$

$A\bar{B}C + \bar{A}B\bar{C}\bar{D} + \bar{A}AC + \bar{A}C\bar{B} + \bar{A}C\bar{D}$

$A\bar{B}C + \bar{A}\bar{B}C + \bar{A}B\bar{C}\bar{D} + \bar{A}C\bar{D}$

$\bar{B}C(\bar{A}+A) + \bar{A}\bar{D}(B\bar{C}+C)$

$\bar{B}C + \bar{A}\bar{D}(B+C)$

Original truth table

A	B	C	D	Output
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	0
1	0	1	0	1
1	0	1	1	1
1	0	1	1	1

	1	1	0	0	0
8.30	1	1	0	1	0
	1	1	1	0	0
9.00	1	1	1	1	0

9.30 Truth table of simplified expression

10.00	A	B	C	D	Output
	0	0	0	0	0
10.30	0	0	0	1	0
	0	0	1	0	1
11.00	0	0	1	1	1
	0	1	0	0	1
11.30	0	1	0	1	0
	0	1	1	0	1
Noon	0	1	1	1	0
	1	0	0	0	0
12.30	1	0	0	1	0
	1	0	1	0	1
1.00	1	0	1	1	1
	1	1	0	0	0
1.30	1	1	0	1	0
	1	1	1	0	0
2.00	1	1	1	1	0

2.30 Verified.

3.00 Q2

3.30 a) i) $AB + ABC + A\bar{C}\bar{B} + A\bar{C}$

4.00 Solution:

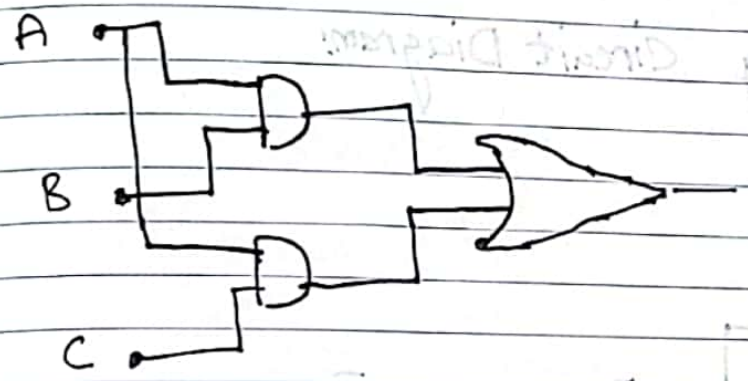
$A\bar{C}(B+1)$ $\quad \therefore A+1=1$

4.30 $AB + ABC + A\bar{C}$

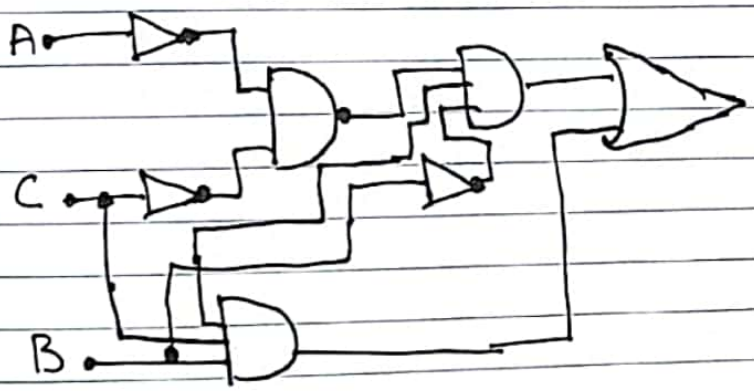
$AB(1+C) + A\bar{C}$

5.00 $AB + A\bar{C}$ $\quad \therefore C+1=1$

6.00 pm



B) Original Circuit



Logical expression

$A' C' A B' + A B C$

Now simplifying

$A \cdot A = A$

Demorganthedrem

$(\bar{A} + \bar{C})(A B') + ABC$

$(A+C)(AB') + ABC$

$A \bar{A} B' + AB'C + ABC$

$A \bar{A} \bar{B} + AB'C + ABC$

$A \bar{B} + AC(B'+B)$

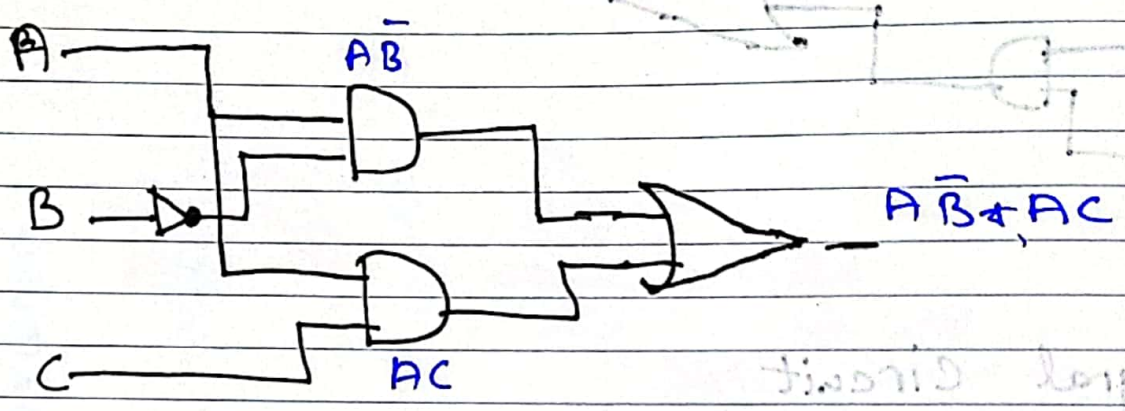
$A \bar{B} + AC(1)$

$A \bar{B} + AC$

As: $A \cdot A = A$

$B' + B = 1$

After Simplifying Circuit Diagram:



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