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CS2200 F-24 Homework

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1. Epp5 problem 2.4.19 / 91.

Q.no.1 Epp5 problem 2.4.19

P	Q	R	S
1	1	1	0
1	1	0	1
1	0	1	0
1	0	0	1
0	1	1	0
0	1	0	1
0	0	1	0
0	0	0	0

a.

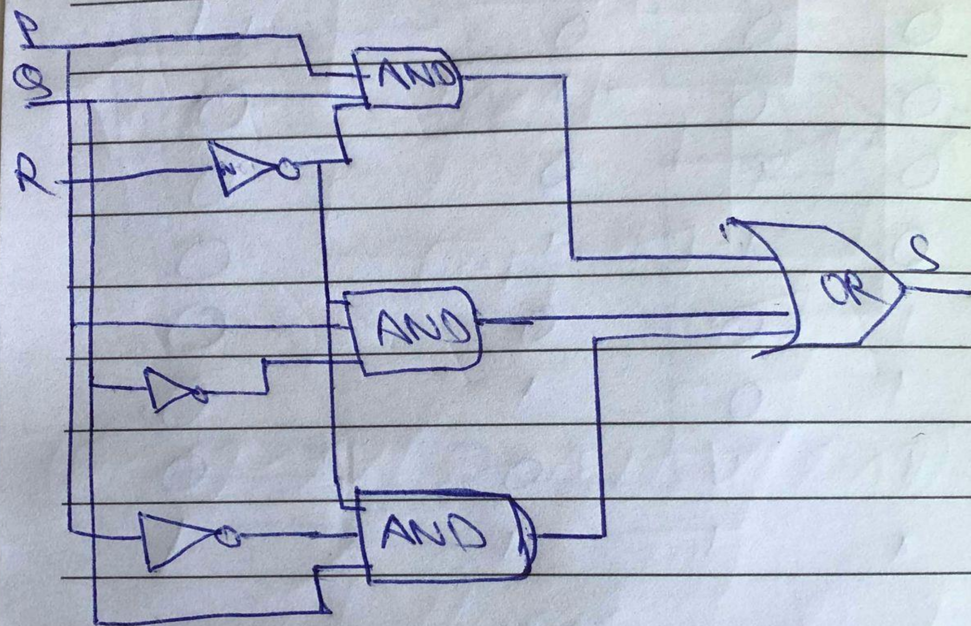
Boolean Expression

$$S = (P \wedge Q \wedge \sim R) \vee (P \wedge \sim Q \wedge \sim R) \vee (\sim P \wedge Q \wedge \sim R)$$

(b) Circuit:

for

$(P \wedge Q \wedge \sim R) \vee (P \wedge \sim Q \wedge \sim R) \vee (\sim P \wedge Q \wedge \sim R)$



Epp5 problem 2.4.23 / 92.

Design a circuit to take input signals P , Q , and R and output a 1 if, and only if, all three of P , Q , and R have the same value.

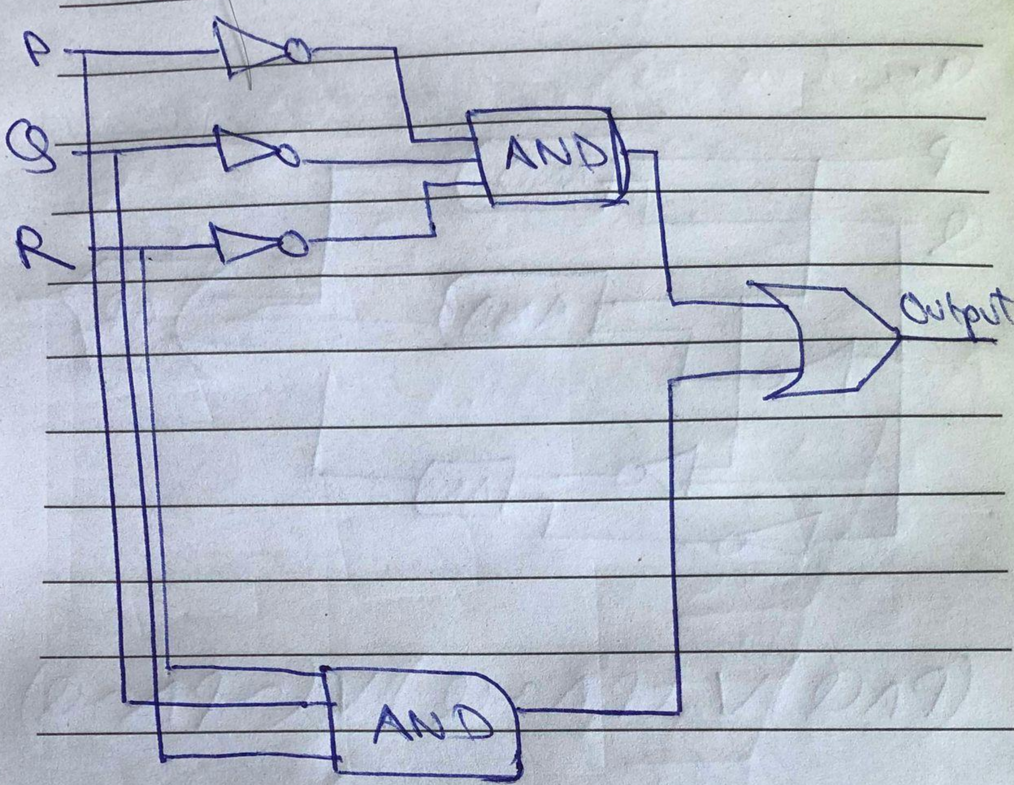
Q in no. 2 Epps problem 2.4.23

Truth table

P	Q	R	Output
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

Output = $(\sim P \wedge \sim Q \wedge \sim R) \vee (P \wedge Q \wedge R)$

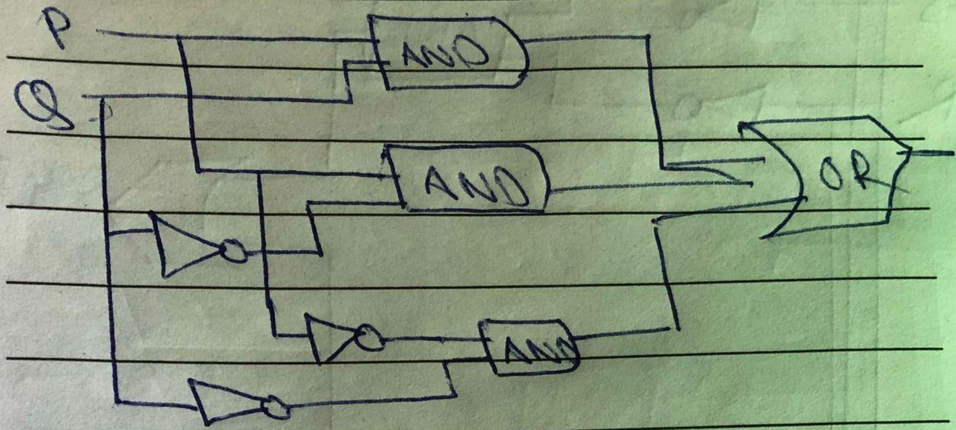
b. Circuit :- $(\sim P \wedge \sim Q \wedge \sim R) \vee (P \wedge Q \wedge R)$



Epp5 problem 2.4.28 / 92.

Q.no 3. Epps problem 2.4.28

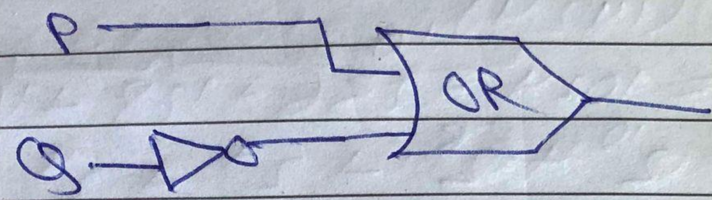
a.



$(P \wedge Q) \vee (P \wedge \sim Q) \vee (\sim P \wedge \sim Q)$

P	Q	Result
1	1	1

b.



P	Q	Result
1	1	1

$(P \vee \sim Q)$

So,

$(P \wedge Q) \vee (P \wedge \sim Q) \vee (\sim P \wedge \sim Q) = (P \vee \sim Q)$

From,

$P \wedge (Q \vee \sim Q) \vee (\sim P \wedge \sim Q)$

where, $Q \vee \sim Q = 1$ complement law

Now,

$P \vee (\sim P \wedge \sim Q)$

According to Absorption law

$P \vee \sim Q$

Both statement are equivalent

Epp5 problem 2.5.6 / 106.

Q no.4 EppB problem 2.5.6

6. $(1424)_{10}$

$= 1024 + 256 + 128 + 16$

$= 2^{10} + 2^{8} + 2^{7} + 2^{4}$

$= (10110010000)_2$

Another method:

$$
\begin{array}{r|l}
2 & 1424 - 0 \\
2 & 712 - 0 \\
2 & 356 - 0 \\
2 & 178 - 0 \\
2 & 89 - 1 \\
2 & 44 - 0 \\
2 & 22 - 0 \\
2 & 11 - 1 \\
2 & 5 - 1 \\
2 & 2 - 0 \\
 & 1
\end{array}
$$

$\boxed{(10110010000)_2 = (1424)_{10}}$

Epp5 problem 2.5.11 / 106.

Epp5 problem 2.5.28 / 107.

Epp5 2.5.11

11) $(1000111)_2$

$64+0+0+0+4+2+1$

$= (71)_{10}$

$(71)_{10} = (1000111)_2$

Epp5. 2.5.28

28. 10011001

Because the leading bit is 1, there is the 8-bit 2's complement of negative integer

$10011001 \xrightarrow{\text{flip bits}} 01100110 \xrightarrow{\text{add } 1} (01100111)_2$

$= 64+32+4+2+1$

$= |-103|$

So, the answer is -103

Epp5 problem 2.5.46 / 107.

7. Epps problem 2.5.46

45 11001001011100_2

Into 4 bits

0011 0010 0101 1100

3 2 5 C

i.e

$(325C)_{16}$

$(11001001011100)_2 = (325C)_{16}$