18PYB103J Semiconductor Physics CT 1 Question Paper

* Required

Answer ALL the questions 25 x 1 = 25 Marks

1. The average distance travelled by an electron between two successive collisions in the presence of applied field is called --------- *

- (A) Collision time
- (B) Mean free path
- (C) Wavenumber
- (D) Drift velocity

2. When an electron in a periodic potential is accelerated relative to the lattice in an electric field or magnetic field, then the mass of the electron is called the ---------- *

- (A) Rest mass
- (B) Effective mass
- (C) Zero mass
- (D) Accelerated mass

3. The motion of electron in an periodic potential is explained by *

- (A) Drude model
- (B) Lorentz model
- (C) Drude – Lorentz model
- (D) Kronig Penny Model

4. Most Commonly used semiconductor material is ---------- *

- (A) Silicon
- (B) Copper
- (C) Mixture of silicon and copper
- (D) Aresenic

5. To calculate the probability that an energy state above EF is occupied by an electron (T = 300 K, E-EF = 3kT) *

- (A) 5.2 %
- (B) 7.6 %
- (C) 4.74 %
- (D) 6.4 %

6. At low temperatures, the semiconductors will behave as *

- (A) Conductors
- (B) Insulators
- (C) Ferroelectrics
- (D) Superconductors

7. The quantum of energy in elastic wave is known as *

- (A) Photon
- (B) Phonon
- (C) Electron
- (D) Magnon

8. In real crystal at positive ion site, the potential of electrons will become *

- (A) Zero
- (B) 1
- (C) 2
- (D) 3

9. What happens to the free electrons when electric field is applied? *

- (A) They move randomly and collide with each other
- (B) They move in the direction of the field
- (C) They remain stable
- (D) They move in the direction opposite to that of the field

10. Outer most shell of atom with highest energy level is known as *

- (A) 1st shell
- (B) 2nd shell
- (C) Valence shell
- (D) hole shell

11. Which of the following theories can be adopted to rectify the drawbacks of classical theory? *

- (A) Compton theory
- (B) Quantum theory
- (C) Band theory
- (D) Electron theory

12. How are charge carriers produced in intrinsic semiconductors? *

- (A) By pure atoms
- (B) By electrons
- (C) By impure atoms
- (D) By holes

13. When temperature increases in the intrinsic semiconductor, which results in increase of---------- *

- (A) Resistivity
- (B) Conductivity
- (C) Capacitivity
- (D) Non conductivity

14. An electron moving in periodic potential, allowed energy levels ---------- with increase of wavevector (k) *

- (A) Decreases
- (B) Increases
- (C) Remain constant
- (D) Contineous

15. The first Brillouin zone is defined between the region *

- (A) k = 0 to π/a
- (B) k = - 2 π /a to π/a
- (C) k = - π/a to 2π/a
- (D) k = - π/a to π/a

16. In semiconductors at low temperatures, the valence band will be *

- (A) Completely filled by an electron
- (B) Empty
- (C) Partially filled by an electron
- (D) Partially empty

17. The conduction electrons always contribute to ---------- *

- (A) Resistivity
- (B) Conductivity
- (C) Thermal effect
- (D) Magnetic effect

18. According to Kronig-Penney model, the shape of inner potential of crystal is *

- (A)Rectangular
- (B)Triangular
- (C) Spherical
- (D) Sinusoidal

19. The indirect band gap semiconductors require a change in energy along with change in *

- (A) Momentum
- (B) Velocity
- (C) Mass
- (D) Potential

20. The complex physical quantity, which describes about the particle wave and helps deriving the probability density function is called as *

- (A) Wave equation
- (B) Wave function
- (C) Schrodinger equation
- (D) Probability density function

21. The difference between metals, semiconductors and insulators is based on *

- (A) Value of bandgap
- (B) No of electrons in valence band
- (C) No of electrons in conduction band
- (D) Magnitude of electric field applied

22. At any temperature T and for E=EF in metals, the Fermi-distribution function becomes *

- (A) 0
- (B) Infinity
- (C) 1
- (D) ½

23. The principle stating that no two electrons can occupy the same quantum state is known as *

- (A) Heisenberg Uncertainty principle
- (B) Pauli Exclusion principle
- (C) De Broglie principle
- (D) Quantum mechanical principle

24. The direct bandgap semiconductors have the requirement of *

- (A) Change in energy & change in momentum
- (B) No change in energy & change in momentum
- (C) No change in energy & no change in momentum
- (D) Change in energy & No change in momentum

25. The carrier generation is the process by which *

- (A) Electrons are created
- (B) Holes are created
- (C) Electrons and holes are created
- (D) Electrons and holes are annihilated

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