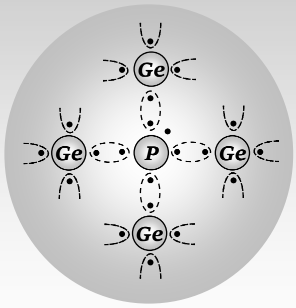


Assignment

Solid and Crystals

1. The manifestation of band structure in solids is due to **[DCE 2000; AIEEE 2004]**

   (a) Heisenberg's uncertainty principle (b) Pauli's exclusion principle

   (c) Bohr's correspondence principle (d) Boltzmann's law

2. For non-conductors, the energy gap is **[Similar to (DPMT 1988); EAMCET (Engg.) 1995; MP PET 1996; RPET 2003]**

   (a) 6 *eV* (b) 1.1 *eV* (c) 0.8 *eV* (d) 0.3 *eV*

3. Which is the correct relation for forbidden energy gap in conductor, semi-conductor and insulator

   (a) $\Delta Eg_c > \Delta Eg_{sc} > \Delta Eg_{insulator}$ (b) $\Delta Eg_{insulator} > \Delta Eg_{sc} > \Delta Eg_{conductor}$

   (c) $\Delta Eg_{conductor} > \Delta Eg_{insulator} > \Delta Eg_{sc}$ (d) $\Delta Eg_{sc} > \Delta Eg_{conductor} > \Delta Eg_{insulator}$

4. The valence band and conduction band of a solid overlap at low temperature, the solid may be

   (a) A metal (b) A semiconductor (c) An insulator (d) None of these

5. The energy band gap is maximum in

   (a) Metals (b) Superconductors (c) Insulators (d) Semiconductors

6. The band gap in Germanium and silicon in *eV* respectively is

   (a) 0.7, 1.1 (b) 1.1, 0.7 (c) 1.1, 0 (d) 0, 1.1

7. Wires *P* and *Q* have the same resistance at ordinary (room) temperature. When heated, resistance of *P* increases and that of *Q* decreases. We conclude that

   (a) *P* and *Q* are conductors of different materials (b) *P* is *n*-type semi-conductor and *Q* is *p*-type semi-conductor

   (c) *P* is semi-conductor and *Q* is conductor (d) *P* is conductor and *Q* is semiconductor

8. The nature of binding for a crystal with alternate and evenly spaced positive and negative ions is

   (a) Covalent (b) Metallic (c) Dipolar (d) Ionic

9. If the distance between the conduction band and valence band is 1 *eV*, then this combination is

   (a) Metal (b) Insulator (c) Conductor (d) Semiconductor s

10. For a crystal system, $a = b = c$, $\alpha = \beta = \gamma \neq 90^\circ$, the system is

    (a) Tetragonal system (b) Cubic system (c) Orthorhombic system (d) Rhombohedral system

11. Which of the following statements is wrong **[BHU 2000]**

(a) A single representative unit spread out in whole of the material in ordered regular arrays gives a single crystal

(b) A polycrystal is compared of grains in which regular periodicity is broken inside the grains but regularity is maintained at grain boundries

(c) In an amorphous material each grain is composed of a single representative unit

(d) In liquid crystals periodicity is maintained in only one or two dimensions.

12. Biaxial crystal among the following is

(a) Calcite (b) Quartz (c) Selenite (d) Tourmaline

13. The temperature coefficient of resistance of a conductor is

(a) Positive always (b) Negative always (c) Zero (d) Infinite

14. Potassium has a *bcc* structure with nearest neighbour distance 4.525 *A*. Its molecular weight is 39. Its density in kg/m^{-3} is **[DCE 1997]**

(a) 454 (b) 908 (c) 602 (d) 802

15. At 0^oK, fermi level for metals

(a) Separate, empty and filled levels (b) Lies between filled levels

(c) Lies between empty levels (d) Depends on metal

16. Which of the following statement is wrong **[MP PMT 1997]**

(a) Resistance of a semi-conductor decreases on increasing the temperature

(b) Displacement of holes is opposite to the displacement of electrons in an electric field

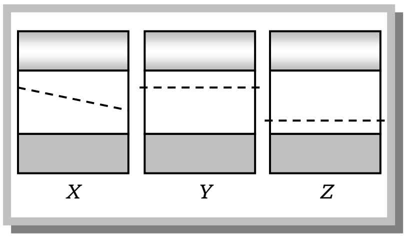
(c) Resistance of a good conductor decreases on increasing the temperature

(d) *N*-type semiconductors are neutral

17. The expected energy of the electrons at absolute zero is called

(a) Fermi energy (b) Emission energy (c) Work function (d) Potential energy

18. The energy band diagrams for three semiconductor samples of silicon are as shown. We can then assert that **[Haryana**



(a) Sample *X* is undoped while samples *Y* and *Z* have been doped with a third group and a fifth group impurity respectively

(b) Sample *X* is undoped while both samples *Y* and *Z* have been doped with a fifth group impurity

(c) Sample *X* has been doped with equal amounts of third and fifth group impurities while samples *Y* and *Z* are undoped

(d) Sample *X* is undoped while samples *Y* and *Z* have been doped with a fifth group and a third group impurity respectively

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

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

20. Bonding in a germanium crystal (semiconductor) is **[CPMT 1986; KCET 1992; EAMCET (Med.) 1995]**

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

21. In a triclinic crystal system **[EAMCET (Med.) 1995]**

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

22. Metallic solids are always opaque because **[AFMC 1994]**

(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

23. Forbiden energy gap in a pure conductor is **[EAMCET (Med.) 1994]**

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

24. In which of the following ionic bond is present **[EAMCET (Med.) 1994]**

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

25. Solid CO_2 forms **[CBSE 1993]**

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

26. Which of the following materials is non crystalline **[CBSE 1993]**

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

27. The coordination number of *Cu* is

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

28. Which one of the following is the weakest kind of bonding in solids

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

29. In a crystal, the atoms are located at the position of **[AMU 1985]**

(a) Maximum potential energy (b) Minimum potential energy (c) Zero potential energy(d)

30. Crystal structure of *NaCl* is

(a) Fcc (b) Bcc (c) Both of the above (d) None of the above

Semiconductor

31. A semiconductor is formed by

(a) Co-ordinate (b) Covalent bonds (c) Electro-valent bonds (d) Metallic bonds

32. A hole carries a charge equal to

(a) Zero (b) Proton (c) Neutron (d) Electron

33. A piece of copper and another of germanium are cooled from room temperature to 77 K, the resistance of **[MP PET 1999;**

(a) Each of them increases (b) Each of them decreases

(c) Copper decreases and germanium increases (d) Copper increases and germanium decreases

34. When germanium is doped with phosphorus, the doped material has

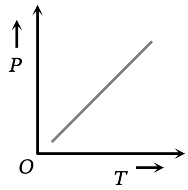
(a) Excess positive charge (b) Excess negative charge

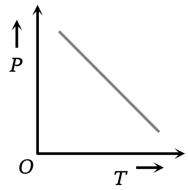
(c) More negative current carriers (d) More positive current carriers

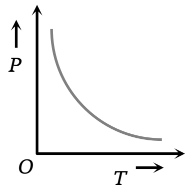
35. Partially filled electron between forbidden gap is **[Bihar CECE 2004]**

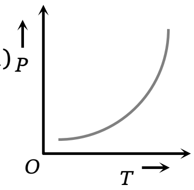
(a) Conductor (b) Insulator (c) Semiconductor (d) All of the above

36. The temperature (T) dependence of resistivity (ρ) of a semiconductor is represented by

(a) 

(b) 

(c) 

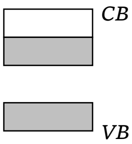
(d) 

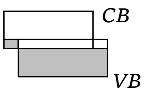
37. In extrinsic *P* and *N*-type, semiconductor materials, the ratio of the impurity atoms to the pure semiconductor atoms is about

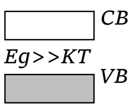
[MP PET 2003]

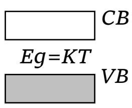
(a) 1 (b) 10^{-1} (c) 10^{-4} (d) 10^{-7}

38. Which of the energy band diagrams shown in the figure corresponds to that of a semiconductor

(a) 

(b) 

(c) 

(d) 

39. In a P-type semiconductor **[Similar to Orissa JEE 2002; MP PET 2003]**

(a) Current is mainly carried by holes (b) Current is mainly carried by electrons

(c) The material is always positively charged (d) Doping is done by pentavalent material

40. At ordinary temperatures, the electrical conductivity of semi conductors in *mho/metre* is in the range

(a) 10^{-3} to 10^{-4} (b) 10^{6} to 10^{9} (c) 10^{-6} to 10^{-10} (d) 10^{-10} to 10^{-16}

41. When phosphorus and antimony are mixed in germaniun, then

(a) *P*-type semiconductor is formed (b) *N*-type semiconductor is formed

(c) Both (a) and (b) (d) None of these

42. To a germanium sample, traces of gallium are added as an impurity. The resultant sample would behave like**[AIIMS 20**

(a) A conductor (b) A P-type semiconductor (c) An N-type semiconductor (d) An insulator

43. Donor type impurity is found in

(a) Trivalent elements (b) Pentavalent elements (c) In both the above (d) None of these

44. The difference in the variation of resistance with temperature in a metal and a semiconductor arises essentially due to the difference in the

(a) Variation of scattering mechanism with temperature (b) Crystal structure

(c) Variation of the number of charge carriers with temperature (d) Type of bonding

45. A piece of semiconductor is connected in series in an electric circuit. On increasing the temperature, the current in the circuit will

[RPMT 2003]

(a) Decrease (b) Remain unchanged (c) Increase (d) Stop flowing

46. When a semiconductor is heated, its resistance **[KCET 1992; MP PMT 1994; MP PET 2002]**

(a) Decreases (b) Increases (c) Remains unchanged (d) Nothing is definite

47. In a semiconductor, the concentration of electrons is $8 \times 10^{14} / cm^3$ and that of the holes is $5 \times 10^{12} / cm^3$. The semiconductor is

[MP PMT 1997; RPET 1999; Kerala PET 2002]

(a) *P*-type (b) *N*-type (c) Intrinsic (d) *PNP*-type

48. In intrinsic semiconductor at room temperature, number of electrons and holes are **[EAMCET (Engg.) 1995; JIPMER 2001**

(a) Equal (b) Zero (c) Unequal (d) Infinite

49. To obtain *P*-type *Si* semiconductor, we need to dope pure *Si* with

(a) Aluminium (b) Phosphorous (c) Oxygen (d) Germanium

50. When the electrical conductivity of a semiconductor is due to the breaking of its covalent bonds, then the semiconductor is said to be

[AIIMS 1997; IIT-JEE 1997; KCET (Engg.) 2002]

(a) Donar (b) Acceptor (c) Intrinsic (d) Extrinsic

51. Which impurity is doped in *Si* to form *N*-type semi-conductor

(a) *Al* (b) *B* (c) *As* (d) None of these

52. In a semiconductor **[AIEEE 2002; AIIMS 2002]**

(a) There are no free electrons at any temperature

(b) The number of free electrons is more than that in a conductor

(c) There are no free electrons at 0*K*

(d) None of these

53. The process of adding impurities to the pure semiconductor is called

(a) Drouping (b) Drooping (c) Doping (d) None of these

54. At room temperature, a *P*-type semiconductor has **[Kerala PMT 2002]**

(a) Large number of holes and few electrons (b) Large number of free electrons and few holes

(c) Equal number of free electrons and holes (d) No electrons or holes

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

[AMU (Engg.) 2001]

(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

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

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

57. A pure semiconductor behaves slightly as a conductor at **[MH CET (Med.) 2001; BHU 2000; AFMC 2001]**

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

58. 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

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

[CPMT 1986, 94; DPMT 1999; CBSE 1999; AIIMS 2000]

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

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

[MP PET 1991, 98; MP PMT 1998, 99; MH CET 2000]

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

61. If n_e and v_d be the number of electrons and drift velocity in a semiconductor. When the temperature is increased **[Pb. CET 2000]**

(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

62. When *N*-type of semiconductor is heated **[CBSE 1993; DPMT 2000]**

(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

63. Semiconductor is damaged by the strong current due to **[MH CET 2000]**

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

64. Charge density for intrinsic semiconductor will be **[RPMT 2000]**

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

65. GaAs is **[RPMT 2000]**

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

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

[Similar to (RPMT 1999); MP PMT 2000]

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

67. An *N*-type and *P*-type silicon can be obtained by doping pure silicon with **[EAMCET (Med.) 1995, 2000]**

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

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

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

69. The state of the energy gained by valance electrons when the temperature is raised or when electric field is applied is called as

[CBSE 2000]

(a) Valance band (b) Conduction band (c) Forbidden band (d) None of these

70. At 0 *K* intrinsic semiconductors behaves as **[MP PET 2000]**

(a) A perfect conductor (b) A super conductor (c) A semiconductor (d) A perfect insulator

71. To obtain electrons as majority charge carriers in a semiconductor, the impurity mixed is

(a) Monovalent (b) Divalent (c) Trivalent (d) Pentavalent

72. For germanium crystal, the forbidden energy gap in joules is

(a) 1.12×10^{-19} (b) 1.76×10^{-19} (c) 1.6×10^{-19} (d) Zero

73. In the terminology related to semiconductor, what is a hole

(a) Space which is a negatively charged

(b) Space which was previously occupied by an electron

(c) A hole in a space time distribution of the universe

(d) Dense area in a space which even absorb light *i.e.*, black hole

74. If n_e and n_h are the number of electrons and holes in a semiconductor heavily doped with phosphorus, then **[MP PMT**

(a) $n_e >> n_h$ (b) $n_e << n_h$ (c) $n_e \le n_h$ (d) $n_e = n_h$

75. In extrinsic semiconductors

(a) The conduction band and valence band overlap

(b) The gap between conduction band and valence band is more than 16 eV

(c) The gap between conduction band and valence band is near about 1 eV

(d) The gap between conduction band and valence band will be 100 eV and more

76. Resistivity of a semiconductor depends on **[MP PMT 1999]**

(a) Shape of semiconductor (b) Atomic nature of semiconductor

(c) Length of semiconductor (d) Shape and atomic nature of semiconductor

77. Electronic configuration of Germanium is 2, 8, 18 and 4. To make it extrinsic semiconductor small quantity of antimony is added

[MP CEE 1999]

(a) The material obtained will be *N*-type Germanium in which electrons and holes are in equal number

(b) The material obtained will be *P*-type Germanium

(c) The material obtained will be *N*-type Germanium which has more electrons than holes at room temperature

(d) The material obtained will be *N*-type Germanium which has less electrons than holes at room temperature

78. At zero degree Kelvin a piece of germanium **[MP PET 1999]**

(a) Becomes semiconductor (b) Becomes good conductor (c) Becomes bad conductor(d)

79. In a *P*-type semiconductor, germanium is doped with **[AFMC 1999]**

(a) Boron (b) Gallium (c) Aluminium (d) All of these

80. In *N*-type semiconductors, majority charge carriers are **[AIIMS 1999]**

(a) Holes (b) Protons (c) Neutrons (d) Electrons

81. *P*-type semiconductor is formed when **[RPET 1999]**

A. *As* impurity is mixed in *Si* B. *Al* impurity is mixed in *Si* C. *B* impurity is mixed in *Ge* D. *P* impurity is mixed in *Ge*

(a) A and C (b) A and D (c) B and C (d) B and D

82. In case of a semiconductor, which of the following statement in wrong

(a) Doping increases conductivity (b) Temperature coefficient of resistance is negative

(c) Resisitivity is in between that of a conductor and insulator (d) At absolute zero temperature, it behaves like a conductor

83. A *N*-type semiconductor is **[AFMC 1988; AMU 1998; RPMT 1999]**

(a) Negatively charged (b) Positively charged (c) Neutral (d) None of these

84. When a potential difference is applied across, the current passing through **[IIT-JEE (Screening) 1999]**

(a) A semiconductor at 0K is zero (b) A metal at 0K is finite

(c) A *P-N* diode at 300K is finite if it is reverse biased (d) All of the above

85. The value indicated by Fermi energy level in an intrinsic semiconductor is **[EAMCET 1997]**

(a) The average energy of electrons and holes (b) The energy of electrons in conduction band

(c) The energy of holes in valence band (d) The energy of forbidden region

86. The dominant mechanisms for motion of charge carriers in forward and reverse biased silicon *P-N* junctions are **[IIT-JE**

(a) Drift in forward bias, diffusion in reverse bias (b) Diffusion in forward bias, drift in reverse bias

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

87. To obtain a *p*-type germanium semiconductor, it must be doped with **[CBSE 1997]**

(a) Arsenic (b) Antimony (c) Indium (d) Phosphorus

88. In a pure semiconductor the current density is given by **[RPMT 1997]**

(a) $J = nq(v_n - v_p)$ (b) $J = nq(v_n + v_p)$ (c) $J = nq(v_n / v_p)$ (d) $J = nq(v_n v_p)$

89. Silicon is a semiconductor. If a small amount of *As* is added to it, then its electrical conductivity **[MP PMT 1996]**

(a) Decreases (b) Increases (c) Remains unchanged (d) Becomes zero

90. Electric current is due to drift of electrons in **[CPMT 1996]**

(a) Metallic conductors (b) Semi-conductors (c) Both (a) and (b) (d) None of these

91. Fermi level of energy of an intrinsic semiconductor lies **[EAMCET (Med.) 1995]**

(a) In the middle of forbidden gap (b) Below the middle of forbidden gap

(c) Above the middle of forbidden gap (d) Outside the forbidden gap

92. In a semiconductor the separation between conduction band and valence band is of the order of **[EAMCET (Med.) 1995]**

(a) 100 *eV* (b) 10 *eV* (c) 1 *eV* (d) 0 *eV*

93. Let n_p and n_e be the number of holes and conduction electrons respectively in a semiconductor. Then **[MP PET 1995]**

(a) $n_p > n_e$ in an intrinsic semiconductor (b) $n_p = n_e$ in an extrinsic semiconductor

(c) $n_p = n_e$ in an intrinsic semiconductor (d) $n_e > n_p$ in an intrinsic semiconductor

94. An intrinsic semiconductor has $10^{18}\ m^{-3}$ free electrons and is doped with pentavalent impurity atoms of density $10^{24}\ m^{-3}$. The free electron density will increase by ..... orders of magnitude **[Roorkee 1995]**

(a) 3 (b) 4 (c) 5 (d) 6

95. The probability of electrons to be found in the conduction band of an intrinsic semiconductor at a finite temperature **[IIT-JEE 1995]**

(a) Decreases exponentially with increasing band gap (b) Increases exponentially with increasing band gap

(c) Decreases with increasing temperature (d) Is independent of the temperature and the band gap

96. Doping of a semiconductor (with small traces of impurity atoms) generally changes the resistivity as follows**[KCET 199**

(a) Decreases (b) Does not alter

(c) May increase or decrease depending on the dopant (d) Increases

97. Three semi-conductors are arranged in the increasing order of their energy gap as follows. The correct arrangement is **[MP PMT 1993]**

(a) Tellurium, germanium, silicon (b) Tellurium, silicon, germanium

(c) Silicon, germanium, tellurium (d) Silicon, tellurium, germanium

98. In insulators **[MP PET 1993]**

(a) The valence band is partially filled with electrons

(b) The conduction band is partially filled with electrons

(c) The conduction band is filled with electrons and the valence band is empty

(d) The conduction band is empty and the valence band is filled with electrons

99. The energy gap of silicon is 1.14 eV. The maximum wavelength at which silicon will begin absorbing energy is**[MP PMT**

(a) 10888 $\mathring{A}$ (b) 1088.8 $\mathring{A}$ (c) 108.88 $\mathring{A}$ (d) 10.888 $\mathring{A}$

100. The typical ionisation energy of a donor in silicon is **[IIT-JEE 1992]**

(a) 10.0 eV (b) 1.0 eV (c) 0.1 eV (d) 0.001 eV

101. The level formed due to impurity atom, in the forbidden energy gap, very near to the valence band in P-type semiconductor is called

EAMCET 1990]

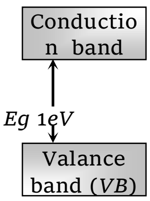
(a) A forbidden level (b) A conduction level (c) A donor level (d) An acceptor level

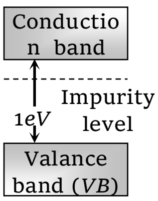
102. A P-type semiconductor can be obtained by adding **[NCERT 1979; BIT 1988; MP PMT1987, 90]**

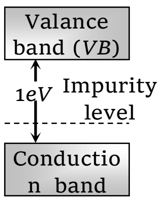
(a) Arsenic to pure silicon (b) Gallium to pure silicon

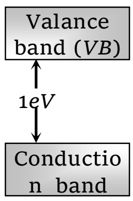
(c) Antimony to pure germanium (d) Phosphorus to pure germanium

103. Which of the following energy band diagram shows the N-type semiconductor **[RPET 1986]**

(a)


(b)


(c)


(d)


104. If the intensity of electric field is E, then current density is directly proportional to **[RPET 1986]**

(a) E (b) $1/E$ (c) E^2 (d) $1/E^2$

105. The mobility of free electron is greater than that of free holes because

(a) The carry negative charge (b) They are light

(c) They mutually collide less (d) They require low energy to continue their motion

106. The relation between the number of free electrons in semiconductors (n) and its temperature (T) is

(a) $n \propto T^2$ (b) $n \propto T$ (c) $n \propto \sqrt{T}$ (d) $n \propto T^{3/2}$

107. The electron mobility in N-type germanium is 3900 $cm^2/v\text{-}s$ and its conductivity is 6.24 *mho/cm*, then impurity concentration will be if the effect of cotters is negligible

(a) $10^{15}\ cm^3$ (b) $10^{13}\ /cm^3$ (c) $10^{12}\ /cm^3$ (d) $10^{16}\ /cm^3$

108. The densities of electrons and cotters in an extrinsic semiconductor are $8 \times 10^{13}\ cm^{-3}$ and $5 \times 10^{12}\ cm^{-3}$ respectively. The mobilities of electrons and holes are $23 \times 10^3\ cm^2/v\text{-}s$ and $10^2\ cm^2\ /v\text{-}s$ respectively. The type of semiconductors is

(a) P (b) N (c) Both types (d) None of these

109. In an N-type semiconductor electron mobility is 3900 $cm^2/v\text{-}s$ and its conductivity is 5 *mho/cm*. The impurity concentration will be (Effect of holes is negligible)

(a) $8 \times 10^{15}\ /cm^3$ (b) $8 \times 10^{13}\ /cm^3$ (c) $8 \times 10^{12}\ /cm^3$ (d) $8 \times 10^{10}\ /cm^3$

110. The forbidden energy gap of a germanium semiconductor is 0.75 *eV*. The minimum thermal energy of electrons reaching the conduction band from the valence band should be

(a) 0.5 *eV* (b) 0.75 *eV* (c) 0.25 *eV* (d) 1.5 *eV*

111. In semiconductor the concentrations of electrons and holes are $8 \times 10^{18}/m^3$ and $5 \times 10^{18}/m$ respectively. If the mobilities of electrons and hole are 2.3 $m^2/v\text{-}s$ and 0.01 $m^2/v\text{-}s$ respectively, then semiconductor is

(a) N-type and its resistivity is 0.34 *ohm-metre* (b) P-type and its resistivity is 0.034 *ohm-metre*

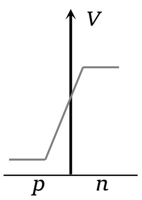
(c) N-type and its resistivity is 0.034 *ohm-metre* (d) P-type and its resistivity is 3.40 *ohm-metre*

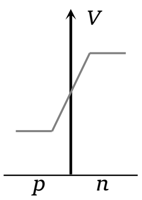
Semiconductor diode

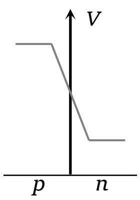
112. The P-N junction diode is used as **[AFMC 1997; EAMCET 1999; DPMT 2000; MP PMT 2004]**

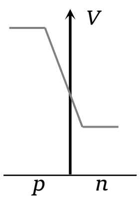
(a) An amplifier (b) An oscillator (c) A rectifier (d) A modulator

113. In a forward biased P-N junction diode, the potential barrier in the depletion region is of the form …**[KCET 2004]**

(a) 

(b) 

(c) 

(d) 

114. When P-N junction diode is forward biased, then **[RPMT 1997; CBSE 1999; UPSEAT 2002; RPET 2003; AIEEE 2004]**

(a) The depletion region is reduced and barrier height is increased

(b) The depletion region is widened and barrier height is reduced

(c) Both the depletion region and barrier height are reduced

(d) Both the depletion region and barrier height are increased

115. A crystal diode is a **[MP PET 2004]**

(a) Non-linear device (b) Amplifying device (c) Linear device (d) Fluctuating device

116. In a *P-N* junction photo cell, the value of photo-electromotive force produced by monochromatic light is proportional to

[CBSE PMT/PDT Screening 2004]

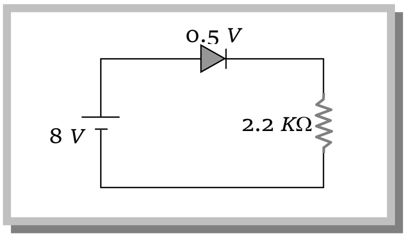
(a) The voltage applied at the *P-N* junction (b) The barrier voltage at the *P-N* junction

(c) The intensity of the light falling on the cell (d) The frequency of the light falling on the cell

117. The peak voltage in the output of a half-wave diode rectifier fed with a sinusoidal signal without filter is $10V$. The dc component of the output voltage is **[CBSE PMT/PDT (Screening) 2004]**

(a) $20/\pi V$ (b) $10/\sqrt{2}\ V$ (c) $10/\pi V$ (d) $10\ V$

118. In the circuit, if the forward voltage drop for the diode is $0.5V$. The current will be **[UPSEAT 2003]**



(a) $3.4\ mA$

(b) $2\ mA$

(c) $2.5\ mA$

(d) $3\ mA$

119. In the middle of the depletion layer of a reverse-biased *P-N* junction, the **[AIEEE 2003]**

(a) Potential is zero (b) Electric field is zero

(c) Potential is maximum (d) Electric field is maximum

120. If a full wave rectifier circuit is operating from $50\ Hz$ mains, the fundamental frequency in the ripple will be[CBSE 200

(a) $50\ Hz$ (b) $70.7\ Hz$ (c) $100\ Hz$ (d) $25\ Hz$

121. Barrier potential of a *P-N* junction diode does not depend on **[CBSE 2003]**

(a) Temperature (b) Forward bias (c) Doping density (d) Diode design

122. In the depletion region of an unbiased *P-N* junction diode there are

[KCET 1999; CBSE 1999; RPET 1991, 2001; RPMT 2001; MP PMT 1994, 2003]

(a) Only electrons (b) Only holes (c) Both electrons and holes (d) Only fixed ions

123. The reverse biasing in a *P-N* junction diode **[MP PMT 1991; EAMCET 1994; CBSE 2003]**

(a) Decreases the potential barrier (b) Increases the potential barrier

(c) Increases the number of minority charge carriers (d) Increases the number of majority charge carriers

124. The electrical circuit used to get smooth dc output from a rectifier circuit is called **[KCET 2003]**

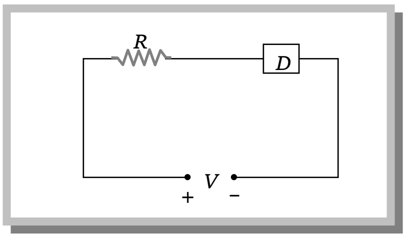
(a) Oscillator (b) Filter (c) Amplifier (d) Logic gates

125. The approximate ratio of resistances in the forward and reverse bias of the *PN* junction diode is

[MP PET 2000; MP PMT 1999, 2002, 2003]

(a) $10^2 : 1$ (b) $10^{-2} : 1$ (c) $1 : 10^{-4}$ (d) $1 : 10^4$

126. An ideal diode is connected in series with a resistor *R* then voltage across *R* will be **[CBSE PMT 2002]**



(a) $2V$ in forward bias

(b) V in forward bias

(b) V in reverse bias

(d) Zero in forward bias

127. In a *P-N* junction diode **[CBSE PMT 2002]**

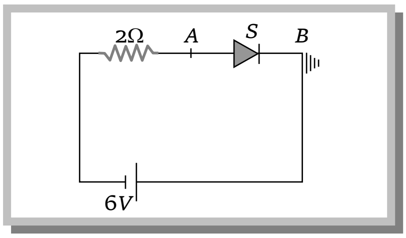
(a) Potential at *P* is more than *N* (b) Potential at *P* is less than *N*

(c) Potential at *P* and *N* is the same (d) Fluctuating potential between *P* and *N*

128. On increasing the reverse bias to a large value in a *P-N* junction diode, the current **[BHU 2002]**

(a) Remains fixed (b) Decrease slowly (c) Increase slowly (d) Suddenly increases

129. The diode shown in the circuit is a silicon diode. The potential difference between the points *A* and *B* will be**[RPMT 200**



(a) 6*V*

(b) 0.6*V*

(c) 0.7*V*

(d) 0*V*

130. Function of rectifier is **[AFMC 2002]**

(a) To convert ac into dc (b) To convert dc into ac (c) Both (a) and (b) (d) None of these

131. When the *P* end of *P-N* junction is connected to the negative terminal of the battery and the *N* end to the positive terminal of the battery, then the *P-N* junction behaves like **[MP PET 2002]**

(a) A conductor (b) An insulator (c) A super-conductor (d) A semi-conductor

132. If the two ends *P* and *N* of a *P-N* diode junction are joined by a wire **[MP PMT 2002]**

(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

133. If no external voltage is applied across *P-N* junction, there would be **[Orissa JEE 2002]**

(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

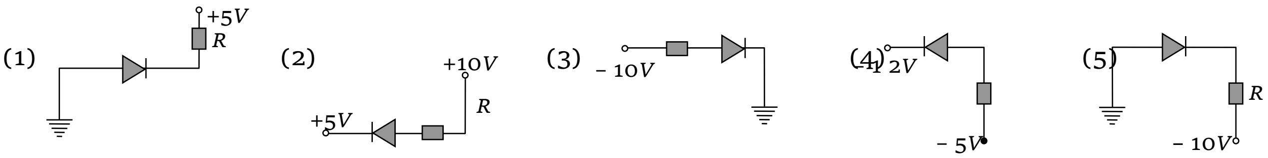
(d) A temporary electric field during formation of *P-N* junction that would subsequently disappear

134. Zener breakdown in a semi-conductor diode occurs when **[UPSEAT 2002]**

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

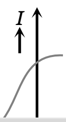
(c) Forward bias exceeds certain value (d) Potential barrier is reduced to zero

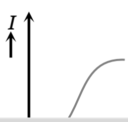
135. In the given figure, which of the diodes are forward biased **[Kerala PET 2002]**

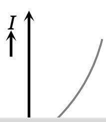


(a) 1, 2, 3 (b) 2, 4, 5 (c) 1, 3, 4 (d) 2, 3, 4

136. 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 **[MP PET 1996; UPSEAT 2002]**

(a) 

(b) 

(c) 

(d) 

137. The potential barrier, in the depletion layer, is due to **[Pb. PMT 1999; AIIMS 2002]**

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

138. 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

139. 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

140. The cause of potential barrier in *P-N* junction diode is **[RPMT 2001]**

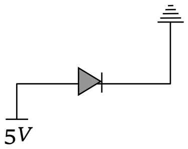
(a) Concentration of (+)*ve* charge in *P-N* junction

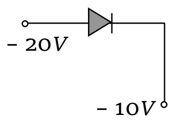
(b) Defficiency (+)*ve* charge in *P-N* junction

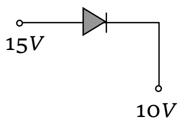
(c) Defficiency (–)*ve* charge in *P-N* junction

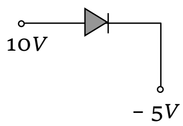
(d) Concentration of (+)*ve* and (–)*ve* charge near the junction

141. Which is reverse biased diode **[DCE 2001]**

(a) 

(b) 

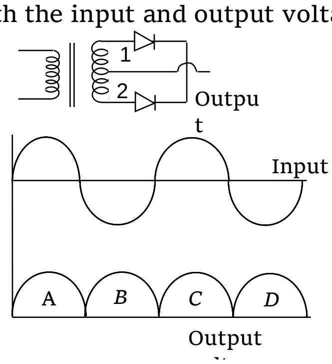
(c) 

(d) 

142. 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

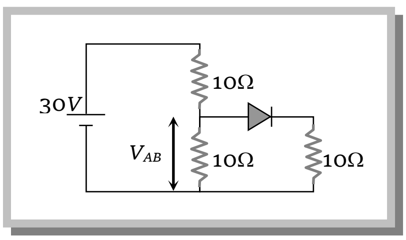
143. A full wave rectifier circuit along with the input and output voltages is shown in the figure



The contribution to output voltage from diode – 2 is **[MP PMT 2001]**

(a) *A*, *C* (b) *B*, *D* (c) *B*, *C* (d) *A*, *D*

144. Find V_{AB} **[RPMT 2000]**



(a) 10 *V*

(b) 20 *V*

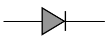
(c) 30 *V*

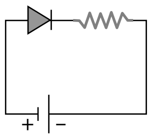
(d) None of these

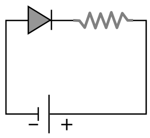
145. Zener breakdown takes place if

(a) Doped impurity is low (b) Doped impurity is high (c) Less impurity in *N*-part (d)Less impurity in *P*-type

146. Which one is in forward bias

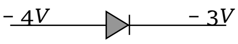
(a) 

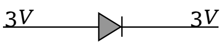
(b) 

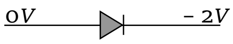
(c) 

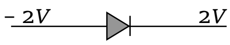
(d) None of these

147. Out of following the forward based diode is **[CBSE PMT 2000]**

(a) 

(b) 

(c) 

(d) 

148. 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

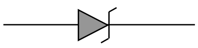
149. Consider the following statements A and B and identify the correct choice of the given answers

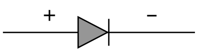
(A) A zener diode is always connected in reverse bias

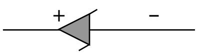
(B) The potential barrier of a *P-N* junction lies between 0.1 to 0.3 *V* approximately **[EAMCET 2000]**

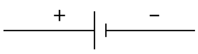
(a) A and B are correct (b) A and B are wrong (c) A is correct but B is wrong (d)A is wrong but B is correct

150. The correct symbol for zener diode is

(a) 

(b) 

(c) 

(d) 

151. 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

152. Which one of the following statements is not correct **[SCRA 2000]**

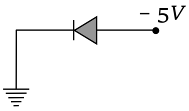
(a) A diode does not obey Ohm's law

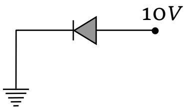
(b) A *P-N* junction diode symbol shows an arrow identifying the direction of current (forward) flow

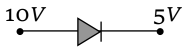
(c) An ideal diode is an open switch

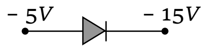
(d) An ideal diode is an ideal one way conductor

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

(a) 

(b) 

(c) 

(d) 

154. 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*

155. 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)

156. In a junction diode, the holes are due to **[CBSE 1999]**

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

157. *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

158. No bias is applied to a *P*-*N* junction, then the current **[RPMT 1999]**

(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

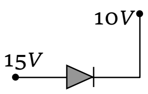
159. Zener diode is used as **[CBSE PMT 1999]**

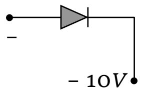
(a) Half wave rectifier (b) Full wave rectifier (c) ac voltage stabilizer (d) dc voltage stabilizer

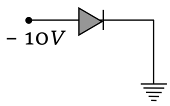
160. The width of forbidden gap in silicon crystal is 1.1 *eV*. When the crystal is converted in to a *N*-type semiconductor the distance of Fermi level from conduction band is

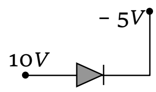
(a) Greater than 0.55 *eV* (b) Equal to 0.55 *eV* (c) Lesser than 0.55 *eV* (d) Equal to 1.1 *eV*

161. Which one is reverse-biased

(a) 

(b) 

(c) 

(d) 

162. In a *P*-*N* junction diode if *P* region is heavily doped than *N* region then the depletion layer is

(a) Greater in *P* region (b) Greater in *N* region

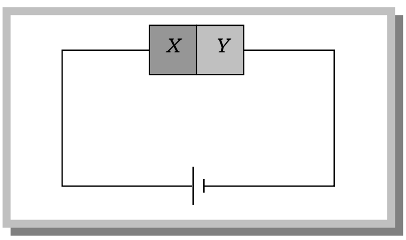
(c) Equal in both region (d) No depletion layer is formed in this case

163. When a potential difference is applied across, the current passing through **[IIT-JEE 1999]**

(a) An insulator at 0*K* is zero (b) A semi-conductor at 0*K* is zero

(c) A *P*-*N* diode at 300 *K* is finite. If it is reverse biased (d) All of these

164. A semiconductor *X* is made by doping a germanium crystal with arsenic (Z = 33). A second semiconductor *Y* is made by doping germanium with indium (Z = 49). The two are joined end to end and connected to a battery as shown. Which of the following statements is correct



(a) *X* is *P*-type, *Y* is *N*-type and the junction is forward biased

(b) *X* is *N*-type, *Y* is *P*-type and the junction is forward biased

(c) *X* is *P*-type, *Y* is *N*-type and the junction is reverse biased

(d) *X* is *N*-type, *Y* is *P*-type and the junction is reverse biased

165. A semiconductor device is connected in a series circuit with a battery and a resistance. A current is found to pass through the circuit. If the polarity of the battery is reversed the current drops almost to zero. The device may be **[MP PET 1995; CBSE 1998]**

(a) A *P*-type semiconductor (b) An *N*-type semiconductor (c) A *P*-*N* junction (d)

166. In *P-N* junction, which stops electron and holes to move from *P* to *N* and *N* to *P* **[CPMT 1998]**

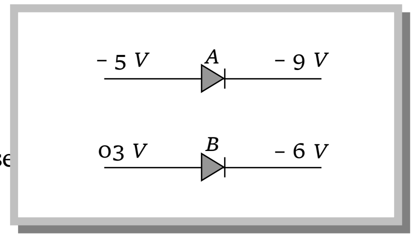
(a) Increase in +*ve* and – *ve* ions at junction (b) Increase in electrons at junction

(c) Increase in holes at junction (d) Increase in holes and electrons at junction

167. The potential in the depletion layer is due to **[EAMCET (Engg.) 1998]**

(a) Electrons (b) Holes (c) Ions (d) Forbidden band

168. The two diodes *A* and *B* are biased as shown, then **[EAMCET 1997]**



(a) The diodes *A* and *B* are reverse biased

(b) The diode *A* is forward biased and *B* is reverse biased

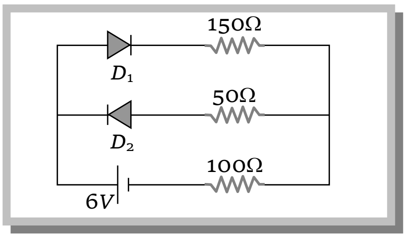
(c) The diodes *B* is forward biased and diode *A* is reverse biase

(d) The diodes *A* and *B* are forward biased

169. In *P-N* junction avalanche current flows in circuit when biasing is

(a) Forward (b) Reverse (c) Zero (d) Excess

170. The circuit shown in fig. contains two diode D_1 and D_2 each with a forward resistance of 50 *ohms* and with infinite backward resistance. If the battery voltage is 6 *V*, the current through the 100 *ohm* resistance (in *amperes*) is **[IIT-JEE 1997]**



(a) Zero

(b) 0.02

(c) 0.03

(d) 0.036

171. The electrical conductivity of a semiconductor increases when a radiation of wavelength shorter than 2480 *nm* is incident on it. The band gap (in *eV*) for the semiconductor is

(a) 0.9 (b) 0.78 (c) 0.5 (d) 1.1

172. If the forward voltage in a semiconductor diode is doubled, the width of the depletion layer will

(a) Become half (b) Become one-fourth (c) Remain unchanged (d) Become double

173. In *P-N* junction, the barrier potential offers resistance to

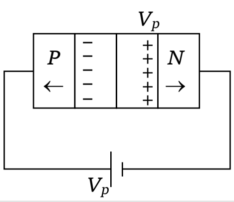
(a) Free electrons in *N* region and holes in *P* region

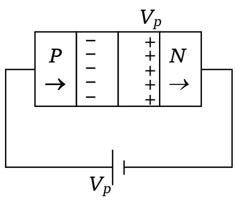
(b) Free electrons in *P* region and holes in *N* region

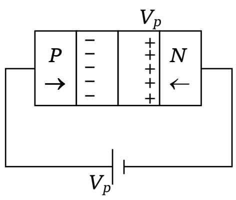
(c) Only free electrons in *N* region

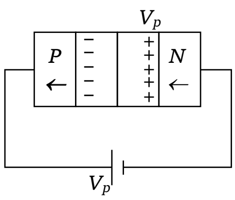
(d) Only holes in *P* region

174. In the case of forward biasing of *P-N* junction, which one of the following figures correctly depicts the direction of flow of carriers **[CBSE 1995]**

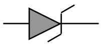
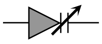
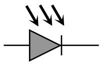
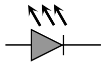
(a)


(b)


(c)


(d)


175. Symbolic representation of photodiode is **[RPMT 1995]**

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

176. Which of the following statements concerning the depletion zone of an unbiased *P-N* junction are true

(a) The width of the zone is independent of the densities of the dopants (impurities)

(b) The width of the zone is dependent on the densities of the dopants

(c) The electric field in the zone is provided by the electrons in the conduction band and the holes in the balance band

(d) The electric field in the zone is produced by the ionized dopant atoms

177. The depletion layer in the *P-N* junction region is caused by

(a) Drift of holes (b) Diffusion of charge carriers (c) Migration of impurity ions (d)

178. On increasing the reverse bias to a large value in a *P-N* junction diode, current **[MP PMT 1994]**

(a) Increase slowly (b) Remains fixed (c) Suddenly increases (d) Decreases slowly

179. To make a *P-N* junction conducting

(a) The value of forward bias should be more than the barrier potential

(b) The value of forward bias should be less than the barrier potential

(c) The value of reverse bias should be more than the barrier potential

(d) The value of reverse bias should be less than the barrier potential

180. According to diagram an ac source of 50 *Hz* is connected to a transformer coil by a filter. *P* and *Q* ends of the secondary coil are connected to a C.R.O. Choose the correct statement from the following which describes. What we get between terminals *P* and *Q*

[RPET 1986, 92]

(a) There is no potential difference

(b) There is alternating voltage

(c) There is fluctuated dc between terminals *P* and *Q* and minimum value of it is zero

(d) There is a constant dc between *P* and *Q*

181. Which is the wrong statement in following sentences ? A device in which *P* and *N*-type semiconductors are used is more useful then a vacuum type because **[MP PET 1992]**

(a) Power is not necessary to heat the filament

(b) It is more stable

(c) Very less heat is produced in it

(d) Its efficiency is high due to a high voltage across the junction

182. In case of a *P-N* junction diode at high value of reverse bias, the current rises sharply. The value of reverse bias is known as

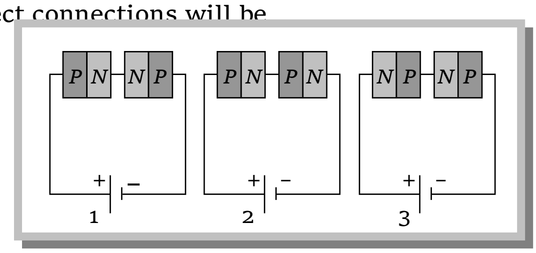
[Pb CET 1991]

(a) Cut off voltage (b) Zener voltage (c) Inverse voltage (d) Critical voltage

183. A *P-N* junction has a thickness of the order of **[BIT 1990]**

(a) 1 *cm* (b) 1 *mm* (c) 10^{-6} *cm* (d) 10^{-12} *cm*

184. Two *P-N* junctions can be connected in series *b* three different methods as shown in the figure. If the potential difference in the junctions is the same, then the correct connections will be



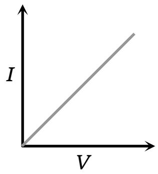
(a) In the circuit (1) and (2)

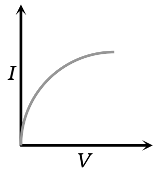
(b) In the circuit (2) and (3)

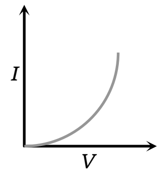
(c) In the circuit (1) and (3)

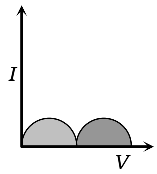
(d) Only in the circuit (1)

185. Which of the following *V-I* graphs is correct for a *P-N* junction

(a) 

(b) 

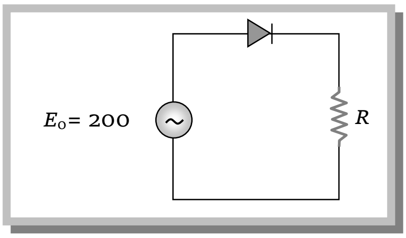
(c) 

(d) 

186. *P-N* junction diode works as a insulator. If connected **[CPMT 1987]**

(a) To ac (b) In forward bias (c) In reverse bias (d) None of these

187. A sinusoidal voltage of peak value 200 *volt* is connected to a diode and resistor *R* in the circuit shown so that half wave rectification occurs. If the forward resistance of the diode is negligible compared to *R* the *rms* voltage (in *volt*) across *R* is approximately



(a) 200

(b) 100

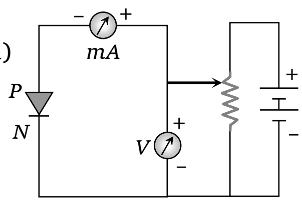
(c) $\frac{200}{\sqrt{2}}$

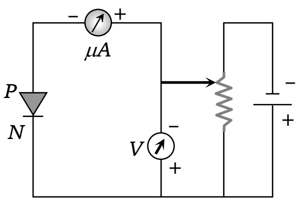
(d) 280

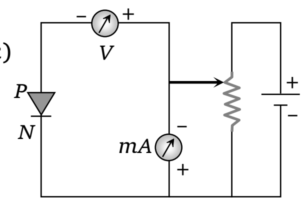
188. The depletion layer in silicon diode is 1 μm wide and the knee potential is 0.6 *V*, then the electric field in the depletion layer will be

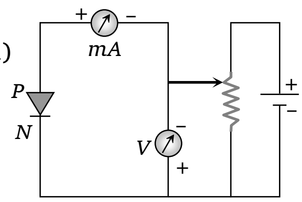
(a) Zero (b) 0.6 Vm^{-1} (c) 6×10^4 *V/m* (d) 6×10^5 *V/m*

189. The correct experimental circuit for forward bias of semiconductor diode is

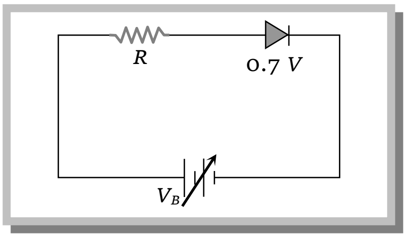
(a) 

(b) 

(c) 

(d) 

190. The junction diode in the following circuit requires a minimum current of 1 *mA* to be above the knee point (0.7 *V*) of its I-V characteristic curve. The voltage across the diode is independent of current above the knee point. If V_B = 5 *V*, then the maximum value of *R* so that the voltage is above the knee point, will be



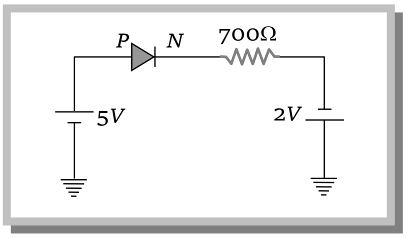
(a) 4.3 *k*Ω

(b) 860 *k*Ω

(c) 4.3 Ω

(d) 860 Ω

191. The current through an ideal *PN* junction shown in the following circuit diagram will be



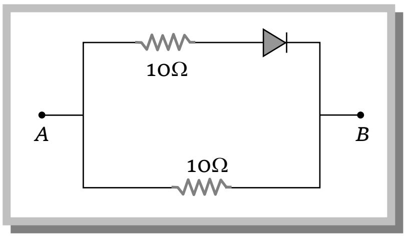
(a) 5 *mA*

(b) 10 *mA*

(c) 70 *mA*

(d) 100 *mA*

192. If V_A and V_B denote the potentials of *A* and *B* then the equivalent resistance between *A* and *B* in the adjoining electric circuit is



(a) 10 *ohms* if $V_A > V_B$

(b) 5 *ohms* if $V_A < V_B$

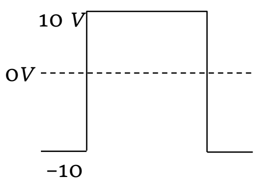
(c) 5 *ohms* if $V_A > V_B$

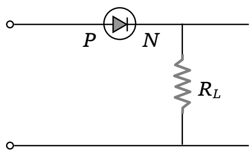
(d) 20 *ohms* if $V_A > V_B$

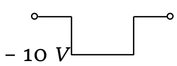
193. In junction diode reverse bias is changed from 10 *V* to 15 *V*, the current changes from 25 μA to 75 μA. The resistance of the junction diode will be

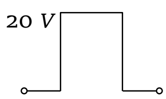
(a) 0.1 *ohm* (b) 10^5 *ohm* (c) 10 *ohm* (d) 10^6 *ohm*

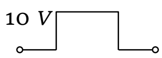
194. If the following input signal is sent through a *PN*-junction diode, then the output signal across R_L will be

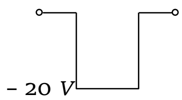




(a) 

(b) 

(c) 

(d) 

Junction Transistor

195. When *NPN* transistor is used as an amplifier **[AIEEE 2004]**

(a) Electrons move from base to collector (b) Holes move from emitter to base

(c) Electrons move from collector to base (d) Holes move from base to emitter

196. The phase difference between input and output voltages of a CE circuit is **[MP PET 2004]**

(a) 0^o (b) 90^o (c) 180^o (d) 270^o

197. An oscillator is nothing but an amplifier with **[MP PET 2004]**

(a) Positive feed back (b) Large gain (c) No feedback (d) Negative feedback

198. The emitter-base junction of a transistor is ...... biased while the collector-base junction is .... biased

(a) Reverse, forward (b) Reverse, reverse (c) Forward, forward (d) Forward, reverse

199. In an *NPN* transistor the collector current is 24 *mA*. If 80% of electrons reach collector its base current in *mA* is **[Kerala PMT 2004]**

(a) 36 (b) 26 (c) 16 (d) 6

200. A *NPN* transistor conducts when

(a) Both collector and emitter are positive with respect to the base

(b) Collector is positive and emitter is negative with respect to the base

(c) Collector is positive and emitter is at same potential as the base

(d) Both collector and emitter are negative with respect to the base

201. In the case of constants α and β of a transistor **[CET 2003]**

(a) $\alpha = \beta$ (b) $\beta < 1 \quad \alpha > 1$ (c) $\alpha\beta = 1$ (d) $\beta > 1 \quad \alpha < 1$

202. Which of the following is true

(a) Common base transistor is commonly used because current gain is maximum

(b) Common emitter is commonly used because current gain is maximum

(c) Common collector is commonly used because current gain is maximum

(d) Common emitter is the least used transistor

203. If $\alpha = 0.98$ and current through emitter $i_e = 20\ mA$, the value of β is

(a) 4.9 (b) 49 (c) 96 (d) 9.6

204. For a common base configuration of *PNP* transistor $\frac{I_C}{I_E} = 0.98$ then maximum current gain in common emitter configuration will be

[CBSE PMT 2002]

(a) 12 (b) 24 (c) 6 (d) 5

205. 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

[AFMC 2002]

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

206. If l_1, l_2, l_3 are the lengths of the emitter, base and collector of a transistor then **[KCET 2002]**

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

207. 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 **[KCET 2001]**

(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) $i_E = 11\ mA, i_B = 1\ mA$

208. 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 **[CBSE PMT 2000; KCET 2000]**

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

209. In a common emitter transistor, the current gain is 80. What is the change in collector current, when the change in base current is 250 μA

(a) $80 \times 250\ \mu A$ (b) $(250 - 80)\ \mu A$ (c) $(250 + 80)\ \mu A$ (d) $250/80\ \mu A$

210. Least doped region in a transistor

(a) Either emitter or collector (b) Base (c) Emitter (d)

211. The transistors provide good power amplification when they are used in

(a) Common collector configuration (b) Common emitter configuration

(c) Common base configuration (d) None of these

212. The transfer ratio of a transistor is 50. The input resistance of the transistor when used in the common-emitter configuration is 1 $K\Omega$. The peak value for an A.C input voltage of 0.01 V peak is **[CBSE PMT 1998]**

(a) $100\ \mu A$ (b) $0.01\ mA$ (c) $0.25\ mA$ (d) $500\ \mu A$

213. For a transistor the parameter $\beta = 99$. The value of the parameter α is

(a) 0.9 (b) 0.99 (c) 1 (d) 9

214. A transistor is used in common emitter mode as an amplifier. Then

(a) The base-emitter junction is forward biased

(b) The base-emitter junction is reverse biased

(c) The input signal is connected in series with the voltage applied to the base-emitter junction

(d) The input signal is connected in series with the voltage applied to bias the base collector junction

215. The arrow head in the transistor symbol always points in the direction of

(a) Hole flow in the emitter region (b) Electron flow in the emitter region

(c) Majority carrier flow in the emitter region (d) Minority carrier flow in the emitter region

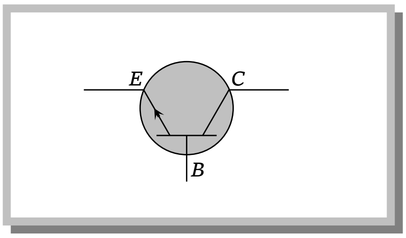
216. In a *PNP* transistor the base is the *N*-region. Its width relative to the *P*-region is **[DCE 1997]**

(a) Smaller (b) Larger (c) Same (d) Not related

217. A common emitter amplifier is designed with *NPN* transistor ($\alpha = 0.99$). The input impedance is 1 $K\Omega$ and load is 10 $K\Omega$. The voltage gain will be

(a) 9.9 (b) 99 (c) 990 (d) 9900

218. The symbol given in figure represents **[AMU 1995, 96]**



(a) *NPN* transistor

(b) *PNP* transistor

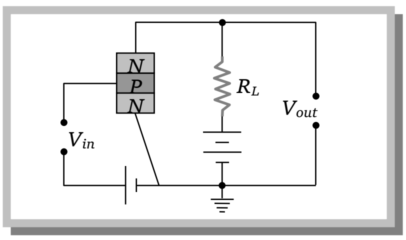
(c) Forward biased *PN* junction diode

(d) Reverse biased *NP* junction diode

219. The most commonly used material for making transistor is

(a) Copper (b) Silicon (c) Ebonite (d) Silver

220. An *NPN*-transistor circuit is arranged as shown in figure. It is



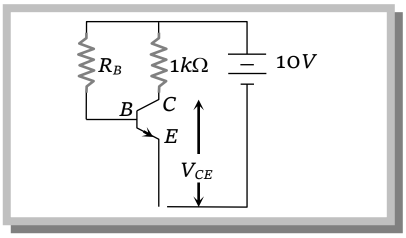
(a) A common base amplifier circuit

(b) A common emitter amplifier circuit

(c) A common collector amplifier circuit

(d) Neither of the above

221. In the circuit here, the transistor used has a current gain β = 100. Value of R_B so that V_{CE} = 5V (neglect V_{BE}) is **[CBSE 1994]**



(a) 200 × 10^3 Ω

(b) 10^6 Ω

(c) 500 Ω

(d) 2 × 10^3 Ω

222. The part of a transistor which is heavily doped to produce a large number of majority carriers, is

(a) Base (b) Emitter (c) Collector (d) None of these

223. In an *NPN*-transistor circuit the collector current is 10mA. If 90% of the electrons are able to reach the collector **[IIT-JEE 1992]**

(a) The emitter current will be 9 *mA*

(b) The emitter current will be 11 *mA*

(c) The base current will be 1*mA*

(d) The base current will be 0.1 *mA*

224. For a transistor, the current amplification factor is 0.8. The transistor is connected in common emitter configuration. The change in the collector current when the base current changes by 6 *mA* is

(a) 6 *mA* (b) 4.8 *mA* (c) 24 *mA* (d) 8 *mA*

225. In a common base amplifier the phase difference between the input signal voltage and the output voltage is **[CBSE PMT**

(a) 0 (b) $\pi/4$ (c) $\pi/2$ (d) π

226. In case of *NPN*-transistors the collector current is always less than the emitter current because

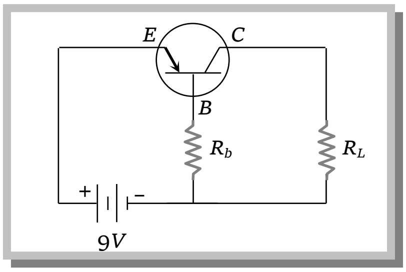
(a) Collector side is reverse biased and emitter side is forward biased

(b) After electrons are lost in the base and only remaining ones reach the collector

(c) Collector side is forward biased and emitter side is reverse biased

(d) Collector being reverse biased attracts less electrons

227. In a transistor circuit shown here the base current is 35 μA. The value of the resistor R_b is



(a) 123.5 *k*Ω

(b) 257 *k*Ω

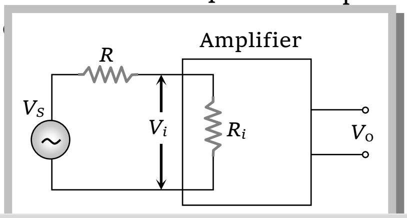
(c) 380.05 *k*Ω

(d) None of these

228. The input resistance of a CE amplifier is 3 Ω and load resistance is 24Ω. If β = 0.6, then the voltage gain of the amplifier is

(a) 1.2 (b) 2.4 (c) 3.6 (d) 4.8

229. The box in figure represents an amplifier with an input resistance R_i = 100 Ω. It is connected to an ac voltage source through a resistance R = 300 Ω. The voltage gain of the transistor is 400. If the peak-to-peak voltage of the input ac source is 5.0 V, The peak-to-peak voltage of the



(a) 500 V

(b) 400 V

(c) 300 V

(d) 200 V

230. In a transistor, a change of 8.0 mA in the emitter current produces a change of 7.8 mA in the collector current. What change in the base current is necessary to produce the same change in the collector current

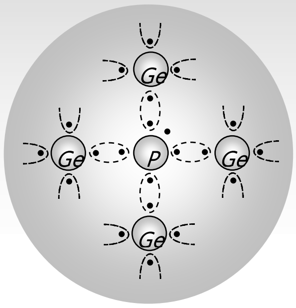
(a) 50 μA (b) 100 μA (c) 150 μA (d) 200 μA

231. An *NPN* transistor is connected in common emitter configuration. Load resistance is 1000 Ω and voltage drop across it is 1V. The current amplification factor is 5/4. If internal resistance of transistor is 200 Ω. Its voltage gain and base current (in *amp*) respectively are

(a) 6.25, 8×10^{-4} (b) 3.25, 8×10^{-4} (c) 4.25, 8×10^{-3} (d) 5.25, 8×10^{-3}

232. A transistor is used as a common emitter amplifier. The load resistance connected to the circuit is 2 *kilo-ohm*. Its current gain β = 50, and input resistance R_I = 0.5 *kilo-ohm*. If input current is changed by 50 μA, then the change in output voltage will be

(a) 2 V (b) 2.5 V (c) 5 V (d) 5.5 V



Answer Sheet

Assignments

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
b	a	b	a	c	a	d	d	d	d	b	d	a	b	a	c	a	d	d	d
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
a	b	d	a	d	c	d	c	b	a	b	b	c	c	c	b	d	d	a	b
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
b	b	b	c	c	a	b	a	a	c	c	c	c	a	d	c	a	d	a	d
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
a	d	b	b	b	c	c	d	b	d	d	a	b	a	c	b	c	c	d	d
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
c	d	c	d	a	b	c	b	b	c	a	c	c	d	a	a	a	d	a	b
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
d	b	b	a	d	d	d	b	a	d	a	c	b	c	a	c	c	a	d	c
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
d	d	b	b	d	b	b	d	b, c	a	b	a	b	b	b	c	d	a	a	d
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
b	d	b	a	c	b	c	c	a	a	c	d	a	d	b	d	a	b	c	c
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
c	b	d	d	c	a	c	d	b	b	c	a	a	c	c	b	b	c	a	c
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
d	b	c	b	c	c	b	d	a	a	b	c	b	c	a	c	a	d	d	b
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220

d	b	b	b	c	d	d	b	a	b	b	d	b	c	a	a	c	a	b	b
221	222	223	224	225	226	227	228	229	230	231	232								
a	b	b, c	b	a	b	b	d	a	d	a	c								