

## FE SEM-I (CBCGS-H) Physics Question Bank for ATKT ESE EXAM September 2020

### 1 Mark Questions:

Q.1 Miller developed a method to determine

- a) set of planes
- b) set of parallel planes
- c) perpendicular planes
- d) parallel as well as perpendicular planes

Q.2 The coordination number in a FCC crystal structure is

- (a) 6
- (b) 9
- (c) 10
- (d) 12

Q.3 Which of the following materials can be used as LED materials?

- a) Si
- b) GaAs
- c) Ge
- d) Si as well as Ge

Q.4 Knee voltage for Ge

- a) 0.1 V
- b) 0.2 V
- c) 0.3 V
- d) 0.4 V

5. Doping

- a) increases the forbidden gap
- b) decreases the forbidden gap
- c) remains constant
- d) first decreases then increases

6. LASER stands for

- a) Light Applied Sophisticated Equipment of Radiation
- b) Light Amplification by Spontaneous Emission of Radiation
- c) Light Amplification by Stimulated Emission of Radiation
- d) both a and b

Q.7 Average no of molecules per unit cell for HCP crystal structure are

- (a) 4
- (b) 8
- (c) 6
- (d) 12

Q.8 The phase difference for destructive interference

- (a)  $2n\pi$
- (b)  $(3n+1)\pi$
- (c)  $(2n+1)\pi$
- (d)  $(2n-2)\pi$

Q.9 Superconductors behave like a

- a) paramagnet
- b) diamagnet
- c) perfect diamagnet
- d) both paramagnet and diamagnet

Q.10 Absence of electron inside the nucleus can be proved using

- (a) Newton's Law
- (b) Uncertainty Principle
- (c) Schrodinger
- (d) Laplace

## **2 Marks Questions:**

Q.11 TIDSE stands for

- (a) Time Independent Shockley Equation
- (b) Time Independent Schootky Equation
- (c) Time Independent Schrodinger Equation
- (d) Time Independent Schrieffer Equation

Q.12 The square of the magnitude of the wave function is called

- (a) current density
- (b) probability density
- (c) zero density
- (d) volume density

Q.13 For particle outside the box the energy of free particle is directly proportional to

- a) square root of  $n$
- b) square root of  $n^2$
- c)  $n^2$
- d)  $n^3$

Q.14 Hall Coefficient is equal to

- a)  $ne$
- b)  $1/ne$
- c)  $n^2e$
- d)  $n^3$

Q.15 In Newton's ring experiment, the diameter of bright rings is proportional to

- a) Odd natural nos.
- b) Natural nos.
- c) Even natural nos.
- d) Square root of natural nos.

Q.16 If Newton's rings pattern are observed in white light

- a) The concentric circles with different colours and with dark as centre are found
- b) coloured centre and dark rings thereafter
- c) Yellow colour at the center
- d) Red colour at the centre

Q.17 Which of the following is used for the formation of holograms?

- a) X-ray
- b) Visible Light
- c) Infrared
- d) Lasers

Q.18 Laser beam is

- a) Incoherent
- b) polychromatic
- c) less intense
- d) highly directional

Q.19 Which of the following is an example of Direct pumping?

- a) Ruby laser
- b) Helium-Neon laser
- c) Semiconductor laser
- d) Dye laser

Q.20 Chemical pumping in which

- a) strong light source is used
- b) electron impact is used
- c) both strong light source and electron impact
- d) chemical reaction is used

21 Silicon has the same crystal structure as Diamond Its density is  $2.33 \times 10^3 \text{ kg/m}^3$  and atomic weight is 28.9. Calculate atomic radius.

- a)  $1.186 \text{ \AA}$
- b)  $2.245 \text{ \AA}$
- c)  $0.0563 \text{ \AA}$
- d)  $1.534 \text{ \AA}$

22. The position and momentum of a 1 KeV electron are simultaneously determined. If the position is located within 1nm, what is the percentage uncertainty in its momentum?

- a) 0.4531%
- b) 0.6153%
- c) 0.3450%
- d) 0.2450%

23. A fast moving neutron has de-Broglie wavelength  $2 \times 10^{-12} \text{ m}$  associated with it. Find the following:

Kinetic energy. Data :  $\lambda_{\text{neutron}} = \lambda_n = 2 \times 10^{-12} \text{ m}$ ,  $m_{\text{neutron}} = m_n = 1.675 \times 10^{-27} \text{ kg}$

- a) 2.504
- b) 3.235
- c) 4.789
- d)  $3.280 \times 10^{-17}$

24. An n-type of Ge sample has a  $N_D = 10^{21}/\text{m}^3$  and thickness 3mm. It is arranged in a hall effect experimental set up. If  $B=0.5\text{T}$ ,  $J=500 \text{ A/m}^2$ , find hall voltage.

- a) 4.2 mV
- b) 4.0 mV
- c) 4.7 mV
- d) 5.2 mV

25. The electrical conductivity of a pure silicon at room temperature is  $4 \times 10^{-4}$  mho/m. If the mobility of electron is  $0.14 \text{ m}^2/\text{V-S}$  & that of hole is  $0.04 \text{ m}^2/\text{V-S}$ . Calculate the intrinsic carrier density

- a)  $1.39 \times 10^{16}$  per  $\text{m}^3$
- b)  $2.39 \times 10^{16}$  per  $\text{m}^3$
- c)  $3.39 \times 10^{16}$  per  $\text{m}^3$
- d)  $4.39 \times 10^{16}$  per  $\text{m}^3$

26. Aluminium is FCC monoatomic and its density is  $2700 \text{ kg}/\text{m}^3$ . Atomic weight is 26.98. calculate the unit cell dimension of the crystal and the diameter of Aluminium atom.

- a) 2.20 Å
- b) 2.86 Å
- c) 3.86 Å
- d) 4.86 Å

27. Find the Miller indices of a set of a parallel planes which make the intercepts in the ratio 3 a : 4 b on X and Y axes and are parallel to Z axis. a, b and c are basic vector.

- a) (323)
- b) (440)
- c) (123)
- d) (430)

28. Gold belongs to monoatomic cubic crystal structure. Its density is  $19320 \text{ kg}/\text{m}^3$  and the lattice constant  $a = 4.08 \text{ Å}$ . Atomic weight = 197. Avogadro's number =  $6.023 \times 10^{26} / \text{kg mole}$ . Determine the type (SC, BCC or FCC) to which the gold belongs.

- a) FCC
- b) BCC
- c) SC
- d) FCC diatomic

## Branch Specific Questions

### For ELEX

29. Which of the following is true about a PIN diode?

- a) it's photosensitive in reverse bias
- b) it offers low resistance and low capacitance
- c) it has a decreased reversed breakdown voltage
- d) carrier storage is low

30) (3) During reverse bias, the PIN diode acts as \_\_\_\_\_

- a) variable resistor
- b) switch
- c) variable capacitor
- d) LED

### For COMP

29. 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

30. 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

### FOR CIVIL

29. A charge is placed in a Square container. The position of charge with respect to origin can be found using

- a) Cartesian Coordinate System
- b) Spherical Coordinate System
- c) Circular Coordinate System
- d) Cylindrical Coordinate System

30. Cartesian coordinate system is also Known as

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- a) Circular Coordinate System
  - b) Spherical Coordinate System
  - c) Rectangular Coordinate System
  - d) Cylindrical Coordinate System