Dayanand Science College, Latur

Department of Physics

Model Question Paper (MCQ for Practice)

Paper Name: Solid State Physics **Paper No.: XIII-A**

SEM-V

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1. Repeatable entity of a crystal structure is known as……

   A. Crystal

   B. Lattice

   C. Unit cell

   D. Miller indices

2. How many atoms per unit cell are in hcp structure?

   A. One

   B. Two

   C. Four

   D. Six

3. The one which is not compatible with crystal symmetry…..

   A. One-fold symmetry

   B. Three-fold symmetry

   C. Five-fold symmetry

   D. Six-fold symmetry

4. For diamond structure the packing Fraction is given by…….

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

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

   C. $\frac{\pi\sqrt{3}}{8}$

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

5. A crystal with unit cell parameters a=b=c and α=β=ϒ=90° belong to .....

A. Monoclinic system

B. Cubic system

C. Triclinic system

D. Hexagonal system

6. Coordinate number for closed packed crystal structure……..

A. 4

B. 8

C. 12

D. 16

7. The atomic radius in case of face centred cubic cell is……..

A. a

B. $\frac{\sqrt{2}\,a}{4}$

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

D. $\frac{a}{4}$

8. A cubic crystal can have……..

A. Only primitive Bravais lattices

B. Any one of primitive, body centered and face centered Bravais lattice

C. All of primitive, body centered and face centered and face centered Bravais lattice

D. All of primitive, base centered and face centered and face centered Bravais lattice

9. Miller indices for octahedral plane in cubic crystal……..

A. (100)

B. (110)

C. (111)

D. (101)

10. Ice (H_2O) is an example of ……

A. Triclinic system

B. Hexagonal system

C. Orthorhombic system

D. Monoclinic system

11. A covalently bonded crystal is……

A. Aluminum

B. Sodium chloride

C. Germanium

D. Lead

12. The nature of bonding for a crystal with alternate and evenly spaced positive and negative ions is……

A. Ionic

B. Covalent

C. Metallic

D. Dipole

13. Lithium and sodium are chemically similar because……..

A. Both have same number of electron

B. Bothe are adjacent elements in the atomic table

C. Bothe have one electron in the outermost incomplete shell

D. Both are alkali

14. Which type of crystal is generally good optical reflector……..

A. Metal

B. Ionic crystal

C. Covalent crystal

D. All of the above

15. In crystal structure of Si we have…….

A. Ionic bond

B. Covalent bond

C. Metallic bond

D. Vander-wall's bond

16. X-rays have larger wavelength than

A. Beta rays

B. Gamma rays

C. Microwave rays

D. Visible light

17. X-ray diffraction patterns are used for studying crystal structure of solid because….

A. They have very high energy, hence they penetrate through solid

B. Their high frequency enables rapid analysis

C. They are electromagnetic radiation and hence they do not interact with matter

D. Their wavelength are comparable to inter atomic distance

18. The energy of X-rays depends upon the……

A. Acceleration voltage

B. Heater current

C. Anode current

D. Heater voltage

19. The Bragg angle theta is fixed in ……..

A. Lau diffraction method

B. Debye-Scherrer's diffraction method

C. Roentgen diffraction method

D. All of the above

20. In Bragg's equation ($2dsin\theta = n\lambda$), θ is the angle between;

A. Specimen surface and incident rays

B. Normal to specimen surface and incident rays

C. Parallel lattice surface d distance apart and incident rays

D. Normal to parallel lattice surface d distance apart and incident rays

21. Dulog-Petits law obeys at room temperature for many metals while it fails for light elements such as boron because…….

A. The Debye's temperature of this elements is very high

B. Their Debye's temperature is about 300K

C. The Debye's temperature of them is low

D. None of these

22. At lower temperature the lattice specific heat varies as……

A. T^3

B. T

C. $\frac{1}{T^3}$

D. $\frac{1}{T^2}$

23. In Debye's theory of specific heat of solids, the frequency of vibrations of lattice has…

A. A fixed value

B. Some discrete value

C. A continuous spectrum up to a finite value

D. A continuous spectrum up to an infinite value

24. Einstein's theory concludes that at lower temperature the specific heat…….

A. Drops linearly with increase of temperature

B. Drops linearly with decrease of temperature

C. Drops exponentially with decrease of temperature

D. Remains constant

25. The increases in internal energy is manifested mainly as;

I. An increase in the vibration of atom about their mean position

II. An increase in the kinetic energy of free electrons

A. Only I

B. Only II

C. Both (I) and (II)

D. None of this

26. If there are N atoms in a mole of the solid then the total internal energy is…..

A. $\frac{1}{2}NKT$

B. 3NKT

C. $\frac{5}{2}NKT$

D. $\frac{3}{2}NKT$

27. According to the free electron model, the average kinetic energy of electron at an absolute temperature T is ……

A. $\frac{1}{2}kT$

B. $\frac{3}{2}kT$

C. $\frac{2}{3}kT$

D. Zero

28. Identify the very good insulator;

A. Saw dust

B. Cork

C. Asbestos sheet

D. Glass wool

29. At frequencies around $5 \times 10^{14}Hz$, the ionic polarization becomes……

A. Zero

B. Unity

C. Infinity

D. Negative

30. Which one is correct about Free electron theory:

A. Ohm's law cannot be derived

B. Semiconductors can be explained properly

C. Insulator can be explained by properly

D. A gas of free electrons is responsible for the properties of metal

31. The electrical conductivity σ depends on……

A. Mobility

B. Number of charge carrier

C. Both (A) and (B)

D. None of these

32. 1. Which of the following is ohms law?

A. $I = \rho E$

B. $I = \sigma E$

C. $I = \frac{\sigma}{E}$

D. $I = \frac{\rho}{E}$

33. Which one of the following form of water has the highest value of thermal conductivity?

A. Boiling water

B. Solid ice

C. Steam

D. Melting ice

34. At low temperature, Lorentz number tends to decrease because……

A. The collision time between two conductivities is identical

B. The collision time between two conductivities is not identical

C. The collision time between walls and atoms is identical

D. The collision time between walls and atoms is not identical

35. With increase in temperature, thermal conductivity of metal……

A. Increases

B. Decreases

C. Either

D. All, depends on metals

36. Which of the following theories cannot be explained by classical theory?

A. Electron theory

B. Lorentz theory

C. Photo-electric effect

D. Classical free electron theory

37. Which one is correct for Weidemann-Franz law

I. The ratio between thermal and electric conductivities is the same for all metals and is a function of temperature only.

II. $\frac{K}{\sigma T} = \frac{\pi^2 k^2}{3e^2} = constant$

A. Only (I)

B. Only (II)

C. Bothe (I) and (II)

D. None of this

38. According to free electron theory;

A. There is no free electron in metal

B. Valance electron are weakly bound with the atom

C. Valance electron are tightly bound with the atom

D. Some valence electron are weakly bound and some are tightly bound

39. Electrical conductivity of insulator is in the range ……

A. $10^{-10}(\Omega\text{-mm})^{-1}$

B. $10^{-10}(\Omega\text{-cm})^{-1}$

C. $10^{-10}(\Omega\text{-m})^{-1}$

D. $10^{-8}(\Omega\text{-m})^{-1}$

40. In p-type semiconductor…….

A. More number of electron than holes

B. More number of holes than electron

C. Equal to number of electrons and holes

D. None of these