

## EDC Objective Solution (ESE-2015 Test Series Dated 21.03.2015)

1. (D) Energy gap of GaP  $\rightarrow 2.3\text{eV} \rightarrow$  Transparent but partly Energy gap of GaN  $\rightarrow 3.4\text{ eV} \rightarrow$  complete range
2. (A)  $E_g = 9\text{eV}$   
 $\varepsilon = 3.9 \times 4\text{eV}$   
 $\rho = (10^{14} - 10^{16})\Omega\text{-cm}$
3. (C) At low temp.,  $\mu \downarrow$  due to  $e^-$  are trapped by doping ions it temp. is normal,  $\mu \downarrow$  due to  $\tau \downarrow$
4. (A)  $n = N_d^+ = 5 \times 10^{14}\text{ cm}^{-3}$  ( $\therefore$  Highly doped)  
$$p = \frac{n_i^2}{N_D^+} = 4.2 \times 10^5\text{ cm}^{-3}$$
5. (B)  $n \cdot p' = n_i^2$   
 $\Rightarrow n \times 2.25p = 2.25 n_i^2$
6. (B)
7. (A)
8. (B)
9. (C)  $I_B (B-E)\text{loop} > \frac{I_C(\text{sat})}{\beta}$   
 $I_C(\text{sat}) < I_C(\text{active})$
10. (B)  $E_g \propto \frac{1}{\lambda}$
11. (D) 
$$F(E) = P_1 = \frac{1}{1 + \exp\left(\frac{E - E_F}{KT}\right)} = \frac{1}{1 + e^{\frac{E_1}{KT}}}$$
  
$$1 - F(E) = P_2 = \frac{1}{1 + e^{-\frac{E_1}{KT}}}$$
  
It  $E_1 = E_2$   
$$F(E) = \frac{1}{1 + e^{\frac{K_1}{K_T}}} = \frac{1}{1 + e^{\frac{\Delta E}{KT}}}$$
  
$$1 - F(E) = 1 - \frac{1}{1 + e^{-\frac{\Delta E}{KT}}} = \frac{e^{-\frac{\Delta E}{KT}}}{1 + e^{-\frac{\Delta E}{KT}}}$$
12. (C)  $x = \omega = \sqrt{\frac{2\varepsilon V_d}{qN_D}}$

$$\frac{x}{\sqrt{2}} = \sqrt{\frac{2\epsilon V_j x_2}{qN}}$$

13. (D)  $E_g(G_aA_s) > E_g(S_i) \Rightarrow$  thermally stable =  $G_aA_s$  since  $G_aA_s \rightarrow$  Direct Bandgap  $\rightarrow$  Transparent to visible light.

14. (B)

15. (C)

16. (C)

17. (B) (It not then answer is 14 V)

18. (A)

19. (C)

20. (C)

21. (B)  $I_D = \frac{10.7 - 0.7}{10} = 1 \text{ mA}$

$$\therefore r_d = \frac{\eta V_T}{I} = \frac{2 \times 25 \text{ mV}}{1 \text{ mA}} = 50 \Omega$$

22. (B)

23. (A)

24. (A)

25. (B)

26. (A)

27. (A)

28. (C)

29. (A)

30. (A)

31. (C)

32. (A)

33. (A)

34. (C)

35. (B)

36. (A)

37. (B)

38. (B)

39. (B)

40. (C)

41. (A)

42. (C)

43. (A)

44. (A)

45. (A)

46. (C)



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- 47. (C)
- 48. (A)
- 49. (B)
- 50. (C)
- 51. (A)
- 52. (A)
- 53. (A)
- 54. (C)
- 55. (B)
- 56. (C)
- 57. (C)
- 58. (B)
- 59. (D)
- 60. (C)