PHYSICS

21. (3)

$I_{in} = \frac{20-5}{2\times10^3} A = 7.5\,mA$

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

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

$\Rightarrow n_e = \frac{n_2}{n_h} = \frac{(1.5\times10^{16})^2}{4.5\times10^{22}}$

$= \frac{1.5\times1.5\times10^{32}}{4.5\times10^{22}} = 5\times10^9\,m^{-3}$

28. (1)

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

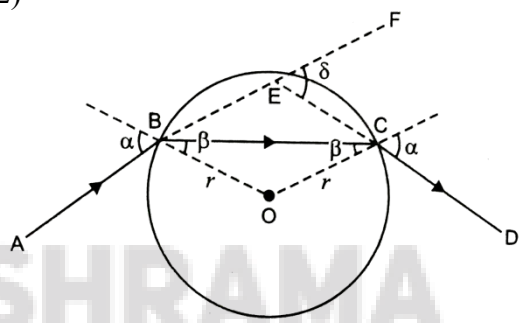
29. (2)

Forward bias resistance = $\frac{\Delta V}{\Delta I} = \frac{0.1}{10x10^{-3}} = 10\,\Omega$

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)



Angle of deviation = (α – β) + (α – β)

= 2 (α – β)