

PHYSICS

21. (3)

$$I_{in} = \frac{20-5}{2 \times 10^3} \text{ A} = 7.5 \text{ mA}$$

$$I_L = \frac{5}{10^3} \text{ A} = 5 \text{ mA} \Rightarrow I_z = 2.5 \text{ mA}$$

22. (3)

23. (4)

24. (2)

25. (4)

Input 1	Input 2	Input 3
0	0	0
1	0	1
0	1	1
1	1	0

26. (1)

When pentavalent atom loses an electron positive charge appears on the atom. So, overall neutral.

27. (1)

For a doped semi-conductor in thermal equilibrium

$$\Rightarrow n_e = \frac{n_2}{n_h} = \frac{(1.5 \times 10^{16})^2}{4.5 \times 10^{22}} = \frac{1.5 \times 1.5 \times 10^{32}}{4.5 \times 10^{22}} = 5 \times 10^9 \text{ m}^{-3}$$

28. (1)

$$\text{Band gap} = \frac{hc}{\lambda_0} = \frac{1242 \text{ eV-nm}}{621 \text{ nm}} = 2 \text{ eV}$$

29. (2)

Forward bias resistance =

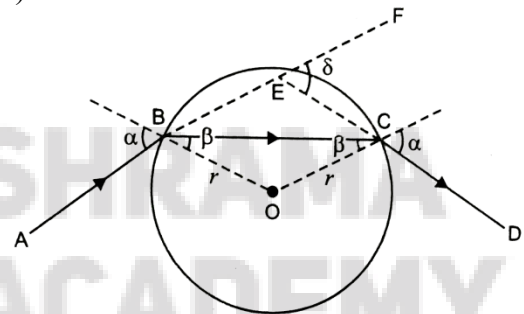
$$\frac{\Delta V}{\Delta I} = \frac{0.1}{10 \times 10^{-3}} = 10 \Omega$$

$$\text{Reverse bias resistance} = \frac{10}{10^{-6}} = 10^7 \Omega$$

Ratio of resistance =

$$\frac{\text{Forward bias resistance}}{\text{Reverse bias resistance}} = 10^{-6}$$

30. (2)



$$\begin{aligned} \text{Angle of deviation} &= (\alpha - \beta) + (\alpha - \beta) \\ &= 2(\alpha - \beta) \end{aligned}$$