Date

DLD-ASSIGNMENT 03

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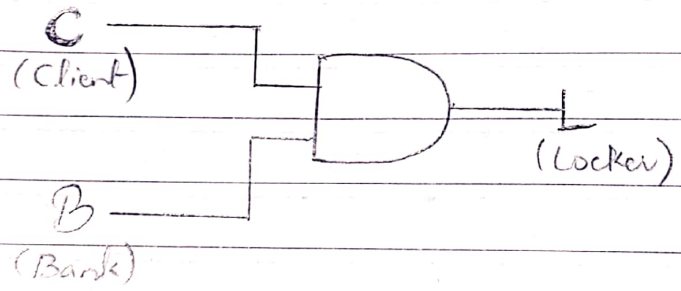
Sec: B ROLLNO: 20K-0183

PROGRAM: BS (CS)

QUESTION a:

Circuit Diagram:



Truth Table:

C	B	C.B = L	
0	0	0	(Close)
0	1	0	(Close)
1	0	0	(Close)
1	1	1	(Open)

Date

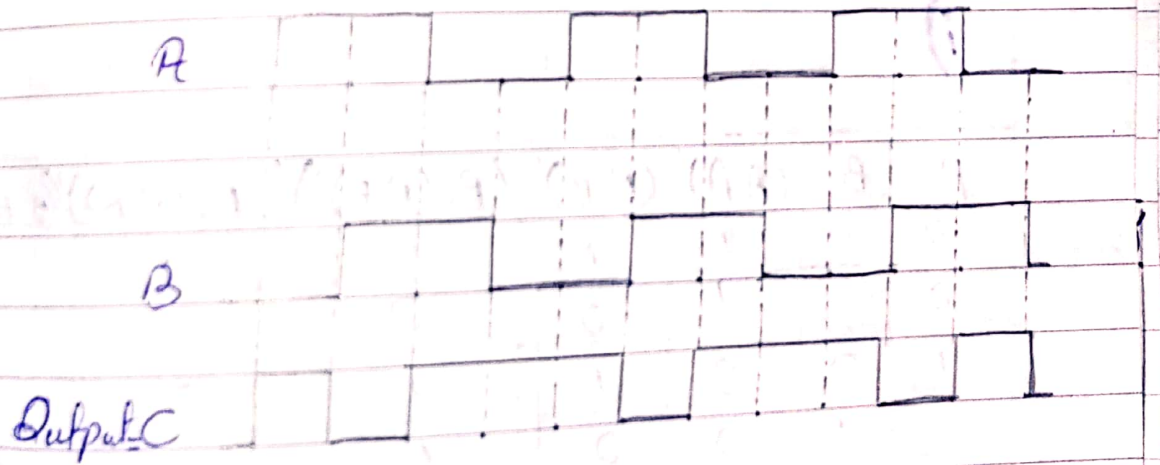
Mechanism:

When Both keys ie (Client & Bank) are inserted the circuit gives a value of 1 (high) & the locker opens. Otherwise for all other conditions the locker remains closed since AND gate require all highs as inputs to give output as 1.

QUESTION b

i) FOR NAND GATE: 

INPUTS:



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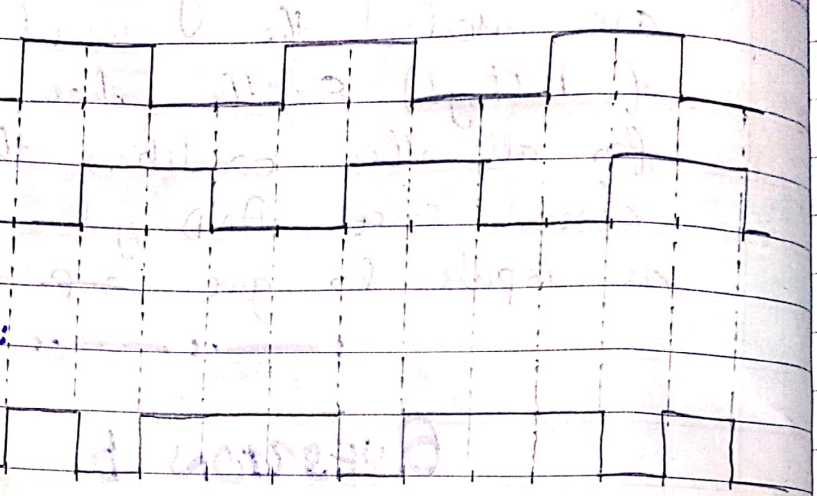
ii) FOR negative OR GATE:

INPUT:



OUTPUT:

QUESTION C:

i)

A	B	(A.A)'	(B.B)'	(B.(A.A)')'	(A.(B.B)')'	(B.(A.A)').(A.(B.B)')'
0	0	1	1	1	1	0
0	1	1	0	0	1	1
1	0	0	1	1	0	1
1	1	0	0	1	1	0

~~For simplification:~~

~~=(B.(A.A)')'.(A.(B.B)')'~~

Date

Equivalent Circuit:

$= ((B.(A.A)')'.(A.(B.B)')')'$

By demorgans law

$(A.B)' = A' + B'$

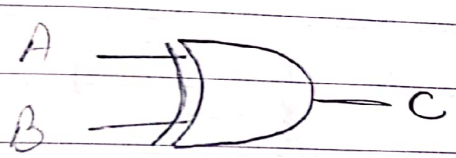
$= ((B.(A.A)')')' + ((A.(B.B)')')'$

$\because A.A = A$

$= \boxed{B.A' + A.B' = \text{XOR Gate}}$

Therefore the given circuit is equal to XOR gate

Equivalent circuit:



ii)

A	B	(A.A)'	(B.B)'	(A.A)'.(B.B)'
0	0	1	1	0
0	1	1	0	1
1	0	0	1	1
1	1	0	0	1

Calculation on next page

Equivalent Circuit:

$= ((A.A)'.(B.B)')'$

$= A.A = A$

$= [(A'.B')'.$

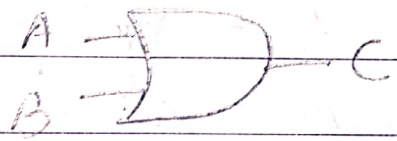
$= (A.B)' = A' + B'$

$= (A')' + (B')'$

$\therefore A + B =$ OR Gate

Hence OR gate is the equivalent of the given circuit

Circuit digram:



Date

iii)

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

EQUIVALENT CIRCUIT:

$$= \{ (A + (A+B)')' + (B + (A+B)')' + (A + (A+B)')' + (B + (A+B)')' \}'$$

$\because A + A = A$

$$= \{ \underbrace{(A + (A+B)')'}_{A} + \underbrace{(B + (A+B)')'}_{B} \}'$$

$\because (A + B)' = A' \cdot B'$

$$= [(A + (A+B)')]' \cdot [(B + (A+B)')]'$$

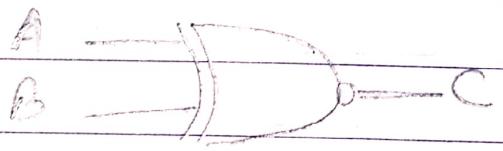
$$= (A + (A+B)') \cdot (B + (A+B)')$$

$$= (A + A'B') \cdot (B + A'B')$$

$$= A'B' + AB = \text{XNOR Gate}$$

Hence the equivalent of the given circuit is XNOR Gate

Equivalent circuit:-



iv)

Date

A	B	(A.B)'	A+B	(A.B)'.(A+B)
0	0	1	0	0
0	1	1	1	1
1	0	1	1	1
1	1	0	1	0

Equivalent circuit:

$= (A.B)'.(A+B)$

$\because (A.B)' = A' + B'$

$= (A'+B').(A+B)$

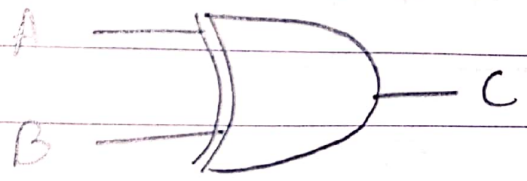
$= AA' + A'B + B'A + B'B'$

$\because AA' = 0$

$= AB' + BA' =$ XOR Gate

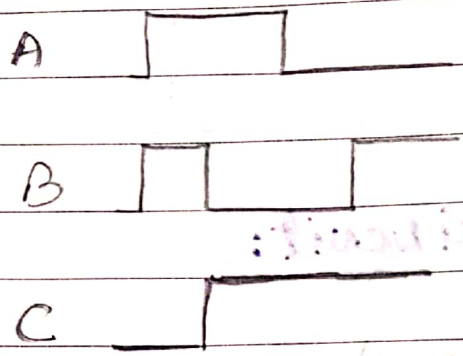
Hence the equivalent of the given circuit is ~~XNOR~~ Gate
XOR

Equivalent circuit:

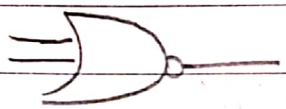


QUESTION d:

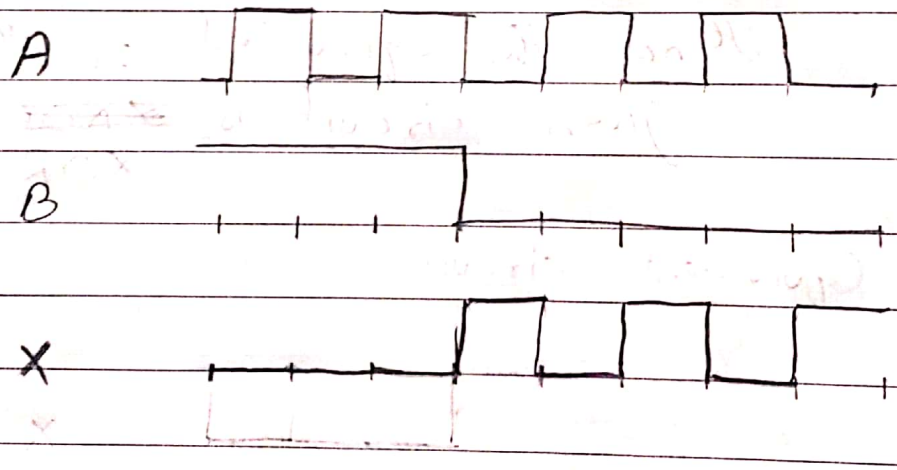
i) The waveform given in the question is incorrect the correct wave form is below



ii)



The wave form in the question is incorrect the correct wave form is below.



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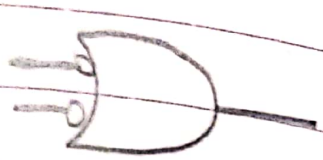
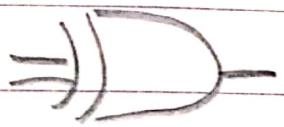
iii)



The waveform in the question is correct.

iv)



The waveform in the question is incorrect the correct waveform is below.