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ROLL NO. : 24K-3057

DLB LAB TASK 4

QUESTION:01(a)

Q.No: 1(a)

AB \ C	0	1
00	1	
01		1
11	1	1
10		

•) Actual Expression :

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

000 011 110 111

•) Reduce Expression :

i) 000 $\Rightarrow \bar{A}\bar{B}\bar{C}$

ii) 110 + 111 $\Rightarrow AB\bar{C} + ABC \Rightarrow AB + AB \Rightarrow AB$

iii) 111 + 011 $\Rightarrow \bar{A}BC + ABC \Rightarrow BC + BC \Rightarrow BC$

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

000 11 11

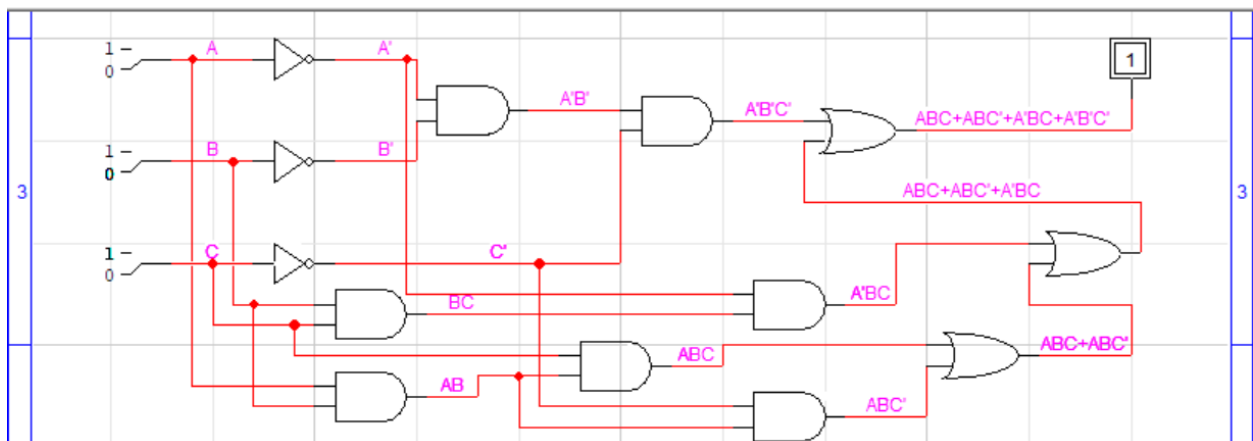
TRUTH TABLE (ACTUAL EXPRESSION):

A	B	C	A'	B'	C'	A'B'C'	A'BC	ABC'	ABC	A'B'C'+A'BC+ABC'+ABC
0	0	0	1	1	1	1	0	0	0	1
0	0	1	1	1	0	0	0	0	0	0
0	1	0	1	0	1	0	0	0	0	0
0	1	1	1	0	0	0	1	0	0	1
1	0	0	0	1	1	0	0	0	0	0
1	0	1	0	1	0	0	0	0	0	0
1	1	0	0	0	1	0	0	1	0	1
1	1	1	0	0	0	0	0	0	1	1

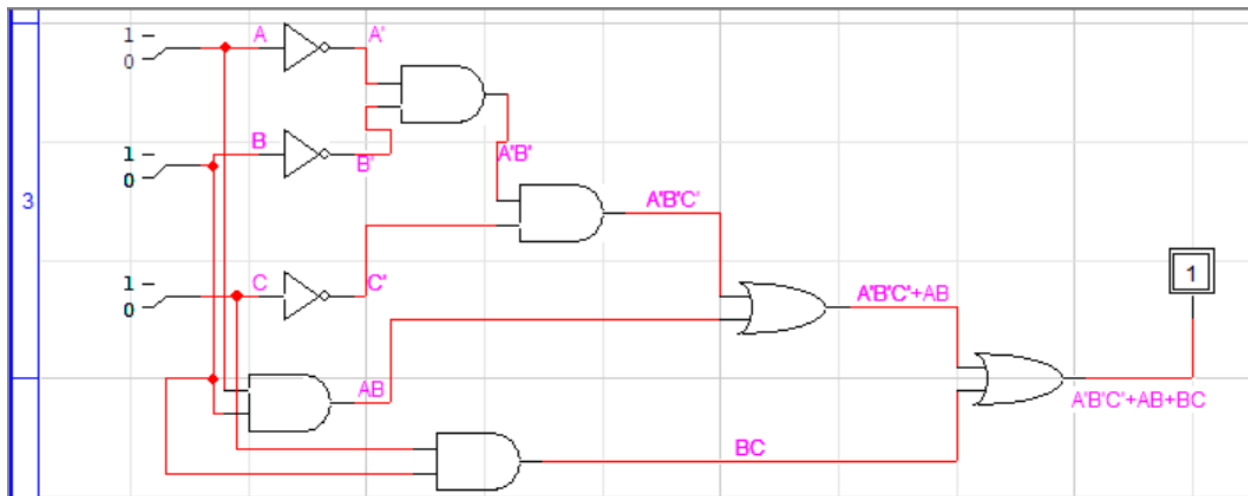
TRUTH TABLE (REDUCE EXPRESSION):

A	B	C	A'	B'	C'	AB	BC	A'B'C'	A'B'C'+AB+BC
0	0	0	1	1	1	0	0	1	1
0	0	1	1	1	0	0	0	0	0
0	1	0	1	0	1	0	0	0	0
0	1	1	1	0	0	0	1	0	1
1	0	0	0	1	1	0	0	0	0
1	0	1	0	1	0	0	0	0	0
1	1	0	0	0	1	1	0	0	1
1	1	1	0	0	0	1	1	0	1

CIRCUIT FIGURE (ACTUAL EXPRESSION):



CIRCUIT FIGURE (REDUCE EXPRESSION):



QUESTION:01(b)

Q No: 1 (b)

AB \ C	0	1
00	1	1
01	1	0
11	0	1
10	1	1

•) Actual Expression :

$$\overline{A}\overline{B}\overline{C} + \overline{A}\overline{B}C + \overline{A}B\overline{C} + A\overline{B}\overline{C} + A\overline{B}C + \overline{A}BC$$

•) Reduce Expression :

- $000 + 001 \Rightarrow \overline{A}\overline{B}\overline{C} + \overline{A}\overline{B}C \Rightarrow \overline{A}\overline{B} + \overline{A}\overline{B} = \overline{A}\overline{B}$
- $000 + 010 \Rightarrow \overline{A}\overline{B}\overline{C} + \overline{A}B\overline{C} \Rightarrow \overline{A}\overline{C} + \overline{A}C \Rightarrow \overline{A}\overline{C}$
- $100 + 101 \Rightarrow A\overline{B}\overline{C} + A\overline{B}C \Rightarrow A\overline{B} + A\overline{B} = A\overline{B}$
- $111 + 101 \Rightarrow A\overline{B}C + A\overline{B}C \Rightarrow AC + AC \Rightarrow AC$

$$\overline{A}\overline{B} + \overline{A}\overline{C} + A\overline{B} + AC$$

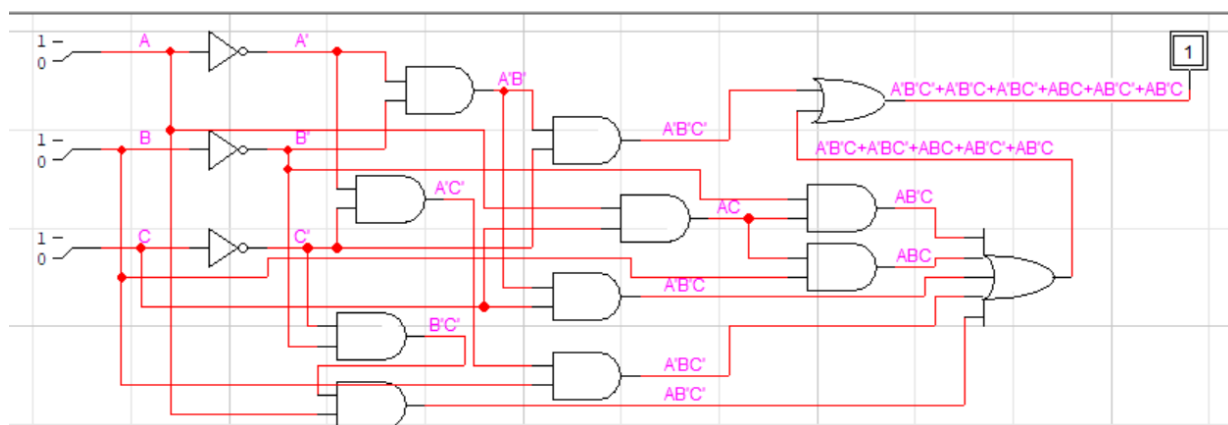
TRUTH TABLE (ACTUAL EXPRESSION):

A	B	C	A'	B'	C'	ABC	A'B'C'	A'B'C	A'BC'	AB'C'	AB'C	A'B'C'+A'B'C+A'BC'+ABC+AB'C'+AB'C
0	0	0	1	1	1	0	1	0	0	0	0	1
0	0	1	1	1	0	0	0	1	0	0	0	1
0	1	0	1	0	1	0	0	0	1	0	0	1
0	1	1	1	0	0	0	0	0	0	0	0	0
1	0	0	0	1	1	0	0	0	0	1	0	1
1	0	1	0	1	0	0	0	0	0	0	1	1
1	1	0	0	0	1	0	0	0	0	0	0	0
1	1	1	0	0	0	1	0	0	0	0	0	1

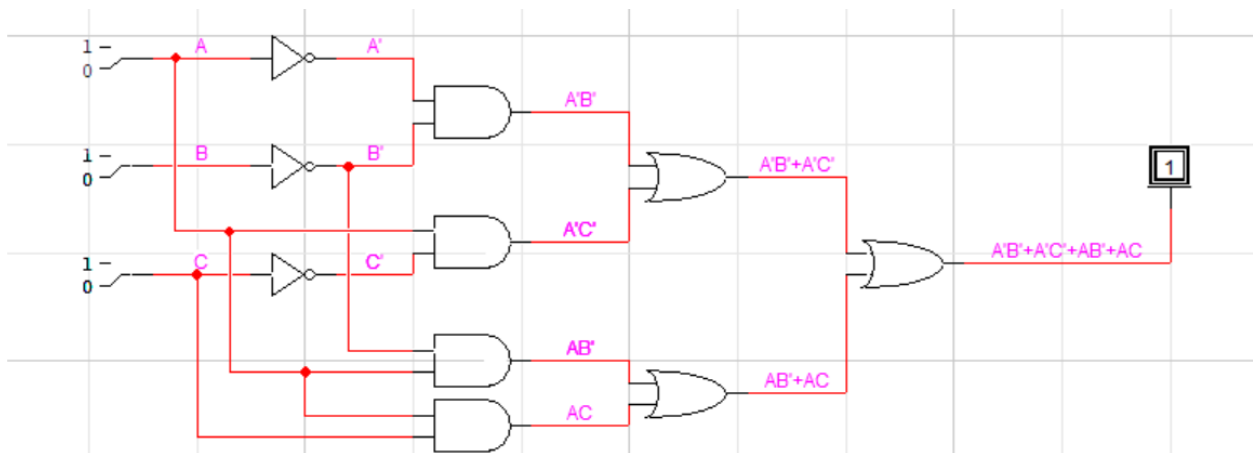
TRUTH TABLE (REDUCE EXPRESSION):

A	B	C	A'	B'	C'	A'B'	A'C'	AB'	AC	A'B'+A'C'+AB'+AC
0	0	0	1	1	1	1	1	0	0	1
0	0	1	1	1	0	1	0	0	0	1
0	1	0	1	0	1	0	1	0	0	1
0	1	1	1	0	0	0	0	0	0	0
1	0	0	0	1	1	0	0	1	0	1
1	0	1	0	1	0	0	0	1	1	1
1	1	0	0	0	1	0	0	0	0	0
1	1	1	0	0	0	0	0	1	1	1

CIRCUIT FIGURE (ACTUAL EXPRESSION):



CIRCUIT FIGURE (REDUCE EXPRESSION):



QUESTION:02(a)

Q.No: 2 (a)

AB \ CD	00	01	11	10
00	1	1	0	0
01	1	1	1	1
11	0	0	0	0
10	0	1	1	0

•) Actual Expression :

$$\overline{A}\overline{B}\overline{C}\overline{D} + \overline{A}\overline{B}\overline{C}D + \overline{A}\overline{B}C\overline{D} + \overline{A}\overline{B}CD + \overline{A}B\overline{C}\overline{D} + \overline{A}B\overline{C}D + \overline{A}B\overline{C}\overline{D} + \overline{A}B\overline{C}D$$

$$\left(\overline{A}\overline{B}\overline{C}\overline{D} \right) \left(\overline{A}\overline{B}\overline{C}D \right) \left(\overline{A}\overline{B}C\overline{D} \right) \left(\overline{A}\overline{B}CD \right) \left(\overline{A}B\overline{C}\overline{D} \right) \left(\overline{A}B\overline{C}D \right)$$

•) Reduce Expression :

i) $(\overline{A}\overline{B}\overline{C}\overline{D}) + (\overline{A}\overline{B}\overline{C}D) \Rightarrow \overline{A}\overline{B}\overline{C}(\overline{D} + D) \Rightarrow \overline{A}\overline{B}\overline{C}$

ii) $(\overline{A}\overline{B}C\overline{D}) + (\overline{A}\overline{B}CD) \Rightarrow \overline{A}\overline{B}C(\overline{D} + D) \Rightarrow \overline{A}\overline{B}C$

iii) $(\overline{A}B\overline{C}\overline{D}) + (\overline{A}B\overline{C}D) \Rightarrow \overline{A}B\overline{C}(\overline{D} + D) \Rightarrow \overline{A}B\overline{C}$

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

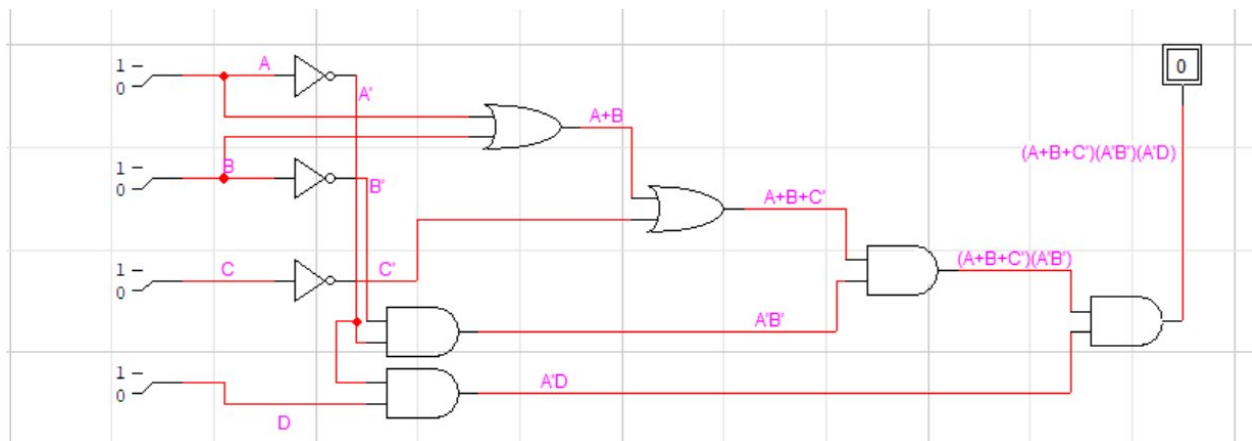
TRUTH TABLE (ACTUAL EXPRESSION):

A	B	C	D	A'	B'	C'	D'	A'+B'+ C+D	A'+B'+ C+D'	A+B+ C'+D'	A+B+ C'+D	A+B+ C+D	A+B+ C+D'	A+B'+ C'+D'	A+B'+ C+D'	RESULT (Using AND Gate)
0	0	0	0	1	1	1	0	1	1	1	1	0	0	1	1	0
0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	1	0	1	1	0	0	1	1	0	0	1	1	1	1	0
0	0	1	1	1	1	0	1	1	1	1	1	1	1	0	1	0
0	1	0	0	1	0	1	0	1	1	1	1	1	1	1	0	0
0	1	0	1	1	0	1	1	1	1	1	1	1	0	1	1	0
0	1	1	0	1	0	0	0	1	1	0	1	1	1	0	1	0
0	1	1	1	1	0	0	1	1	1	1	1	1	0	1	1	0
1	0	0	0	0	1	1	0	1	1	1	1	0	1	1	1	0
1	0	0	1	0	1	1	1	1	1	1	0	1	1	1	1	0
1	0	1	0	0	1	0	0	1	1	1	1	0	1	1	1	0
1	0	1	1	0	1	0	1	1	1	1	1	1	0	1	1	0
1	1	0	0	0	0	1	0	0	0	1	1	1	1	1	1	0
1	1	0	1	0	0	1	1	1	1	1	0	1	1	1	1	0
1	1	1	0	0	0	0	0	1	1	1	1	1	0	1	1	0
1	1	1	1	0	0	0	1	1	1	1	1	0	1	1	1	0

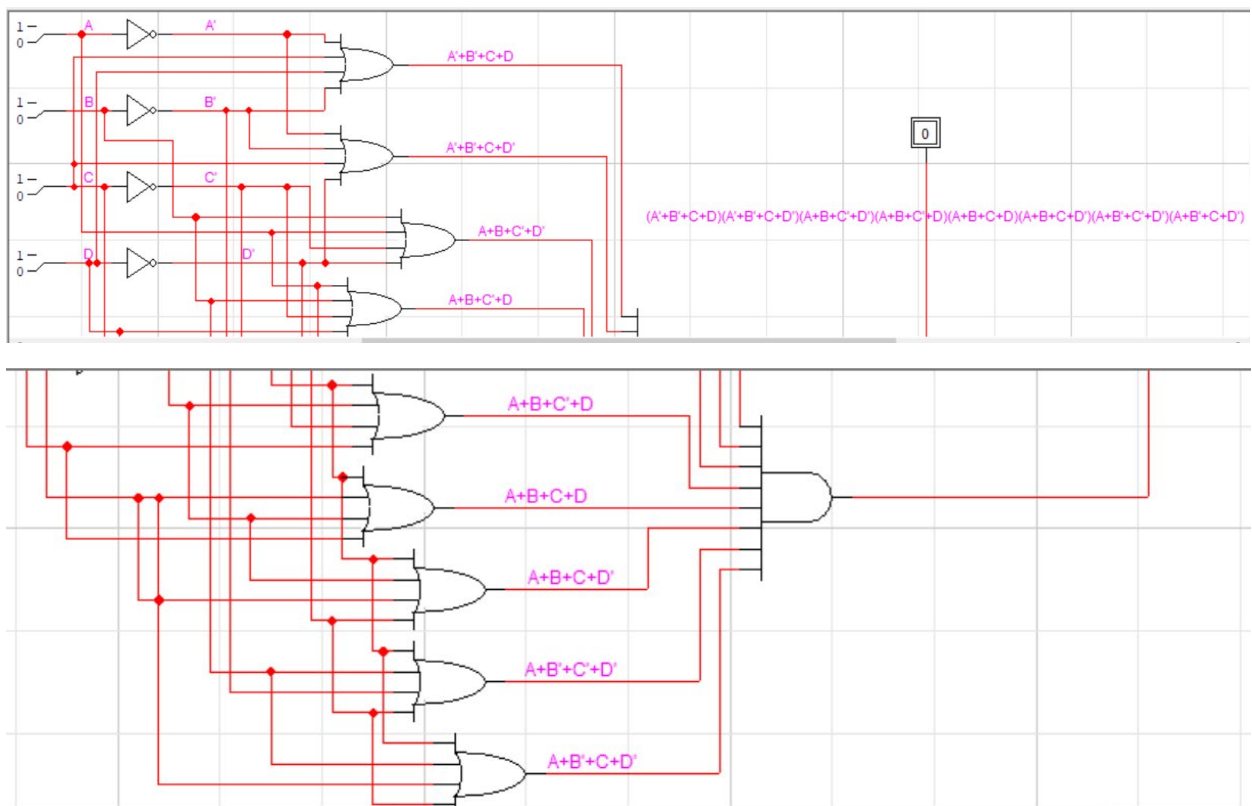
TRUTH TABLE (REDUCE EXPRESSION):

A	B	C	D	A'	B'	C'	A'B'	A'D	A+B+C'	(A+B+C')(A'B')(A'D)
0	0	0	0	1	1	1	1	0	1	0
0	0	0	1	1	1	1	1	1	1	1
0	0	1	0	1	1	0	1	0	0	0
0	0	1	1	1	1	0	1	1	0	0
0	1	0	0	1	0	1	0	0	1	0
0	1	0	1	1	0	1	0	1	1	0
0	1	1	0	1	0	0	0	0	1	0
0	1	1	1	1	0	0	0	1	1	0
1	0	0	0	0	1	1	0	0	1	0
1	0	0	1	0	1	1	0	0	1	0
1	0	1	0	0	1	0	0	0	1	0
1	0	1	1	0	1	0	0	0	1	0
1	1	0	0	0	0	1	0	0	1	0
1	1	0	1	0	0	1	0	0	1	0
1	1	1	0	0	0	0	0	0	1	0
1	1	1	1	0	0	0	0	0	1	0

CIRCUIT FIGURE (REDUCE EXPRESSION):



CIRCUIT FIGURE (ACTUAL EXPRESSION):



QUESTION:02(b)

Q NO : 2 (b)

AB \ CD	00	01	11	10
00	1	0	0	1
01	1	1	0	1
11	1	1	0	1
10	1	0	1	1

•) Actual Expression :

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

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

•) Reduce Expression :

i) ~~0001~~ $(0+0+0+1)(1+0+0+1) \Rightarrow (A+B+C+\bar{D})(\bar{A}+B+C+\bar{D})$

ii) $(0+0+1+1)(0+1+1+1) \Rightarrow (A+B+\bar{C}+\bar{D})(A+\bar{B}+\bar{C}+\bar{D})$

iii) $(0+1+1+1)(1+1+1+1) \Rightarrow (A+\bar{B}+\bar{C}+\bar{D})(\bar{A}+\bar{B}+\bar{C}+\bar{D})$

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

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

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

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

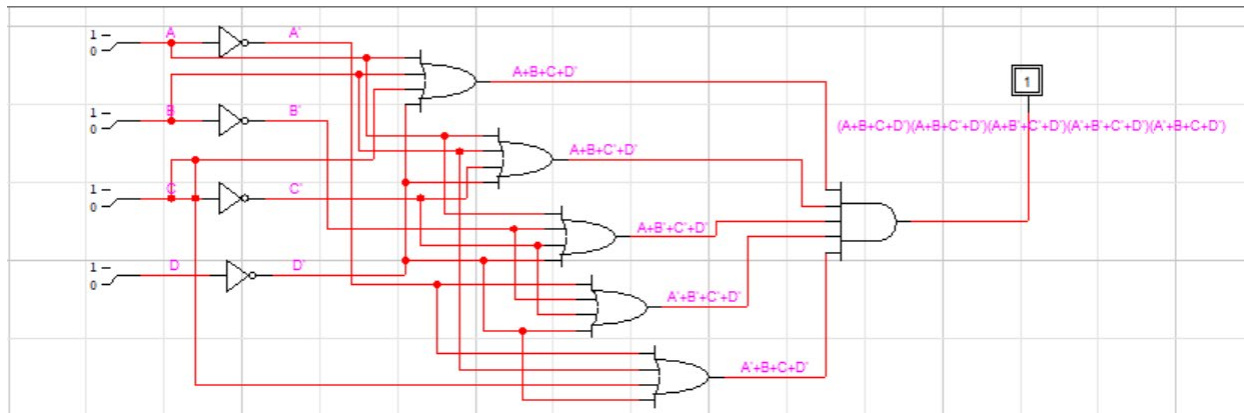
TRUTH TABLE (ACTUAL EXPRESSION):

A	B	C	D	A'	B'	C'	D'	A+B+C+D'	A+B+C'+D'	A+B'+C+D'	A'+B'+C'+D'	A'+B+C+D'	RESULT (Using AND Gate)
0	0	0	0	1	1	1	1	1	1	1	1	1	1
0	0	0	1	1	1	1	0	0	1	1	1	1	0
0	0	1	0	1	1	0	1	1	1	1	1	1	1
0	0	1	1	1	1	0	0	1	0	1	1	1	0
0	1	0	0	1	0	1	1	1	1	1	1	1	1
0	1	0	1	1	0	1	0	1	1	1	1	1	1
0	1	1	0	1	0	0	1	1	1	1	1	1	1
0	1	1	1	1	0	0	0	1	1	0	1	1	0
1	0	0	0	0	1	1	1	1	1	1	1	1	1
1	0	0	1	0	1	1	0	1	1	1	1	0	0
1	0	1	0	0	1	0	1	1	1	1	1	1	1
1	0	1	1	0	1	0	0	1	1	1	1	1	1
1	1	0	0	0	0	1	1	1	1	1	1	1	1
1	1	0	1	0	0	1	0	1	1	1	1	1	1
1	1	1	0	0	0	0	1	1	1	1	1	1	1
1	1	1	1	0	0	0	0	1	1	1	0	1	0

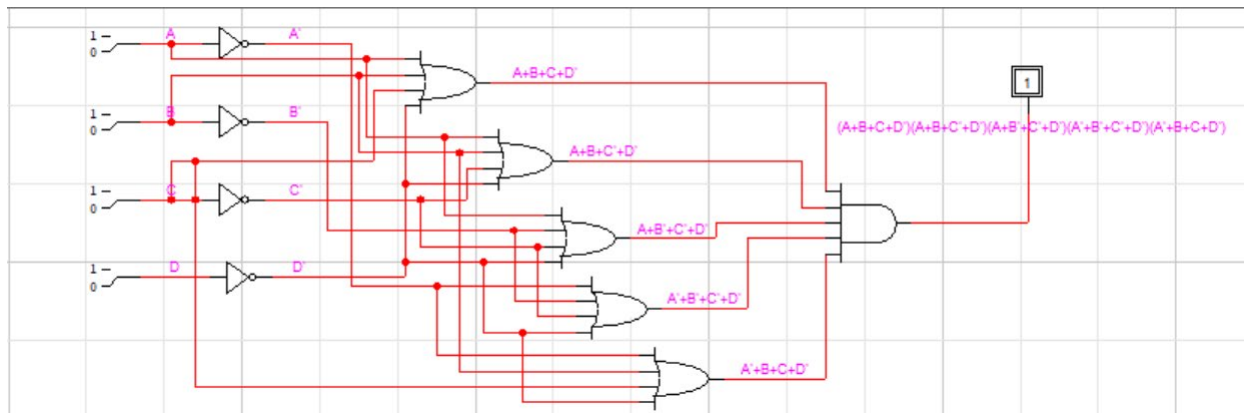
TRUTH TABLE (REDUCE EXPRESSION):

A	B	C	D	A'	B'	C'	D'	A+B+C+D'	A+B+C'+D'	A+B'+C+D'	A'+B'+C'+D'	A'+B+C+D'	RESULT (Using AND Gate)
0	0	0	0	1	1	1	1	1	1	1	1	1	1
0	0	0	1	1	1	1	0	0	1	1	1	1	0
0	0	1	0	1	1	0	1	1	1	1	1	1	1
0	0	1	1	1	1	0	0	1	0	1	1	1	0
0	1	0	0	1	0	1	1	1	1	1	1	1	1
0	1	0	1	1	0	1	0	1	1	1	1	1	1
0	1	1	0	1	0	0	1	1	1	1	1	1	1
0	1	1	1	1	0	0	0	1	1	0	1	1	0
1	0	0	0	0	1	1	1	1	1	1	1	1	1
1	0	0	1	0	1	1	0	1	1	1	1	0	0
1	0	1	0	0	1	0	1	1	1	1	1	1	1
1	0	1	1	0	1	0	0	1	1	1	1	1	1
1	1	0	0	0	0	1	1	1	1	1	1	1	1
1	1	0	1	0	0	1	0	1	1	1	1	1	1
1	1	1	0	0	0	0	1	1	1	1	1	1	1
1	1	1	1	0	0	0	0	1	1	1	0	1	0

CIRCUIT FIGURE (ACTUAL EXPRESSION):



CIRCUIT FIGURE (REDUCE EXPRESSION):



QUESTION:03

Q.No : 3

	0	1
00	1	1
01		1
11		
10	1	1

•) Actual Expression :

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

•) Reduce Expression :

i) $000 + 001 + 100 + 101 \Rightarrow \cancel{A\bar{B}\bar{C}} + \cancel{A\bar{B}C} + \cancel{A\bar{B}\bar{C}} + \cancel{A\bar{B}C}$
 $\Rightarrow B'$

ii) $001 + 011 \Rightarrow \cancel{A\bar{B}C} + \cancel{A\bar{B}C} \Rightarrow A'C$

$$B' + A'C$$

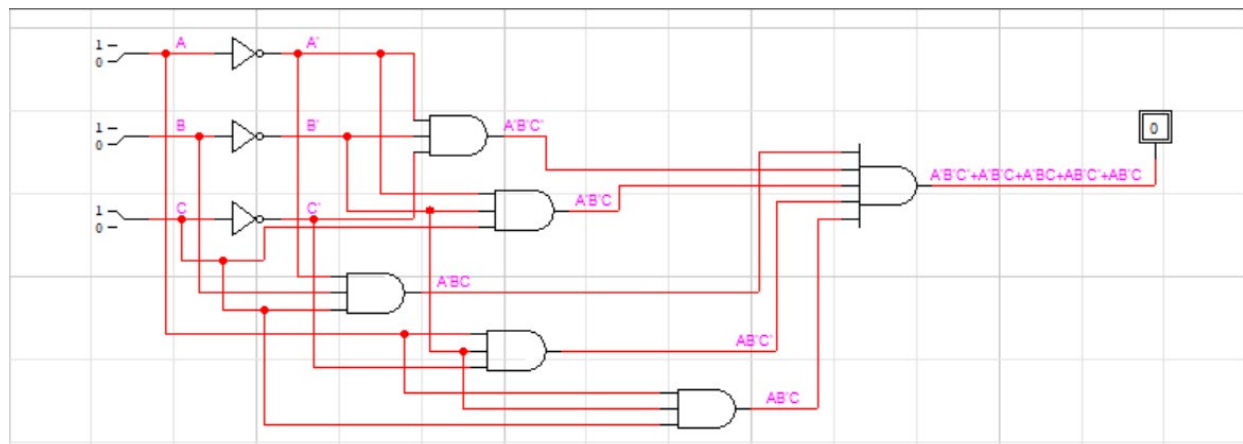
TRUTH TABLE (ACTUAL EXPRESSION):

A	B	C	A'	B'	C'	A'B'C'	A'B'C	A'BC	AB'C'	AB'C	A'B'C'+A'B'C+A'BC+AB'C'+AB'C
0	0	0	1	1	1	1	0	0	0	0	1
0	0	1	1	1	0	0	1	0	0	0	1
0	1	0	1	0	1	0	0	0	0	0	0
0	1	1	1	0	0	0	0	1	0	0	1
1	0	0	0	1	1	0	0	0	1	0	1
1	0	1	0	1	0	0	0	0	0	1	1
1	1	0	0	0	1	0	0	0	0	0	0
1	1	1	0	0	0	0	0	0	0	0	0

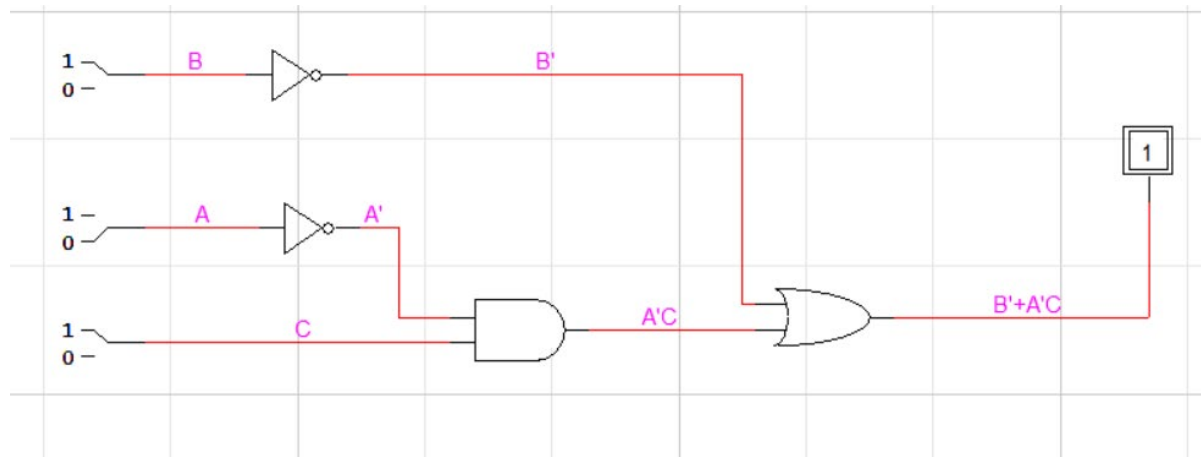
TRUTH TABLE (REDUCE EXPRESSION):

A	B	C	A'	B'	A'C	B'+A'C
0	0	0	1	1	0	1
0	0	1	1	1	1	1
0	1	0	1	0	0	0
0	1	1	1	0	1	1
1	0	0	0	1	0	1
1	0	1	0	1	0	1
1	1	0	0	0	0	0
1	1	1	0	0	0	0

CIRCUIT FIGURE (ACTUAL EXPRESSION):



CIRCUIT FIGURE (REDUCE EXPRESSION):



QUESTION:04

..) Using POS Method :

..) Reduce Expression :

i) $(0+0+1) \cdot (0+1+0+1) \cdot (1+1+0+1) \cdot (1+0+0+1) \Rightarrow (A'B'G\bar{D}) \cdot (A'B'C\bar{D}) \cdot (\bar{A}+B+C\bar{D}) \cdot (\bar{A}+B+C\bar{D})$

ii) $(0+1+1+1) \cdot (1+1+1+1) \Rightarrow (A+\bar{B}+\bar{C}+\bar{D}) \cdot (\bar{A}+\bar{B}+\bar{C}+\bar{D})$

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

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

•) Using SOP Method :

	00	01	11	10
00	1	0	1	1
01	1	0	0	1
11	1	0	0	1
10	1	0	1	1

•) Actual Expression :

$$\bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}C\bar{D} + \bar{A}B\bar{C}\bar{D} + \bar{A}\bar{B}CD + \bar{A}B\bar{C}D + \bar{A}B\bar{C}\bar{D} + \bar{A}BC\bar{D} + \bar{A}BCD + \bar{A}B\bar{C}D$$

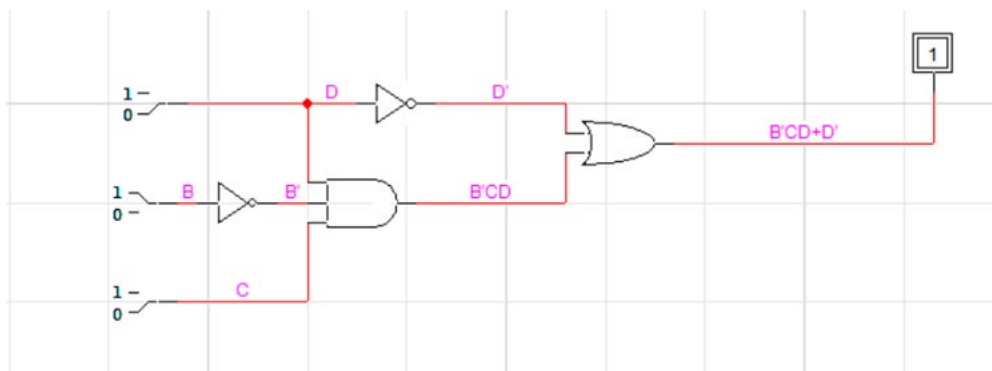
•) Reduce Expression :

i) $0000 + 0100 + 1100 + 1000 + 0010 + 0110 + 1110 + 1010$
 $\Rightarrow \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}C\bar{D} + \bar{A}B\bar{C}\bar{D} + \bar{A}\bar{B}CD + \bar{A}B\bar{C}D + \bar{A}B\bar{C}\bar{D} + \bar{A}BC\bar{D}$
 $\Rightarrow \bar{D}$

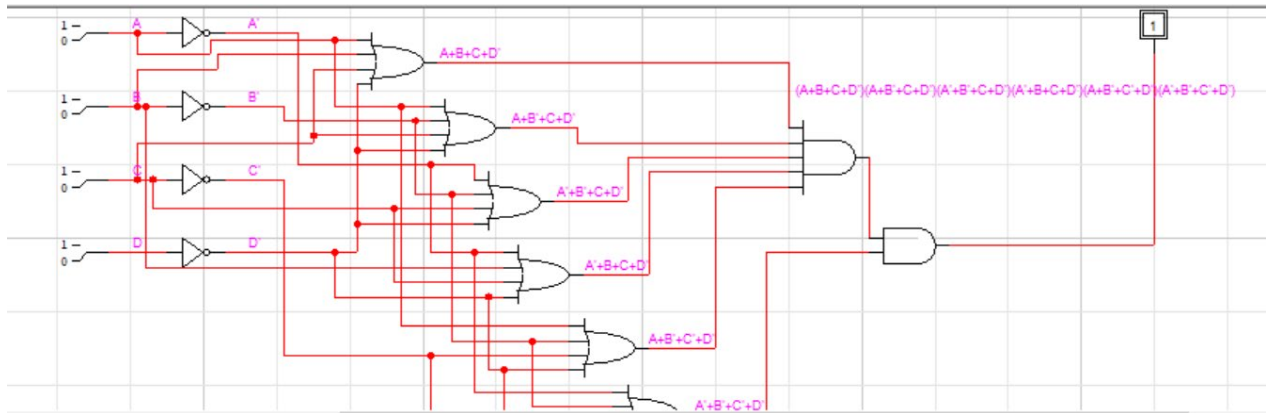
ii) $0011 + 1011 \Rightarrow \bar{A}\bar{B}CD + \bar{A}B\bar{C}D$
 $\Rightarrow \bar{B}CD$

$$D' + B'CD$$

CIRCUIT FIGURE (REDUCE EXPRESSION OF SOP):



CIRCUIT FIGURE (REDUCE EXPRESSION OF POS):



TRUTH TABLE (REDUCE EXPRESSION OF POS):

A	B	C	D	A'	B'	C'	D'	A+B+ C+D'	A+B'+ C+D'	A'+B'+ C+D'	A'+B+ C+D'	A+B'+ C'+D'	A'+B'+ C'+D'	RESULT (Using AND Gate)
0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
0	0	0	1	1	1	1	0	0	1	1	1	1	1	0
0	0	1	0	1	1	0	1	1	1	1	1	1	1	1
0	0	1	1	1	1	0	0	1	1	1	1	1	1	1
0	1	0	0	1	0	1	1	1	1	1	1	1	1	1
0	1	0	1	1	0	1	0	1	0	1	1	1	1	0
0	1	1	0	1	0	0	1	1	1	1	1	1	1	1
0	1	1	1	1	0	0	0	1	1	1	1	0	1	0
1	0	0	0	0	1	1	1	1	1	1	1	1	1	1
1	0	0	1	0	1	1	0	1	1	1	0	1	1	0
1	0	1	0	0	1	0	1	1	1	1	1	1	1	1
1	0	1	1	0	1	0	0	1	1	1	1	1	1	1
1	1	0	0	0	0	1	1	1	1	1	1	1	1	1
1	1	0	1	0	0	1	0	1	1	0	1	1	1	0
1	1	1	0	0	0	0	1	1	1	1	1	1	1	1
1	1	1	1	0	0	0	0	1	1	1	1	1	0	0

TRUTH TABLE (REDUCE EXPRESSION OF SOP):

B	C	D	B'	C'	D'	B'CD	B'CD+D'
0	0	1	1	1	0	0	0
0	0	0	1	1	1	0	1
0	1	1	1	0	0	1	1
0	1	0	1	0	1	0	1
1	0	1	0	1	0	0	0
1	0	0	0	1	1	0	1
1	1	1	0	0	0	0	0
1	1	0	0	0	1	0	0