Solid and Semiconductor Assignment (II)

1. In good conductors of electricity, the type of bonding that exists is

(a) Ionic (b) Vander Waals (c) Covalent (d) Metallic

2. Bonding in a germanium crystal (semiconductor) is

(a) Metallic (b) Ionic (c) Vander Waal's type (d) Covalent

3. In a triclinic crystal system

(a) $a \neq b \neq c$, $\alpha \neq \beta \neq \gamma$ (b) $a = b = c$, $\alpha \neq \beta \neq \gamma$ (c) $a \neq b \neq c$, $\alpha \neq \beta = \gamma$ (d) $a = b \neq c$, $\alpha = \beta = \gamma$

4. Metallic solids are always opaque because

(a) Solids effect the incident light

(b) Incident light is readily absorbed by the free electron in a metal

(c) Incident light is scattered by solid molecules

(d) Energy band traps the incident light

5. Forbiden energy gap in a pure conductor is

(a) 6 *eV* (b) 1.1 *eV* (c) 0.7 *eV* (d) 0 *eV*

6. In which of the following ionic bond is present

(a) *NaCl* (b) *Ar* (c) *Si* (d) *Ge*

7. Solid CO_2 forms

(a) Ionic bond (b) Vander Waal bond (c) Chemical bond (d) Covalent bond

8. Which of the following materials is non crystalline

(a) Copper (b) Sodium chloride (c) Wood (d) Diamond

9. The coordination number of Cu is

(a) 1 (b) 6 (c) 8 (d) 12

10. Intrinsic semiconductor is electrically neutral. Extrinsic semiconductor having large number of current carriers would be

(a) Positively charged

(b) Negatively charged

(c) Positively charged or negatively charged depending upon the type of impurity that has been added

(d) Electrically neutral

11. *P*-type semiconductors are made by adding impurity element

(a) *As* (b) *P* (c) *B* (d) *Bi*

12. A pure semiconductor behaves slightly as a conductor at

(a) Room temperature (b) Low temperature (c) High temperature (d) Both (b) and (c)

13. If N_p and N_e be the numbers of holes and conduction electrons in an extrinsic semiconductor, then

(a) $N_p > N_e$

(b) $N_p = N_e$

(c) $N_p < N_e$

(d) $N_p > N_e$ or $N_p < N_e$ depending on the nature of impurity

14. Which of the following when added as an impurity into the silicon produces *N*-type semiconductor

(a) *P* (b) *Al* (c) *B* (d) *Mg*

15. In *P*-type semiconductor the majority and minority charge carriers are respectively

(a) Protons and electrons (b) Electrons and protons (c) Electrons and holes (d) Holes and electrons

16. If n_e and v_d be the number of electrons and drift velocity in a semiconductor. When the temperature is increased

(a) n_e increases and v_d decreases (b) n_e decreases and v_d increases

(c) Both n_e and v_d increases (d) Both n_e and v_d decreases

17. When *N*-type of semiconductor is heated

(a) Number of electrons increases while that of holes decreases (b) Number of holes increases while that of electrons decreases

(c) Number of electrons and holes remains same (d) Number of electrons and holes increases equally

18. Semiconductor is damaged by the strong current due to

(a) Lack of free electron (b) Excess of electrons (c) Excess of proton (d) None of these

19. Charge density for intrinsic semiconductor will be

(a) $15\times10^{17}m^{-3}$ (b) $1.6\times10^{16}m^{-3}$ (c) $15\times10^{13}m^{-3}$ (d) $15\times10^{14}m^{-3}$

20. GaAs is

(a) Element semiconductor (b) Alloy semiconductor (c) Bad conductor (d) Metallic semiconductor

21. At ordinary temperature, an increase in temperature increases the conductivity of

(a) Conductor (b) Insulator (c) Semiconductor (d) Alloy

22. An *N*-type and *P*-type silicon can be obtained by doping pure silicon with

(a) Arsenic and Phosphorous (b) Indium and Aluminium (c) Phosphorous and Indium (d) Aluminium and Boron

23. *N*-type semiconductors will be obtained, when germanium is doped with

(a) Phosphorus (b) Aluminium (c) Arsenic (d) Both (a) or (c)

24. If the two ends *P* and *N* of a *P-N* diode junction are joined by a wire

(a) There will not be a steady current in the circuit

(b) There will be a steady current from *N* side to *P* side

(c) There will be a steady current from *P* side to *N* side

(d) There may not be a current depending upon the resistance of the connecting wire

25. If no external voltage is applied across *P-N* junction, there would be

(a) No electric field across the junction

(b) An electric field pointing from *N*-type to *P*-type side across the junction

(c) An electric field pointing from *P*-type to *N*-type side across the junction

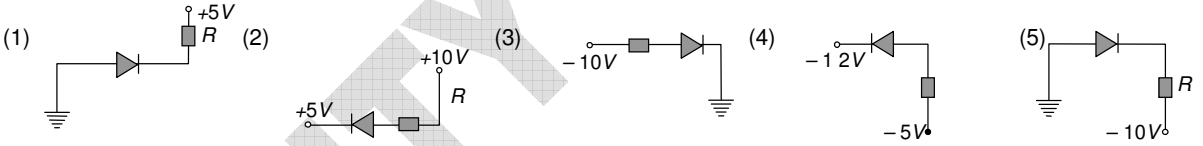
(d) A temporary electric field during formation of *P-N* junction that would subsequently disappear

26. Zener breakdown in a semi-conductor diode occurs when

(a) Forward currents exceeds certain value (b) Reverse bias exceeds certain value

(c) Forward bias exceeds certain value (d) Potential barrier is reduced to zero

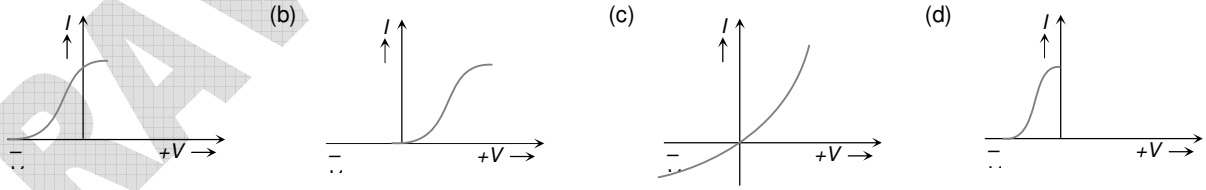
27. In the given figure, which of the diodes are forward biased



(a) 1, 2, 3 (b) 2, 4, 5 (c) 1, 3, 4 (d) 2, 3, 4

28. Different voltages are applied across a *P-N* junction and the currents are measured for each value. Which of the following graphs is obtained between voltage and current

(a) (b) (c) (d)



29. The potential barrier, in the depletion layer, is due to

(a) Ions (b) Holes (c) Electrons (d) Both (b) and (c)

30. When the forward voltage is increased in the crystal diode, then the thickness of depletion layer

(a) Decreases (b) Increases

(c) Remains unchanged (d) Increases in the ratio of applied voltage

31. Avalanche breakdown is due to

(a) Collision of minority charge carrier (b) Increase in depletion layer thickness

(c) Decrease in depletion layer thickness (d) None of these

32. The cause of potential barrier in *P-N* junction diode is

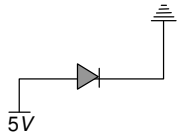
(a) Concentration of (+)*ve* charge in *P-N* junction

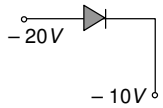
(b) Defficiency (+)*ve* charge in *P-N* junction

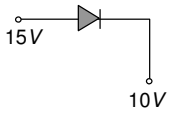
(c) Defficiency (–)*ve* charge in *P-N* junction

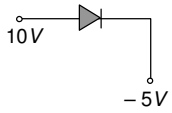
(d) Concentration of (+)*ve* and (–)*ve* charge near the junction

33. Which is reverse biased diode

(a) 

(b) 

(c) 

(d) 

34. In comparison to a half wave rectifier, the full wave rectifier gives lower

(a) Efficiency (b) Average dc (c) Average output voltage (d) None of these

35. Consider the following statements A and B and identify the correct choice of the given answers

(A) The width of the depletion layer in a *P-N* junction diode increases in forward bias

(B) In an intrinsic semiconductor the Fermi energy level is exactly in the middle of the forbidden gap

(a) A is true and B is false (b) Both A and B are false (c) A is false and B is true (d) Both A and B is true

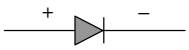
36. Consider the following statements A and B and identify the correct choice of the given answers

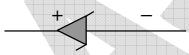
(A) A zener diode is always connected in reverse bias

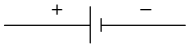
(B) The potential barrier of a *P-N* junction lies between 0.1 to 0.3 *V* approximately

(a) A and B are correct (b) A and B are wrong (c) A is correct but B is wrong (d) A is wrong but B is correct

37. The correct symbol for zener diode is

(a)  (b) 

(c) 

(d) 

38. What accounts for the flow of charge carriers in forward and reverse biasing of silicon *P-N* diode

(a) Drift in both reverse and forward bias (b) Drift in forward bias and diffusion in reverse bias

(c) Drift in reverse bias and diffusion in forward bias (d) Diffusion in both forward and reverse bias

39. Which one of the following statements is not correct

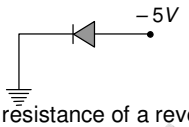
(a) A diode does not obey Ohm's law

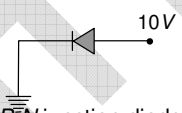
(b) A *P-N* junction diode symbol shows an arrow identifying the direction of current (forward) flow

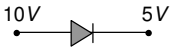
(c) An ideal diode is an open switch

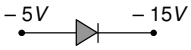
(d) An ideal diode is an ideal one way conductor

40. Which of the following semi-conductor diodes is reverse biased

(a) 

(b) 

(c) 

(d) 

41. The resistance of a reverse biased *P-N* junction diode is about

(a) 1 *ohm* (b) 10^2 *ohm* (c) 10^3 *ohm* (d) 10^6 *ohm*

42. In forward bias the width of potential barrier in a *P-N* junction diode

(a) Increases (b) Decreases (c) Remains constant (d) First (a) then (b)

43. In a junction diode, the holes are due to

(a) Protons (b) Neutrons (c) Extra electrons (d) Missing of electrons

44. *P*-type crystal of a *P-N* junction diode is connected to a positive terminal of battery and *n*-type crystal connected to negative terminal of battery

(a) Diode is forward biased (b) Diode is reverse biased

(c) Potential barrier in depletion layer increases (d) Potential barrier in depletion layer remains unchanged

45. No bias is applied to a *P-N* junction, then the current

(a) Is zero because the number of charge carriers flowing on both sides is same

(b) Is zero because the charge carriers do not move

(c) Is non-zero

(d) None of these

46. Zener diode is used as

(a) Half wave rectifier (b) Full wave rectifier (c) ac voltage stabilizer (d) dc voltage stabilizer

47. In a *P-N-P* transistor working as a common-base amplifier, current gain is 0.96 and emitter current is 7.2 *mA*. The base current is

(a) 0.4 *mA* (b) 0.2 *mA* (c) 0.29 *mA* (d) 0.35 *mA*

48. If l_1, l_2, l_3 are the lengths of the emitter, base and collector of a transistor then

(a) $l_1 = l_2 = l_3$ (b) $l_3 < l_2 > l_1$ (c) $l_3 < l_1 < l_2$ (d) $l_3 > l_1 > l_2$

49. In an *NPN* transistor circuit, the collector current is 10 *mA*. If 90% of the electrons emitted reach the collector, the emitter current (i_E) and base current (i_B) are given by

(a) $i_E = -1$ *mA*, $i_B = 9$ *mA* (b) $i_E = 9$ *mA*, $i_B = -1$ *mA* (c) $i_E = 1$ *mA*, $i_B = 11$ *mA* (d) $i_E = 11$ *mA*, $i_B = 1$ *mA*

50. In the study of transistor as an amplifier, if $\alpha = I_c / I_e$ and $\beta = I_c / I_b$, where I_c, I_b and I_e are the collector, base and emitter currents, then

(a) $\beta = \frac{1-\alpha}{\alpha}$ (b) $\beta = \frac{\alpha}{1-\alpha}$ (c) $\beta = \frac{\alpha}{1+\alpha}$ (d) $\beta = \frac{1+\alpha}{\alpha}$