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Rollno	20P-0153
Section	BSCS 2B
Batch	Fall 2020
Assignment	# 03
Submitted to	Sir Shakir Ullah

Q#1 (a):

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

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

A	B	C	$\bar{A}$	$\bar{B}$	$\bar{C}$	$\bar{A}\bar{B}\bar{C}$	$\bar{A}B\bar{C}$	$A\bar{B}\bar{C}$	$\bar{A}\bar{B}\bar{C}$	↑
0	0	0	1	1	1	1	0	0	1	1
0	0	1	1	1	0	0	0	0	0	0
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	0	0	0
1	1	0	0	0	1	0	0	0	0	0
1	1	1	0	0	0	0	0	0	0	0

Simplification:

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

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

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

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

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

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

Truth table after Simplification:

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

Q#1 (b) $A\bar{B}C + \bar{A}B\bar{C}\bar{D} + \bar{A}C(\overline{\bar{A}BD})$

Before Simplification:-

A	B	C	D	$\bar{A}$	$\bar{B}$	$\bar{C}$	$\bar{D}$
0	0	0	0	1	1	1	1
0	0	0	1	1	1	1	0
0	0	1	0	1	1	0	1
0	0	1	1	1	1	0	0
0	1	0	0	1	0	1	1
0	1	0	1	1	0	1	0
0	1	1	0	1	0	0	1
0	1	1	1	1	0	0	0
1	0	0	0	0	1	1	1
1	0	0	1	0	1	1	0
1	0	1	0	0	1	0	1
1	0	1	1	0	1	0	0
1	1	0	0	0	0	1	1
1	1	0	1	0	0	1	0
1	1	1	0	0	0	0	1
1	1	1	1	0	0	0	0

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Q#1 (b)

$A\overline{B}C$	$\overline{A}B\overline{C}D$	$A\overline{Z}$	$A\overline{B}D$	$\overline{A}\overline{B}\overline{D}$	$\overline{A}C(\overline{A}\overline{B}D)$	$A\overline{B}C+\overline{A}B\overline{C}D+$
0	0	0	0	1	0	0
0	0	0	0	1	0	0
0	1	0	0	1	1	1
0	1	0	0	1	1	1
0	0	1	0	1	0	1
0	0	0	1	0	0	0
0	1	0	0	1	1	1
0	1	0	1	0	0	0
0	0	0	0	1	0	0
0	0	0	0	1	0	0
1	0	0	0	1	0	1
1	0	0	0	1	0	1
0	0	0	0	1	0	0
0	0	0	0	1	0	0
0	0	0	0	1	0	0
0	0	0	0	1	0	0

(b) Simplification,,

$$\overline{A}\,\overline{B}\,C + \overline{A}\,B\,\overline{C}\,\overline{D} + \overline{A}\,C\,(\overline{AB\,D})$$

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

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

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

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

$$A\,\overline{B}\,C + \overline{A}\,B\,\overline{C}\,\overline{D} + 0 + \overline{A}\,\overline{B}\,C + \overline{A}\,D\,C$$

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

$$\overline{B}\,C\,(1) + \overline{A}\,\overline{D}\,(B\,\overline{C} + C)$$

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

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

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Truth Table after Simplification.

$$\overline{B}\,C + \overline{A}\,\overline{D}\,C + \overline{A}\,B\,\overline{D}$$
↑

A	B	C	D	$\overline{A}$	$\overline{B}$	$\overline{C}$	$\overline{D}$	
0	0	0	0	1	1	1	1	0
0	0	0	1	1	1	1	0	0
0	0	1	0	1	1	0	1	1
0	0	1	1	1	1	0	0	1
0	1	0	0	1	0	1	1	1
0	1	0	1	1	0	1	0	0
0	1	1	0	1	0	0	1	1
0	1	1	1	1	0	0	0	0

Q#1 (b)

A	B	C	D	$\bar{A}$	$\bar{B}$	$\bar{C}$	$\bar{D}$	$\bar{B}C+\bar{A}\bar{D}C$
1	0	0	0	0	1	1	1	0
1	0	0	1	0	1	1	0	0
1	0	1	0	0	1	0	1	1
1	0	1	1	0	1	0	0	1
1	1	0	0	0	0	1	1	0
1	1	0	1	0	0	1	0	0
1	1	1	0	0	0	0	1	0
1	1	1	1	0	0	0	0	0

$\longleftrightarrow$

Q#2 a)

Generate boolean Expression

$\rightarrow$

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

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

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

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

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

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

Logic Gate

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

$(B+\bar{C})$
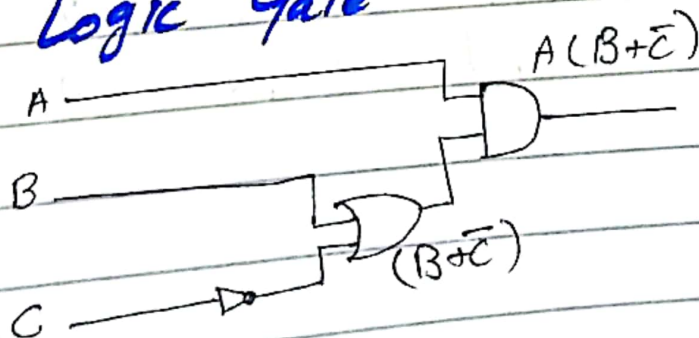
Q#2:- (b)

Boolean Expression:-

$(\overline{\overline{AC}})\, A\overline{B} + ABC$

$(\overline{\overline{AC}})\, A\overline{B} + ABC$

Simplification:

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

$(AA + AC)\overline{B} + ABC$

Apply rule #7
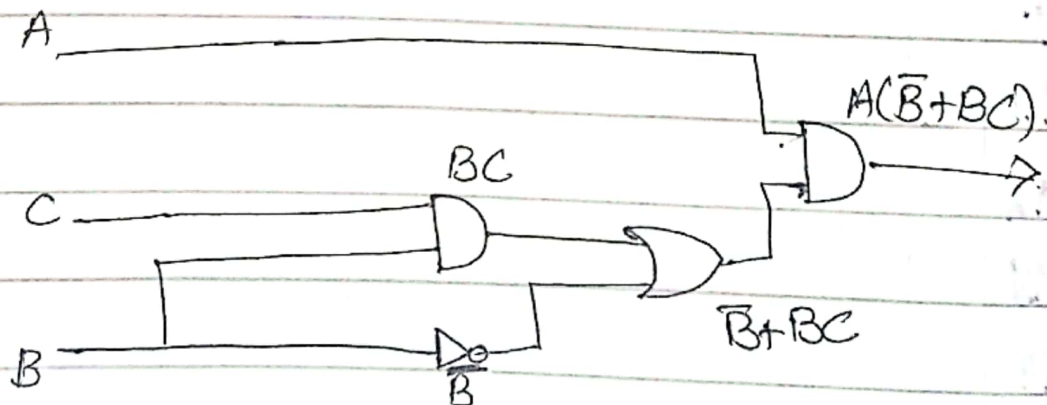
$(A + AC)\overline{B} + ABC$

Apply rule #10

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

$A\overline{B} + ABC$

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

Logic Gates

End