Name - Aayans Rathi

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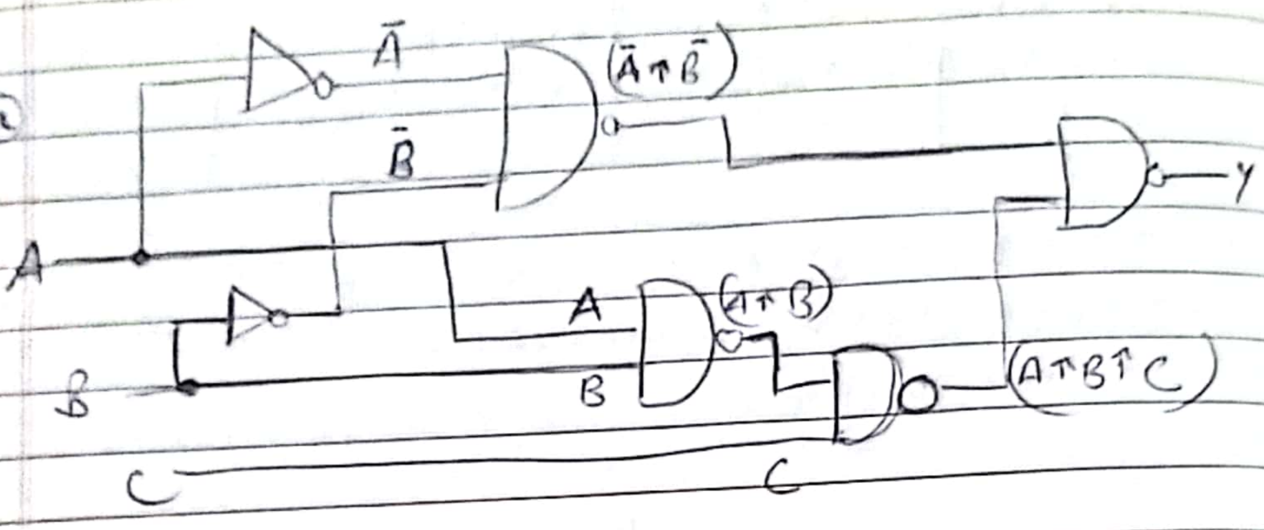
Homework - 8

Q.8 (a)



$$Y = (\bar{A} \uparrow \bar{B}) \uparrow (A \uparrow B \uparrow C)$$

(b)

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

DNF →

$(\neg A \wedge \neg B \wedge \neg C) \vee (\neg A \wedge \neg B \wedge C) \vee (\neg A \wedge B \wedge C) \vee (A \wedge \neg B \wedge C)$

CNF

$(A \vee \neg B \vee C) \wedge (\neg A \vee B \vee C) \wedge (\neg A \vee \neg B \vee C) \wedge (\neg A \vee \neg B \vee \neg C)$

Q2 (a) $S = A \dot{\vee} B \dot{\vee} C_{in}$

$C_{out} = (A \wedge B) \vee (C_{in} \wedge (A \dot{\vee} B))$

A	B	Cin	Cout	S
0	0	0	0	0
0	1	0	0	1
1	0	0	0	1
1	1	0	1	0
0	0	1	0	1
0	1	1	1	0
1	0	1	1	0
1	1	1	1	1

(a) $S = (\neg A \wedge B \wedge \neg C_{in}) \vee (A \wedge \neg B \wedge \neg C_{in}) \vee (\neg A \wedge \neg B \wedge C_{in}) \vee$

$(A \wedge B \wedge C_{in})$

$C_{out} = (A \wedge B \neg C_{in}) \vee (\neg A \wedge B \wedge C_{in}) \vee (A \wedge \neg B \wedge C_{in}) \vee$

$(A \wedge B \wedge C_{in})$

(b) $\cancel{S = (A \vee B \vee C_{in}) \wedge (\neg A \vee \neg B \vee C_{in}) \wedge}$

$S = (A \vee B \vee C_{in}) \wedge (\neg A \vee \neg B \vee C_{in}) \wedge (A \vee \neg B \vee \neg C_{in}) \wedge (\neg A \vee B \vee \neg C_{in})$

$C_{out} = (A \vee B \vee C_{in}) \wedge (A \vee \neg B \vee C_{in}) \wedge (\neg A \vee B \vee C_{in}) \wedge (A \vee B \vee \neg C_{in})$

(c)

A	B	$A \dot{\vee} B$	$\bar{A}$	$\bar{B}$	$A \uparrow B$	$\bar{A} \uparrow \bar{B}$	$\overline{A \uparrow B \uparrow (\bar{A} \uparrow \bar{B})}$
0	0	0	1	1	1	0	0
0	1	1	1	0	1	1	1
1	0	1	0	1	1	1	1
1	1	0	0	0	0	1	0

So

$A \dot{\vee} B$ canbe expressed as $\overline{(A \uparrow B) \uparrow (\bar{A} \uparrow \bar{B})}$

$S = A \dot{\vee} B \dot{\vee} c_{in}$

$= \overline{(A \uparrow B) \uparrow (\bar{A} \uparrow \bar{B})} \dot{\vee} c_{in}$

$= \overline{\overline{((A \uparrow B) \uparrow (\bar{A} \uparrow \bar{B}))} \uparrow c_{in} \uparrow (\overline{(A \uparrow B) \uparrow (\bar{A} \uparrow \bar{B})}) \uparrow \bar{c}_{in}}$

$= \overline{(\overline{(A \uparrow B) \uparrow (\bar{A} \uparrow \bar{B})} \uparrow c_{in}) \uparrow ((\overline{(A \uparrow B) \uparrow (\bar{A} \uparrow \bar{B})}) \uparrow \bar{c}_{in})}$

Now $A \vee B$ is represented by $\bar{A} \uparrow \bar{B}$
and $A \wedge B$ is ~~~~ represented by $\overline{A \uparrow B}$

$C = (A \wedge B) \vee (c_{in} \wedge (A \dot{\vee} B))$

$= (A \wedge B) \vee (c_{in} \wedge (\overline{(A \uparrow B) \uparrow (\bar{A} \uparrow \bar{B})}))$

$= (A \wedge B) \vee (c_{in} \uparrow ((A \uparrow B) \uparrow (\bar{A} \uparrow \bar{B})))$

$$= \overline{(A \uparrow B)} \vee \left(C_{in} \uparrow \overline{(A \uparrow B) \uparrow (\bar{A} \uparrow \bar{B})}\right)$$

$$= \overline{\overline{(A \uparrow B)}} \uparrow \left(C_{in} \uparrow \overline{\left((A \uparrow B) \uparrow (\bar{A} \uparrow \bar{B})\right)}\right)$$

$$= (A \uparrow B) \uparrow \left(C_{in} \uparrow \overline{\left((A \uparrow B) \uparrow (\bar{A} \uparrow \bar{B})\right)}\right)$$

(d)