Name Shafiq ID 14859

1(a) Binary Numbers into Decimal Numbers:

$0110011_2 =$

$0\cdot2^6 + 1\cdot2^5 + 1\cdot2^4 + 0\cdot2^3 + 0\cdot2^2 + 1\cdot2^1 + 1\cdot2^0 =$

$= 0 + 32 + 16 + 0 + 0 + 2 + 1 = 51_{10}$

Happened 51_{10}

$101010_2 =$

$1\cdot2^5 + 0\cdot2^4 + 1\cdot2^3 + 0\cdot2^2 + 1\cdot2^1 + 0\cdot2^0 =$

$32 + 0 + 8 + 0 + 2 + 0 = 42_{10}$

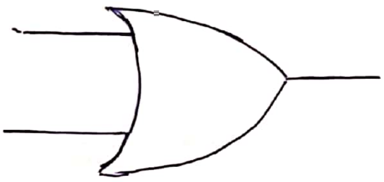
Happened 42_{10}

OR Gate: An OR gate can have two or more Inputs its output is true if at least one input is true

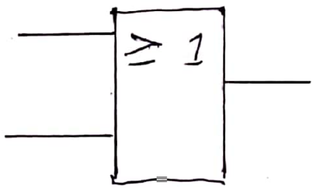
The out Put Q is true if Input A OR Input B is true (or both of them are true)

Q = A OR B

Input A	Input B	Out Put Q
0	0	0
0	1	1
1	0	1
1	1	1



Traditional Symbol



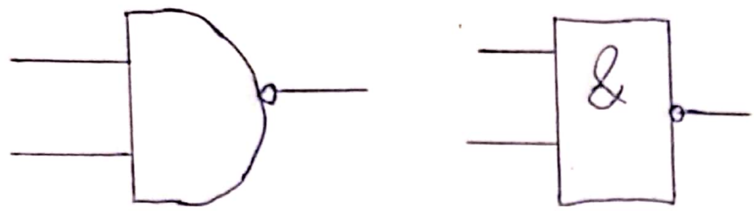
IEC Symbol

NAND Gate:

NAND = Not AND This is an AND gate with the output Inverted as shown by the "o" on the symbol output A NAND gate can have two or more Inputs its output is true if NOT all inputs are true The output Q is true if Input A AND Input B are NOT both true

Q = NOT (A AND B)

Input A	Input B	Output Q
0	0	1
0	1	1
1	0	1
1	1	0



Traditional Symbol — IEC Symbol

Q2 Decimal number into Binary.

(i) 25

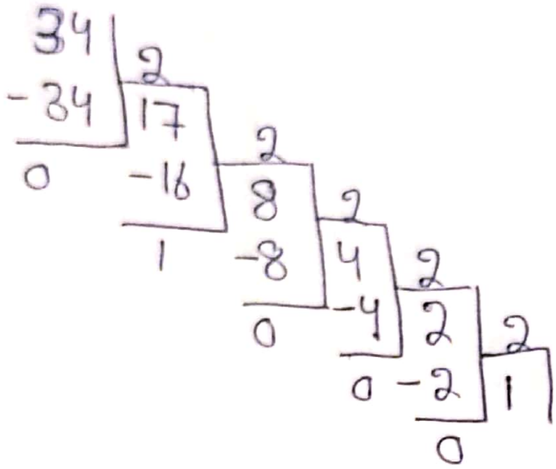
Converting$_{10}$ in Binary System here so whole Part of a number is obtained by dividing on the basis new.

25 ÷ 2 = 12, 25 − 24 = 1
12 ÷ 2 = 6, 12 − 12 = 0
6 ÷ 2 = 3, 6 − 6 = 0
3 ÷ 2 = 1, 3 − 2 = 1
1

Result: $25_{10} = 11001_2$

34

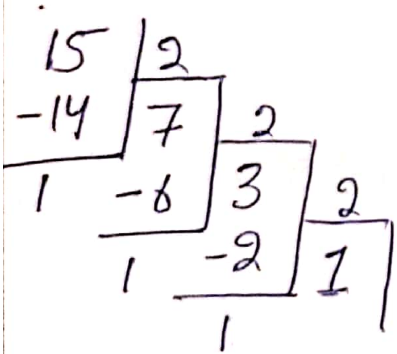
Converting 34_{10} in Binary System here So



Result $34_{10} = 100010_2$

15

Converting 15_{10} in Binary System here so



Resut $15_{10} = 1111_2$

4 12

Converting 12_{10} in Binary system here So

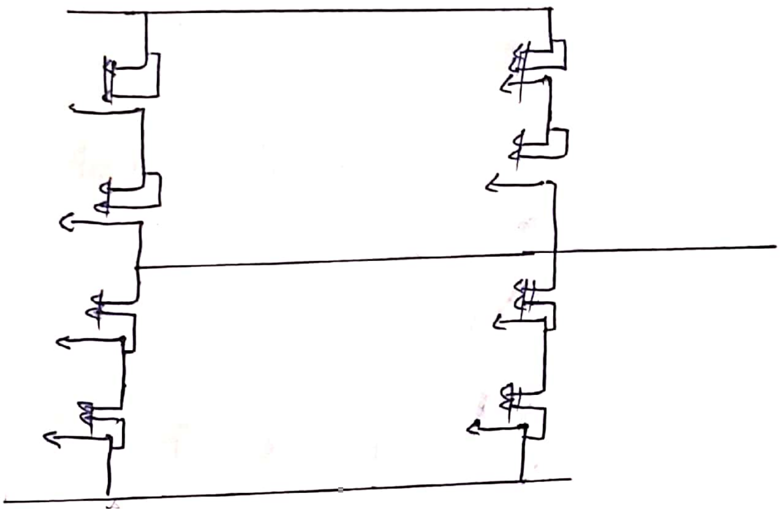
12 ÷ 2 = 6, remainder 0 (12 − 12 = 0)
6 ÷ 2 = 3, remainder 0 (6 − 6 = 0)
3 ÷ 2 = 1, remainder 1 (3 − 2 = 1)
1

Result $12_{10} = 1100_2$

Ans 3 (B) ~~(A)~~

A	B	A XOR B
0	0	0
0	1	1
1	0	1
1	1	0

XOR gate (Sometimes EOR, or EXOR and Pronounced as Exclusive OR) is a digital logic gate that gives a true (1 or High) output when the number of true Inputs is odd. An XOR gate Implements an exclusive or that is a true output results if one and only one of the Inputs to ~~g~~ the gate is true if both Inputs are false (0/Low) or both are true a false output results XOR represents the Inequality function i.e the output is true if the inputs are not alike otherwise the output is false. A way to remember XOR is must have one or the other but not both.

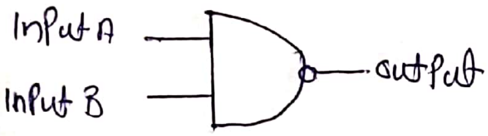


XOR can also be viewed as addition modulo 2 As a result XOR gates are used to Implement binary addition in Computers A half adder Consists of an XOR gate and an AND gate other uses Include Subtractors Comparators and Controlled inverters.

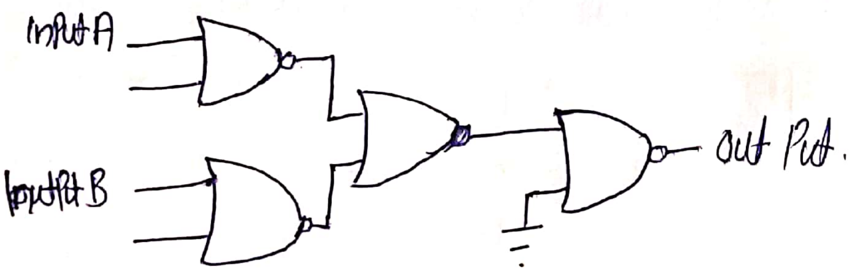
The algebraic expressions $A\cdot\overline{B}+\overline{A}\cdot B$ or $(A+B)\cdot(\overline{A}+\overline{B})$ or $A \oplus B$ all represent the XOR gate with Input A and B The behavior of XOR is summarized in the truth table.

Ans 3(A) NAND function:

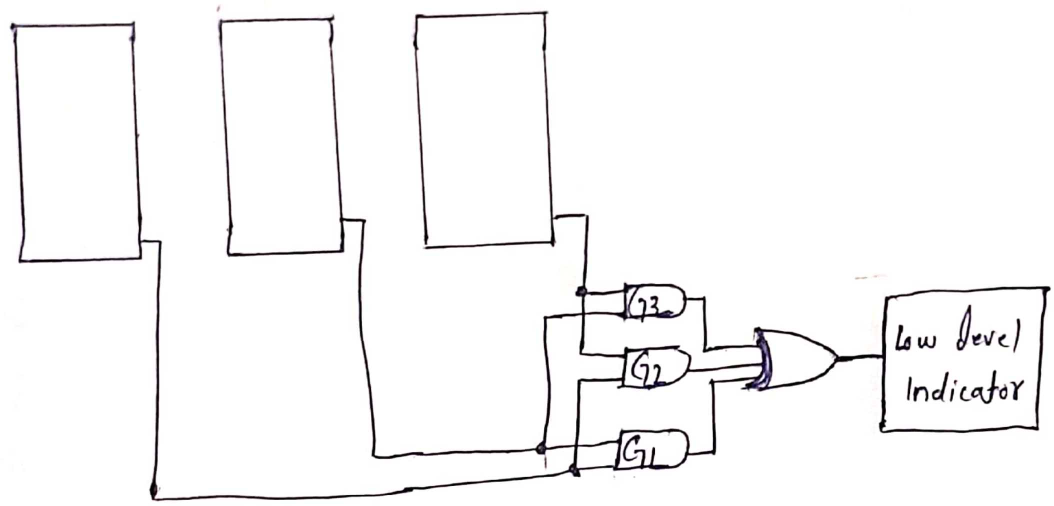
It would be Pointless to Show you how to Construct the NAND fuction using a NAND gate. Since there is nothing to do To make a NoR gate Perform the NAND function we must invert all inputs of the NoR gate as well as the NoR gate's output For a two- input gate this requires three more NoR gate Connected as Invetors.



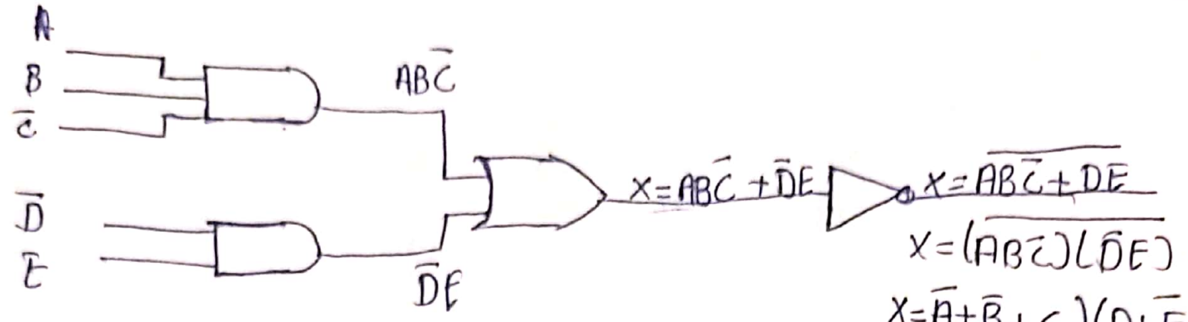
A	B	output
0	0	1
0	1	1
1	0	1
1	1	0



Ans 4 Design a circuit that monitors the chemical level in each tank and indicates when the level in any two of the tanks drops to below the specified point.



write the Boolean SOP expressions for the AND OR logic in figure 5-2.
when the out of a SOP form is inverted the circuit is called an AND OR Invert circuit. The AOI configuration lends itself to product of sum (POS) implemention An Example of AOI implementation is shown The output expression can be changed to a POS expression by applying De morgan's theorem twice.



$X = \overline{AB\bar{C} + \bar{D}E}$ AOI

$X = (\overline{AB\bar{C}})(\overline{\bar{D}E})$ DeMorgn

$X = (\bar{A}+\bar{B}+C)(D+\bar{E})$ PoS

Ans5

Sum of Products:

A boolean expression Consisting Purely of minterms Product terms) is Said to be in Canonical Sum of Products form.

Example: lets Say we have a boolean function F defined on two Variables A and B So A and B are the Inputs for F and lets Say output of F is true i.e F=1 when any one of the Input is true or 1 Now we draw the truth table for F

A	B	F
0	0	0
0	1	1
1	0	1
1	1	1

Now we will Created a Column for the minterm using the variables A and B if Input is 0 we take the Complement of the variable and if Input is 1 we take the variable as is.

A	B	F	Minterm
0	0	0	A'B'
0	1	1	A'B
1	0	1	AB'
1	1	1	AB

To get the desired Canonical SoP expression we will add the minterms for which the output is 1.

F = A'B + AB' + AB

Product of Sums (PoS)

A boolean expression Consisting Purely of maxterms is said to be in Canonical Product of Sums form.

Example: lets say we have a boolean function F defined on two variables A and B so A and B are the Inputs for F and lets say output of F is true i.e F=1 when only one of the input is true or 1

now we draw the truth table for F.

A	B	F
0	0	0
0	1	1
1	0	1
1	1	0

Now we will Create a Column for the maxterm using the variables A and B If Input is 1 we take the Complement of the variable and if Input is 0 we take the variable as is

A	B	F	Maxterm
0	0	0	$A+B$
0	1	1	$A+B'$
1	0	1	$A'+B$
1	1	0	$A'+B'$

To get the desired Canonical Pos expression we will multiply the maxterms for which the output is 0

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

Answer 5 (b)

In a Common Cathod dispay the Common terminal for the Segments is Conneted to ground (negative) and the Individual Segments are driven Positive by the Control Circuitry.

In a Common anode display the Common terminal for the Segments is Connected to the Positive Power Supply and the Individual Segments are driven negative by the Control Circuitry.