**1. Fermi energy level**

(a) is the top most filled energy level at 0K temperature

(b) is the top most filled energy level at 00C temperature

(c) separates valance band and conduction band

(d) none of the above

**Ans:** a and c

**2. Which of the following is true regarding the position of Fermi level?**

(a) lies exactly in the middle between the bottom of the conduction band

and top of the valance band in an intrinsic semiconductor

(b) nearer to the conduction band in N-type semiconductor

(c) nearer to the valance band in P-type semiconductor

(d) all the above.

**Ans:**d

**3. Fermi-Dirac statistics explains**

(a) how electrons are distributed among different energy levels

(b) the probability of an energy level to be occupied by electrons

(c) the probability of an energy level to be occupied by quantum mechanical particles

(d) how quantum mechanical particles are distributed in different energy

level.

**Ans:**All are correct

**4. Fermi-Dirac (FD) statistics governs**

(a) fermions

(b) free electrons

(c) gas molecules

(d) All the above

**Ans:**a and b

**5. In free electron gas theory, electrons**

(a) can move anywhere inside the metal.

(b) are considered as a gas.

(c) pairs with holes and become neutral.

(d) All the above.

**Ans:**a and b

**6. Which of the following can be explained by using free electron theory**

(a) copper

(b) Gold

(c) Silver

(d) Sodium

**Ans:**All are correct since all are metals which contain free electrons

**7. Free electron theory gas is applicable to**

(a) metals

(b) gas

(c) solids

(d) all the above.

**Ans:**a and c. a is a more accurate answer

**8. Free electron gas theory assumes**

(a) electrons are free from Coulomb force

(b) the Coulomb force of repulsion is negligible.

(c) Electrons are free to move anywhere.

(d) All the above.

**Ans:**b. Electrons are free to move inside the metal only

**9. For a semiconductor-based light source, it should be a**

(a) direct bandgap semiconductor

(b) indirect direct bandgap semiconductor

(c) either direct bandgap or indirect bandgap

(d) the semiconductor can not be used as a light source

**Ans:**a

**10. In an indirect bandgap semiconductor, a transition between conduction**

**band and valance band results in**

(a) heat

(b) light

(c) both

(d) none of the above.

**Ans:**a

**11. In a direct bandgap semiconductor**

(a) The two points of intersection of a vertical line with the E-K curve of

both valance band and conduction band are at the same momentum.

(b) The two points of intersection of a vertical line with the E-K curve of both

valance band and conduction band are having the same wave vector.

(c) The K value of the lowest point of the conduction band is equal to the K

value of highest point of valance band.

(d) The transitions of electrons take place directly.

**Ans:**All are correct.

**12. Which of the following is true?**

(a) In an indirect bandgap semiconductor, emission of photons is not

possible

(b) In a direct bandgap semiconductor emission of both light and heat

is possible.

**Ans:**b. Option a is not true. The emission of photons is possible with less probability.

**13. In an indirect bandgap semiconductor, emission of light does not occur**

because of the fact that

(a) momentum is not conserved in case of direct transition

(b) electrons are trapped in defects before making the transition.

**Ans:**a and b

**14. Which of the following is an indirect bandgap semiconductor?**

(a) silica

(b) germanium

(c) carbon

(d) all the above.

**Ans:**d

**15. Which of the following is a radiative semiconductor**

(a) Silica

(b) Gallium Arsenide

(c) Germanium

(d) None of the above

**Ans:**b. The radiative semiconductor is the one that emits light.

**16. Diffusion current occurs due to**

(a) charge density gradient

(b) electric field

(c) nonuniform distribution of electron and holes

(d) all the above

**Ans:**  a and c. option b is drift current.

**17. The shape of E-K diagram of the conduction band and valance band is**

(a) horizontal

(b) vertical

(c) parabolic

(d) none of the above.

**Ans:**c

**18. The curvature of E-K diagram**

(a) is higher in conduction band than valance band

(b) is lower in valence band than the conduction band

(c) is negative in the conduction band

(d) b and c

**Ans:**a and b. Curvature is negative in the valance band.

**19. The symbol K in Fermi energy represents**

(a) Maxwell-Boltzmann constant

(b) Boltzmann constant

(c) Wave vector

(d) None of the above.

**Ans:**b. K is a wave vector or propagation constant in the wave function.

**20. Hertz is the unit of**

(a) frequency of ultrasound

(b) frequency of AC

(c) frequency of waves

(d) all the above.

**Ans:** d

**21. The effective mass of a charge carrier**

(a) is directly proportional to the curvature of E-K curve

(b) is inversely proportional to the curvature of E-K curve

(c) is positive near the bottom of the conduction band

(d) is negative near the top of the valance band

**Ans:**b, c, d. The effective mass may be positive or negative according to the sign of curvature. The curvature may be positive or negative in both the conduction band and the valance band.

**22. Electronic bands are formed due to**

(a) split-up of energy levels

(b) to satisfy Pauli’s exclusion principle

(c) The shift in energy levels

(d) All the above

**Ans:**a and b

**23. An electronic band is**

(a) Any range of energy levels

(b) Energy levels where free electrons exist

(c) A range of energy level is characterized by the existence of

electrons.

(d) All the above.

**Ans:**c

**24. The interaction of different atoms leads to the formation of**

(a) electronic band

(b) electronic bond

(c) none of the above

(d) all the above

**Ans:**a and b

**25. A forbidden band**

(a) is the one where electrons are forbidden

(b) is the one where energy is forbidden

(c) is not there in between the conduction and valence band in conductors

(d) all the above.

**Ans:**a and c

**26. Current flow is in the direction of**

(a) electric field

(b) opposite to the flow of electrons

(c) flow of holes

(d) all the above.

**Ans:**d

**27. Dopant for N-type semiconductor**

(a) should be a pentavalent impurity

(b) should be a trivalent impurity

(c) either a or b

(d) depends on the number of valance electrons in the host atom

**Ans:**a

**28. Hall voltage is developed due to the**

(a) change in the magnetic field

(b) change in the electric field

(c) polarization of charges

(d) none of the above.

**Ans:** c

**29. In the Hall effect, electrons experience**

(a) electrostatic force

(b) magnetic force

(c) Lorentz force

(d) all the above

**Ans:**c

**30. The force acting on moving electrons due to a perpendicular magnetic**

the field is in the direction

(a) parallel to the magnetic field

(b) perpendicular to the magnetic field and parallel to the direction of electrons

(c) perpendicular to the direction of electrons and parallel to the magnetic field

(d) Opposite to the magnetic field.

**Ans:**All are wrong. Perpendicular to both electric and magnetic field

**31. For constructive interference**

(a) The phase difference should be constant

(b) The phase difference should be zero

(c) The two waves should be out of phase

(d) None of the above

**Ans:**b. c is the condition of destructive interference

**32. Interference is**

(a) the addition of two waves

(b) superimposition of two waves

(c) disturbance of a wave using another wave.

(d) All the above.

**Ans:**d

**33. Which of the following method is used to produce the sound of frequency more**

**than 20 kHz?**

(a) Magnetostriction method

(b) Piezo-electric method

(c) Inverse piezo-electric method

(d) Ultrasonic interferometer

**Ans:**a and c. The ultrasonic interferometer is not a method but an instrument. Moreover, its main objective is not to generate ultrasonic waves though generation of ultrasonic waves is a part of it.

**34. In the magnetostriction method, a ferromagnet substance changes its shape**

**and size when placed in a**

(a) magnetic field

(b) alternating current

(c) electric field

(d) all the above

**Ans:**a and b

**35. Which of the following is true?**

(a) In the magnetostriction method, magnetic dipoles make orientation according to the magnetic field.

(b) In the piezoelectric method, electric dipoles align towards electric field.

(c) In the piezoelectric effect, an electric field produces mechanical vibrations.

(d) In the inverse piezoelectric method, mechanical pressure produces an electric field.

**Ans:**a and b

**36. In magnetostriction method of ultrasonic sound production**

(a) a magnetic rod is used

(b) a magnetic cube is used

(c) a dielectric rod is used

(d) a conducting rod is used.

**Ans:** a

**37. In the magnetostriction method**

(a) an electric field should be perpendicular to the magnetic rod.

(b) a magnetic field should be perpendicular to the magnetic rod.

(c) a magnetic field should be parallel to the magnetic rod.

(d) none of the above.

**Ans:**c

**38. A device which is used to convert electrical energy into ultrasonic sound**

**and vice-versa is called**

(a) Ultrasonic interferometer

(b) Ultrasonic transducer

(c) Piezoelectric device

(d) All the above.

**Ans:**d. (a is not more accurate)

**39. Which of the following uses ultrasonic sound waves?**

(a) anemometer

(b) SONAR

(c) Ultrasonography

(d) Non-destructive testing

(e) All the above.

**Ans:**e

**40. Absorption of ultrasonic waves results in the emission of**

(a) light

(b) heat

(c) both light and heat

(d) electrical energy

**Ans:**b

**41. Dispersion of ultrasonic waves occurs due to**

(a) wavelength dependent variation of refractive index

(b) variation of density in the medium

(c) prism

(d) all the above

**Ans:** b

**42. Which of the following method is used to detect ultrasonic waves?**

(a) Piezoelectric method

(b) Sensitive tube method

(c) Kundt’s tube method

(d) all the above.

**Ans:**a and c, sensitive flame method

**43. In sensitive flame method,**

(a) a flame is produced by ultrasonic sound.

(b) a flame is used to produce ultrasonic sound

(c) a flame is used to detect ultrasonic sound

(d) all the above.

**Ans:**c

**44. A sensitive flame can be used to detect ultrasonic waves because**

(a) it is sensitive to mechanical pressure

(b) it is sensitive to density variation

(c) a and b

(d) none of the above

**Ans:**c

**45. In sensitive flame method,**

(a) the flame is on during the node of the sound wave

(b) the flame is off during the anti-node of the sound wave

(c) the flame is off during the node of the sound wave

(d) the flame is on during the anti-node of the sound wave.

**Ans:**a and b

**46. In Kundt’s tube method,**

(a) talcum powder is used

(b) a vertical glass tube is used

(c) Lycopodium powder can be used

(d) All are correct.

**Ans:**  a and c. Horizontal glass tube is used.

**47. In Kundt’s tube method,**

(a) particle in powder makes displacement according to the pressure of

sound waves

(b) The displacement is maximum at the antinode of the sound waves.

(c) The displacement is in the horizontal direction

(d) The displacement is maximum at the node of the wave

**Ans:**  a and b. displacement is in the vertical direction to the propagation of sound wave.

**48. The density of states gives**

(a) The number of unoccupied energy states in a given interval of energy.

(b) The number of energy levels in a given interval of energy.

(c) The number of occupied energy levels in a given interval of energy

(d) none of the above.

**Ans:**a

**49. The current produced due to an externally applied potential is called**

(a) drift current

(b) diffusion current

(c) eddy current

(d) All the above

**Ans:**a

**50. Which of the following phenomenon could not be explained by classical**

**mechanics?**

(a) Photoelectric effect

(b) Black body radiation

(c) Specific heat of solids

(d) All the above

**Ans:**d

**51. Classical mechanics fails because**

(a) it is based on macroscopic observations

(b) it does not fail

(c) it considers physical quantities as continuous variables

(d) none of the above

**Ans:**a and c

**52. The photoelectric effect can be explained by quantum mechanics by**

(a) by observing the phenomenon using a microscope

(b) assuming emission and absorption taking place in a discreet manner.

(c) using wave theory

(d) all the above

**Ans:**b and c

**53. Which of the following phenomenon asserts light can have particle nature?**

(a) Compton effect

(b) Photoelectric effect

(c) Black body radiation

(d) All the above

**Ans:**d

**54. Which of the following phenomenon asserts particles can have wave properties?**

(a) Interference of light

(b) interference of electrons

(c) both (a) and (b)

**Ans:**b

**55. Which of the following exhibits dual characters?**

(a) light waves

(b) sound waves

(c) particles

(d) air

**Ans:**a, b, c (Sound waves can behave like particles called phonons.)

**56. What are the conditions for a physical entity to be eligible for the particle?**

(a) it should have momentum

(b) it should have mass

(c) any one of its variables should be discreet.

(d) all the above.

**Ans:**d

**57. De-Broglie’s wavelength is applicable to**

(a) electrons

(b) photons

(c) matter waves

(d) All the above

**Ans:**a

**58. Which of the following is a function of temperature?**

(a) Fermi level

(b) Density of states

(c) No of free electrons

(d) All the above.

**Ans:**b and c

**59. In P-type semiconductor which of the following is (are) charge careers?**

(a) holes

(b) electrons

(c) ions

(d) all the above.

**Ans:**d

**60. An intrinsic semiconductor is**

(a) free electron free

(b) defect free

(c) dopant free

(d) all the above.