DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutions

Subject : PHYSICS
DPP No. : 2

Topic :- SEMICONDUCTOR ELECTRONICS: MATERIALS,DEVIES AND SIMPLE CIRCUITS

1 **(b)**

$\overline{A \cdot A} = \overline{A} + \overline{\overline{A}} = \overline{A} + A = 1$

$A \cdot \overline{A} = 0$

$A + \overline{A} = 1$

$A + 1 = 1$

2 **(b)**

The conductivity of an intrinsic semiconductor decreases with decrease in temperature and so it behaves as an insulator at 0 K. The conductivity of an insulator is zero. Therefore, the electrical conductivity of an intrinsic semiconductor at 0 K is equal to zero.

5 **(c)**

When a $p - n$ junction is formed, n-side attains positive potential and p-side attains negative. When ends of p and n of a $p - n$ junction are joined by a wire, there will be a steady conventional current from n-side to p-side through the wire and p-side to n-side through the $p - n$ junction.

6 **(c)**

Wood is non-crystalline

7 **(c)**

At ordinary temperature $n_e = n_h$.

8 **(d)**

As shown, we conclude that A and C are analogue signals but B is digital signal.

9 **(b)**

In reverse biasing, width of depletion layer increases

10 **(c)**

$$R_p = \frac{V_p}{i_p} = \frac{50}{150 \times 10^{-3}} = 333.3\ \Omega$$

11 **(b)**

$$V_b - i_b R_b \Rightarrow R_b = \frac{9}{35 \times 10^{-6}} = 257\ k\Omega$$

12 **(d)**

In forward biasing both V_B and x decreases

13 **(a)**

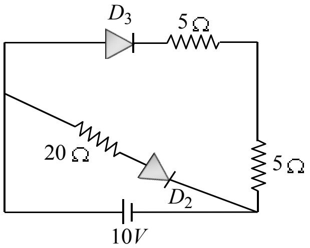
Truth table for given combination is

A	***B***	***X***
0	0	0
0	1	1
1	0	1
1	1	1

This comes out to be truth table of OR gate.

14 **(c)**

In the given circuit, diode D_1 is reverse biased, so it will not conduct. Diodes D_2 and D_3 are forward biased, so they will conduct. The corresponding equivalent circuit is as shown in the figure



The equivalent resistance of the circuit is

$$R_{eq} = \frac{(5+5)\times 20}{(5+5)+20} = \frac{10\times 20}{10+20} = \frac{200}{30} = \frac{20}{3}\,\Omega$$

Current through the battery, $I = \frac{10V}{\frac{20}{3}\Omega} = 1.5A$

16 **(c)**

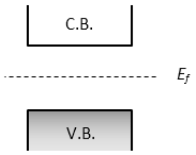
If the voltage of the DC source is increased then both conductor and semiconductor registers same current *ie*, semiconductor is in forward biased condition and it conducts. So, ammeters connected to both semiconductor and conductor will register the same current.

17 **(b)**

The temperature coefficient of resistance of silicon (*ie*, semiconductor) is negative and that of platinum (*ie*, conductor) is positive.

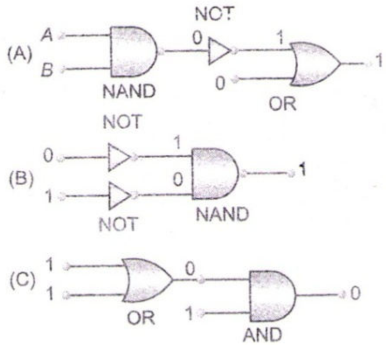
18 **(c)**

In forward biasing of PN junction diode width of depletion layer decreases. In intrinsic semiconductor fermi energy level is exactly in the middle of the forbidden gap



20 **(a)**

The output gate circuit will be as shown below.



Hence, outputs of A, B and C are 1, 1, and 0 respectively.

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ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	B	B	C	C	C	C	C	D	B	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	B	D	A	C	D	C	B	C	C	A

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