PHYSICS

BOOKS - UNIVERSAL BOOK DEPOT 1960 PHYSICS (HINGLISH)

ELECTRONICS

Exercise

1. 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

Answer: D

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

A. Tetragonal system

B. Cubic system

C. Orthorhombic system

D. Rhombohedral system

Answer: D

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3. Biaxial crystal among the following is

A. Calcite

B. Quartz

C. Selenite

D. Tourmaline

Answer: D

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4. The temperature coefficient of resistance of a conductor is

A. Positive always

B. Negative always

C. Zero

D. Infinite

Answer: A

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5. Calculate the kinetic energy of one gram mole of gas at NTP. Density of gas $= 0.178 kgm^{-3}$ at NTP. Its molecular weight = 4. Density of mercury $= 13.6 \times 10^3 kgm^{-3}$.

A. 900

B. 494

C. 602

D. 802

Answer: A

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6. The exerted energy of the electrons at absolute zero is called

A. Fermi energy

B. Emission energy

C. Work function

D. Potential energy

Answer: A

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7. 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. $a \neq b \neq c, \alpha \neq \beta \neq \gamma$

D. $a = b \neq c, \alpha = \beta = \gamma$

Answer: A

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8. 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

Answer: B

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9. In which of the following ionic bond is present

A. NaCl

B. Ar

C. Si

D. Ge

Answer: A

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10. Which of the following materials are crystalline?

A. Copper

B. Sodium chloride

C. Wood

D. Diamond

Answer: C

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11. The coordination number of Cu is

A. 1

B. 6

C. 8

D. 12

Answer: D

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

A. Ionic

B. Metallic

C. Vander Waals

D. Covalent

Answer: C

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13. In a crystal, the atoms are located at the position of

A. Maximum potential energy

B. Minimum potential energy

C. Zero potential energy

D. Infinite potential energy

Answer: B

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14. Crystal structure of NaCl is

A. Fcc

B. Bcc

C. Both of the above

D. None of the above

Answer: A

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15. What is the coordination number of sodium ions in the case of sodium chloride structure

A. 6

B. 8

C. 4

D. 12

Answer: A

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16. The distance between the body centred atom and a corner atom in sodium $(a = 4.225 \text{Å})$ is

A. 3.66Å

B. 3.17Å

C. 2.99Å

D. 2.54Å

Answer: A

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17. A solid that transmits light in visible region and has a very low melting point possesses

A. Metallic bonding

B. Ionic bonding

C. Covalent bonding

D. Vander Waal's bonding

Answer: D

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18. Atomic radius of fcc is

A. $\frac{a}{2}$

B. $\frac{a}{2\sqrt{2}}$

C. $\frac{\sqrt{3}}{4}a$

D. $\frac{\sqrt{3}}{2}a$

Answer: B

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19. A solid reflects incident light and it's electrical conductivity decreases with temperature. The binding in this solids

A. Ionic

B. Covalent

C. Metallic

D. Molecular

Answer: C

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20. The laptop PC's modern electronic watches and calculators use the following for display

A. Single crystal

B. Poly crystal

C. Liquid crystal

D. Semiconductors

Answer: C

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21. In bcc structure of lattice constant a, the minimum distance between atoms is

A. $a\frac{\sqrt{2}}{3}$

B. $a\frac{\sqrt{2}}{2}$

C. $q\sqrt{3}$

D. $\frac{a}{\sqrt{2}}$

Answer: B

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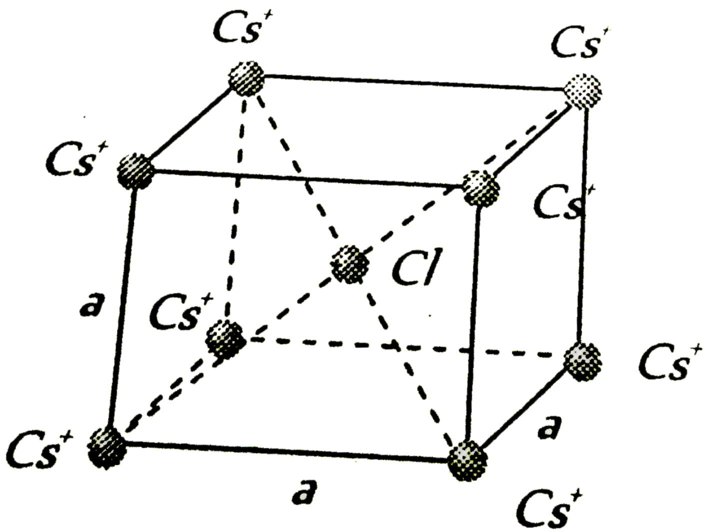
22. What is the net force on a Cl – placed at the centre of the bcc structure of CsCl



A. Zero

B. ke^2 / a^2

C. $ke^2 a^2$

D. Data is incomplete

Answer: A

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23. Sodium has body centred packing. Distance between two nearest atoms is 3.7Å. The lattice parameter is

A. 4.8Å

B. 4.3Å

C. 3.9Å

D. 3.3Å

Answer: B

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24. Which of the following is an amorphous solid

A. Glass

B. Diamond

C. Salt

D. Sugar

Answer: A

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25. Copper has face centred cubic (fcc) lattice with interatomic spacing equal to 2.54Å. The value of the lattice constant for this lattice is

A. 1.27Å

B. 5.08Å

C. 2.54Å

D. 3.59Å

Answer: D

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

A. Ionic

B. Vander Waals

C. Covalent

D. Metallic

Answer: D

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27. Bonding in a germanium crystal (semi-conductor) is

A. Metallic

B. Ionic

C. Vander Waal's type

D. Covalent

Answer: D

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28. The ionic bond is absent in

A. NaCl

B. CsCl

C. LiF

D. HO

Answer: D

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29. The majority charge carriers in P -type semiconductor are

A. Electrons

B. Protons

C. Holes

D. Neutrons

Answer: C

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30. A P -type semiconductor can be obtained by adding

A. Arsenic to pure silicon

B. Gallium to pure silicon

C. Antimony to pure germanium

D. Phosphorous to pure germanium

Answer: B

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31. The valence of an impurity added to germanium crystal in order to convert it into a P-type semiconductor is

A. 6

B. 5

C. 4

D. 3

Answer: D

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32. A semiconductor is known to have an electron concentric of $8 \times 10^{13} / cm^3$ and hole concentration of $5 \times 10^{12} / cm^3$. The semiconductor is

A. P - type

B. N - type

C. Intrinsic

D. PNP -type

Answer: B

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33. In P-type semiconductor, there is

A. An excess of one electron

B. Absence of one electron

C. A missing atom

D. A donar level

Answer: B

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34. The valence of an impurity added to germanium crystal in order to convert it into a P-type semiconductor is

A. 6

B. 5

C. 4

D. 3

Answer: B

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35. Silicon is a semiconductor. If a small amount of As is added to it, then its electrical conductivity

A. Decreases

B. Increases

C. Remains unchanged

D. Becomes zero

Answer: B

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

A. Donar

B. Acceptor

C. Intrinsic

D. Extrinsic

Answer: C

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37. A piece of copper and the other of germanium are cooled from the room temperature to 80 K, then which of the following would be true statements?

A. Resistance of each increases

B. Resistance of each decreases

C. Resistance of copper increases while that of germanium decreases

D. Resistance of copper decreases while that of germanium increases

Answer: D

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38. To obtain a P-type Si semiconductor, we need to dope pure Si with

A. Aluminium

B. Phosphorous

C. Oxygen

D. Germanium

Answer: A

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39. Electrical conductivity of a semiconductor

A. Decreases with the rise in its temperature

B. Increases with the rise in its temperature

C. Does not change with the rise in its temperature

D. First increases and then decreases with the rise in its temperature

Answer: B

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40. Three semi-conductor are arranged in the increasing order of their energy gap as follows. The correct arrangement is

A. Tellurium, germanium, silicon

B. Tellurium, silicon, germanium

C. Silicon, germanium, tellurium

D. Silicon, tellurium, germanium

Answer: A

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41. When a semiconductor is heated, its resistance

A. Decreases

B. Increases

C. Remains unchanged

D. Nothing is definite

Answer: A

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42. In an insulator, the forbidden energy gap between the valence band and conduction band is of the order of

A. 1 MeV

B. $0.1 MeV$

C. 1 eV

D. 5 eV

Answer: D

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43. A N - type semiconductor is

A. Negatively charged

B. Positively charged

C. Neutral

D. None of these

Answer: C

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44. The energy band gap of Si is

A. $0.70eV$

B. $1.1eV$

C. Between $0.70eV$ to $1.1eV$

D. 5 eV

Answer: B

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45. The forbidden energy band gap in conductors, semiconductors and insulators are EG_1, EG_2 and EG_3 respectively. The relation among them is

A. $EG_1 = EG_2 = EG_3$

B. $EG_1 < EG_2 < EG_3$

C. $EG_1 > EG_2 > EG_3$

D. $EG_1 < EG_2 > EG_3$

Answer: B

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46. Which statement is correct?

A. N - type germanium is negatively charged and P - type germanium is positively charged

B. Both N - type and P - type germanium are neutral

C. N - type germanium is positively charged and P - type germanium is negatively charged

D. Both N -type and P - type germanium are negatively charged

Answer: B

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47. When Ge crystals are doped with phosphorus atom, then it becomes

A. Insulator

B. P - type

C. N - type

D. Superconductor

Answer: C

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48. Let n_p and n_e be the number of holes and conduction electrons respectively in a semiconductor. Then

A. $n_p > n_e$ in an intrisnsic 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

Answer: C

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49. 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 semiconductor and Q is P - type semiconductor

C. P is semiconductor and Q is conductor

D. P is conductor and Q is semiconductor

Answer: D

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50. The impurity atoms with which pure silicon should be doped to make a p - type semiconductor are those of

A. Phosphorus

B. Boron

C. Antimony

D. Copper

Answer: B

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51. Holes are charge carriers in

A. Intrinsic semiconductors

B. Ionic solids

C. P -type semiconductors

D. Metals

Answer: A::C

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

A. 1

B. 10^{-1}

C. 10^{-4}

D. 10^{-7}

Answer: D

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53. A hole in a P - type semiconductor is

A. An excess electron

B. A missing electron

C. A missing atom

D. A donor level

Answer: B

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54. The forbidden gap in the energy bands of germanium at room temperature is about

A. $1.1eV$

B. $0.1eV$

C. $0.67eV$

D. $6.7 eV$

Answer: C

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55. In P-type semiconductor the majority and minorty charge carriers are respectively

A. Protons and electrons

B. Electrons and protons

C. Electrons and holes

D. Holes and electrons

Answer: D

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56. At zero Kelvin a piece of germanium

A. Becomes semiconductor

B. Becomes good conductor

C. Becomes bad conductor

D. Has maximum conductivity

Answer: C

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57. Electronical configuration of germenium is $2, 8, 18$ and 4. To make it extrinsic semiconductor small quantity of antimony is added

A. The material obtained will be N -type germanium in which electrons and holes are equal in 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

Answer: C

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58. A semiconductor is cooled form T_1K to T_2K.

Its resistance

A. Will decrease

B. Will increase

C. Will first decrease and then increase

D. Will not change

Answer: B

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59. 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

Answer: D

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60. In intrinsic semiconductor at room temperature, the number of electrons and holes are

A. Equal

B. Zero

C. Unequal

D. Infinite

Answer: A

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61. (USS 133) Indium impurity in germanium makes

A. N -type

B. P - type

C. Insulator

D. Intrinsic

Answer: B

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62. Fermi level of energy of an intrinsic semiconductor lies

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

Answer: A

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63. In an semiconductor the separation between conduction band and valence band is of the order of

A. 100 eV

B. 10 eV

C. 1 eV

D. 0 eV

Answer: C

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64. The intrinsic semiconductor becomes an insulator at

A. $0^\circ C$

B. $-100^\circ C$

C. 300 K

D. 0 K

Answer: D

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65. The addition of antimony atoms to a sample of intrinsic germanium transforms it to a material which is

A. Superconductor

B. An insulator

C. N -type semiconductor

D. P - type semiconductor

Answer: C

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66. Resistance of semiconductor at $0^{\circ} K$ is

A. Zero

B. Infinite

C. Large

D. Small

Answer: B

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67. In a good conductor the energy gap between the conduction band and the valence band is

A. Infinite

B. Wide

C. Narrow

D. Zero

Answer: D

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68. The impurity atom added to germenium to make it N-type semiconductor is

A. Arsenic

B. Iridium

C. Aluminium

D. Iodine

Answer: A

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69. 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

Answer: D

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70. To obtain a P-type germanium semiconductor, it must be dopped with

A. Arsenic

B. Antimony

C. Indium

D. Phosphorus

Answer: C

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71. The temperature coefficient of resistance of a semiconductor

A. Is always positive

B. Is always negative

C. Is zero

D. May be positive or negative or zero

Answer: B

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72. A P-type semiconductor is formed when

(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

Answer: C

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73. In case of a semiconductor, which of the following statement is 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

Answer: D

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74. Energy band in solids are a consequence of

A. Ohm's Law

B. Pauli's exclusion principle

C. Bohr's theory

D. Heisenberg's uncertainty principle

Answer: B

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75. In a P -type semiconductor

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

Answer: A

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76. At ordinary temperatures, the electrical conductivity of semi conductors in r /metemho 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}

Answer: B

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77. When the temperature of silicon sample is increased from $27^{\circ}C$ to $100^{\circ}C$, the conductivity of silicon will be

A. Increased

B. Decreased

C. Remain same

D. Zero

Answer: A

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78. In a P -type semiconductor, germanium is doped with

A. Boron

B. Gallium

C. Aluminium

D. All of these

Answer: D

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79. In N-type semiconductors, majority charge carriers are

A. Holes

B. Protons

C. Neutrons

D. Electrons

Answer: D

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80. 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

Answer: B

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81. GaAs is-

A. Element semiconductor

B. Alloy semiconductor

C. Bad conductor

D. Metallic semiconductor

Answer: B

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82. If n_e and n_h are the number of electrons and holes in a semiconductor heavily doped with phosphorus, then

A. $n_e > > n_h$

B. $n_e < < n_h$

C. $n_e \le n_h$

D. $n_e = n_h$

Answer: A

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83. 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

Answer: C

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84. N-type semiconductors will be obtained, when germanium is dopped with

A. Phosphorus

B. Aluminium

C. Arsenic

D. Both (a) or (c)

Answer: D

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

A. Valance band

B. Conduction band

C. Forbidden band

D. None of these

Answer: B

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

A. Monovalent

B. Divalent

C. Trivalent

D. Pentavalent

Answer: D

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87. For germenium 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

Answer: A

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88. A pure semiconductor behaves slightly as a conductor at

A. Room temperature

B. Low temperature

C. High temperature

D. Both (b) and (c)

Answer: A

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

A. $\Delta Eg_c > \Delta Eg_{sc} > \Delta Eg_{\text{insulator}}$

B.

$\Delta Eg_{\langle \in s\underline{a} \to r)\text{gt Delta Eg\_(sc)gt Delta Eg\_}(conduc \to r}$

C. $\Delta Eg_{\text{conductor}} > \Delta Eg_{\text{insulator}} > \Delta Eg_{sc}$

D.

Answer: B

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90. 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

Answer: A

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91. P-type semiconductors are made by adding impurity element

A. As

B. P

C. B

D. Bi

Answer: C

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92. At room temperature, a P-type semiconductors has

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

Answer: A

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93. In intrinsic semiconductor at room temperature, the number of electrons and holes are

A. Unequal

B. Equal

C. Infinite

D. Zero

Answer: B

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94. 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

Answer: A

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95. Which impurity is dopped in Si to from N-type semiconductor?

A. Al

B. B

C. As

D. None of these

Answer: C

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96. In a semiconductor,

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

Answer: C

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97. The energy band gap is maximum in

A. Metals

B. Superconductors

C. Insulators

D. Semiconductors

Answer: C

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

A. Drouping

B. Drooping

C. Doping

D. None of these

Answer: C

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99. When phosphorus and antimony are mixed in germanium, then

A. P -type semiconductor is formed

B. N -type semiconductor is formed

C. Both (a) and (b)

D. None of these

Answer: B

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100. To a germanium sample, traces of gallium are added as an impurity. The resultant sample would behave like

A. A conductor

B. A P -type semiconductor

C. An N -type semiconductor

D. An insulator

Answer: B

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101. For non-conductors, the energy gap is

A. 6 eV

B. $1.1eV$

C. $0.8eV$

D. $0.3eV$

Answer: A

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102. Donor type impurity is found in

A. Trivalent elements

B. Pentavalent elements

C. In both the above

D. None of these

Answer: B

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103. 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 bon

Answer: C

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104. The charge on a hole is equal to the charge of

A. Zero

B. Proton

C. Neutron

D. Electron

Answer: B

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105. 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

Answer: C

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106. A Ge specimen is dopped with Al. The concentration of acceptor atoms is ~$10^{21} atoms/m^3$. Given that the intrinsic concentration of electron hole pairs is ~$10^{19}/m^3$, the concentration of electron in the speciman is

A. $10^{17}/m^3$

B. $10^{15}/m^3$

C. $10^4/m^3$

D. $10^2/m^3$

Answer: A

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107. Which of the following has negative temperature coefficient of resistance?

A. Copper

B. Aluminium

C. Iron

D. Germanium

Answer: D

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108. In semiconductors at a room temperature

A. The valence band is partially empty and the conduction band is partially filled

B. The valence band is completely filled and the conduction band is partially filled

C. The valence band is completely filled

D. The conduction band is completely empty

Answer: A

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109. Regarding a semiconductor which one of the following statements is wrong?

A. There are no free electrons at room temperature

B. There are no free electrons at 0 K

C. The number of free electrons increases with rise of temperature

D. The charge carriers are electrons and holes

Answer: A

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110. Which of the following statements is true for an n-type semi-comductor?

A. The donor level lies closely below the bottom of the conduction band

B. The donor level lies closely above the top of the valence band

C. The donor level lies at the halfway mark of the forbidden energy gap

D. None of above

Answer: A

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111. Choose the correct statement

A. When we heat a semiconductor its resistance increases

B. When we heat a semiconductor its resistance decreases

C. When we cool a semiconductor to 0 K then it becomes super conductor

D. Resistance of a semiconductor is independent of temperature

Answer: B

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112. In a P -type semi-conductor, germanium is dopped with

A. Gallium

B. Boron

C. Aluminium

D. All of these

Answer: D

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113. A piece of semiconductors is connected in sereis in an electric circuit. On increasing the temperautre, the current in the circuit will

A. Decrease

B. Remain unchanged

C. Increase

D. Stop flowing

Answer: C

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114. 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

Answer: D

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115. If n_e and n_h 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

Answer: A

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116. 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

Answer: C

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117. Resistivity of a semiconductor depends on

A. Shape of semiconductor

B. Atomic nature of semiconductor

C. Length of semiconductor

D. Shape and atomic nature of semiconductor

Answer: B

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118. Electric current is due to drift of electrons in

A. Metallic conductors

B. Semi-conductors

C. Both (a) and (b)

D. None of these

Answer: C

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119. The energy gap of silicon is $1.14eV$. The maximum wavelength at which silicon will begin absorbing energy is

A. 10888Å

B. 1088.8Å

C. 108.88Å

D. 10.888Å

Answer: A

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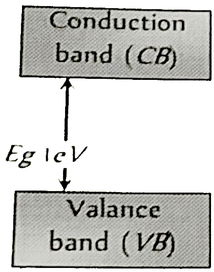
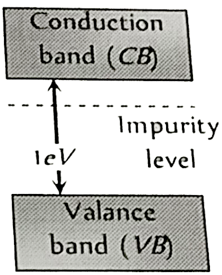
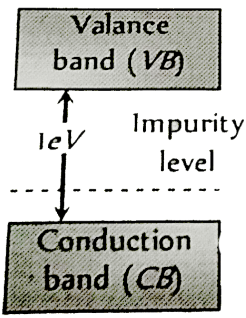
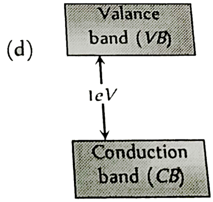
120. Which of the following energy band diagrams shows the N-type semiconductor?

A. 

B. 

C. 

D. 

Answer: B

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121. The mobility of free electrons is greater then 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

Answer: D

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122. The relation between number of free electrons (n) in a semiconductor and temperature (T) is given by

A. $n \propto T^2$

B. $n \propto T$

C. $n \propto \sqrt{T}$

D. $n \propto T^{3/2}$

Answer: D

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123. The electron mobility in N-type germanium is $3900 cm^2 / v - s$ 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. $10^{16} / cm^3$

Answer: D

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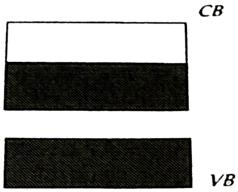
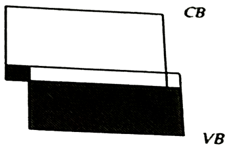
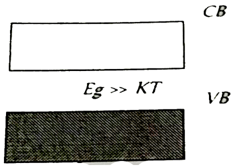
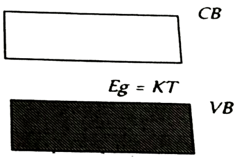
124. Which of the energy band diagrams shown in the figure corresponds to that of a semiconductor?

A. 

B. 

C. 

D. 

Answer: D

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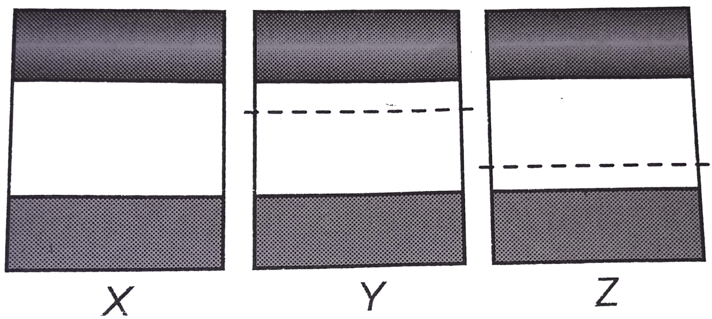
125. The energy band diagrams for three semiconductor samples of silicon are as shown. We can then assert that



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

Answer: D

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126. Carbon , silicon and germanium have four valence elcectrons each . These are characterised by valence and conduction bands separated by energy band - gap respectively equal to $(E_g)_c(E_g)_{si}$ and $(E_g)_{Ge}$. Which of the following statements ture ?

A. $\left(E_g - (C) > (E_g)_{Si}\right.$

B. $(E_g)(C) = (E_g)_{Si}$

C. $(E_g)_C < (E_g)_{Ge}$

D. $(E_g)_C < (E_g)_{Si}$

Answer: A

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127. A semiconductor dopped with a donor impurity is

A. P - type

B. N -type

C. NPN type

D. PNP type

Answer: B

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128. In a semiconducting material the mobilities of electrons and holes are μ_e and μ_h respectively. Which of the following is true?

A. $\mu_e > \mu_h$

B. $\mu_e < \mu_h$

C. $\mu_e = \mu_h$

D. $\mu_e < 0, \mu_h > 0$

Answer: A

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129. Why doping is done in semiconductor?

A. To neutralize charge carriers

B. To increase the concentration of majority charge carriers

C. To make it neutral before disposal

D. To carry out further purification

Answer: B

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130. In the forward biase arrangement of a PN-junction diode

A. The N - end is connected to the positive terminal of the battery

B. The P - end is connected to the positive terminal of the battery

C. The direction of current is from N -end to P - end in the diode

D. The P - end is connected to the negative terminal of battery

Answer: B

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131. In a PN -junction diode

A. The current in the reverse biased condition is generally very small

B. The current in the reverse biased condition is small but the forward biased current is independent of the bias voltage

C. The reverse biased current is strongly dependent on the applied bias voltage

D. The forward biased current is very small in comparison to reverse biased current

Answer: A

132. The cut-in voltage for silicon diode is approximately

A. $0.2V$

B. $0.6V$

C. $1.1V$

D. $1.4V$

Answer: B

133. The electrical circuit used to get smooth dc output from a rectifier circuit is called

A. Oscillator

B. Filter

C. Amplifier

D. Logic gates

Answer: B

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134. PN-junction diode works as a insulator, if connected

A. To A.C.

B. In forward bias

C. In reverse bias

D. None of these

Answer: C

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135. The reverse biasing in a PN junction diode

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

Answer: B

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136. The electrical resistance of depletion layer is large because

A. It has no charge carriers

B. It has a large number of charge carriers

C. It contains electrons as charge carriers

D. It has holes as charge carriers

Answer: A

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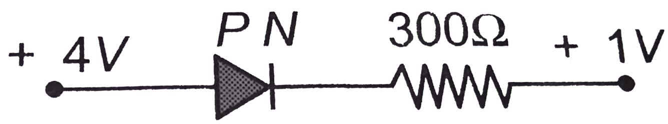
137. In the circuit given below, the value of the current is



A. $0\ amp$

B. $10^{-2} amp$

C. $10^{2} amp$

D. $10^{-3} amp$

Answer: B

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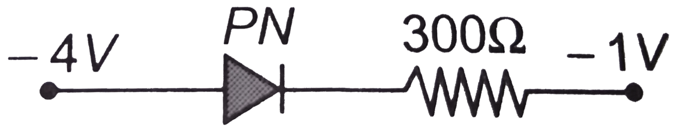
138. What is the current in the circuit shown below?



A. $0 amp$

B. $10^{-2} amp$

C. 1 amp

D. $0.10 amp$

Answer: A

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139. If the forward voltage in a diode is increased, the width of the depletion region-

A. Become half

B. Become one-fourth

C. Remain unchanged

D. Become double

Answer: A

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140. The PN junction diode is used as

A. An amplifier

B. A rectifier

C. An oscillator

D. A modulator

Answer: B

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141. When a p-n junction diode is reverse biased the flow of current across the junction is mainly due to

A. Electrons and holes are attracted towards each other and move towards the depletion region

B. Electrons and holes move away from the junction depletion region

C. Height of the potential barrier decreases

D. No change in the current takes place

Answer: B

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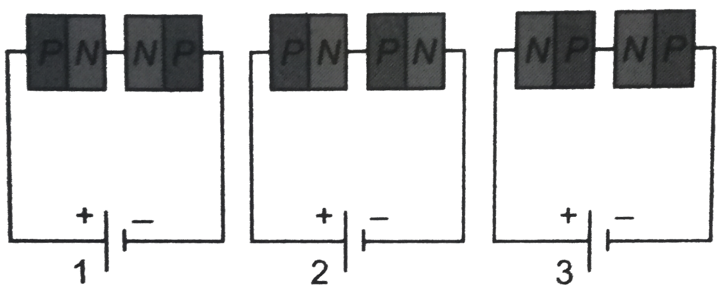
142. Two PN-junction can be connected in series by three different methods as shown in the figure. If the potential difference in the junction is the same, then the correct connection will be



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)

Answer: B

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143. A PN - junction has a thickness of the order of

A. 1 cm

B. 1 mm

C. $10^{-6}m$

D. $10^{-12}cm$

Answer: C

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144. In the depletion region of an unbiased p-n junction diode, what are the charge carriers?

A. Only electrons

B. Only holes

C. Both electrons and holes

D. Only fixed ions

Answer: D

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145. On increases the reverse biase to a large value of in a PN- junction diode, current.

A. Increases slowly

B. Remains fixed

C. Suddenly increases

D. Decreases slowly

Answer: C

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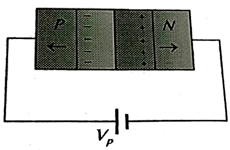
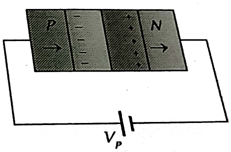
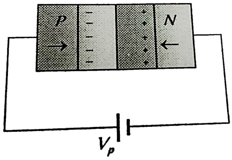
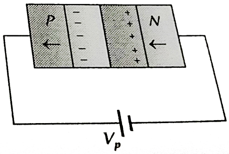
146. In the case of forward biasing of PN-junction, which one of the following figures correctly depicts the direction of flow of carriers?

A. 

B. 

C. 

D. 

Answer: C

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147. Which of the following statements concerning the depletion zone of an unbiased p-n junction is (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 produced by the ionized dopant atoms

D. The electric field in the zone is provided by the electrons in the conduction band and the holes in the valence band

Answer: B::C

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148. A semiconducting 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 to almost zero.The device may be

A. A P -type semiconductor

B. An N - type semiconductor

C. A PN - junction

D. An intrinsic semiconductor

Answer: C

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149. The approximate ratio of resistance in the forward and reverse biase of the $PN-$ junction diode is

A. $10^2 : 1$

B. $10^{-2} : 1$

C. $1 : 10^{-4}$

D. $1 : 10^4$

Answer: D

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150. In junction diode, the holes are due to

A. Protons

B. Neutrons

C. Extra electrons

D. Missing of electrons

Answer: D

151. In forward bias, the width of potential barrier in a $P - N$ junction diode

A. Increases

B. Decreases

C. Remains constant

D. First increases then decreases

Answer: B

152. The cause of the potential barrier in a p-n diode is:

A. Depletion of positive charges near the junction

B. Concentration of positive charges near the junction

C. Depletion of negative charges near the junction

D. Concentration of positive and negative charges near the junction

Answer: D

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153. In a p- n junction diode not connected to any circuit,

A. The potential is the same everywhere

B. The P - type is a higher potential than the N -type side

C. There is an electric field at the junction directed from the N - type side to the P -

type side

D. There is an electric field at the junction directed from the P -type side to the N -type side

Answer: C

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154. Which of the following statements is not true?

A. The resistance of intrinsic semiconductors decrease with increase of temperature

B. Doping pure Si with trivalent impurities give P - type semiconductors

C. The majority carriers in N - type semiconductors are holes

D. A PN - junction can act as a semiconductor diode

Answer: D

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155. The dominant mechanisms for motion of charge carriers in forward and reverse biased silicon $P-N$ junction are

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

Answer: B

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156. In $P-N$ junction, avalanche current flows in circuit when biassing is

A. Forward

B. Reverse

C. Zero

D. Excess

Answer: B

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157. The depletion layer in $P-N$ junction region is caused by

A. Drift of holes

B. Diffusion of charge carriers

C. Migration of impurity ions

D. Drift of electrons

Answer: B

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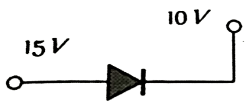
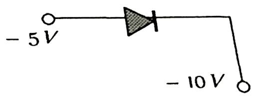
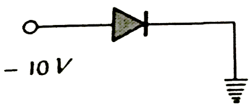
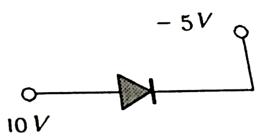
158. Which one is reverse-biased

A. 

B. 

C. 

D. 

Answer: C

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159. In a $P-N$ junction diode is 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

Answer: B

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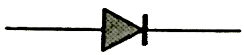
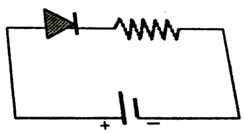
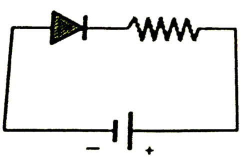
160. Which one is in forward bias

A. 

B. 

C. 

D. None of these

Answer: B

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161. The reason of current flow in $P-N$ junction forward biase is

A. Drifting of charge carriers

B. Minority charge carriers

C. Diffusion of charge carriers

D. All of these

Answer: C

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162. The resistance of a revese biased $P - N$ junction diode is about

A. 1 ohm

B. $10^2 ohm$

C. $10^3 ohm$

D. $10^6 ohm$

Answer: D

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163. Consider the following statement 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 forwards biase

$B:$ In an intrinsic semiconductor the fermi energy level is exactely 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 are true

Answer: C

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164. 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

Answer: D

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165. 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

Answer: A

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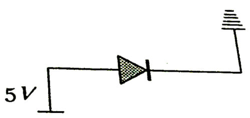
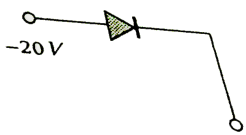
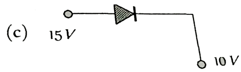
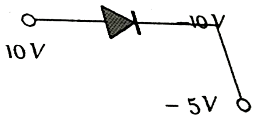
166. Which of the following is reverse biased diode?

A. 

B. 

C. 

D. 

Answer: B

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

A. Forward current exceeds certain value

B. Reverse bias exceeds certain value

C. Forward bias exceeds certain value

D. Potential barrier is reduced to zero

Answer: B

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168. When forward bias is applied to a $P-N$ junction, then what happence to the potential barrier V_B, and the width of charge depleted region x?

A. V_B increases, x decreases

B. V_B decreases, x increases

C. V_B increases, x increases

D. V_B decreases, x decreases

Answer: D

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

A. Ions

B. Holes

C. Electrons

D. Both (b) and (c)

Answer: A

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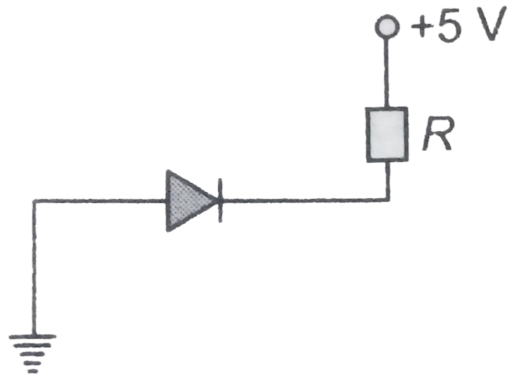
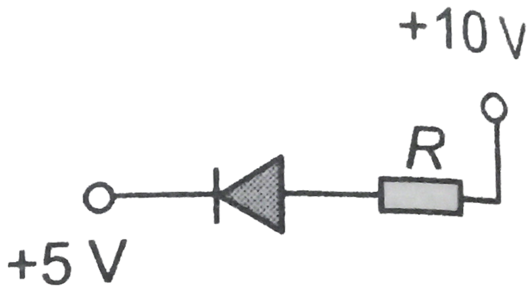
170. In the given figure, which of the diodes are forward biased?

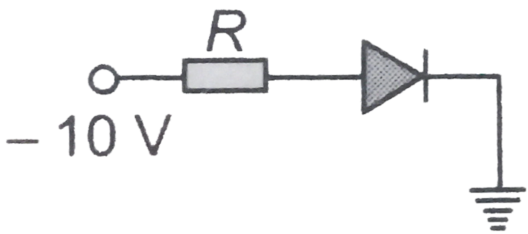
1.



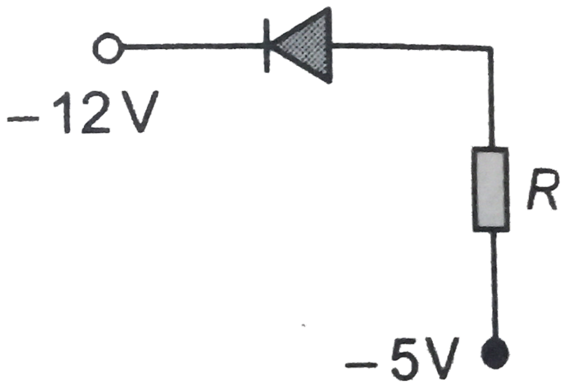
2.



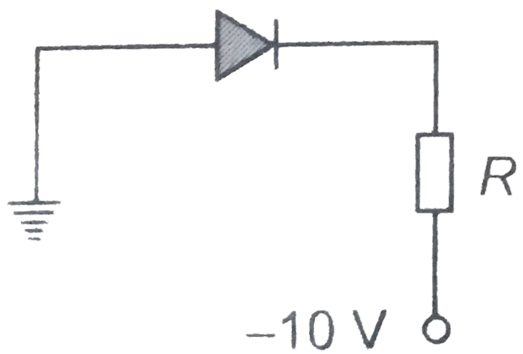
3.



4.



5.



A. 1, 2, 3

B. 2, 4, 5

C. $1, 3, 4$

D. $2, 3, 4$

Answer: B

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171. Function of rectifier is

A. To convert ac into dc

B. To convert dc into ac

C. Both (a) and (b)

D. None of these

Answer: A

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172. 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 then diode behaves as

A. A conductor

B. An insulator

C. A super-conductor

D. A semi-conductor

Answer: B

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173. If the two ends of a p-n 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

Answer: A

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174. A potential barrier of $0.50V$ exists across a $P-N$ junction. If the depletion region is $5.0 \times 10^{-7}m$, wide the intensity of the electric field in this region is

A. $1.0 \times 10^{6} V / m$

B. $1.0 \times 10^{5} V / m$

C. $2.0 \times 10^{5} V / m$

D. $2.0 \times 10^{6} V / m$

Answer: A

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175. 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

Answer: B

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176. In a PN-junction

A. P and N both are at same potential

B. High potential at N side and low potential at P side

C. High potential at P side and low potential at N side

D. Low potential at N side and zero potential at P side

Answer: B

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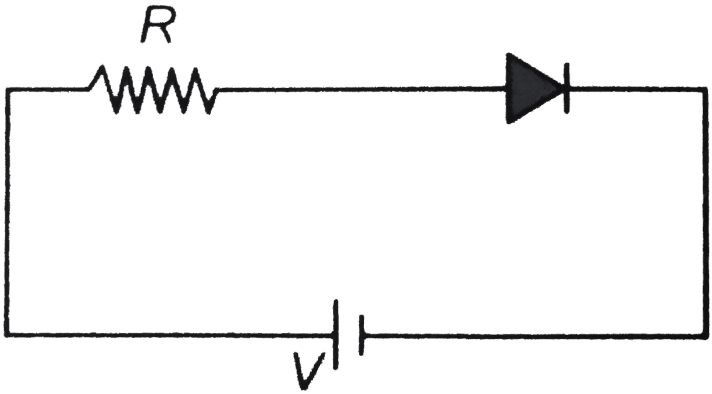
177. For the given circuit of PN-junction diode, which of the following statements is correct?



A. In forward biasing the voltage across R is V

B. In forward biasing the voltage across R is 2

V

C. In reverse biasing the voltage across R is V

D. In reverse biasing the voltage across R is 2

V

Answer: A

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178. On adjusting the $P-N$ junction diode in forward biased

A. Depletion layer increases

B. Resistance increases

C. Both decreases

D. None of these

Answer: C

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179. In the middle of the depletion layer of a reverse - biased $p-n$ junction , the

A. Potential is zero

B. Electric field is zero

C. Potential is maximum

D. Electric field is maximum

Answer: D

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180. Barrier potential of a $p-n$ junction diode does not depend on

A. Temperature

B. Forward bias

C. Doping density

D. Diode design

Answer: D

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181. A crystal diode is a

A. Non-linear device

B. Amplifying device

C. Linear device

D. Fluctuating device

Answer: A

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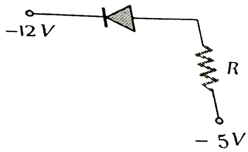
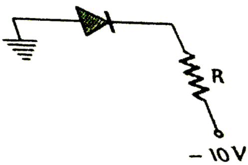
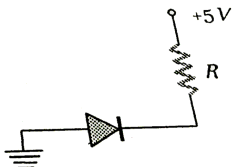
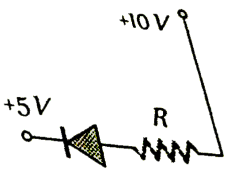
182. Of the diodes shown in the following diagrams, which one is reverse biased?

A. 

B. 

C. 

D. 

Answer: C

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183. In a $p-n$ junction photo cell, the value of the of the photo electromotive force produced by monochromatic light is proportional to

A. The voltage applied at the PN junction

B. The barrier voltage at the PN junction

C. The intensity of the light falling on the cell

D. The frequency of the light falling on the cell

Answer: C

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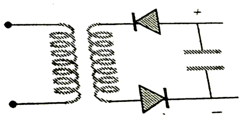
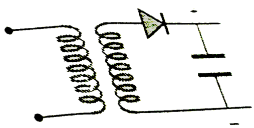
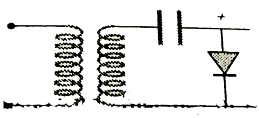
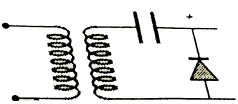
184. Which is the correct diagram of a half- wave reactifier?

A. 

B. 

C. 

D. 

Answer: B

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185. The maximum effeciency of full wave rectifier is

A. 100%

B. 25.20%

C. 40.2%

D. 81.2%

Answer: D

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186. Serious draw back of the semiconductor device is

A. They cannot be used with high voltage

B. They pollute the environment

C. They are costly

D. They do not last for long time

Answer: A

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187. Select the correct statement

A. In a full wave rectifier, two diodes work alternately

B. In a full wave rectifier, two diodes work simultaneously

C. The efficiency of full wave and half wave rectifiers is same

D. The full wave rectifier is bi-directional.

Answer: A

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188. In order to forward bias a PN junction, the negative terminal of battery is connected to

A. P - side

B. Either P –side or N –side

C. N –side

D. None of these

Answer: C

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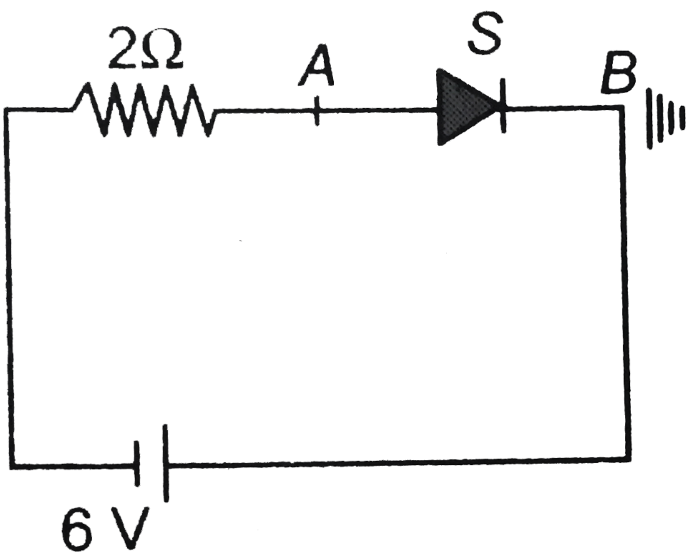
189. The diode shown in the circuit is a silicon diode. The potential difference between the points A and B will be



A. 6 V

B. $0.6V$

C. $0.7V$

D. 0 V

Answer: A

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190. 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

Answer: B

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191. Consider the following statements A and B and identify the correct answer

(A) A Zener diode is always connected in reverse bias to use it as voltage regulator.

(B) The potential barrier of a $p-n$ junction lies between 0.1 to $0.3V$, 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

Answer: C

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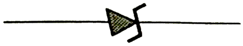
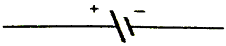
192. Symbol of zener diode-

A. 

B. 

C. 

D. 

Answer: A

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193. Which one of the following statement is not correct?

A. A diode does not obey Ohm's law

B. A PN 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

Answer: C

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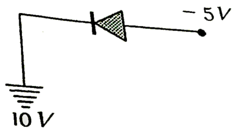
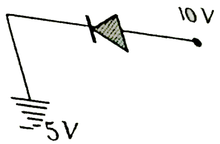
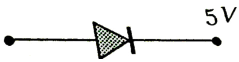
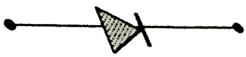
194. Which of the following semi-conductor diodes is reverse biased

A. 

B. 

C. 

D. 

Answer: A

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195. No biase 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

Answer: B

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196. Zener diode is used as

A. Half wave rectifier

B. Full wave rectifier

C. ac voltage stabilizer

D. dc voltage stabilizer

Answer: C

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197. The width of forbidden gap in silicon crystal is $1.1 eV$. When the crystal is converted into 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 $1.1 eV$

Answer: C

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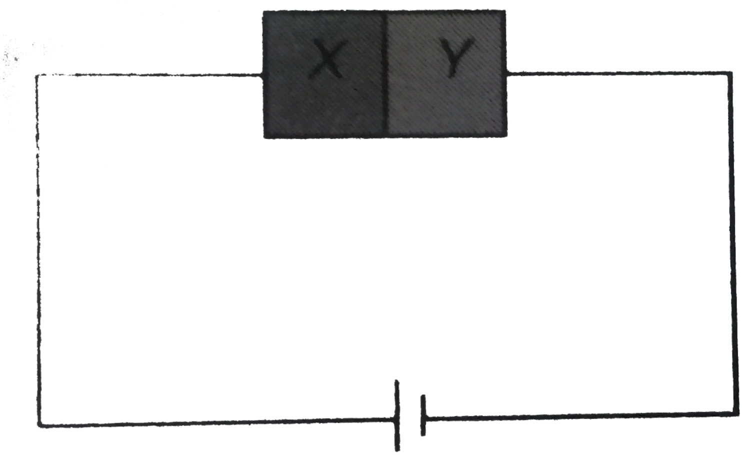
198. A semiconductor X is made by dopping a germanium crystal with arsenic $(Z = 33)$. A scond semiconductor Y is made by dopping germanium with indium $(Z = 49)$. The two are joined end to end and connected to a battery as shown. Which of the following statements is correct?



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 biase

Answer: D

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199. In $P-N$ junction, the barrier potential offerse 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

Answer: A

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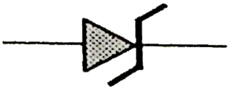
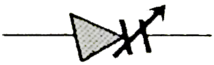
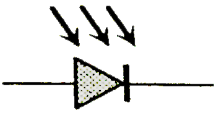
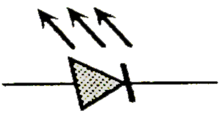
200. Symbolic representation of photodiode is

A. 

B. 

C. 

D. 

Answer: C

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201. To make a PN 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

Answer: A

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202. Which is the wrong statement in following sentence? A device in which P and N type semiconductors are used is more useful then a cacuum tube because-

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

Answer: D

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203. The depletion layer in diode is $1\mu m$ wide and the knee potential is $0.6V$, then the electric field in the depletion layer will be

A. Zero

B. $0.6Vm$

C. $6 \times 10^4 V/m$

D. $6 \times 10^5 V/m$

Answer: D

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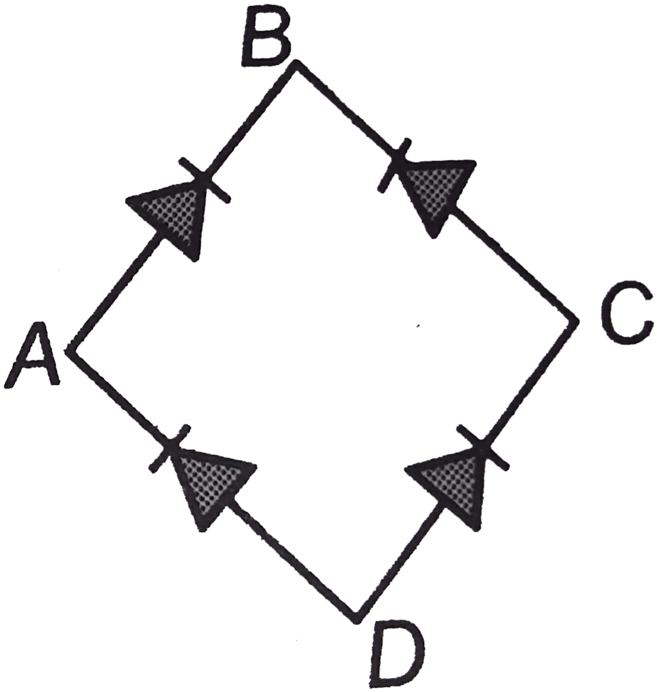
204. In the diagram, the input is across the terminals A and C and the output is across the terminals B and D, then the outputs is



A. Zero

B. Same as input

C. Full wave rectifier

D. Half wave rectifier

Answer: C

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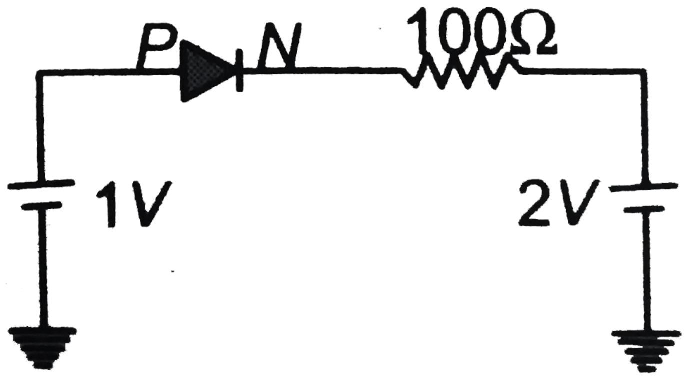
205. The current through an ideal PN-junction shown in the following circuit diagram will be



A. Zero

B. 1 mA

C. 10 mA

D. 30 mA

Answer: A

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206. If a full wave rectifier circuit is operating from $50Hz$ mains, the fundamental frequency in the ripple will be

A. 50 Hz

B. $70.7Hz$

C. 100 Hz

D. 25 Hz

Answer: C

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207. In a full wave rectifiers, input ac current has a frequency $'v'$. The output frequency of the current is

A. V/2

B. V

C. 2 V

D. None of these

Answer: C

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208. A diode having potential difference $0.5V$ across its junction which does not depend on current, is connected in series with resistance of 20Ω across source. If $0.1A$ passes through resistance then what is the voltage of the source?

A. $1.5V$

B. $2.0V$

C. $2.5V$

D. 5V

Answer: C

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209. When npn transistor is used as an amplifier

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

Answer: A

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210. The phase difference between input and output voltage of a CE circuit is

A. 0°

B. 90°

C. 180°

D. 270°

Answer: C

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211. An oscillator is nothing but an amplifier with

A. Positive feed back

B. Large gain

C. No feedback

D. Negative feedback

Answer: A

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

A. Reverse, forward

B. Reverse, reverse

C. Forward, forward

D. Forward, reverse

Answer: D

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213. In an NPN transistor the collector current is $24mA$. If 80% of electrons reach collector it base current in mA is

A. 36

B. 26

C. 16

D. 6

Answer: D

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214. 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

Answer: B

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215. In the case of constant α and β of a transistor

A. $\alpha = \beta$

B. $\beta < 1 \alpha > 1$

C. $\alpha\beta = 1$

D. $\beta > \alpha < 1$

Answer: D

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216. 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

Answer: B

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

A. 4.9

B. 49

C. 96

D. 9.6

Answer: B

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218. For a common base configuration of PNP transistor $\frac{l_C}{l_E}=0.98$, then maximum current gain in common emitter configuration will be

A. 12

B. 24

C. 6

D. 5

Answer: B

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219. In a PNP transistor working as common-base amplifier, current gain is 0.96 and current is $7.2mA$. The base current is

A. $0.4mA$

B. $0.2mA$

C. $0.29mA$

D. $0.35mA$

Answer: C

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220. 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. $l_3 > l_1 > l_2$

Answer: D

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

A. $i_E = -1mA, i_B = 9mA$

B. $i_E = 9mA, i_B = -1mA$

C. $i_E = 1mA, i_B = 11mA$

D. $i_E = 11mA, i_B = 1mA$

Answer: D

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222. In a common emitter transistor, the current gain is 80. What is the change in collector current, when the change in base current is $250\mu A$?

A. $80 \times 250\mu A$

B. $(250 - 80)\mu A$

C. $(250 + 80)\mu A$

D. $250 / 80\mu A$

Answer: A

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223. Least doped region in a transistor

A. Either emitter or collector

B. Base

C. Emitter

D. Collector

Answer: B

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224. 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

Answer: B

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225. The transfer ration of a transistor is 50. The input resistance of the transistor when used in the common -emitter configuration is $1k\Omega$. The peak value for an $A.C.$ input voltage of $0.01V$ peak is

A. $100\mu A$

B. $0.01mA$

C. $0.25mA$

D. $500\mu A$

Answer: D

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

A. 0.9

B. 0.99

C. 1

D. 9

Answer: B

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

(1) the base-emitter junction is forward biased

(2) the base emitter junction is reverse biased

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

(4) the input signal is connected in series with

the voltage applied to the base collector junction.

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

Answer: A::C

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228. In a PNP transistor the base is the N-region. Its width relative to the P-region is

A. Smaller

B. Larger

C. Same

D. Not related

Answer: A

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229. A common emitter amplifier is designed with NPN transistor $(\alpha = 0.99)$. The input impedence is $1kK\omega$ and load is $10K\omega$. The voltage gain will be

A. 9.9

B. 99

C. 990

D. 9900

Answer: C

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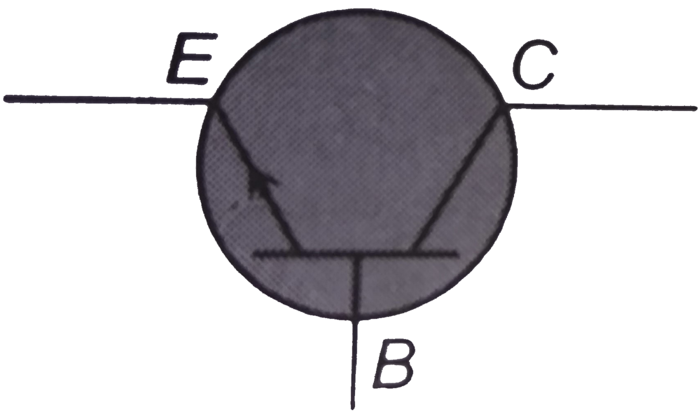
230. The symbol given in figure represents



A. NPN transistor

B. PNP transistor

C. Forward biased PN junction diode

D. Reverse biased NP junction diode

Answer: A

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231. The most commonly used material for making transistor is

A. Copper

B. Silicon

C. Ebonite

D. Silver

Answer: B

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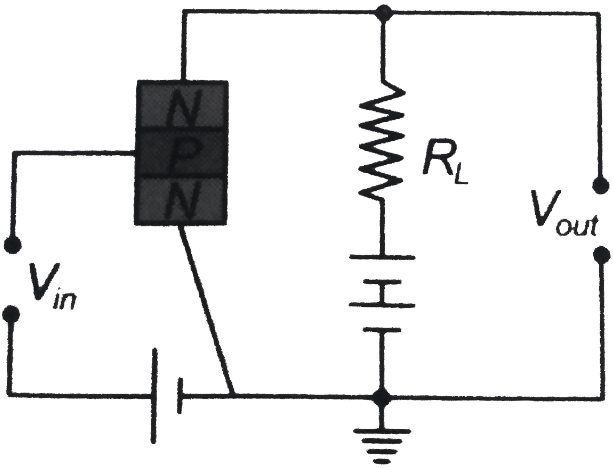
232. An NPN-transistor circuit is arranged as shown in figure. It is



A. A common base amplifier circuit

B. A common emitter amplifier circuit

C. A common collector amplifier circuit

D. Neither of the above

Answer: B

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233. 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

Answer: B

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

A. 6 mA

B. $4.8mA$

C. 24 mA

D. 8 mA

Answer: C

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235. In a common base amplifier circuit, calculate the change in base current if that in the emitter current is $2mA$ and $\alpha = 0.98$

A. $0.04mA$

B. $1.96mA$

C. $0.98mA$

D. 2 mA

Answer: A

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236. In case of NPN-transistor 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

Answer: B

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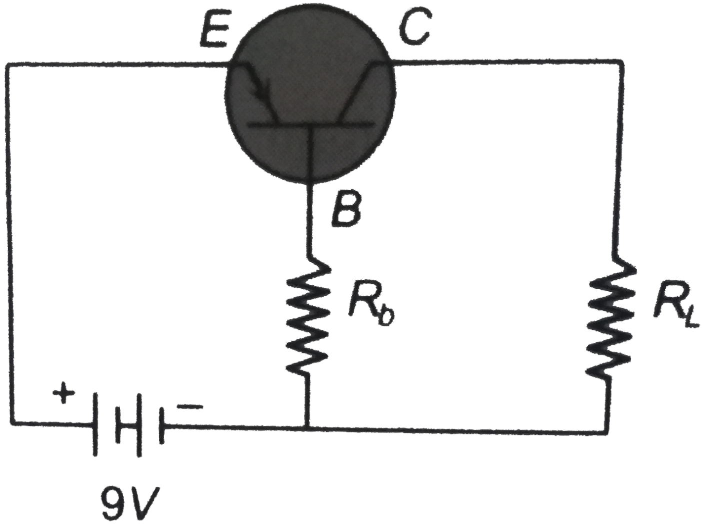
237. In a transistor circuit shown here the base current is $35\mu A$. The value of the resistor R_b is



A. $123.5K\Omega$

B. $257K\Omega$

C. $380.05K\Omega$

D. None of these

Answer: B

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

A. $50\mu A$

B. $100\mu A$

C. $150\mu A$

D. $200\mu A$

Answer: D

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239. In a transistor configuration β -parameter is

A. $\frac{l_b}{l_c}$

B. $\frac{l_c}{l_b}$

C. $\frac{l_c}{l_a}$

D. $\frac{l_a}{l_c}$

Answer: B

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240. Which of these is unipolar transistor?

A. Point contact transistor

B. Field effect transistor

C. PNP transistor

D. None of these

Answer: B

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241. For a transistor, in a common emitter arragement, the alternating current gain β is given by

A. $\beta = \left(\frac{\Delta I_C}{\Delta I_B}\right)_{V_C}$

B. $\beta = \left(\frac{\Delta I_B}{\Delta I_C}\right)_{V_C}$

C. $\beta = \left(\frac{\Delta I_C}{\Delta I_E}\right)_{V_C}$

D. $\beta = \left(\frac{\Delta I_E}{\Delta I_C}\right)_{V_C}$

Answer: A

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242. The relation between α and β parameters of current gains for a transistors is given by

A. $\alpha = \dfrac{\beta}{1-\beta}$

B. $\alpha = \dfrac{\beta}{1+\beta}$

C. $\alpha = \dfrac{1-\beta}{\beta}$

D. $\alpha = \dfrac{1+\beta}{\beta}$

Answer: B

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243. When npn transistor is used as an amplifier

A. Electrons move from base to emitter

B. Electrons move from emitter to base

C. Electrons moves from base to emitter

D. Holes moves from base to emitter

Answer: B

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244. In the CB mode of a transistor, when the collector voltage is changed by 0.5 volt. The collector current changes by $0.05 mA$. The output resistance will be

A. $10 K\Omega$

B. $20 K\Omega$

C. $5 K\Omega$

D. $2.5 K\Omega$

Answer: A

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245. Which of the following is used to produce radio waves of constant amplitude?

A. Oscillator

B. FET

C. Rectifier

D. Amplifier

Answer: A

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246. While a collector to emitter voltage is constant in a transistor, the collector current changes by $8.2 mA$ when the emitter current changes by $8.3 mA$. The value of forward current ratio h_{fe} is

A. 82

B. 83

C. 8.2

D. 8.3

Answer: A

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247. Consider an $n-p-n$ transistor amplifer in common-emitter configuration. The current gain of the transistor is 100. If the collector current changes by $1mA$, what will be the change in emitter current?

A. $1.1mA$

B. $1.01mA$

C. $0.01mA$

D. $10mA$

Answer: B

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248. In a common base ampifier , the phase difference between the input signal and output voltage is

A. 0

B. $\pi / 4$

C. $\pi / 2$

D. π

Answer: A

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249. In NPN transistor the collector current is $10mA$. If 90% of electrons emitted reach the collector, the

A. Emitter current will be 9 mA

B. Emitter current will be $11.1mA$

C. Base current will be $0.1mA$

D. Base current will be $0.01mA$

Answer: B

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250. NPN transistor are prefered to PNP transistor because they have

A. Low cost

B. Low dissipation energy

C. Capability of handing large power

D. Electrons having high mobility than holes

Answer: D

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251. In a transistor in CE configuration, the ratio of power gain to voltage gain is

A. α

B. β / α

C. $\beta\alpha$

D. β

Answer: D

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252. In the study of transistors as an amplifier, if $\alpha = I_c / I_c$ 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. $\beta = \frac{1 + \alpha}{\alpha}$

Answer: B

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253. Given below are symbols for some logic gates :-

The XOR gate and NOR gate respectively are :-

A. 1 and 2

B. 2 and 3

C. 3 and 4

D. 1 and 4

Answer: B

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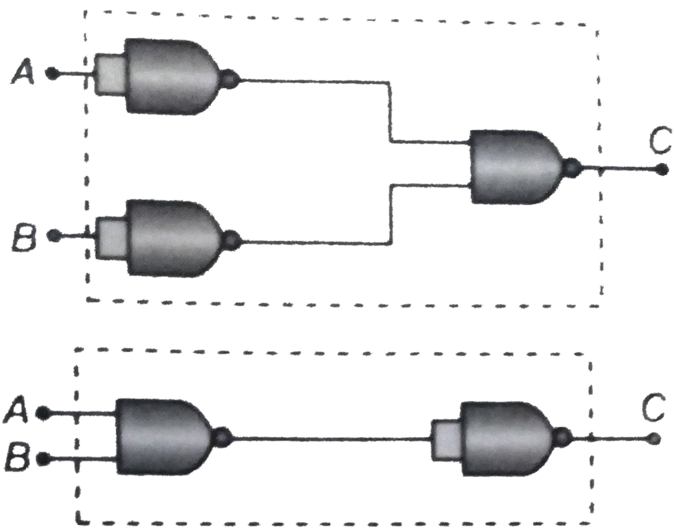
254. The combination of $'NAND'$ gates shown here under (figure) are equivalent to



A. An OR gate and an AND gate respectively

B. An AND gate and a NOT gate respectively

C. An AND gate and an OR gate respectively

D. An OR gate and a NOT gate respectively.

Answer: A

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255. A truth table is given below. Which of the following has this types fo truth table?

$$\begin{vmatrix} A & 0 & 1 & 0 & 1 \\ B & 0 & 0 & 1 & 1 \\ Y & 1 & 0 & 0 & 0 \end{vmatrix}$$

A. XOR gate

B. NOR gate

C. AND gate

D. OR gate

Answer: B

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256. The truth table shown in figure is for

$$\begin{vmatrix} A & 0 & 0 & 1 & 1 \\ B & 0 & 1 & 0 & 1 \\ Y & 1 & 0 & 0 & 1 \end{vmatrix}$$

A. XOR

B. AND

C. XNOR

D. OR

Answer: C

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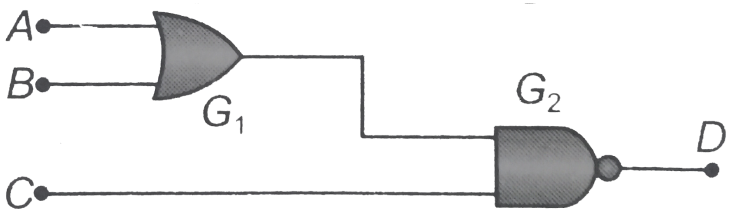
257. For the given combination of gates, if the logic states of inputs $A, B, C,$ are as follows $A = B = C = 0$ and $A = B = 1, C = 0$ then the logic states of output D are



A. $0, 0$

B. $0, 1$

C. $1, 0$

D. $1, 1$

Answer: D

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258. Boolean algebra is essentially based on

A. Truth

B. Logic

C. Symbol

D. Numbers

Answer: B

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259. The logic behind 'NOR' gate is that it gives

A. High output when both the inputs are low

B. Low output when both the inputs are low

C. High output when both the inputs are high

D. None of these

Answer: A

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260. A logic gate is an electronic circuit which

A. Makes logic decisions

B. Allows electrons flow only in one direction

C. Works binary algebra

D. Alternates between 0 and 1 values

Answer: A

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261. A gate has the following truth table

P	1	1	0	0
Q	1	0	1	0
R	1	0	0	0

The gate is

A. NOR

B. OR

C. NAND

D. AND

Answer: D

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262. How many $NAND$ gate are used to from AND gate?

A. 1

B. 2

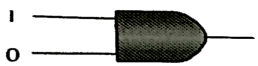
C. 3

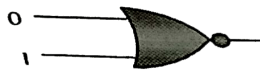
D. 4

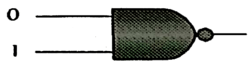
Answer: B

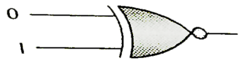
Watch Video Solution

263. Which of the following gates will have an output of 1

A. 

B. 

C. 

D. 

Answer: C

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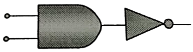
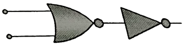
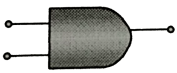
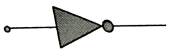
264. Which of these represents $NAND$ gate?

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer: A

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265. The given truth table is of

$$\begin{vmatrix} A & X \\ 0 & 1 \\ 1 & 0 \end{vmatrix}$$

A. OR gate

B. AND gate

C. NOT gate

D. None of these

Answer: C

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266. What will be the input of A and B for the Boolean expression $\overline{(A+B)}.\overline{(A.B)}=1$?

A. $0, 0$

B. $0, 1$

C. $1, 0$

D. $1, 1$

Answer: A

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267. If A and B are two inputs in AND gate, then AND gate has an output of 1 when the values of A and B are

A. $A = 0, B = 0$

B. $A = 1, B = 1$

C. $A = 1, B = 0$

D. $A = 0, B = 1$

Answer: B

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268. The boolean equation of NOR gate is-

A. $C = A + B$

B. $C = \overline{A + B}$

C. $C = A.\ B$

D. $C = \overline{A.\ B}$

Answer: B

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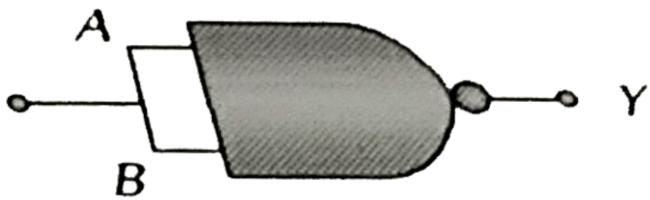
269. This symbol represents



A. NOT gate

B. OR gate

C. AND gate

D. NOT gate

Answer: A

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270. Which logic gate is represented by following diagram?

A. AND

B. OR

C. NOR

D. XOR

Answer: A

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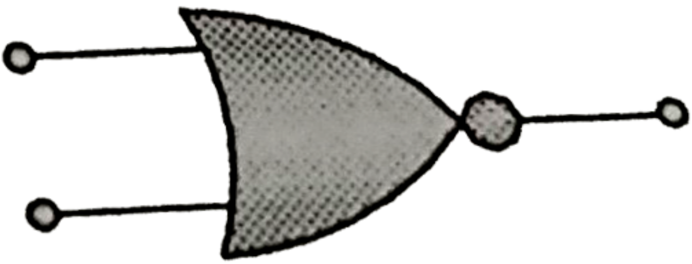
271. Symbol



represents

A. NAND gate

B. NOR gate

C. NOT gate

D. XNOR gate

Answer: B

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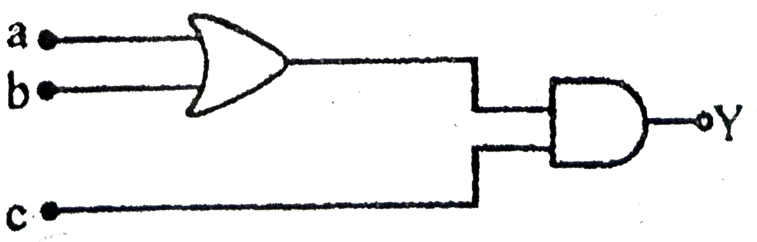
272. To get an output of 1 form the circuit shown in figure the input must be :-



A. $A = 0, B = 1, C = 0$

B. $A = 1, B = 0, C = 0$

C. $A = 1, B = 0, C = 1$

D. $A = 1, B = 1, C = 0$

Answer: C

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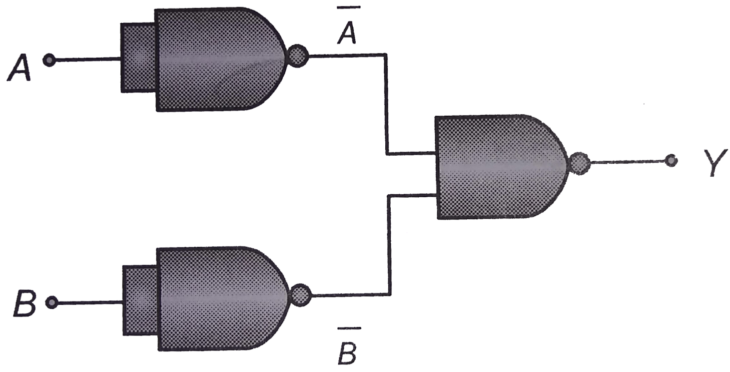
273. The combination of the gates shown in the figure below produces



A. NOR gate

B. OR gate

C. AND gate

D. XOR gate

Answer: B

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274. The output of a $NAND$ gate is 0

A. If both inputs are 0

B. If one input is 0 and the other input is 1

C. If both inputs are 1

D. Either if both inputs are 1 or if one of the inputs is 1 and the other 0

Answer: C

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275. A gate in which all the inputs must be low to get a high output is called

A. A NAND gate

B. An inverter

C. A NOR gate

D. An AND gate

Answer: B

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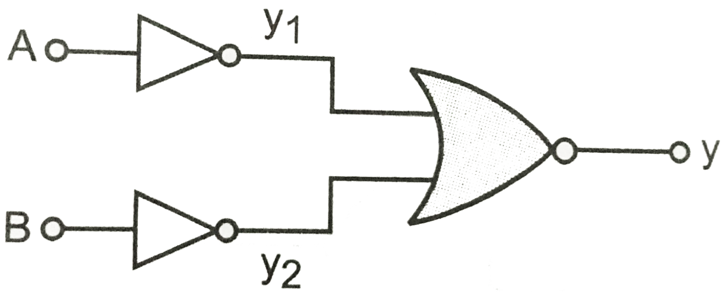
276. Which logic gate is represented by the following combination of logic gates



A. OR

B. NAND

C. AND

D. NOR

Answer: C

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277. The output of OR gate is 1

A. If both inputs are zero

B. If either or both inputs are 1

C. Only if both input are 1

D. If either input is zero

Answer: B

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278. Which gate is represented by this figure?

A. NAND gate

B. AND gate

C. NOT gate

D. OR gate

Answer: A

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279. Sum of the two binary numbers $(1000010)_2$ and $(11011)_2$ is

A. $(111101)_2$

B. $(111111)_2$

C. $(101111)_2$

D. $(111001)_2$

Answer: A

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280. The truth-table given below is for which gate

A	0	0	1	1
B	0	1	0	1
C	1	1	1	0

A. XOR

B. OR

C. AND

D. NAND

Answer: D

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281. Which of the following logic gates is an universal gate?

A. OR

B. NOT

C. AND

D. NOR

Answer: D

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282. Thermionic emission from a heated filament varies with its temperature T as

A. T^{-1}

B. T

C. T^{2}

D. $T^{3/2}$

Answer: C

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283. Number of secondary electrons emitted per number of primary electrons depends on

A. Material of target

B. Frequency of primary electrons

C. Intensity

D. None of the above

Answer: C

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284. Due to S.C.R in vacuum tube

A. $I_p \rightarrow$ Decrease

B. $I_p -$ Increase

C. $V_p =$ Increase

D. $V_g =$ Increase

Answer: A

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285. In diode, when there is saturation current, the plate resistance (r_p) is

A. Zero

B. Infinite

C. Some finite quantity

D. Data is insufficient

Answer: B

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286. The grid voltage of any triode valve is changed from –1 volt to – 3 volt and the mutual conductance is $3 \times 10^{-4} mho$. The change in plate circuit current will be

A. $0.8 mA$

B. $0.6 mA$

C. $0.4 mA$

D. $1 mA$

Answer: B

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287. In a triode, $gm = 2 \times 10^{-3} ohm^{-1}$, $\mu = 42$, resistance load, R = 50 kilo ohm. The voltage amplification obtained from this triode will be

A. 30.42

B. 29.57

C. 28.18

D. 27.15

Answer: B

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288. In an amplifier the load resistance R_L is equal to the plate resistance (r_p). The voltage amplification is equal to

A. μ

B. 2μ

C. $\mu/2$

D. $\mu/4$

Answer: C

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289. For a given plate voltage , the plate current in a triode valve is maximum when the potential of

A. The grid is positive and plate is negative

B. The grid is positive and plate is positive

C. The grid is zero and plate is positive

D. The grid is negative and plate is positive

Answer: B

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290. If $R_p = 7K\Omega g_m = 2.5$ millimho, then on increasing plate voltage by 50 V, how much the grid voltage is changed so that plate current remains the same

A. $-2.86V$

B. $-4V$

C. $+4V$

D. $+2V$

Answer: A

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291. The amplification factor of a triode is 20 and trans-conductance is 3 milli mho and load resistance $3 \times 10^4 \Omega$, then the voltage gain is

A. 16.36

B. 28

C. 78

D. 108

Answer: A

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292. In a triode amplifier, $\mu = 2.5$, $r_p = 40$ kilo ohm and load resistance $R_L = 10$ kilo ohm. If the input signal voltage is 0.5 volt, then output signal voltage will be

A. 1.25 volt

B. 5 volt

C. 2.5 volt

D. 10 volt

Answer: C

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293. The amplification factor of a triode is 20. If the grid potential is reduced by 0.2 volt then to keep the plate current constant its plate voltage is to be increased by

A. 10 volt

B. 4 volt

C. 40 volt

D. 100 volt

Answer: B

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294. For a triode $r_p = 10$ kilo ohm and $g_m = 3$ milli mho . If the load resistance is double of plate resistance, then the value of voltage gain will be

A. 10

B. 20

C. 15

D. 30

Answer: B

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295. The amplification produced by a triode is due to the action of

A. Filament

B. Cathode

C. Grid

D. Plate

Answer: C

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296. In an experiment, the saturation in the plate current in a diode is observed at 240 V . But a student still wants to increase the plate current. It can be done, if

A. The plate voltage is increased further

B. The plate voltage is decreased

C. The filament current is decreased

D. The filament current is increased

Answer: D

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297. In a triode amplifier, the value of maximum gain is equal to

A. Half the amplification factor

B. Amplification factor

C. Twice the amplification factor

D. Infinity

Answer: B

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298. For a given triode $\mu = 20$. The load resistance is 1.5 times the anode resistance. The maximum gain will be

A. 16

B. 12

C. 10

D. None of the above

Answer: B

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299. The voltage gain of a triode depends upon

A. Filament voltage

B. Plate voltage

C. Plate resistance

D. Plate current

Answer: C

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300. In a triode valve

A. If the grid voltage is zero then plate current will be zero

B. If the temperature of filament is doubled, then the thermionic current will also be doubled

C. If the temperature of filament is doubled, then the thermionic current will nearly be four times

D. At a definite grid voltage the plate current varies with plate voltage according to Ohm's law

Answer: C

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301. The amplification factor of a triode valve is 15. If the grid voltage is changed by 0.3 volt the change in plate voltage in order to keep the plate current constant (in volt) is

A. 0.02

B. 0.002

C. 4.5

D. 5.0

Answer: C

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302. The slope of plate characteristic of a vacuum tube diode for certain operating point on the curve is $10^{-3}\frac{mA}{V}$. The plate resistance of the diode and its nature respectively

A. 100 kilo-ohms static

B. 1000 kilo - ohms static

C. 1000 kilo - ohms dynamic

D. 100 kilo - ohms dynamic

Answer: B

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303. A triode has a mutual conductance of $2 \times 10^{-3} mho$ and an amplification factor of 50. The anode is connected through a resistance of $25 \times 10^{3} ohms$ to a 250 volts supply. The voltage gain of this amplifier is

A. 50

B. 25

C. 100

D. 12.5

Answer: B

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304. 14×10^{15} electrons reach the anode per second. If the power consumed is 448 milliwatts, then the plate (anode) voltage is

A. 150 V

B. 200 V

C. $14 \times 448 V$

D. $448 / 14 V$

Answer: B

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305. In the circuit of a triode valve, there is no change in the plate current, when the plate potential is increased from 200 volt to 220 volt and the grid potential is decreased from -0.5 volt to -1.3 volt . The amplification factor of this valve is

A. 15

B. 20

C. 25

D. 35

Answer: C

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306. If the amplification factor of a triode (μ) is 22 and its plate resistance is 6600 ohm , then the mutual conductance of this valve is mho is

A. $\frac{1}{300}$

B. 25×10^{-2}

C. 2.5×10^{-2}

D. 0.25×10^{-2}

Answer: A

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307. For a triode, at $V_g = -1$ volt, the following observations were taken $V_p = 75V, I_p = 2mA, V_p = 100V, I_p = 4mA.$ The value of plate resistance will be

A. $25k\Omega$

B. $20.8k\Omega$

C. $12.5k\Omega$

D. $100k\Omega$

Answer: C

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308. The triode constant is out of the following

A. Plate resistance

B. Amplification factor

C. Mutual conductance

D. All the above

Answer: D

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309. The unit of mutual conductance of a triode valve is

A. Siemen

B. Ohm

C. Ohm metre

D. Joule Coulomb^{-1}

Answer: A

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310. With a change of load resistance of a triode, used as an amplifier, from 50 k ilo o h m s to 100 k ilo o h m s , its voltage amplification changes from 25 to 30. Plate resistance of the triode is

A. $25k\Omega$

B. $75k\Omega$

C. $7.5k\Omega$

D. $2.5k\Omega$

Answer: A

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311. Select the correct statements from the following

A. A diode can be used as a rectifier

B. A triode cannot be used as a rectifier

C. The current in a diode is always proportional to the applied voltage

D. The linear portion of the I–V characteristic of a triode is used for amplification without distortion

Answer: A::D

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312. The introduction of a grid in a triode valve affects plate current by

A. Making the thermionic emission easier at low temperature

B. Releasing more electrons from the plate

C. By increasing plate voltage

D. By neutralising space charge

Answer: D

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313. Before the saturation state of a diode at the plate voltages of 400 V and 200 V respectively the currents are i_1 and i_2 respectively. The ratio i_1 / i_2 will be

A. $\sqrt{2} / 4$

B. $2\sqrt{2}$

C. 2

D. $1/2$

Answer: C

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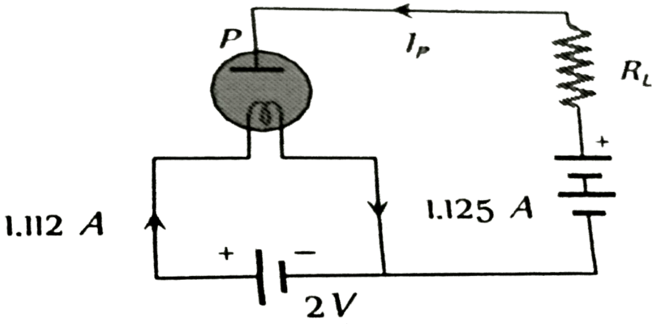
314. The value of plate current in the given circuit diagram will be



A. 3 mA

B. 8 mA

C. 13 mA

D. 18 mA

Answer: C

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315. Coating of strontium oxide on Tungsten cathode in a valve is good for thermionic emission because

A. Work function decreases

B. Work function increases

C. Conductivity of cathode increases

D. Cathode can be heated to high temperature

Answer: A

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316. Correct relation for triode is

A. $\mu = g_m \times r_p$

B. $\mu = \dfrac{g_m}{r_p}$

C. $\mu = 2g_m \times r_p$

D. None of these

Answer: A

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317. Following is the relation between current and charge $I = AT^2 e^{qt/V_L}$ then value of V_L will be

A. $\dfrac{V}{kT}$

B. $\frac{kV}{T}$

C. $\frac{kT}{V}$

D. $\frac{VT}{k}$

Answer: C

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318. Which one is correct relation for thermionic emission

A. $J = AT^{1/2}e^{-\phi/kT}$

B. $J = AT^2e^{-\phi/kT}$

C. $J = AT^{3/2}e^{-\phi/kT}$

D. $J = AT^{2}e^{-\phi/2kT}$

Answer: B

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319. When plate voltage in diode valve is increased from 100 volt to 150 volt then plate current increases from 7.5 mA to 12 mA . The dynamic plastic resistance will be

A. $10k\Omega$

B. $11k\Omega$

C. $15k\Omega$

D. $11.1k\Omega$

Answer: D

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320. Plate resistance of two triode valves is $2k\Omega$ and $4k\Omega$, amplification factor of each of the valves is 40. The ratio of voltage amplification, when used with $4k\Omega$ load resistance, will be

A. 10

B. $\frac{4}{3}$

C. $\frac{3}{4}$

D. $\frac{16}{3}$

Answer: C

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321. Diode is used as a/an

A. Oscillator

B. Amplifier

C. Rectifier

D. Modulator

Answer: C

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322. The electrical circuit used to get smooth dc output from a rectifier circuit is called

A. Filter

B. Amplifier

C. Full wave rectifier

D. Oscillator

Answer: B

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323. Which of the following does not vary with plate or grid voltages

A. g.

B. R

C. μ

D. Each of them varies

Answer: D

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324. The grid in a triode valve is used

A. To increases the thermionic emission

B. To control the plate to cathode current

C. To reduce the inter-electrode capacity

D. To keep cathode at constant potential

Answer: B

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325. In a triode valve the amplification factor is 20 and mutual conductance is 10–3 mho . The plate resistance is

A. $2 \times 10^3 \Omega$

B. $4 \times 10^3 \Omega$

C. $2 \times 10^4 \Omega$

D. $2 \times 10^4 \Omega$

Answer: C

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326. The thermionic emission of electron is due to

A. Electromagnetic field

B. Electrostatic field

C. High temperature

D. Photoelectric effect

Answer: C

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327. The slope of plate characteristic of a vacuum diode is $2 \times 10^{-2} mA/V$. The plate resistance of diode will be

A. 50Ω

B. $50k\Omega$

C. $500k\Omega$

D. $500k\Omega$

Answer: B

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328. The transconductance of a triode amplifier is 2.5 mili mho having plate resistance of $20k\Omega$, amplification 10. Find the load resistance

A. $5k\Omega$

B. $25k\Omega$

C. $20k\Omega$

D. $50k\Omega$

Answer: A

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329. The amplification factor of a triode is 18 and its plate resistance is $8 \times 10^3 \Omega$. A load resistance of $10^4 \Omega$ is connected in the plate circuit. The voltage gain will be

A. 30

B. 20

C. 10

D. 1

Answer: C

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330. The correct relation for a triode is

A. $g_m = \frac{\Delta I_p}{\Delta V_p}\Big|_{V_{\text{g= constt.}}}$

B.

C. $g_m = \frac{\Delta I_p}{\Delta V_g}\Big|_{V_{\text{p=constt.}}}$

D. None of these

Answer: B

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331. In a diode valve the cathode temperature must be (ϕ= work function)

A. High and ϕ should be high

B. High and ϕ should be low

C. Low and ϕ should be high

D. Low and ϕ should be high

Answer: B

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332. The plate resistance of a triode is $2.5 \times 10^4 \Omega$ and mutual conductance is $2 \times 10^{-3} mho$. What will be the value of amplification factor

A. 50

B. 1.25×10^7

C. 75

D. 2.25×10^{7}

Answer: A

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333. Plate voltage of a triode is increased from 200 V to 225 V . To maintain the plate current, change in grid voltage from 5 V to $5.75V$ is needed. The amplification factor is

A. 40

B. 45

C. 33.3

D. 25

Answer: C

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334. The current in a triode at anode potential 100 V and grid potential $-1.2V$ is 7.5 mA . If grid potential is changed to $-2.2V$, the current becomes $5.5mA$. the value of trans conductance (g_m) will be

A. 2 mili mho

B. 3 mili mho

C. 4 mili mho

D. 0.2 mili mho

Answer: A

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335. Select the correct statement

A. In a full wave rectifier, two diodes work alternately

B. In a full wave rectifier, two diodes work simultaneously

C. The efficiency of full wave and half wave rectifiers is same

D. The full wave rectifier is bi-directional

Answer: A

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336. The amplification factor of a triode is 20. Its plate resistance is 10 kilo ohms. Mutual conductance is

A. $2 \times 10^{5} mho$

B. $2 \times 10^{4} mho$

C. $500 mho$

D. $2 \times 10^{-3} mho$

Answer: D

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337. A silicon specimen is made into a P-type semiconductor by dopping, on an average, one helium atoms per 5×10^7 silicon atoms. If the number density of atoms in the silicon specimen is $5 \times 10^{28} atom / m^3$ then the number of acceptor atoms in silicon per cubic centimeter will be

A. $2.5 \times 10^{30} \text{atoms} / cm^3$

B. $1.0 \times 10^{13} \text{atoms} / cm^3$

C. $1.0 \times 10^{15} \text{atoms} / cm^3$

D. $2.5 \times 10^{36} \text{atoms} / cm^3$

Answer: C

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338. The probability of electrons to be found in the conduction band of an intrinsic semiconductor at a finite temperature

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

Answer: A

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339. The typical ionisation energy of a donor in silicon is

A. $10.0eV$

B. $1.0eV$

C. $0.1eV$

D. $0.001eV$

Answer: C

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340. In a p-n junction diode the reverse saturation current is $10^{-5} Aat27^{\circ} C$. Find the forward current for a voltage of $0.2V$. Given exp. $(7.62) = 2038.6, k = 1.4 \times 10^{-23} JK^{-1}$.

A. $2037.6 \times 10^{-3} amp$

B. $203.76 \times 10^{-3} amp$

C. $20.376 \times 10^{-3} amp$

D. $2.0376 \times 10^{3} amp$

Answer: C

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341. When a potential difference is applied across, the current passing through

A. An insulator at 0 K is zero

B. A semiconductor at 0 K is zero

C. A metal at 0 K is zero

D. A P - N diode at 300 K is finite, if it is reverse biased

Answer: A::B::D

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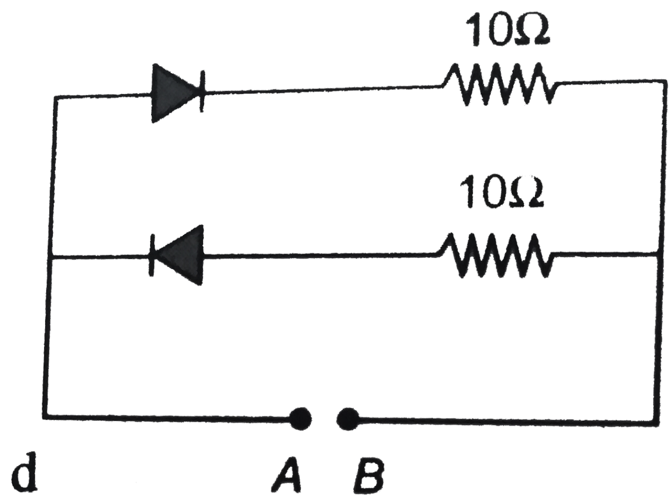
342. A $2V$ battery is connected across the points A and B as shown in the figure given below. Assuming that the resistance of each diode is zero in forward bias and infinity in reverese biase, the current supplied by the battery when its positive terminal is connected to A is



A. $0.2A$

B. $0.4A$

C. Zero

D. $0.1A$

Answer: A

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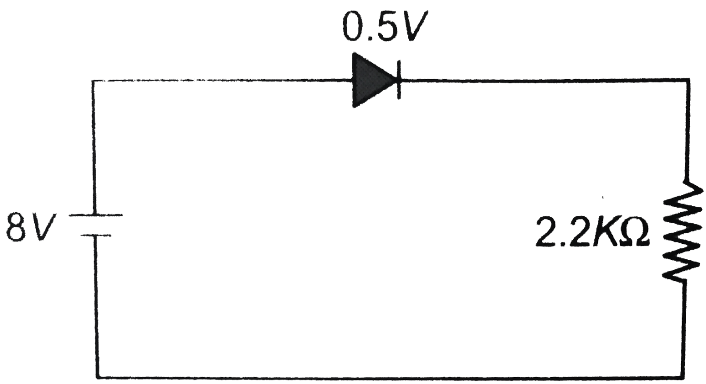
343. In the circuit, if the forward voltage drop for the diode is $0.5V$, the current will be



A. $3.4mA$

B. 2 mA

C. $2.5 mA$

D. 3 mA

Answer: A

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344. A P-type semiconductor has acceptor levels $57 meV$ above the valence band. The maximum wavelength of light required to create a hole is (Planck's constant $h = 6.6 \times 10^{-34} J - s$)

A. 57Å

B. 57×10^{-3}Å

C. 217100Å

D. 11.61×10^{-33}Å

Answer: C

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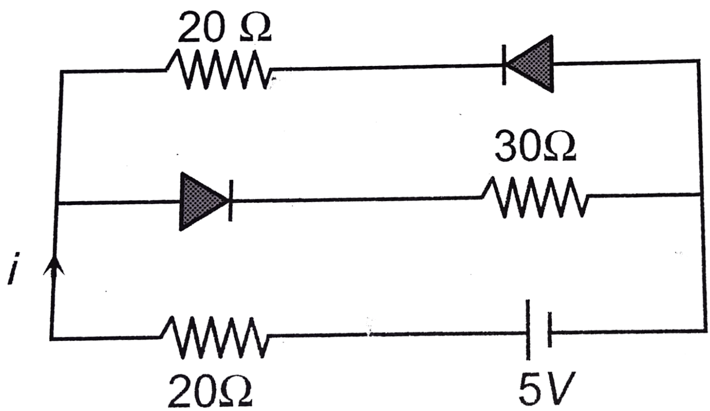
345. Current in the circuit will be



A. $\frac{5}{40} A$

B. $\frac{5}{50} A$

C. $\frac{5}{10} A$

D. $\frac{5}{20} A$

Answer: B

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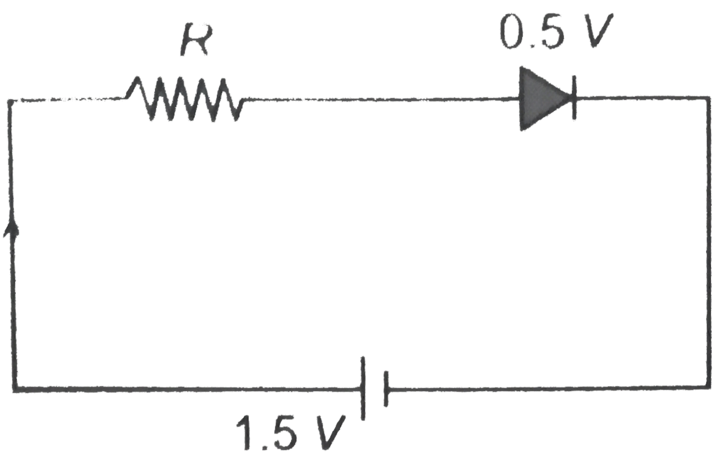
346. The diode used in the circuit shown in the figure has a constant voltage drop of $0.5V$ at all currents and a maximum power rating fo 100 milliwatts. What should be the value of the resistor R, connected in series with the diode for obtaining maximum current?



A. 1.5Ω

B. 5Ω

C. 6.67Ω

D. 200Ω

Answer: B

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347. For a transistor amplifier in common emiter configuration for load imperdance of

$1k\Omega\left(h_{fe}=50 \text{ and } h_{oe}=25\right)$ the current gain is

A. -5.2

B. -15.7

C. -24.8

D. -48.78

Answer: D

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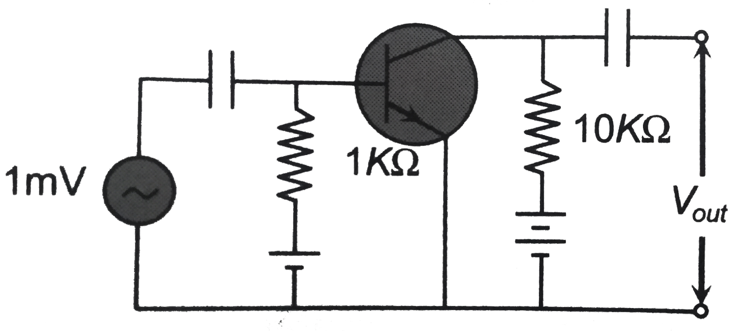
348. In the following common emitter configuration an NPN transistor with current gain $\beta = 100$ is used. The output voltage of the amlifier will be



A. 10 mV

B. $0.1V$

C. $1.0V$

D. 0 V

Answer: C

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349. In semiconductor the concentrations of electron and holes are $8 \times 10^{18} / m^3$ and $5 \times 10^{18} / m$ respectively. If the mobilities of electrons and hole are $2.3 m^2 /$ volt-sec and $0.01 m^2 /$ volt-sec respectively, then semicondutor 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

Answer: A

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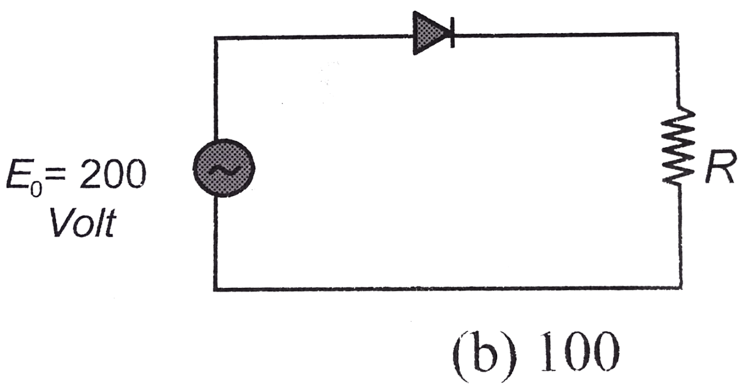
350. A sinusoidal voltage of peak value 200 volts is connected to a diode and resistor R in the circuit shown so that half wave rectification occurs. If the forward resistance of the diode is negligible compared to R the rms voltage (in volt) across R is approximately



A. 200

B. 100

C. $\frac{200}{\sqrt{2}}$

D. 280

Answer: B

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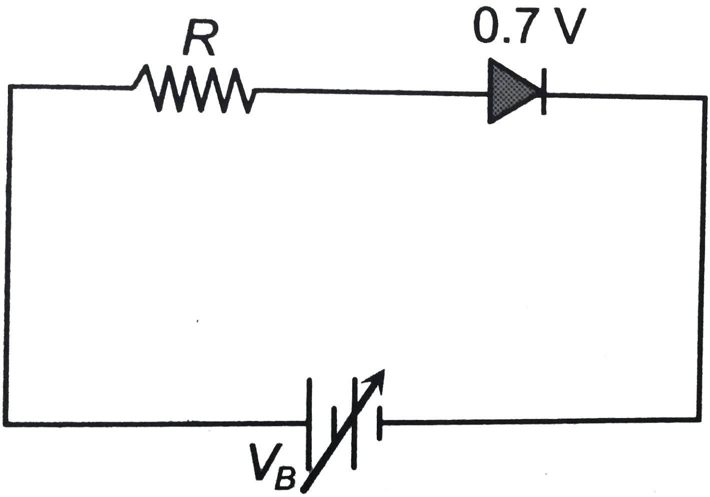
351. The junction diode in the following circuit requires a minimum current of $1mA$ to be above the knee point $(0.7V)$ of its $I - V$ characterstic curve. The voltage across the diode is independent of current above the knee point. If $V_B = 5V$, then the maximum value of R so that the voltage is above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



A. $4.3k\Omega$

B. $860k\Omega$

C. 4.3Ω

D. 860Ω

Answer: A

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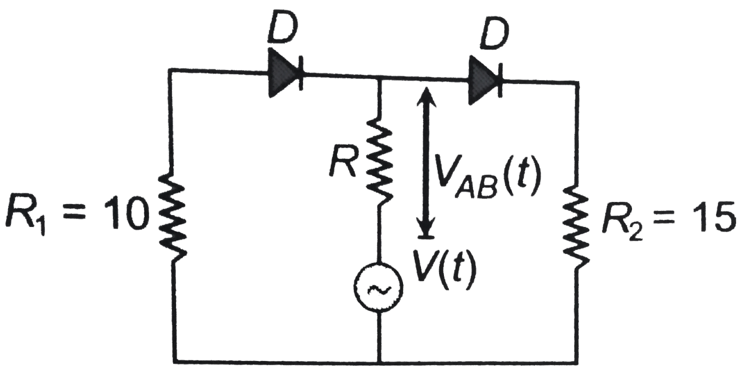
352. In the circuit given below, $V(t)$ is the sinusiodal voltage source, voltage drop $V_{AB}(t)$ across the resistance R is



A. Is half wave rectified

B. Is full wave rectified

C. Has the same peak value in the positive and negative half cycles

D. Has different peak values during positive and negative half cycle

Answer: D

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353. The peak voltage in the output of a half-wave diode rectifier fed with a sinusiodal signal without filter is $10V$. The dc component of the output voltage is

A. $10/\sqrt{2}V$

B. $10/\pi V$

C. 10 V

D. $20/\pi V$

Answer: B

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354. A transistor is used as an amplifier in CB mode with a load resistance of $5k\Omega$ the current gain of amplifier is 0.98 and the input resistance is 70Ω, the voltage gain and power gain respectively are

A. $70, 68.6$

B. $80, 75.6$

C. $60, 66.6$

D. $90, 96.6$

Answer: A

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355. The Bohr radius of the fifth electron of phosphorus (atomic number = 15) acting as dopant in silicon (relative dielectric constant = 12) is

A. 10.6Å

B. 0.53Å

C. 21.2Å

D. None of these

Answer: A

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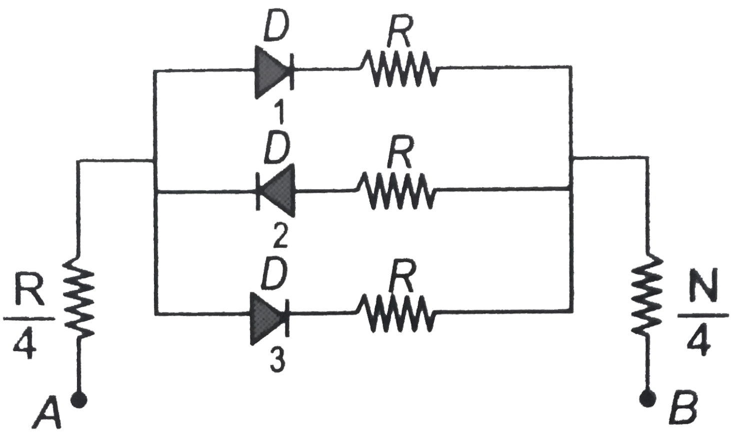
356. In the following circuits PN-junction diodes D_1, D_2 and D_3 are ideal for the following potential of A and B, the correct increasing order to resistance between A and B will be



$(i) - 10V, \ - 5V (ii) - 5V, \ - 10V$

$(iii) - 4V, \ - 12V$

A. $(i) < (ii) < (iii)$

B. $(iii) < (ii) < (i)$

C. $(ii) = (iii) < (i)$

D. $(i) = (iii) < (ii)$

Answer: C

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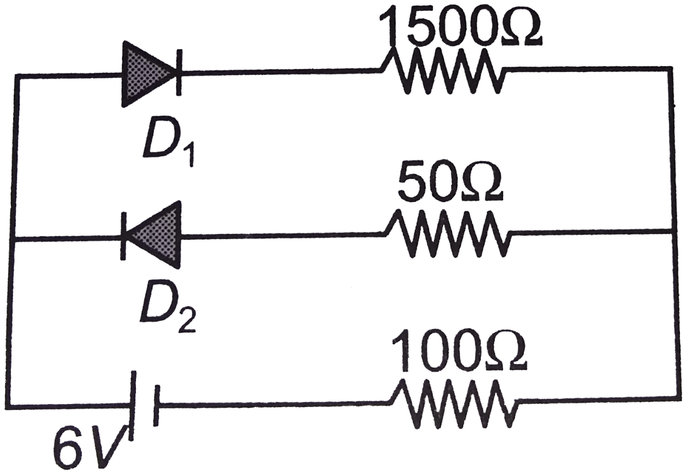
357. The circuit shown in following figure contanis two diode D_1 and D_2 each with a forward resistance of $50 ohm$ and with infinite backward resistance. If the battery voltage is $6V$, the current through the 100 ohm resistance (in amperes) is



A. Zero

B. 0.02

C. 0.03

D. 0.036

Answer: B

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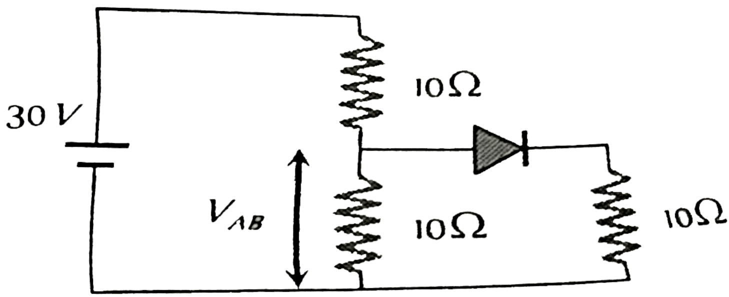
358. Find V



A. 10 V

B. 20 V

C. 30 V

D. None of these

Answer: A

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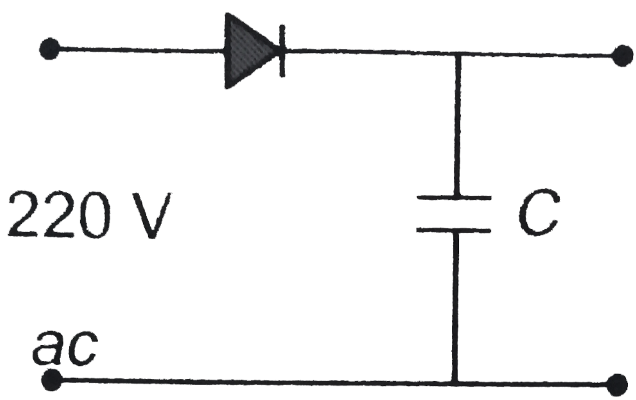
359. A diode is connected to $220V(rms)$ ac in series with a capacitor as shown in fig. The voltage across the capacitor is



A. 220 V

B. 110 V

C. $311.1V$

D. $\frac{220}{\sqrt{2}}V$

Answer: D

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360. A potential difference of $2V$ is applied between the opposite faces of a Ge crystal plate of area $1cm^2$ and thickness $0.5mm$. If the concentration of electrons in Ge is $2 \times 10^{19} / m^3$ and mobilities of electrons and holes are $0.36 \frac{m^2}{volt - \sec}$ and $0.14 \frac{m^2}{volt - \sec}$ respectively, then the current flowing through the plate will be

A. $0.25A$

B. $0.45A$

C. $0.56A$

D. $0.64A$

Answer: D

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361. The contribution in the total current flowing through a semiconductor due to electrons and holes are $\frac{3}{4}$ and $\frac{1}{4}$ respectively. If the drift velocity of electrons is $\frac{5}{2}$ times that of holes at this temperature, then the ratio of concentration of electrons and holes is

A. $6:5$

B. $5:6$

C. $3:2$

D. $2:3$

Answer: A

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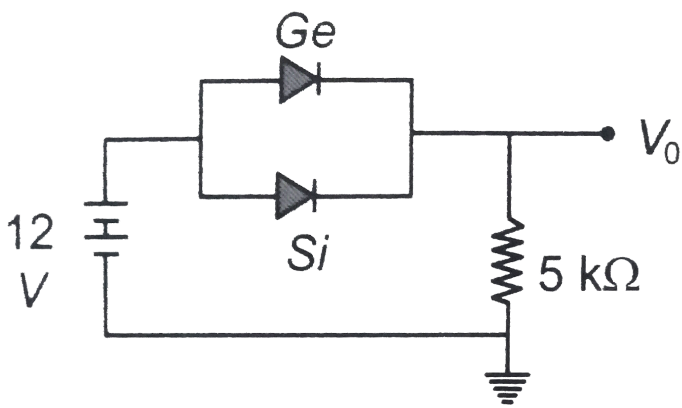
362. Ge and Si diodes conduct at $0.3V$ and $0.7V$ respectively. In the following figure if Ge diode connection are reversed, the value of V_0 changes by



A. $0.2V$

B. $0.4V$

C. $0.6V$

D. $0.8V$

Answer: B

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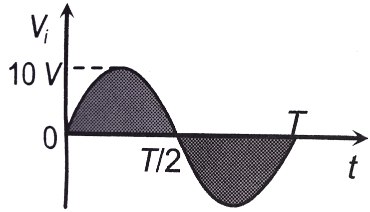
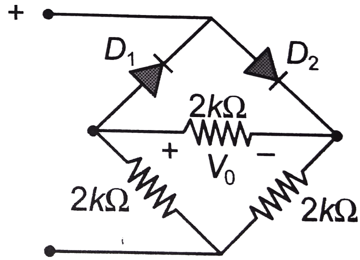
363. In the circuit shown in figure the maximum output voltage V_0 is





A. 0 V

B. 5 V

C. 10 V

D. $\frac{5}{\sqrt{2}} V$

Answer: B

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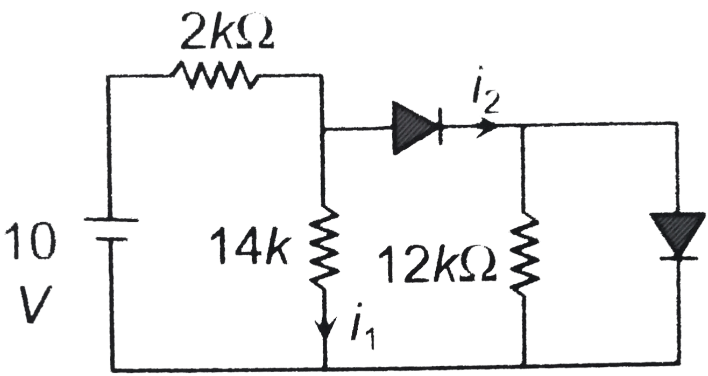
364. In the following circuit find I_1 and I_2



A. 0,0

B. 5 mA, 5 mA

C. 5 mA, 0

D. 0,5 mA

Answer: D

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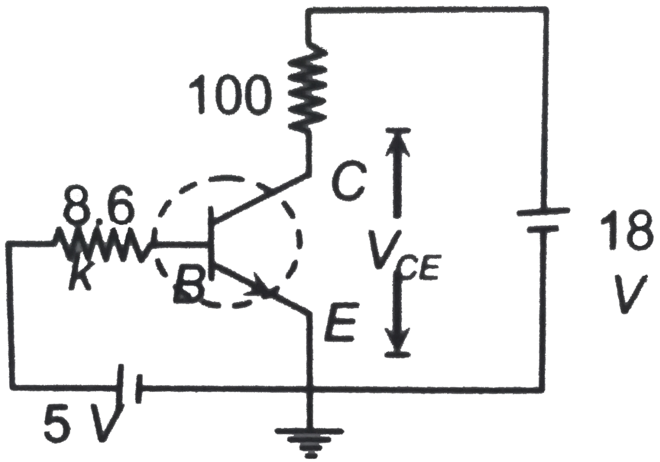
365. For the transistor circuit shown below, if $\beta = 100$, voltage drop between emitter and base is $0.7V$ then value of V_{CE} will be



A. 10 V

B. 5 V

C. 13 V

D. 0 V

Answer: C

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366. In NPN transistor, 10^{10} electrons enters in emitter region in 10^{-6}sc. If 2% electrons are lost in base region then collector current and current amplification factor (β) respectively are

A. $1.57mA, 49$

B. $1.92mA, 70$

C. $2mA, 25$

D. $2.25mA, 100$

Answer: A

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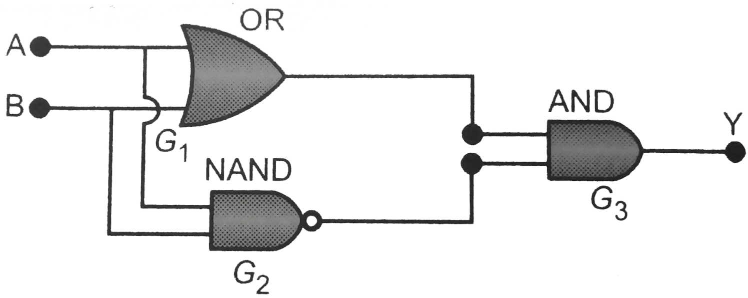
367. The following configuration of gate is equivalent to



A. NAND

B. XOR

C. OR

D. None of these

Answer: B

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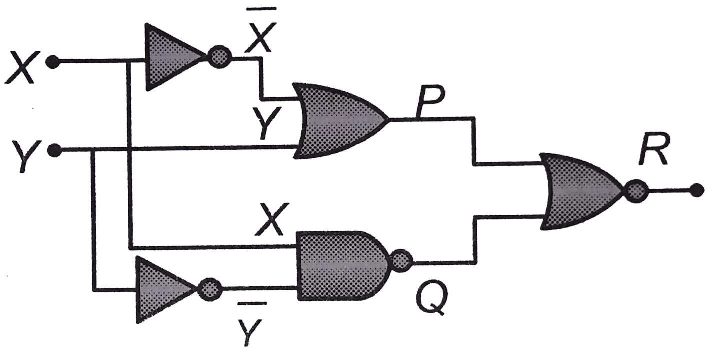
368. Figure gives a system of logic gates. From the study of truth table it can be found that no produce a high output (1) at R, we must have



A. $X = 0, Y = 1$

B. $X = 1, Y = 1$

C. $X = 1, Y = 0$

D. $X = 0, Y = 0$

Answer: C

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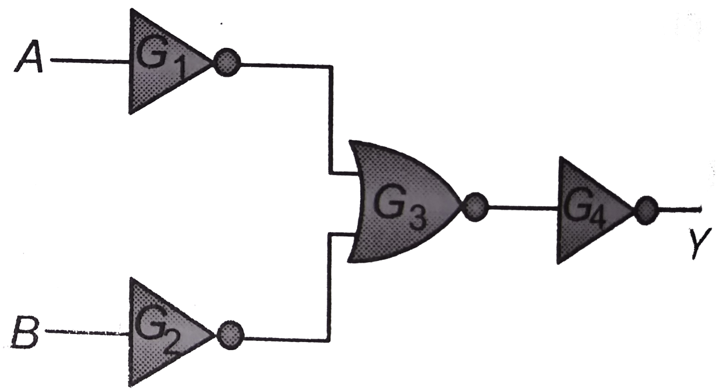
369. The combination of gates shown below produces



A. AND gate

B. XOR gate

C. NOR gate

D. NAND gate

Answer: D

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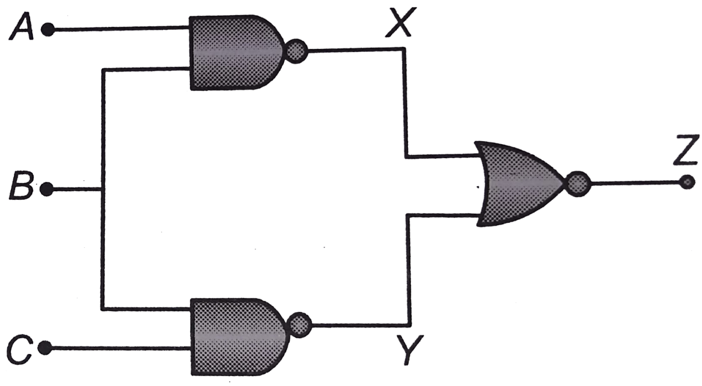
370. The figure shows two $NAND$ gates followed by a NOR gate. The system is equivalent to the following logic gate



A. OR

B. AND

C. NAND

D. None of these

Answer: B

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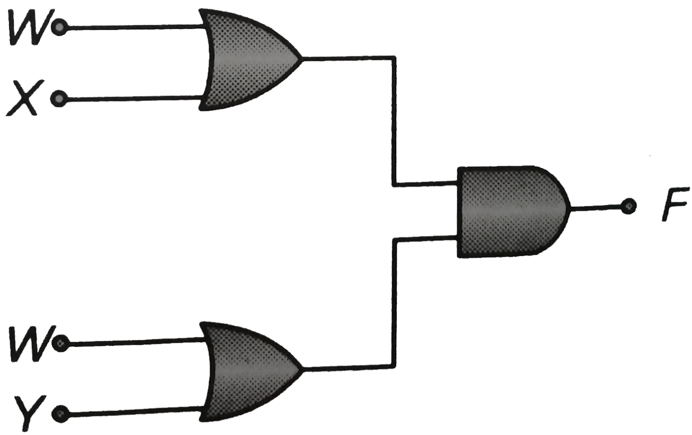
371. The diagram of a logic circuit is given below.

The output F of the circuit is represented by



A. $W.(X+Y)$

B. $W.(X.Y)$

C. $W+(X.Y)$

D. $W+(X+Y)$

Answer: C

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372. For a triode $\mu = 64$ and $g_m = 1600 \mu mho$. It is used as an amplifier and an input signal of 1 V (rms) is applied. The signal power in the load of $40 k\Omega$ will be

A. $23.5 mW$

B. $48.7 mW$

C. $25.6 mW$

D. None of these

Answer: C

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373. The amplification factor of a triode is 20. If the grid potential is reduced by 0.2 volt then to keep the plate current constant its plate voltage is to be increased by

A. $1.69mA$

B. $3.95mA$

C. 2.87

D. $7.02mA$

Answer: A

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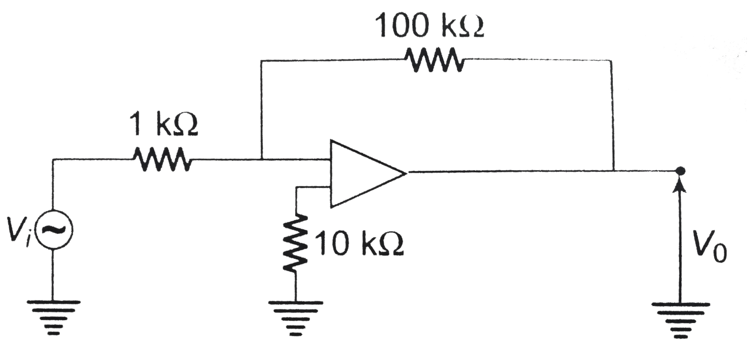
374. The voltage gain of the following amplifier is



A. 10

B. 100

C. 1000

D. 9.9

Answer: B

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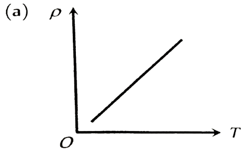
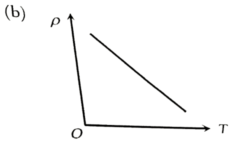
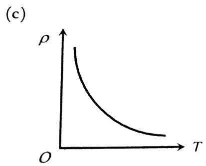
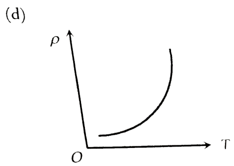
375. The temperature (T) dependence of resistivity (rho) of a semiconductor is represented by :

A. 

B. 

C. 

D. 

Answer: C

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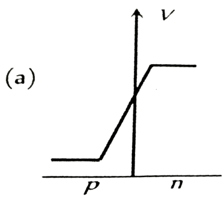
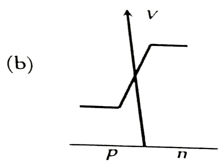
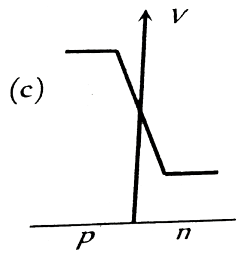
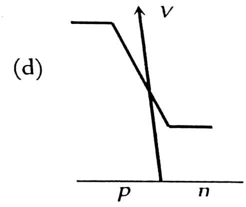
376. In a forward biased PN- junction diode, the potential barrier in the depletion region is of the from...

A. 

B. 

C. 

D. 

Answer: B

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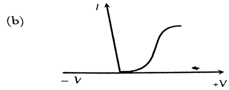
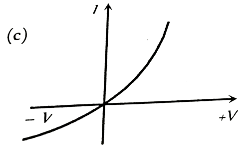
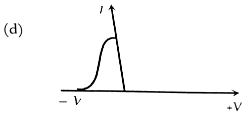
377. Different voltages are applied across a $P-N$ junction and the currents are measured for each value. Which of the following graphs is obtained between voltage and current?

A. 

B. 

C. 

D. 

Answer: C

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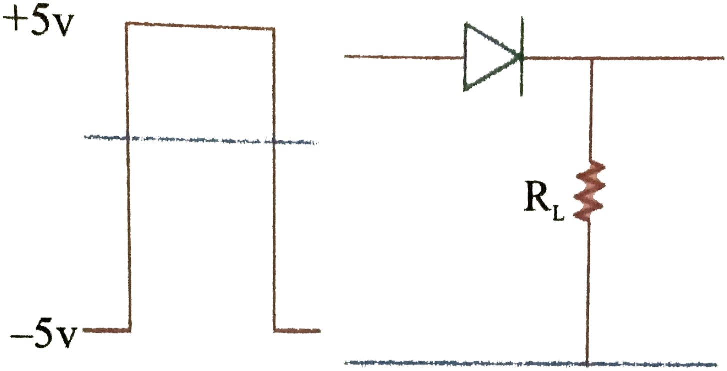
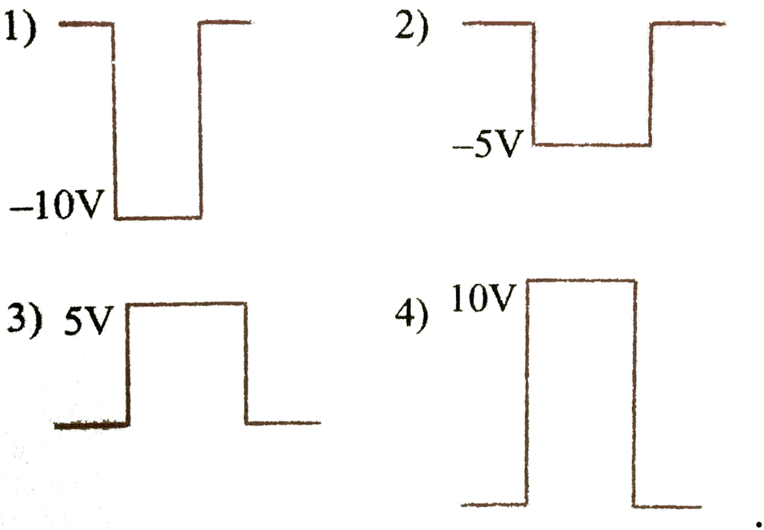
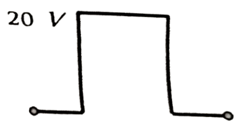
378. If a $p-n$ junction diode, a square input signal of $10V$ is applied as shown.



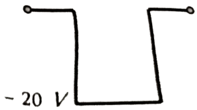
Then the out put signal across R_L will be



A. 

B. 

C. 

D. 

Answer: C

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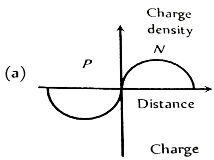
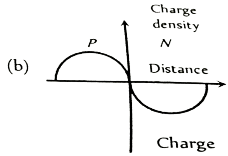
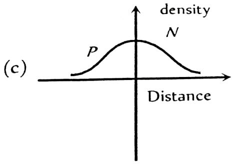
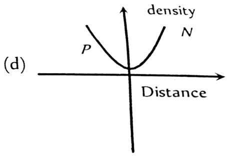
379. The correct curve between potential (V) and distance (d) near $p-n$ junction is.

A. 

B. 

C. 

D. 

Answer: A

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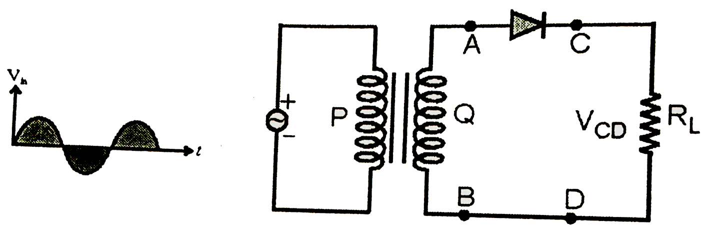
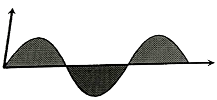
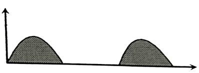
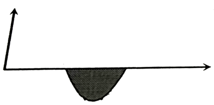
380.

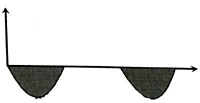


In the half-wave rectifier circuit shown. Which one of the following wave forms in true for V_{CD}, if the input is as shown?

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer: B

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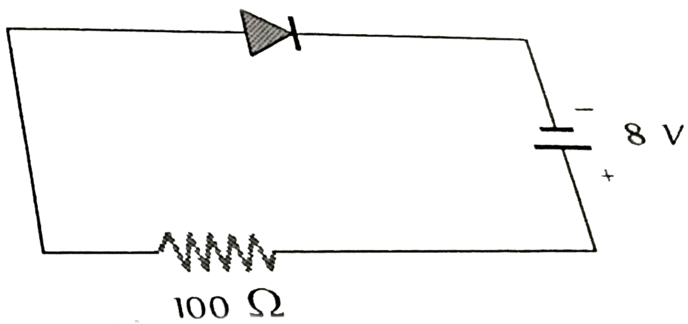
381. A source voltage of 8 V drives the diode in fig. through a current- limiting resistor of 100 ohm . Then the magnitude of the slope load line on the V - I characteristics of the diode is



A. 0.01

B. 100

C. 0.08

D. 12.5

Answer: A

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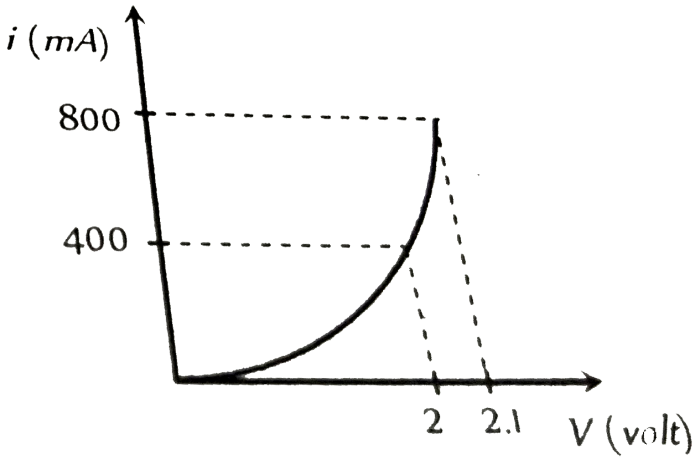
382. The i - V characteristic of a P - N junction diode is shown below. The approximate dynamic resistance of the P - N junction when a forward bias of 2 volt is applied



A. 1Ω

B. 0.25Ω

C. 0.5Ω

D. 5Ω

Answer: B

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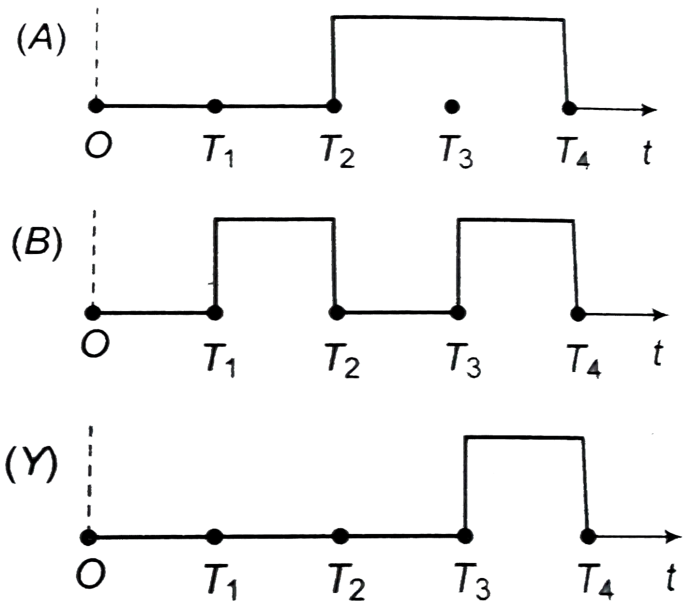
383. The given figure shows the wave forms for two inputs A and B and that for the output Y of a logic circuit.the logic circuit is



A. An AND gate

B. An OR gate

C. A NAND gate

D. An NOT gate

Answer: A

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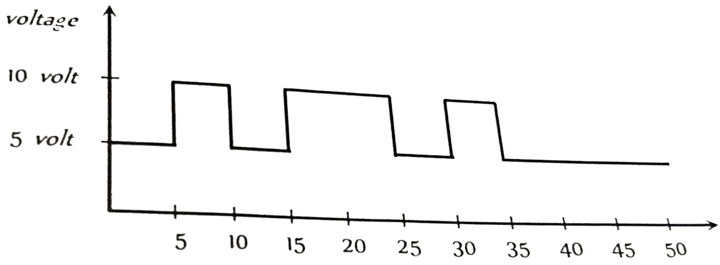
384. In a negative logic the following wave form corresponds to the



A. 0000000000

B. 000

C. 1111111111

D. 1010010111

Answer: D

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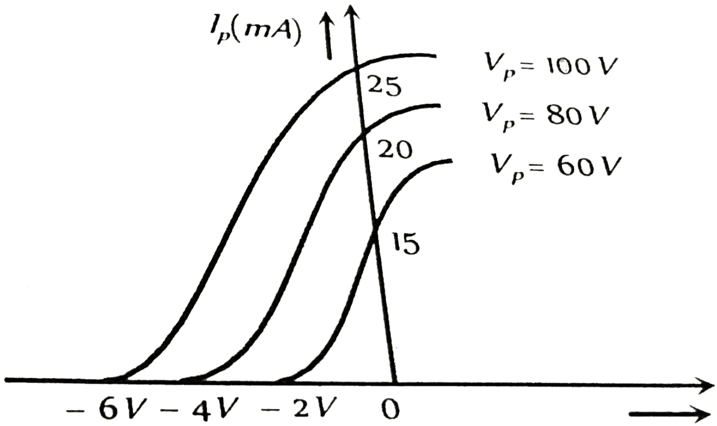
385. The variation of anode current in a triode corresponding to a change in grid potential at three different values of the plate potential is shown in the diagram. The mutual conductance of the triode is



A. $2.5 mmho$

B. $5.0 mmho$

C. $7.5 mmho$

D. $10.0 mmho$

Answer: A

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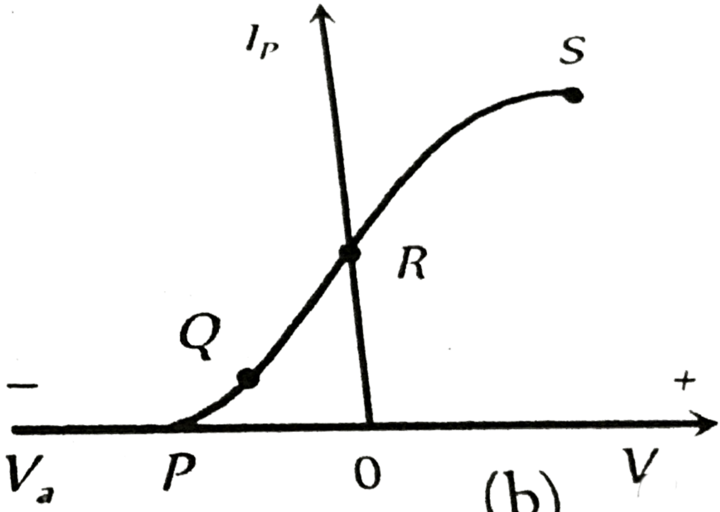
386. The point representing the cut off grid voltage on the mutual characteristic of triode is



(b)

A. S

B. R

C. O

D. P

Answer: D

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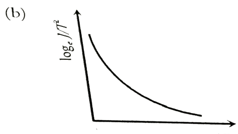
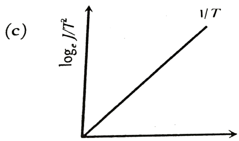
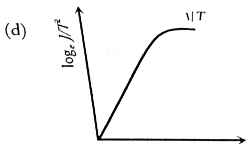
387. If the thermionic current density is J and emitter temperature is T then the curve between $\frac{J}{T^2}$ and $\frac{1}{T}$ will be

A.

B. 

C. 

D. 

Answer: A

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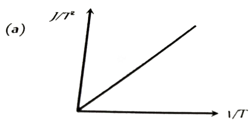
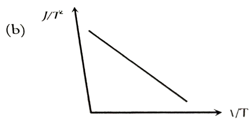
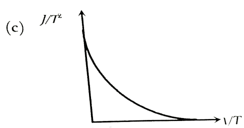
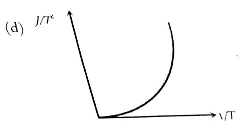
388. If the thermionic current density is J and emitter temperature is T then the curve between $\frac{J}{T^2}$ and $\frac{1}{T}$ will be

A. 

B. 

C. 

D. 

Answer: C

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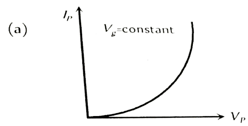
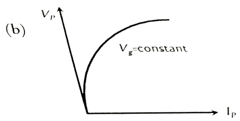
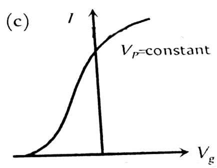
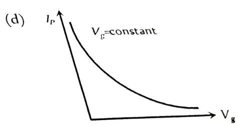
389. The mutual characteristic of triode is

A. 

B. 

C. 

D. 

Answer: C

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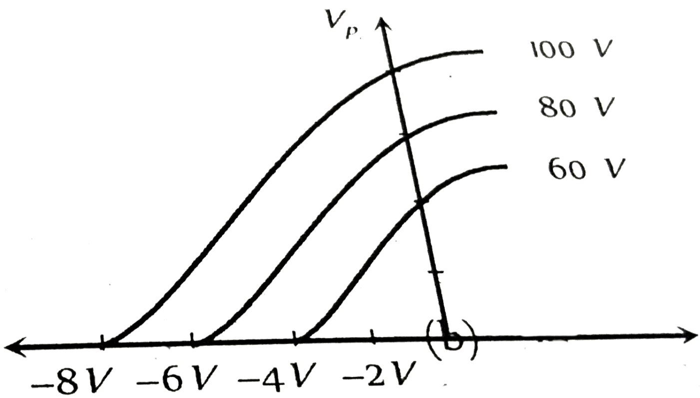
390. The value of amplification factor from the following graph will be



A. 10

B. 50

C. 25

D. 40

Answer: A

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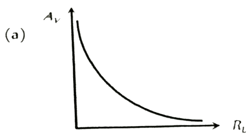
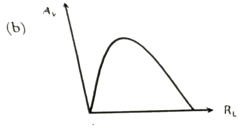
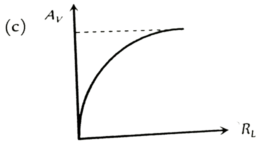
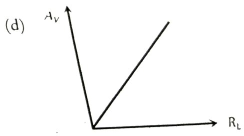
391. The correct curve between voltage gain (A_v) and load resistance (R_L) is

A. 

B. 

C. 

D. 

Answer: C

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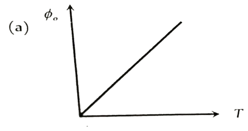
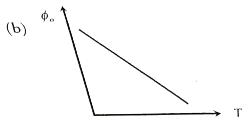
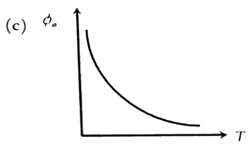
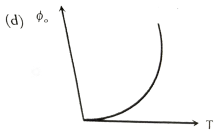
392. The curve between the work function of a metal (ϕ_o) and its temperature (T) will be

A. 

B. 

C. 

D. 

Answer: C

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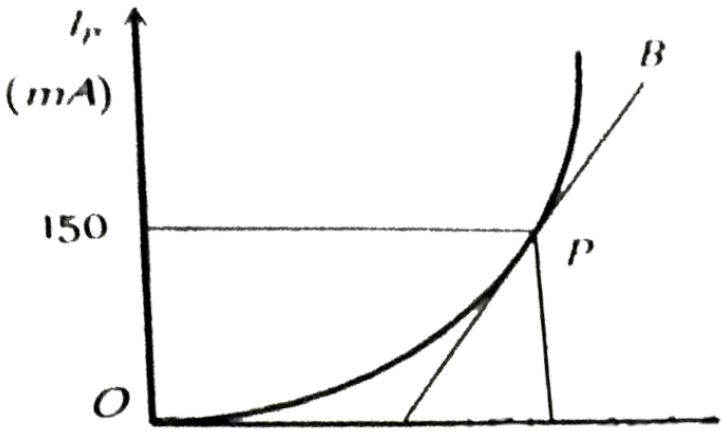
393. The plate characteristic curve of a diode in space charge limited region is as shown in the figure. The slope of curve at point P is 5.0 mA / V . The static plate resistance of diode will be



A. 111.1Ω

B. 222.2Ω

C. 333.3Ω

D. 444.4Ω

Answer: C

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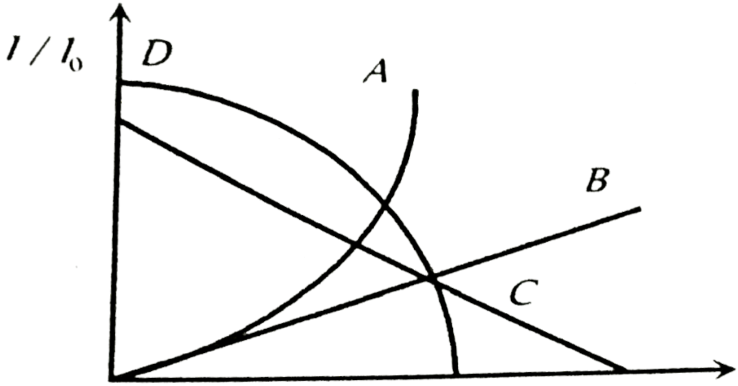
394. The ratio of thermionic currents (I/I_0) for a metal when the temperature is slowly increased T_0 to T as shown in figure. (I and I_0 are currents at T and respectively). Then which one is correct?



A. A

B. B

C. C

D. D

Answer: A

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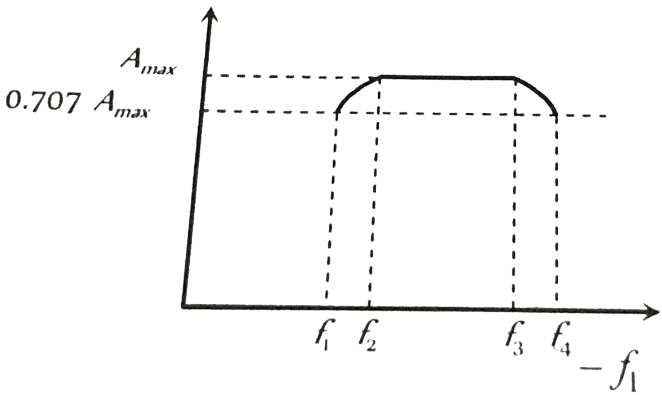
395. The frequency response curve of RC coupled amplifier is shown in figure. The band width of the amplifier will be



A. $f_3 - f_2$

B. $f_4 - f_1$

C. $\dfrac{f_4 - f_2}{2}$

D. $f_3 - f_1$

Answer: B

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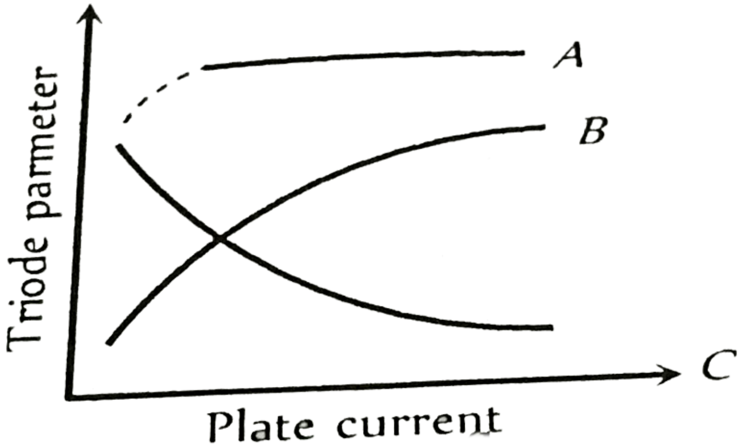
396. The figure represents variation of triode parameter $(\mu$ or r or g_(m)) $withtheplatecurrent. Thec$ or $rectvariationof$ mu and r_(p)` are given, respectively by the curves



A. A and B

B. B and C

C. A and C

D. None of the above

Answer: C

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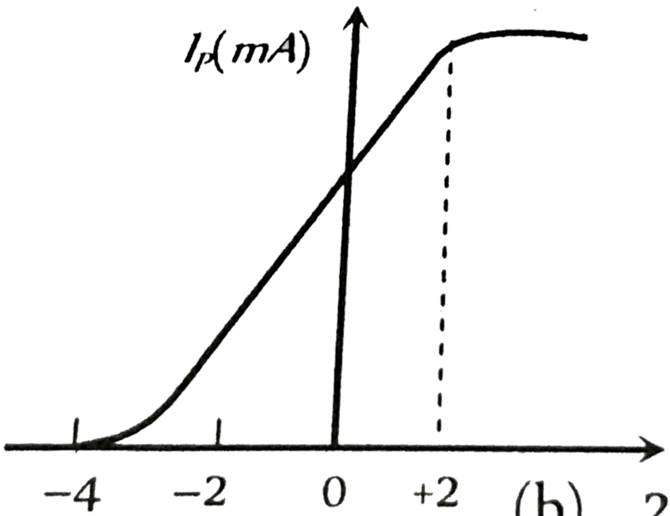
397. The mutual characteristic curves of a triode are as shown in figure. The cut off voltage for the triode is



(b) 2 V

A. $0V$

B. $2V$

C. $-4V$

D. $6V$

Answer: C

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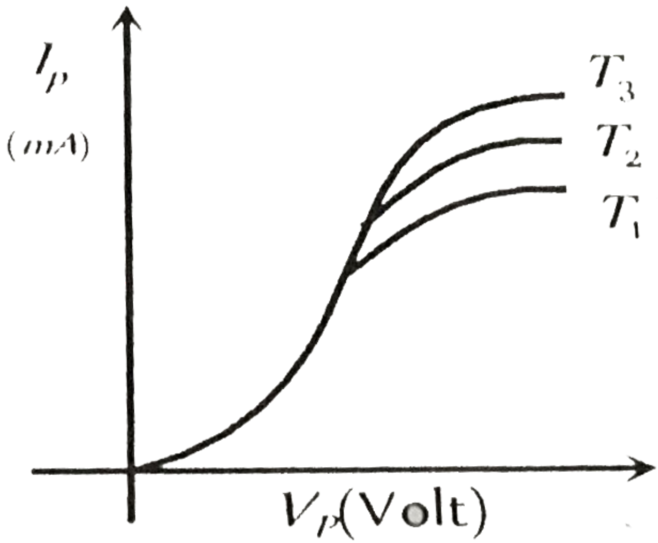
398. For the diode, the characteristic curves are given at different temperature. The relation between the temperatures is



A. $T_1 = T_2 = T_3$

B. $T_1 < T_2 < T_3$

C. $T_1 > T_2 > T_3$

D. None of the above

Answer: B

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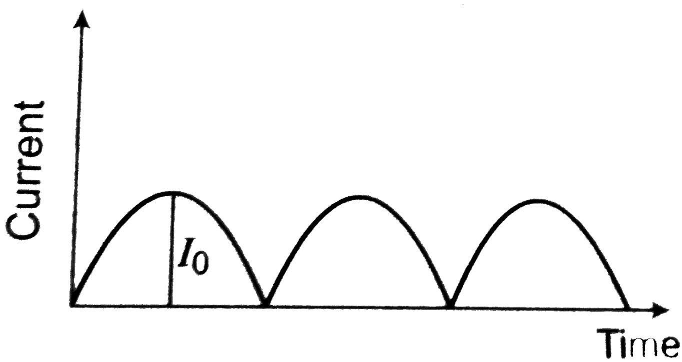
399. The output current versus time curve of a rectifire is shown in the figure. The voltage value of output current in this case is



A. 0

B. i / π

C. $2i / \pi$

D. i_0

Answer: C

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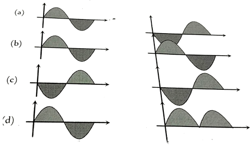
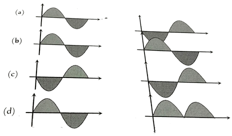
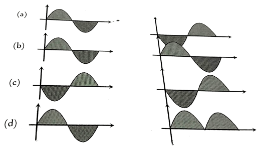
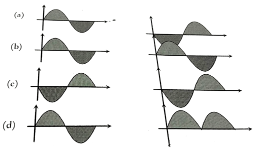
400. Which of the following figures correctly shows the phase relation between the input signal and the output signal of triode amplifier

A. 

B. 

C. 

D. 

Answer: A

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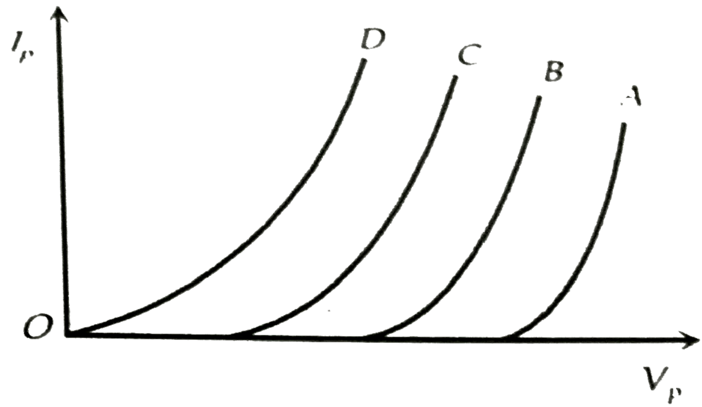
401. In the figure four plate characteristics of a triode at different grid voltage are shown. The difference between successive grid voltage is 1 V . Which curve will have maximum grid voltage and what is its value?



A. $A, V_g = +4V$

B. $B, V_g = +4V$

C. $A, V_g = 0$

D. $D, V_g = 0$

Answer: D

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402. Assertion: The logic gate NOT can be built using diode.

Reason: The output voltage and the input voltage of the diode have 180° phase difference.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

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403. Assertion: The number of electrons in a p-type silicon semiconductor is less than the number of electrons ina pure silicon semiconductor at room temperature.

Reason: It is due to law of mass action.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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404. Assertion : In a common emitter transistor amplifier, the input current is much less than output current.

Reason : The common-emitter transistor amplifier has a very high input impedance.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

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405. Assertion : A transistor amplifier in common emitter configuration has a low input impedence.

Reason : The base to emitter region is forward biased.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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406. Assertion: The resistivity of a semiconductor increases with temperature.

Reason: The atoms of a semiconductor vibrate with larger amplitude at higher temperature therby increasing it resistivity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

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407. Assertion: If the temperature of a semiconductor is increased then its resistance decreases.

Reason: The energy gap between conduction band and valence band is very small

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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408. Statement-1 : The temperature coefficient of resistance is positive for metals and negative for p-type semiconductor.

Statement-2 : The effective charge carriers in metals are negatively charged whereas in p-type semiconductor, they are positively charged

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

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409. Assertion: Electron has higher mobility than hole in a semiconductor.

Reason: Mass of electron is less than the mass of hole.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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410. Assertion : An N-type semiconductor has a large number of electrons but still it is electrically neutral.

Reason: An N-type semiconductor is obtained by doping an intrinsic semiconductor with a pentavelent impurity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

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411. Assertion : The crystalline solids have a sharp melting point.

Reason: All the bonds between the atoms or molecules fo a crystalline solids are equally strong, that they get broken at the same temperature.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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412. Assertion: Silicon is preferred over germanium for making semiconductor devices.

Reason: The energy gap for germanium is more than the energy gap of silicon.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

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413. Assertion: We can measure the potential barrier of a PN junction by putting a sensitive voltmeter across its terminals.

Reason: The current through the PN junction is not same in forward and reversed bias.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

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414. Assertion: Semiconductor do not obey Ohm's law.

Reason: Current is dertemined by the rate of flow of charge carriers.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

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415. Assertion: Two $P-N$ junction diodes placed back to back, will work as a NPN transistor.

Reason: The $P-N$ junction of two PN junction diodes back to back will form the base of NPN transistor.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

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416. Assertion : In transistor common emitter mode as an amplifier is preferred over common base mode.

Reason : In common emitter mode the input signal is connected in series with the voltage applied to the base emitter function.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

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417. Assertion:The dominant mechanism for motion of charge carriers in forward and reverse biased silicon $P-N$ junction are drift in both forward and reverse biase.

Reason: In reverse biasing, no current flow through the junction.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

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418. Assertion: A transistor is a voltage-operating device.

Reason: Base current is greater than the collector current.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

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419. Assertion: $NAND$ or NOR gates are called digital building blocks.

Reason: The repeated use of $NAND$ (or NOR) gates can produce all the basic or complicated gates.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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420. Assertion: At $0K$ germanium is a superconductor.

$Reason: At$0K` germanium offers zero resistance.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

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421. Assertion: Base in transistor is made very thin as compared to collector and emitter regions.

Reason: Due to thin base power gain and voltage gain is obtained by a transistor.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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422. Assertion: The current gain in common base circuit is always less than one.

Reason: At constant collector votalge the change in collector current is more than the change in emitter current.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

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423. Assertion: $V-i$ charcteristic of $P-N$ junction diode is same as that of any other conductor.

Reason: $P-N$ junction diode behaves as conductor at room temperature.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

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424. Assertion: Zener diode works on aa principle of of breakdown voltage.

Reason: Current increases suddenly after breakdown voltage.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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425. Assertion: NOT gate is also called inverter circuit.

Reason: NOT gate inverts the input order.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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426. Assertion: In vacuum tubes (vales), vacuum is necessary for the movement of electrons between electrods otherwise electrons collide with air and loss their energy.

Reason: In semiconductor devices, external heating or vacuum is not required.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

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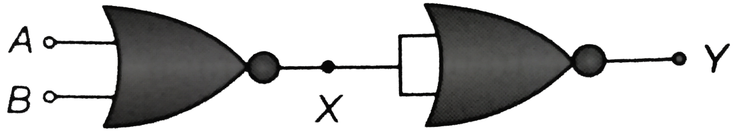
427. Assertion: The following circuit represents $'OR'$ gate



Reason: For the above circuit

$$Y=\overline{X}=\overline{\overline{A+B}}=A+B$$

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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428. Assertion: A $P-N$ photodiode is made from a semiconductor for which $E_g=2.8eV$. This photo diode will not detect the wavelength of $6000nm$.

Reason: A PN photodiode detect wavelength λ if $\frac{hc}{\lambda}>E_g$.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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429. Assertion : 29 is the equivalent decimal number of binary number 11101. Reason : $(mol) = (1 \times 2 + 1 \times 2 + 0 \times 2 + 1 \times 2)$

$= (16 + 8 + 4 + 0 + 1) = (29)$.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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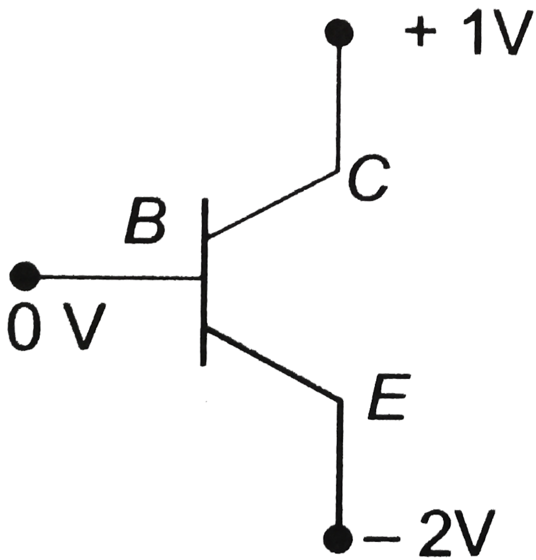
430. Assertion: When PN-junction is forward biased then motion of charge carriers at junction is due to diffusion. In reverse biasing. The cause of motion of charge is drifting.

Reason: In the following circuit emitter is reverse biased and collector is forward biased.



A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

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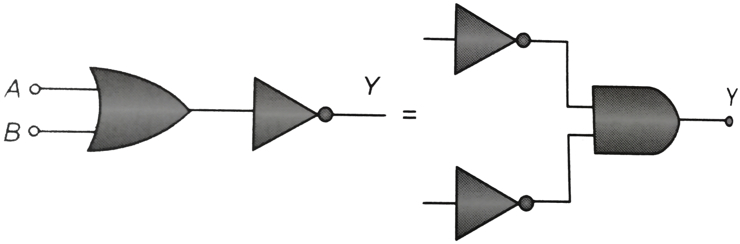
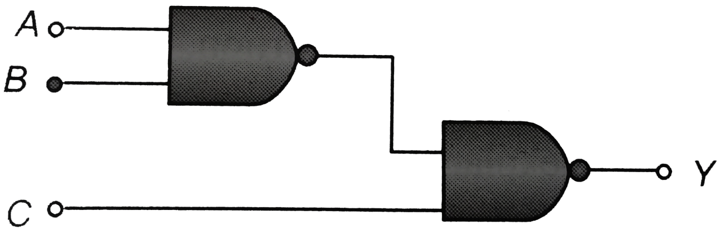
431. Assertion: De Morgan's theoram $\overline{A + B} = \overline{A} . \overline{B}$ may be explained by the following circuit.



Reason: In the following circuit, for output, inputs ABC are 101.



A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

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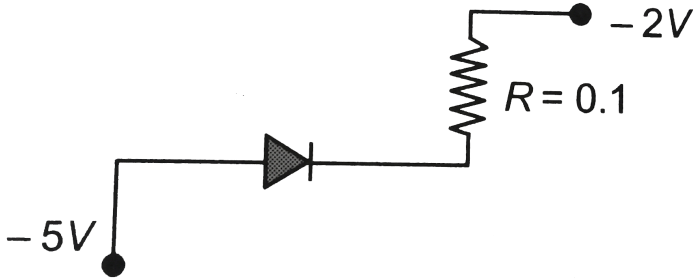
432. Assertion: In the following circuit the potential drop across the resistance is zero.



Reason: The given resistance has low value.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

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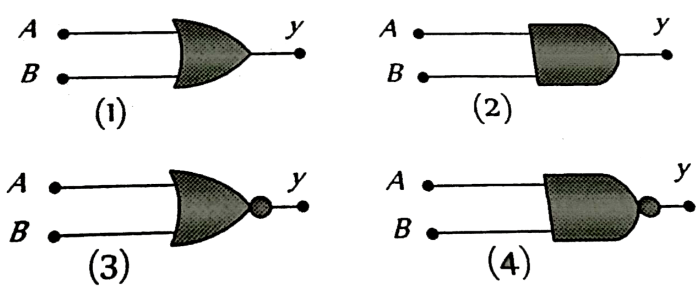
Digital Electronics

1. Given below are four logic gate symbol (figure).

Those for OR, NOR and NAND are respectively



A. $1, 4, 3$

B. $4, 1, 2$

C. $1, 3, 4$

D. $4, 2, 1$

Answer: C

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2. The following truth table corresponds to the logic gate

$$\begin{array}{ccccc} A & 0 & 0 & 1 & 1 \\ B & 0 & 1 & 0 & 1 \\ X & 0 & 1 & 1 & 1 \end{array}$$

A. NAND

B. OR

C. AND

D. XOR

Answer: B

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Valve Electronics (Diode and Triode)

1. In a diode valve, the state of saturation can be obtained easily by

A. High plate voltage and high filament current

B. Low filament current and high plate voltage

C. Low plate voltage and high cathode temperature

D. High filament current and high plate voltage

Answer: B

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2. The amplification factor of a triode is 50. If the grid potential is decreased by $0.20V$, what increase in plate potential will keep the plate current unchanged

A. 5 V

B. 10 V

C. $0.2V$

D. 50 V

Answer: B

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3. The ripple factor in a half wave rectifier is

A. 1.21

B. 0.48

C. 0.6

D. None of these

Answer: A

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Objective Questions

1. The plate current i_p in a triode valve is given $i_p = K(V_p + \mu V_g)^{3/2}$ where i_p is in milliampere and V_p and V_g are in volt. If $r_p = 10^4 ohm$ and $g_m = 5 \times 10^{-3} mho$, then for $i_p = 8mA$ and $V_p = 300$ volt, what of K and grid cur off voltage

A. $-6V, (30)^{3/2}$

B. $-6V,\ (1/30)^{3/2}$

C. $+6V,\ (30)^{3/2}$

D. $+6V,\ (1/30)^{3/2}$

Answer: B

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2. The linear portions of the characteristic curves

of a triode valve give the following readings

V_g(volt)	0	-2	-4	-6
$I_p(mA)$ for $V_p = 150$ volts	15	12.5	10	7.5
$I_p(mA)$ for $V_p = 120$ volts	10	7.5	5	2.5

The plate resistance is

A. 2000 ohms

B. 4000 ohms

C. 8000 ohms

D. 6000 ohms

Answer: D

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3. The relation between dynamic plate resistance (r_p) of a vacuum diode and plate current in the space charge limited region, is

A. $r_p \propto I_p$

B. $r_p \propto I_p^{3/2}$

C. $r_p \propto \frac{1}{I_p}$

D. $r_p \propto \frac{1}{(I_p)^{1/3}}$

Answer: D

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4. The relation between I_p and V_p for a triode is

$I_p = (0.124V_p - 7.5)mA$

Keeping the grid potential constant at 1 V , the value of r_p will be

A. $8k\Omega$

B. $4k\Omega$

C. $2k\Omega$

D. $8k\Omega$

Answer: D

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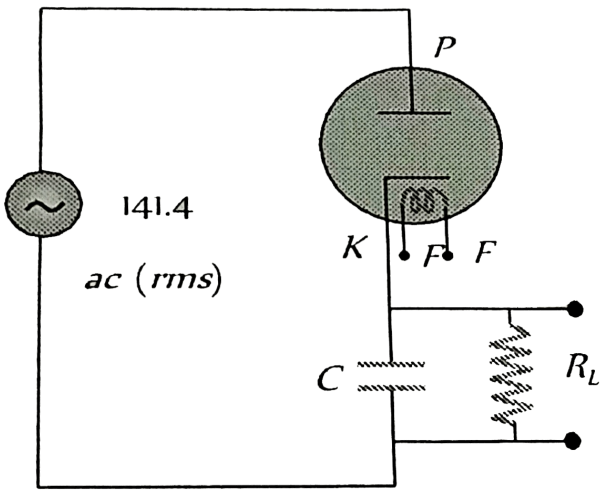
5. An alternating voltage of $141.4V(rms)$ is applied to a vacuum diode as shown in the figure. The maximum potential difference across the condenser will be



A. 100 V

B. 200 V

C. $100\sqrt{2}V$

D. $200\sqrt{2}V$

Answer: B

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6. A metallic surface with work function of 2 eV , on heating to a temperature of 800 K gives an emission current of 1 mA . If another metallic surface having the same surface area, same emission constant but work function 4 eV is heated to a temperature of 1600 K, then the emission current will be

A. 1 mA

B. 2 mA

C. 4 mA

D. None of these

Answer: C

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7. A change of $0.8mA$ in the anode current of a triode occurs when the anode potential is changed by 0 V. If $\mu = 8$ for the triode, then what change in the grid voltage would be required to produce a change of 4 mA in the anode current

A. $6.25V$

B. $0.16V$

C. $15.2V$

D. None of these

Answer: A

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8. The plate current in a triode is given by

$I_p = 0.004(V_p + 10V_g)^{3/2} mA$

where I_p, V_p and V_g are the values of plate current, plate voltage and grid voltage, respectively. What are the triode parameters μr_p and g_m for the operating point at volt $V_p = 120$ volt and $V_g = -2$ volt ?

A. $10, 16.7 kOmeg, 0.6 mmho$

B. $15,\ 16.7k\Omega,\ 0.06mmho$

C. $20,\ 6k\Omega,\ 16.7mmho$

D. None of these

Answer: A

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9. A triode whose mutual conductance is 2.5 m A / volt and anode resistance is 20 kilo ohm , is used as an amplifier whose amplification is 10. The resistance connected in plate circuit will be

A. $1k\Omega$

B. $5k\Omega$

C. $10k\Omega$

D. $20k\Omega$

Answer: B

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10. In the grid circuit of a triode a signal $E = 2\sqrt{2}\cos\omega t$ is applied. If $\mu = 14$ and

$r_p = 10k\Omega$ then root mean square current flowing through $R_L = 12k\Omega$ will be

A. $1.27mA$

B. 10 mA

C. $1.5mA$

D. $12.4mA$

Answer: A

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11. On applying a potential of – 1 volt at the grid of a triode, the following relation between plate voltage V_p (volt) and plate current I_p (in mA) is found

$I_p = 0.125V_p - 7.5$

If on applying – 3 volt potential at grid and 300 V potential at plate, the plate current is found to be 5 mA , then amplification factor of the triode is

A. 100

B. 50

C. 30

D. 20

Answer: A

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12. The slopes of anode and mutual characteristics of a triode are $0.02 mAV^{-1}$ and $1 mAV^{-1}$ respectively. What is the amplification factor of the valve

A. 5

B. 50

C. 500

D. 0.5

Answer: B

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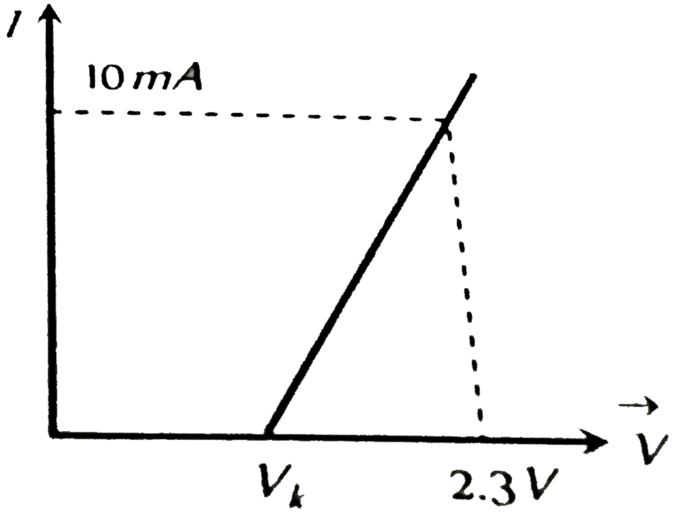
Graphical Questions

1. The resistance of a germanium junction diode whose $V - I$ is shown in figure is $(V_k = 0.3V)$



A. $5k\Omega$

B. $0.2k\Omega$

C. $2.3k\Omega$

D. $\left(\frac{10}{2.3}\right)k\Omega$

Answer: B

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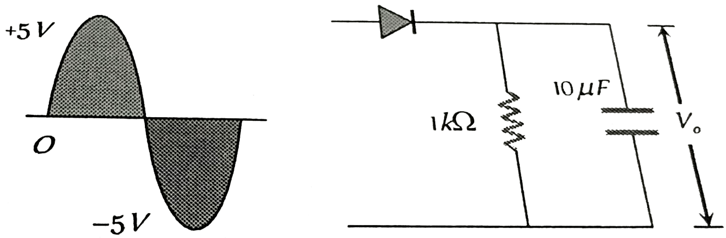
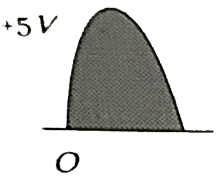
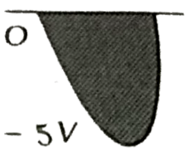
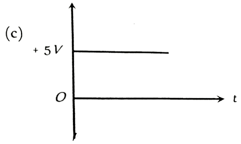
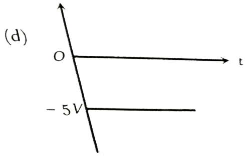
2. The output in the circuit of figure is taken across a capacitor. It is as shown in figure



A. 

B. 

C. 

D. 

Answer: C

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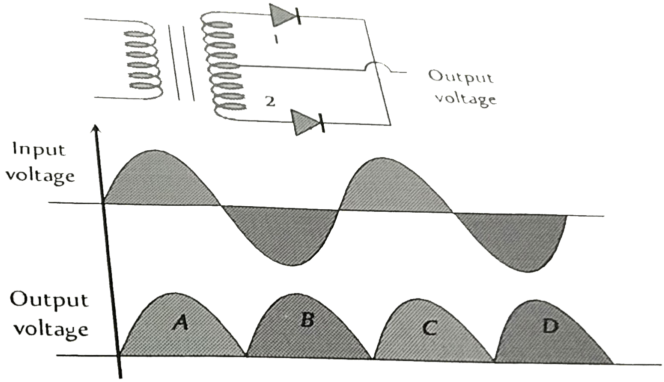
3. A full wave rectifier circuit along with the input and output voltages is shown in the figure



The contribution to output voltage from diode – 2 is

A. A,C

B. B,D

C. B,C

D. A,D

Answer: B

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Selv Evaluation Test

1. In a pure silicon $\left(n_i = 10^{16} / m^3\right)$ crystal at $300K$, 10^{21} atoms of phosphorus are added per cubic meter. The new hole concentration will be

A. $10^{21} perm^3$

B. $10^{19} perm^3$

C. $10^{11} perm^3$

D. $10^5 perm^3$

Answer: C

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2. In the Boolean algebra $\overline{A} . \overline{B}$ equals is :-

A. $\overline{A + B}$

B. A

C. $\overline{A . B}$

D. $A + B$

Answer: B

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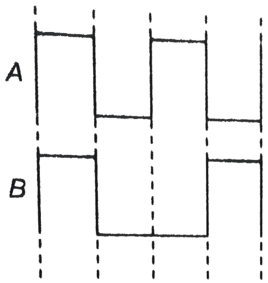
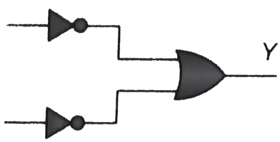
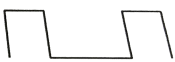
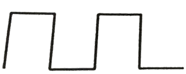
3. In the given circuit as shown the two input waveform A and B are applied simultaneously. The resultant waveform Y is



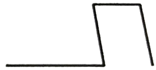


A. (a) 

B. (b) 

C. (c) 

D. (d)



Answer: A

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4. Two identical capacitors A and B are charged to the same potential V and are connected in two circuits at t=0 as shown in figure.The charges on the capacitor at a time $t = CR$ are, respectively,

- VC, VC

- $\frac{VC}{e}, VC$
- $VC, \frac{VC}{e}$
- $\frac{VC}{e}, \frac{VC}{e}$

Answer: B

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5. In transistor, forward bias is always smaller than the reverse bias. The correct reason is

A. To avoid excessive heating of transistor

B. To maintain a constant base current

C. To produce large voltage gain

D. None of these

Answer: A

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6. In NPN transistor, if doping in base region is increased then collector current

A. Increases

B. Decreases

C. Remain same

D. None of these

Answer: B

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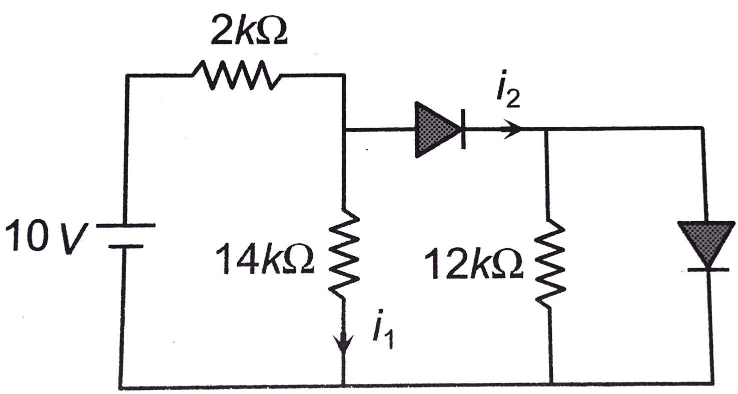
7. In the following circuit I_1 and I_2 are respectively



A. $0, 0$

B. $5mA, 5mA$

C. $5mA, 0$

D. $0, 5mA$

Answer: D

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8. In space charge limited region, the plate current in a diode is 10 mA for plate voltage 150 V . If the plate voltage is increased to 600 V , then the plate current will be

A. 10 mA

B. 40 mA

C. 80 mA

D. 160 mA

Answer: C

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9. A triode has a plate resistance of $10k\Omega$ and amplification factor 24. If the input signal voltage is 0.4 V (r.m.s.), and the load resistance is 10 k ohm , then, the output voltage (r.m.s.) is

A. $4.8V$

B. $9.6V$

C. $12.0V$

D. None of these

Answer: A

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10. Pure sodium (Na) is a good conductor of electricity because the $3s$ and $3p$ atomic bands overlap to from a partially filled conduction band. By contrast the ionic sodium chloride $(NaCl)$ crystal is

A. Insulator

B. Conductor

C. Semiconductor

D. None of these

Answer: A

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11. Would there be any advantage to adding n-type or p-type impurities to copper

A. Yes

B. No

C. May be

D. Information is insufficient

Answer: B

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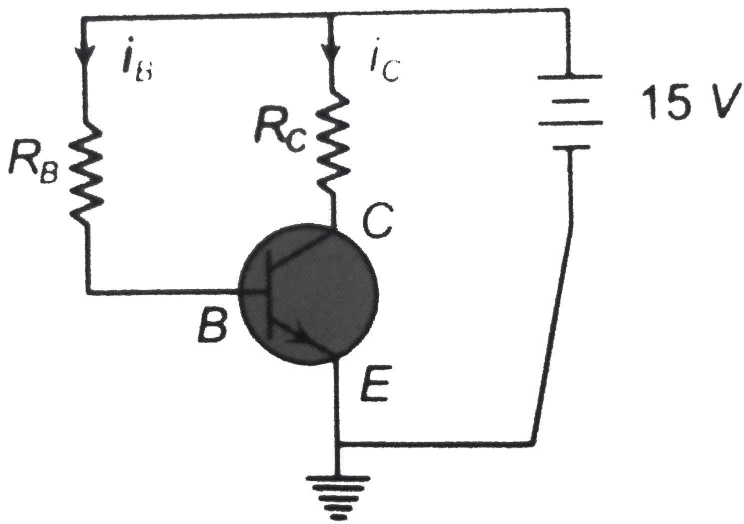
12. In the following common emitter circuit if

$\beta = 100, V_{CE} = 7V, V_{BE}$=Negligible, $R_C = 2k\Omega$

then $I_B = ?$



A. $0.01mA$

B. $0.04mA$

C. $0.02mA$

D. $0.03mA$

Answer: B

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13. When a battery is connected to a P-type semiconductor with a metallic wire, the current in the semiconductor (predominantly), inside the metallic wire and that inside the bettery respectively due to

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14. Is the ionisation energy of an isolated free atom different from the ionisation energy E_g for the atoms in a crystalline lattice

A. Yes

B. No

C. May be

D. None of these

Answer: A

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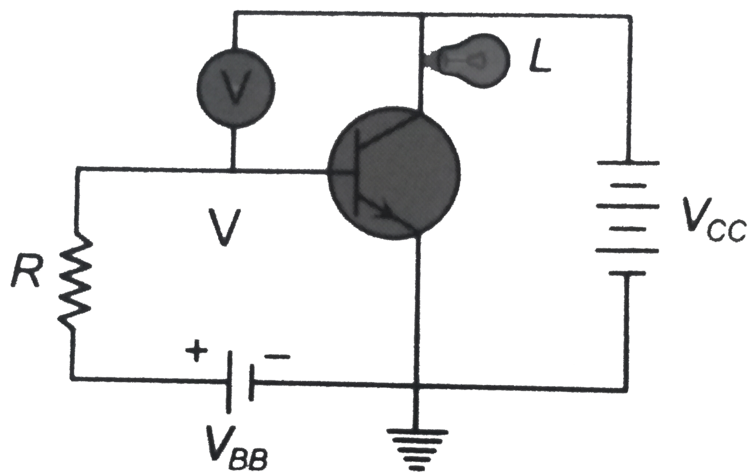
15. In the following circuit, a voltmeter V is connected across a lamp L. What change would occure in voltmeter reading if the resistance R is reduced in value?



A. Increases

B. Decreases

C. Remains same

D. None of these

Answer: A

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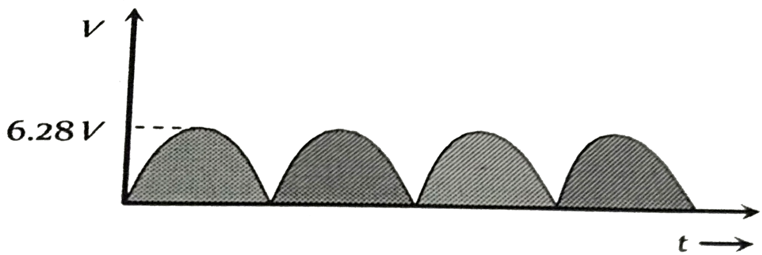
16. For given electric voltage signal dc value is



A. $6.28V$

B. $3.14V$

C. $4V$

D. $0V$

Answer: C

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17. When a silicon PN junction is in forwards biased condition with series resistance, it has knee voltage of $0.6V$. Current flow in it is $5mA$, when PN junction is connected with $2.6V$ battery, the value of series resistance is

A. 100Ω

B. 200Ω

C. 400Ω

D. 500Ω

Answer: C

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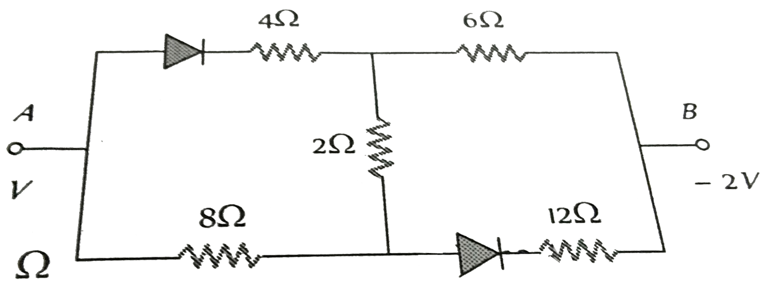
18. In the following circuit the equivalent resistance between A and B is



A. $\frac{20}{3}\Omega$

B. 10Ω

C. 16Ω

D. 20Ω

Answer: C

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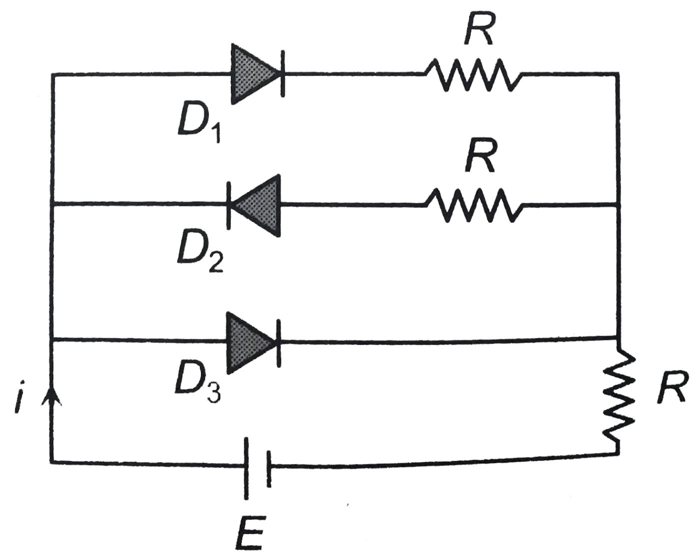
19. In the following circuit of PN junction diodes D_1, D_2 and D_3 are ideal then i is



A. E/R

B. E/2 R

C. 2E/3R

D. Zero

Answer: A

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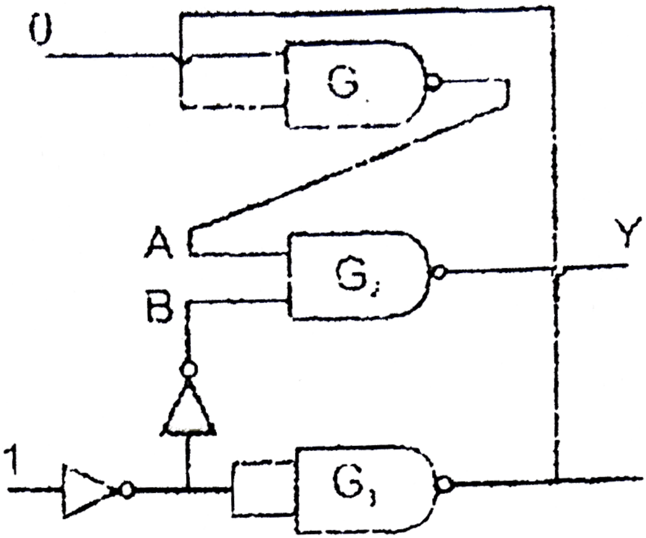
20.



In circuit in following figure the value of Y is-

A. 0

B. 1

C. Fluctuates between 0 and 1

D. Indeterminate as the circuit can’t be realised

Answer: A

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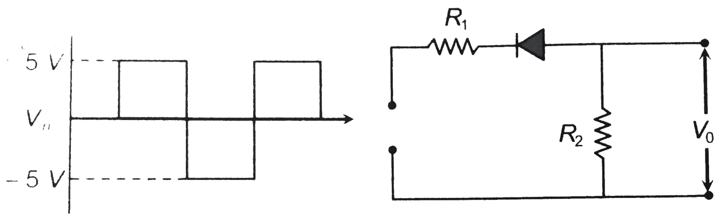
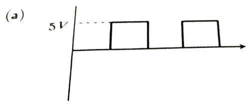
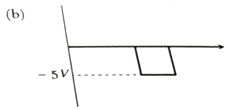
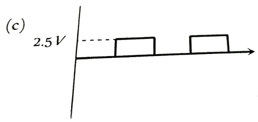
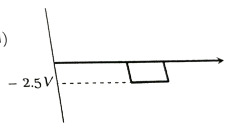
21. A waveform shown when applied to the following circuit will produce which of the following output waveform? [Assuming ideal diode configuration and $R_1 = R_2$]



A. 

B. 

C. 

D. 

Answer: D

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22. In a triode, cathode, grid and plate are at 0, –2 and 80 V respectively. The electrons is emitted from the cathode with energy 3 eV . The energy of the electron reaching the plate is

A. 77 eV

B. 85 eV

C. 81 eV

D. 83 eV

Answer: D

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23. The energy gap of silicon is $1.5eV$. At what wavelength the silicon will stop to absorb the photon

A. 8250Å

B. 7259Å

C. 6875.5Å

D. 5000Å

Answer: A

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