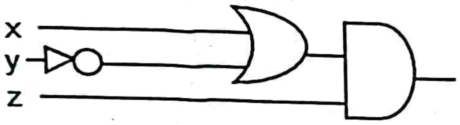
Qn. 24

Consider the logical gate diagram.

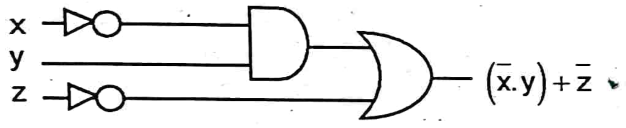


a) Find the logical expression for the circuit given.
b) Find the compliment of the logical expression.
c) Draw the circuit diagram representing the compliment.

a) Circuit ന് സമാനമായ logical expression എഴുതുക.
b) logical expressionന്റെ complement കണ്ടുപിടിക്കുക.
c) Complement ന് സമാനമായ Logic circuit വരയ്ക്കുക.

Ans: a) $(x+\bar{y}).z$ b) $(\bar{x}.y)+\bar{z}$

c)

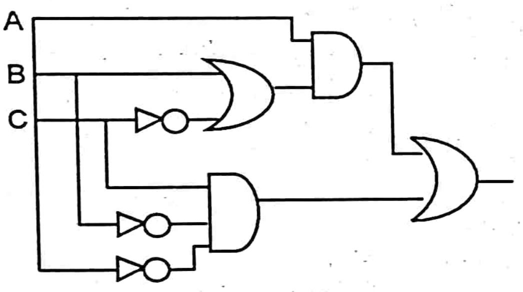


Qn. 25

Draw the logic circuit diagram for the following Boolean expression.
താഴെ തന്നിരിക്കുന്ന expressionന് സമാനമായ circuit വരയ്ക്കുക.

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

Ans:



Qn. 26

Consider a bulb with three switches x,y and z. Write the Boolean expression representing the following states.

a) All the switches x, y and z are ON
b) x is ON and y is OFF or Z is OFF
c) Exactly one switch is ON.

മൂന്ന് switches, x, y & z ഉള്ള ഒരു ബൾബ് പരിഗണിച്ച് താഴെ കൊടുത്തിരിക്കുന്നവയ്ക്കുള്ള boolean expression എഴുതുക.

a) എല്ലാ switches ഉം ON ആണ്.
b) x എന്ന switch ON ആണ്. Y സ്വിച്ചോ Z സ്വിച്ചോ, OFF ആണ്.
c) ഒരേ ഒരു സ്വിച്ച് മാത്രം ON

Ans: a) $x.y.z$ b) $x.\bar{y}+\bar{z}$ c) $x.\bar{y}.\bar{z}+\bar{x}.y.\bar{z}+\bar{x}.\bar{y}.\bar{z}$

Qn. 27

Match the following.
ചേരുംപടി ചേർക്കുക.

A	B
i) Idem potent law	a) $x+(y+z)=(x+y)+z$
ii) Involution law	b) $x+xy = x$
iii) Complementarity law	c) $x+y = y+x$
iv) Commutative law	d) $\bar{x}\,x = 0$
v) Absorption law	e) $x = x$
vi) Associative law	f) $x+x = x$

Ans: i - f, ii - e, iii - d, iv - c, v - b, vi - a

Qn. 28

Explain the principle of duality.
എന്താണ് Principle of Duality?

Ans: It states that, starting with a Boolean relation, another Boolean relation can be derived by

i) Changing each OR sign (+) to a AND sign (.)
ii) Changing each AND sign (.) to an OR sign (+)
iii) Replacing each 0 by 1 and each 1 by 0.

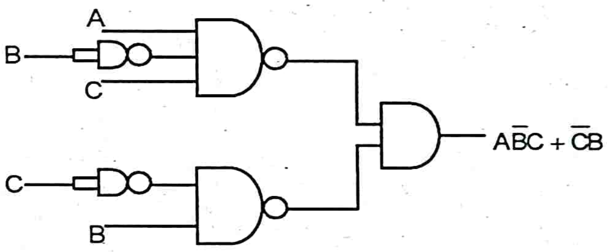
The relation derived using the duality principle is called the dual of the original expression.
eg: $x+0=x$ is the dual of $x.1=x$

Qn. 29

Draw the circuit diagram for

$F = A\bar{B}C+\bar{C}B$ using NAND gate only.
NAND gates മാത്രം ഉപയോഗിച്ച് circuit വരയ്ക്കുക.

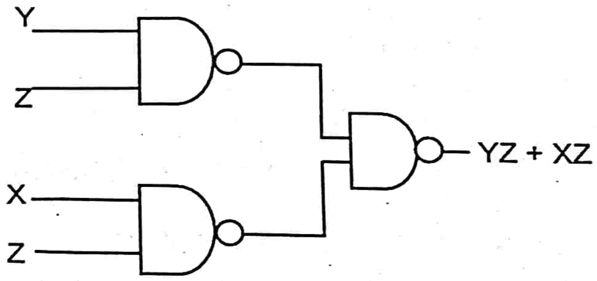
Ans: $F = A\bar{B}C+\bar{C}B$
= (A NAND (NOT B) NAND C) NAND ((NOT C) NAND B



Qn. 30

Draw a logic diagram for the function f = YZ + XZ using NAND gates only.
NAND gate മാത്രം ഉപയോഗിച്ച് വരയ്ക്കുക.

Ans: f = YZ + XZ
= (Y NAND Z) NAND (X NAND Z)



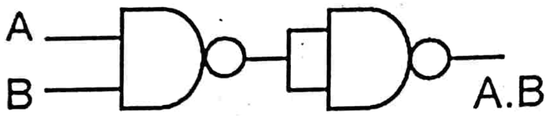
Qn. 31

How do you make various basic logic gates using NAND gates.

NAND gates ഉപയോഗിച്ച് എങ്ങനെ basic gates ഉണ്ടാക്കാം?

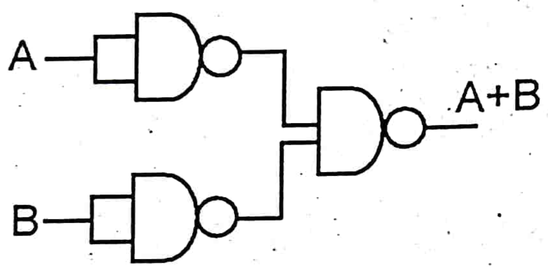
Ans: i) AND operation using NAND gate,

A.B = (A NAND B) NAND (A NAND B)



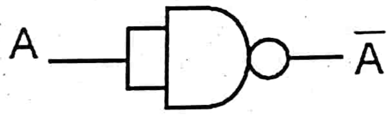
ii) OR operation using NAND gate,

A+B = (A NAND A) NAND (B NAND B)



iii) NOT operation using NAND gate,

NOT A = (A NAND A)



Qn. 32

Which of the following Boolean expressions are correct? Write the correct forms of the incorrect ones.

താഴെ തന്നിരിക്കുന്നവയിൽ നിന്ന് ശരിയായത് എടുത്തെഴുതുക. ശരിയല്ലാത്തത് തെറ്റുതിരുത്തുക.

a) $A + A^1 = 1$ b) $A + 0 = A$

c) $A.1 = A$ d) $A.A^1 = 1$

e) $A + A.B = A$ f) $A.(A+B) = A$

g) $A + 1 = 1$ h) $\overline{(A.B)} = \overline{A}.\overline{B}$

i) $A + A^1B = A + B$ j) $A + A = A$

k) $A + B.C = (A+B).(B+C)$

Ans: a) Correct b) Correct

c) Correct d) Wrong, $A.A^1 = 0$

e) Correct f) Correct

g) Correct h) Wrong $\overline{A.B} = \overline{A} + \overline{B}$

i) Correct j) Correct

k) Wrong, $A+B.C = (A+B).(A+C)$