

## MCQ AND ANSWER OF IPM AND EM

Q.1 The correct order of the coordination number is SC, BCC, FCC and HCP unit cells is

- (A) 12, 8, 12, 6. (B) 6, 8, 12, 12.  
(C) 8, 6, 12, 12. (D) 6, 12, 12, 8.

Ans: B

Q.2 Frankel and Schottky imperfections are

- (A) dislocations in ionic crystals.  
(B) Grain boundaries in covalent crystals.  
(C) Vacancies in ionic crystals.  
(D) Vacancies in covalent crystals.

Ans: C

Q.3 The electronic polarizability  $a_e$  of a mono atomic gas atom where R is the radius of circular orbit is

- (A)  $4\pi\epsilon_0 R^3$  (B)  $4\pi\epsilon_0 R$   
(C)  $4\pi\epsilon_0 R^3$  (D)  $4\pi\epsilon_0 R^2$

Ans: C

Q.4 The forbidden energy gap of carbon in diamond structure is

- (A) 7.0 eV (B) 1.0 eV  
(C) 0.01 eV (D) none

Ans: A

Q.5 For silicon doped with trivalent impurity,

- (A)  $n_e \gg n_h$  (B)  $n_e > n_h$  .  
(C)  $n_h \gg n_e$  . (D)  $n_h > n_e$  .

Ans: C

Q.6 With increase in temperature, the orientation polarization in general

- (A) decreases. (B) increases.  
(C) remains same. (D) none of these.

Ans: A

Q.7 A suitable material for audio and TV transformers is

- (A) Fe – 4% Si. (B) Ferrite.  
(C) Fe – 30% Ni. (D) Pure Fe.

Ans: B

Q.8 Which of the following is not the function of oxide layer during IC fabrication

- (A) to increase the melting point of silicon.  
(B) to mask against diffusion or ion implant.  
(C) to insulate the surface electrically.  
(D) to produce a chemically stable surface.

Ans: A

Q.9 In normalizing, one of the following is not correct:

- (A) it relieves internal stresses
- (B) it produces a uniform structure.
- (C) the rate of cooling is rapid
- (D) the rate of cooling is slow.

Ans: D

Q.10 Which of the following materials is used for making permanent magnet.

- (A) Platinum cobalt
- (B) Alnico
- (C) Carbon Steel
- (D) all the three

Ans: D

Q.11 The number of atoms present in the unit cell of HCP structure is

- (A) 2.
- (B) 4.
- (C) 6.
- (D) 7.

Ans: C

Q.12 Metallic bond is not characterized by

- (A) ductility.
- (B) high conductivity.
- (C) directionality.
- (D) opacity.

Ans: C

Q.14 If the Fermi energy of silver at 00 K is 5 electron volt, the mean energy of electron in silver at

00 K is

- (A) 6 electron volt.
- (B) 12 electron volt.
- (C) 1.5 electron volt.
- (D) 3 electron volt.

Ans: D

Q.15 The Fermi level in an n-type semiconductor at 00 K lies

- (A) below the donor level.
- (B) Half way between the bottom of conduction band and donor level.
- (C) Exactly in the middle of band gap.
- (D) Half way between the top of valence band and the acceptor level.

Ans: B

Q.16 Hard magnetic material is characterized by

- (A) High coercive force and low residual magnetic induction..
- (B) Low coercive force and high residual magnetic induction..
- (C) Only low coercive force.
- (D) High coercive force and high residual magnetic induction..

Ans: D

Q.17 Piezoelectric effect is the production of electricity by

- (A) chemical effect.
- (B) pressure.
- (C) varying field.
- (D) temperature.

Ans: B

Q.18 Electromigration in metallization refers to the diffusion (under the influence of current) of

(A) Al. (B) Cu in Al-Cu alloy.

(C) Si. (D) Na.

Ans: A

Q.19 Fine grain sizes are obtained by

(A) slow cooling. (B) increasing nucleation rate.

(C) decreasing growth rate (D) fast cooling.

Ans: A

Q.20 Zinc has hcp structure. In a unit cell of zinc, the zinc atoms occupy

(A) 74% of volume of unit cell. (B) 80% of volume of unit cell.

(C) 68% of volume of unit cell. (D) 90% of volume of unit cell.

Ans: A

Q.21 The density of carriers in a pure semiconductor is proportional to

(A)  $\exp(-E_g / kT)$

(C)  $\exp(-E_g / kT^2)$

(B)  $\exp(-2E_g / kT)$

(D)  $\exp(-E_g / 2kT)$

Ans: A

Q.22 The probability of occupation of an energy level E, when  $E - E_F = kT$ , is given by

(A) 0.73 (B) 0.63

(C) 0.5 (D) 0.27

Ans: D

Q.23 The majority charge carriers in p-type semiconductor are

(A) ions. (B) holes.

(C) free electrons. (D) conduction electrons.

Ans: B

Q.24 Polarization in a dielectric on application of electric field is

(A) Displacement/separation of opposite charge centres.

(B) Passing of current through dielectric.

(C) Breaking of insulation.

(D) Excitation of electrons to higher energy level.

Ans: A

Q.25 Which one of the following is not the purpose of full annealing

(A) refines grains (B) induces softness.

(C) removes strains and stresses (D) produces hardest material.

Ans: D

Q.26 Which of the following elements is a covalently bonded crystal?

(A) aluminium (B) sodium chloride

(C) germanium (D) lead

Ans: C

Q.27 The radius of first Bohr orbit in the hydrogen atom is about

- (A) 0.053 Å (B) 0.530 Å
- (C) 5.31 Å (D) 53.10 Å

Ans: B

Q.28 Binary phase diagrams of two component systems are usually

- (A) two dimensional plots of temperature and pressure.
- (B) two dimensional plots of temperature and composition.
- (C) two dimensional plots of pressure and composition.
- (D) two dimensional plots of pressure, temperature and composition.

Ans: B

Q.29 Imperfection arising due to the displacement of an ion from a regular site to an interstitial site

maintaining overall electrical neutrality of the ionic crystal is called.

- (A) Frenkel imperfection (B) Schottky imperfection
- (C) Point imperfection (D) Volume imperfection

Ans: A

Q.30 The Fermi level is

- (A) an average value of all available energy levels.
- (B) an energy level at the top of the valence band.
- (C) the highest occupied energy level at 0 °C.
- (D) the highest occupied energy level at 0 K.

Ans: D

Q.31 Among the common dielectric materials, the highest dielectric strength is possessed by

- (A) mica. (B) polyethylene.
- (C) PVC. (D) transformer oil.

Ans: A

Q.32 Annealing is generally done to impart

- (A) hardness to the material (B) softness to the material
- (C) brittleness to the material (D) high conductivity to the material

Ans: B

Q.33 A ferromagnetic material is one in which neighbouring atomic magnetic moments are

- (A) antiparallel and unequal.
- (B) predominantly parallel.
- (C) all randomly oriented.
- (D) predominantly parallel in a small region of material.

Ans: B

Q.34 In intrinsic semiconductor there are

- (A) no mobile holes.
- (B) no free electrons.
- (C) as many free electrons as there are holes.
- (D) neither free electrons nor mobile holes.

Ans: C

Q.35 Covalent bonding in solids depends primarily on

- (A) electrical dipoles. (B) sharing of electrons.
- (C) transfer of electrons. (D) gravitational forces.

Ans: B

Q.36 Mobility of electron is

- (A) Average flow of electrons per unit field.
- (B) Average applied field per unit drift velocity.
- (C) Average drift velocity per unit field.
- (D) Reciprocal of conductivity per unit charge.

Ans: C

Q.37 In a dielectric, the power loss is proportional to

- (A)  $\omega$ . (B)  $1/\omega^2$ .
- (C)  $\omega$  (D)  $\omega^2$

Where  $\omega$  is the angular frequency of applied electric field.

Ans: A

Q.38 Above curie temperature, the spontaneous polarization for ferro electric materials is

- (A) zero. (B) 1.
- (C)  $1/2$ . (D) infinity.

Ans: A

Q.39 Chemical formula of a simple ferrite may be written as

- (A)  $2+ e e3 + 24-$ . (B)  $M3+ F4 + O2 +$ .
- (C)  $4+22+ 3+e 4$ . (D)  $e e 45+ 4 + 2 +e e 4$

Ans: A

Q.40 Fermi level represents the energy level with probability of its occupation of

- (A) 0 %. (B) 25 %.
- (C) 50 %. (D) 100 %.

Ans: C

Q.41 The acceptor type impurity is formed by adding impurity of valency

- (A) 6. (B) 5.
- (C) 4. (D) 3.

Ans: D

Q.42 Which of the following processes is used to harden a steel?

- (A) Normalizing
- (B) Annealing
- (C) Carburizing
- (D) Quenching

Ans: D

Q.43 If the atomic number of an element is  $Z$ , and its atomic mass number is  $A$ , the number of protons in its nucleus is

- (A)  $A$ .
- (B)  $Z$ .
- (C)  $A - Z$ .
- (D)  $A / Z$ .

Ans: B

Q.44 Miller indices of the diagonal plane of a cube are

- (A) (200).
- (B) (111).
- (C) (010).
- (D) (110).

Ans: D

Q.45 Melting point of Cesium and Iridium are diagrams they are likely to have

- (A) solid phase partly.
- (B) liquid phase.
- (C) solid liquid phase.
- (D) all of the above.

Ans: D

Q.46 The steady state conditions in diffusion are governed by

- (A) Fick's second law.
- (B) Fick's first law.
- (C) both (A) and (B).
- (D) Maxwell-Boltzmann's law.

Ans: B

Q.47 Highest electrical resistivity exists in

- (A) platinum wire.
- (B) nichrome wire.
- (C) silver wire.
- (D) kanthal wire.

Ans: B

Q.48 For high speed of reading and storing the informations in a computer, the use is made of

- (A) ferrites.
- (C) piezo electrics.
- (B) pyroelectrics.
- (D) ferromagnetics above  $768^{\circ} \text{C}$ .

Ans: A

Q.49 Hall effect can be used to measure

- (A) mobility of semiconductors.
- (B) conductivity of semiconductors.
- (C) resistivity of semiconductors.
- (D) all of these.

Ans: D

51-Fibers or particles embedded in matrix of another material are the example of

- (A) an alloy
- (B) composite material
- (C) cutting tool material
- (D) none of the above

Ans: B

52-In matrix based structural composites, the matrix serves the purpose of

- (A) binding the reinforcement phases in place
- (B) deforming to distribute the stresses
- (C) both (A) and (B)
- (D) none of the above

Ans: C

53-Thermoplastics is an example of

- (A) Carbon and Graphitic matrix composites
- (B) Ceramic matrix composites
- (C) Metal matrix composites
- (D) Polymer matrix composites

Ans: D

54-Organic matrix composite is generally assumed to include

- (A) Polymer matrix composites and carbon matrix composites
- (B) Polymer matrix composites and metal matrix composites
- (C) Metal matrix composites and carbon matrix composites
- (D) Polymer matrix composites and ceramic matrix composites

Ans: A

55-Following is (are) the reinforcement form of composites

- (A) fibre reinforced composites
- (B) laminar composites
- (C) particulate composites
- (D) all of the above

Ans: D

56- Fibre Reinforced Composites are composed of fibres embedded in \_\_\_\_ material.

- (A) matrix
- (B) metallic
- (C) plastic
- (D) none of the above

Ans: A

57- When the length of the fibre is such that any further increase in length does not further increase, the elastic modulus of the composite, the composite is considered to be \_\_\_\_

- (A) discontinuous fibre
- (B) continuous fibre reinforced
- (C) short fibre composite
- (D) none of the above

Ans: B

58- Sandwich structures fall under \_\_\_\_ category.

- (A) Fiber reinforced composites
- (B) Laminar composites
- (C) Particulate composites
- (D) none of the above

Ans: B

59- Following is (are) type(s) of polymer(s)

- (A) thermosets
- (B) thermoplastics
- (C) both (A) and (B)
- (D) none of the above

Ans: C

60- Following is (are) kind(s) of thermoplastics.

- (A) Polyethylene
- (B) Polystyrene
- (C) Nylons
- (D) All of the above

Ans: D

61- Following is (are) kind(s) of thermosets.

- (A) Epoxy
- (B) Phenolic polyamide resins
- (C) Polyester
- (D) All of the above

Ans: D

62- The metal used as in matrix in metal matrix composites

- (A) Nickel
- (B) Lead
- (C) Boron
- (D) Titanium

Ans: D

63- Following is the earliest known fibers used to reinforce materials

- (A) Glass fibers
- (B) Carbon fibers
- (C) Plant fibers
- (D) Wood fibers

Ans: A



64- Reinforcements for the composites can be

- (A) fibers
- (B) fabrics particles
- (C) whiskers
- (D) all of the above

Ans: D

65- Single crystals grown with nearly zero defects are termed

- (A) whiskers
- (B) fabric particles
- (C) fibers
- (D) none of the above

Ans: A

66- \_\_\_\_ are often used in place of fibers as can be densely packed.

- (A) Foils
- (B) Flakes
- (C) Plastics
- (D) All of the above

Ans: B

67- A CerMet is a composite material composed of

- (A) Ceramic
- (B) Metal
- (C) both (A) and (B)
- (D) None of the above

Ans: C

68- Following is (are) the function(s) of a matrix

- (A) Holds the fibres together
- (B) Protects the fibers from environment
- (C) Enhances transverse properties of a laminate
- (D) All of the above

Ans: D

69- Which of the following is not a desired property of a Matrix?

- (A) Increased moisture absorption
- (B) Low shrinkage
- (C) Dimensional stability
- (D) Low temperature capability

Ans: A

70- Composites are used in

- (A) long span bridges
- (B) power generating wind mills
- (C) earthquake proof highway supports
- (D) all of the above

Ans: D

71. The word 'ceramic' meant for \_\_\_\_\_.

- (A) soft material
- (B) hard material
- (C) burnt material
- (D) dry material

Ans: C

72. Not a characteristic property of ceramic material

- (A) high temperature stability
- (B) high mechanical strength
- (C) low elongation
- (D) low hardness

Ans: D

73. Major ingredients of traditional ceramics

- (A) silica
- (B) clay
- (C) feldspar
- (D) all

Ans: D

74. Not a major contributor of engineering ceramics

- (A) SiC
- (B) SiO<sub>2</sub>
- (C) Si<sub>3</sub>N<sub>4</sub>
- (D) Al<sub>2</sub>O<sub>3</sub>

Ans: B

75. The following ceramic product is mostly used as pigment in paints

- (A)  $\text{TiO}_2$
- (B)  $\text{SiO}_2$
- (C)  $\text{UO}_2$
- (D)  $\text{ZrO}_2$

Ans: A