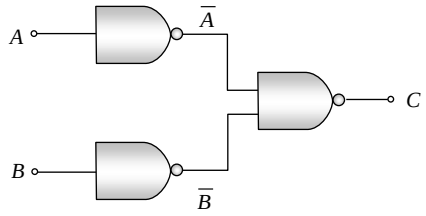
1. (b)

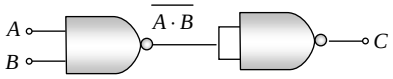
2. (c)

3. (a)



$C = \overline{\overline{A}.\overline{B}} = \overline{\overline{A} + \overline{B}} = A + B$ (De morgan's theorem)

Hence output C is equivalent to OR gate.



$C = \overline{\overline{AB}.\overline{AB}} = \overline{\overline{AB}} + \overline{\overline{AB}} = AB + AB = AB$

In this case output C is equivalent to AND gate.

4. (b) In 'NOR' gate $Y = \overline{A + B}$

i.e. $\overline{0+0} = \overline{0} = 1$, $\overline{1+0} = \overline{1} = 0$

$\overline{0+1} = \overline{1} = 0$, $\overline{1+1} = \overline{1} = 0$

5. (c) For 'XNOR' gate $Y = \overline{A}\,\overline{B} + AB$

i.e. $\overline{0}.\overline{0} + 0.0 = 1.1 + 0.0 = 1 + 0 = 1$

$\overline{0}.\overline{1} + 0.1 = 1.0 + 0.1 = 0 + 0 = 0$

$\overline{1}.\overline{0} + 1.0 = 0.1 + 1.0 = 0 + 0 = 0$

$\overline{1}.\overline{1} + 1.1 = 0.0 + 1.1 = 0 + 1 = 1$

6. (a) The Boolean expression for 'NOR' gate is $Y = \overline{A + B}$

i.e. if $A = B = 0$ (Low), $Y = \overline{0+0} = \overline{0} = 1$ (High)

7. (a)

8. (d) The Boolean expression for 'AND' gate is $R = P.Q$

$\Rightarrow$1.1 = 1, 1.0 = 0, 0.1 = 0, 0.0 = 0

9. (c) For 'NAND' gate (option c), output $= \overline{0.1} = \overline{0} = 1$

10. (a) AND + NOT $\rightarrow$ NAND

11. (c) For 'NOT' gate $X = \overline{A}$

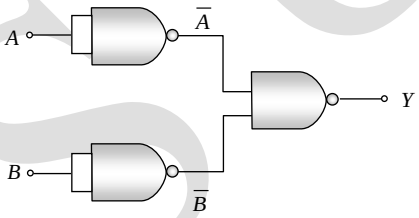
12. (b) For 'AND' gate, if output is 1 then both inputs must be 1.

13. (b)

14. (a)

15. (a) The given symbol is of 'AND' gate.

16. (b)



$Y = \overline{\overline{A}.\overline{B}} = \overline{\overline{A}} + \overline{\overline{B}} = A + B$

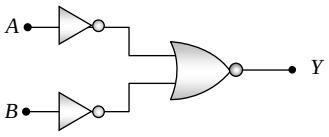
This output equation is equivalent to OR gate.

17. (c) If inputs are A and B then output for NAND gate is $Y = \overline{AB}$

$\Rightarrow$ If $A = B = 1$, $Y = \overline{1.1} = \overline{1} = 0$

18. (b)

19. (c)



$Y = \overline{\overline{A} + \overline{B}}$

According to De morgan's theorem

$Y = \overline{\overline{A} + \overline{B}} = \overline{\overline{A}}.\overline{\overline{B}} = A.B$

This is the output equation of 'AND' gate.

20. (a) The given symbol is of NAND gate.