CHAPTER – 1: ELECTRICAL CHARGES AND FIELDS

1. **When 6.25×10^{19} electrons are removed from a neutral body, the electric charge on it is** (A) 1C (B) – 1C **(C) 10 C** (D) – 10C
2. **When a glass rod is rubbed with silk, then glass rod**
   (A) gains electrons from silk **(B) gives electrons to silk**
   (C) gains protons from silk (D) gives protons to silk
3. **Which one is not the method of charging a body?**
   (A) Friction (B) Conduction (C) Induction **(D) Earthing**
4. **One of the following methods may be used to charge insulators**
   (A) Conduction (B) Induction **(C) Friction** (D) Radiation
5. **The force between two point charges in vacuum is given by**
   (A) Coulomb's law (B) Gauss's law (C) Ohm's law (D) Faraday's law
6. **The law which relates electric flux and electric charge is**
   (A) Coulomb's law **(B) Gauss's law** (C) Ohm's law (D)Faraday's law
7. **Which among the following is wrong property of the electric charge?**
   (A) Charge is quantised (B) Charge is conserved
   (C) Charge is additive **(D) Charge is vector**
8. **The minimum amount of charge that can be added or removed from a body is**
   (A) charge of electron (1.6×10^{-19} C) (B) Charge of alpha particle (3.2×10^{-19} C)
   (C) 32×10^{-19} C (D) 16×10^{-19} C
9. **The SI unit of electric field is** **(A) N C^{-1} (or V m^{-1})** (B) N C (C) V m (D) Nm^2
10. **The SI unit of electric flux is** (A) N C^{-1} **(B) N $C^{-1}m^2$ or Vm** (C) Vm^{-1} (D) Nm
11. **The electric field due to a point charge varies with distance from it as:**
    (A) $\frac{1}{(\text{distance})^2}$ (B) $\frac{1}{(\text{distance})^3}$ (C) $\frac{1}{\text{distance}}$ (D) $(\text{distance})^2$
12. **Which of the following is deflected by electric field?**
    (A) X-rays (B) γ-rays (C) neutrons **(D) α -particles**
13. **The electric field near a sheet having a uniform surface charge density σ is given by**
    (A) $\frac{\sigma}{\varepsilon_0}$ and is parallel to the surface (B) $\frac{\sigma}{2\varepsilon_0}$ and is parallel to the surface
    (C) $\frac{\sigma}{\varepsilon_0}$ and is normal to the surface **(D) $\frac{\sigma}{2\varepsilon_0}$ and is normal to the surface.**
14. **The electric field (E) due to infinitely large charged plane sheet having uniform surface charge density varies with distance r as $E \propto r^n$.**
    The value of n = (A) –1 (B) 1 (C) 2 **(D) 0**

15. A proton enters in an electric field with its velocity in the direction of the electric field. Then

(A) The path of the proton will be a circle (B) The path of the proton will be a parabola

(C) The path of the proton will be a straight line (D) The path of the proton will be helix

16. An electric dipole is kept in uniform electric field. It experiences

(A) A force and a torque (B) A force but not a torque

(C) A torque but not a force (D) Neither a force nor a torque

17. An electric dipole is kept in non-uniform electric field. It experiences

(A) both force and torque (B) a force but not a torque

(C) a torque but not a force (D) neither a force nor a torque

18. Net charge of an electric dipole is **(A) zero** (B) +q (C) –q (D) 2q

19. The direction of dipole moment of an electric dipole composed of charge +q and –q is

(A) from +q to –q (B) perpendicular to the line joining +q and –q

(C) from –q to +q (D) make an angle 45^o with dipole axis.

20. The torque $(\vec{\tau})$ acting on a dipole of moment $(\vec{p})$ in an electric field $(\vec{E})$ is

(A) $\vec{\tau} = \vec{p} \times \vec{E}$ (B) $\vec{\tau} = \vec{p} \bullet \vec{E}$ (C) $\vec{\tau} = -\vec{p} \times \vec{E}$ (D) $\vec{\tau} = -\vec{p} \bullet \vec{E}$

21. A dipole experiences maximum torque when the angle between electric field and dipole moment is equal to (A) 0^o (B) 180^o (C) 45^o **(D) 90^o**

22. If E_{ax} be the electric field strength of a short dipole at a point on its axial line at a distance r from dipole centre and E_{eq} that on the equatorial line at the same distance (r), then

(A) $E_{ax} = E_{eq}$ **(B) $E_{ax} = 2\,E_{eq}$** (C) $2E_{ax} = E_{eq}$ (D) $E_{ax} = 4\,E_{eq}$

23. The vector quantity among the following is

(A) electric charge (B) electric potential **(C) electric field** (D) electric flux

24. A metallic sphere of radius R has a uniform distribution of electric charge on its surface. At a distance x from its centre, for $x > R$, the electric field is proportional to

(A) x^2 (B) x (C) $\frac{1}{x}$ **(D) $\frac{1}{x^2}$**

25. Intrinsic dipole moment of a polar molecule is (q is net positive charge of dipole and 2a is distance between charges +q and –q) **(A) 2aq** (B) aq (C) aq/2 (D) zero

22. Intrinsic dipole moment of a non-polar molecule is (A) 2aq (B) aq (C) aq/2 **(D) 0**

26. The electric flux through a closed surface enclosing a dipole is

(A) zero (B) $\frac{q}{\varepsilon_0}$ (C) $\frac{2q}{\varepsilon_0}$ (D) $\frac{q}{2\varepsilon_0}$

27. A sphere and a cube enclose the same charge. If the surface area of cube and sphere are in the ratio 1:2, electric flux through them are in the ratio

(A) 1:2 (B) 2:1 (C) 1:4 **(D) 1:1**

28. The correct mathematical form of Gauss's law in electrostatics is

(A) $Q = \frac{1}{\varepsilon_0}\phi$ **(B) $\phi = \frac{Q}{\varepsilon_0}$** (C) $\phi = \frac{Q}{\mu_0}$ (D) $\phi = \frac{Q}{2\,\varepsilon_0}$

29. **A soap bubble is given a positive charge. Its radius will**
(A) increase (B) decrease (C) remain unchanged (D) decreases first then increases

30. **A stationary electric charge produces**
(A) electric field only (B) magnetic field only
(C) both magnetic and electric field (D) neither magnetic field nor electric field

31. **If an electron and a proton are kept in a uniform electric field, then**
(A) the electric force acting on them is same
(B) the acceleration produced in them is same
(C) the magnitude of the acceleration in them is same
(D) the magnitude of the force acting on them is same

32. **Identify the wrong statement among the following options about electric field lines:**
(A) They form closed loops.
(B) They can never intersect each other.
(C) The tangent drawn to the electric field line at any point gives the direction of electric field at that point.
(D) They are directed from positive charge to negative charge.

33. **Electric field lines in case of a positive point charge are**
(A) radially outwards (B) circular clockwise
(C) radially inwards (D) parallel straight lines

34. **An electric dipole is placed in a uniform electric field. The net force acting on it is**
(A) pE sin θ **(B) Zero** (C) – pEcosθ (D) 2aq

FILL IN THE BLANKS

1. If product of the two point charges $q_1q_2 < 0$, then nature of force between them is ________ **Ans: attractive**
2. A body can be charged by the method of __________. **Ans: friction/conduction**
3. _______ is the simple apparatus which detects the presence of electric charge on a body. **Ans: Electroscope**
4. The SI unit of volume charge density is ____________ **Ans: coulomb per metre^3 (C/m^3)**
5. The direction of electric field is ______ from the positive charge. **Ans: away**
6. The direction of electric field is ______ the negative charge. **Ans: towards**
7. The electric field inside a charged conductor is ________. **Ans: zero**
8. SI unit of dipole moment is _____. **Ans: coulomb-metre (Cm)**

CHAPTER – 2: ELECTROSTATIC POTENTIAL AND CAPACITANCE

1. **The SI unit of electrostatic potential is**
(A) volt (B) watt (C) farad (D) coulomb

2. **Electric potential at a point due to a point charge q depends on distance as**
(A) $\frac{1}{(\text{distance})^2}$ (B) $\frac{1}{(\text{distance})^3}$ **(C) $\frac{1}{\text{distance}}$** (D) $(\text{distance})^2$

3. **The electric potential at a point due to a short dipole depends on distance as**

(A) $\frac{1}{(\text{distance})^2}$ (B) $\frac{1}{(\text{distance})^3}$ (C) $\frac{1}{\text{distance}}$ (D) $(\text{distance})^2$

4. **A metallic sphere of radius R has a uniform distribution of electric charge on its surface. At a distance x from its centre, for $x > R$, the electric potential is proportional to** (A) x^2 (B) x **(C) $\frac{1}{x}$** (D) $\frac{1}{x^2}$

5. **The electric potential at a point due to a short dipole varies with orientation of r with p as:** (A) sinθ **(B) cosθ** (C) tanθ (D) cos2θ

6. **The angle between electric field and equipotential surface is**
(A) 90^o (B) 0^o (C) 180^o (D) 45^o

7. **The work done in carrying a test charge once around an equipotential path is**
(A) Infinity (B) Positive (C) Negative **(D) Zero**

8. **Which of the following sentences is WRONG for an equipotential surface?**
(A) Work done to move a charge between two points on the equipotential surface is zero.
(B) Electric field at any point on the surface is perpendicular to the equipotential surface.
(C) Equipotential surfaces are close together in regions of strong electric field.
(D) Two equipotential surfaces can intersect with each other.

9. **The potential energy (U) of an electric dipole of moment $(\vec{p})$ in a uniform electric field $(\vec{E})$ is** (A) $U = \vec{p} \times \vec{E}$ (B) $U = \vec{p} \cdot \vec{E}$ (C) $U = -\vec{p} \times \vec{E}$ **(D) $U = -\vec{p} \cdot \vec{E}$**

10. **The potential energy stored in an electric dipole is maximum when the angle between uniform electric field and dipole moment is equal to**
(A) 0^o **(B) 180^o** (C) 45^o (D) 90^o

11. **The potential energy stored in a dipole is minimum when the angle between uniform electric field and dipole moment is equal to** **(A) 0^o** (B) 180^o (C) 45^o (D) 90^o

12. **The potential energy stored in a dipole is zero when the angle between uniform electric field and dipole moment is equal to** (A) 0^o (B) 180^o (C) 45^o **(D) 90^o**

13. **The formula connecting electric field (E) and electric potential (V) is (r - distance)**
(A) $E = -\frac{dV}{dr}$ (B) $E = \frac{dV}{dr}$ (C) $V = \frac{dE}{dr}$ (D) $V = -\frac{dE}{dr}$

14. **On the equatorial plane of an electric potential (V) and electric field (E) are such that**
(A) V=0 and E= 0 (B) V≠0 and E=0 **(C) V=0, E ≠ 0** (D) V≠0 and E≠0

15. **Inside a charged conducting spherical shell**
(A) V=0 and E= 0 **(B) V≠0 and E=0** (C) V=0, E ≠ 0 (D) V≠0 and E≠0

16. **The potential energy between two point charges q_1 and q_2, separated by a distance r in vacuum is given by**
(A) $U = \frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{r}$ **(B)** $U = \frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{r^2}$ (C) $U = \frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{r^3}$ (D) $U = \frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{2r}$

17. **Potential energy of an electric dipole is zero when its dipole moment is aligned**
(A) parallel to the electric field (B) antiparallel to the electric field
(C) perpendicular to the electric field (D) at an angle of 45^o to the electric field.

18. **An electron is accelerated through a potential difference of 1V. The kinetic energy gained by the electron is**

(A) 1 eV (B) 1 keV (C) 1 J (D) 1kJ

19. **Which is the polar molecule among the examples given below?**

(A) H_2 (B) N_2 (C) O_2 **(D) NH_3**

20. **Which is the non-polar molecule among the examples given below?**

(A) H_2O **(B) N_2** (C) SO_2 (D) HCl

21. **The electric field above which dipoles in an insulator break and charges separate is called**

(A) dielectric polarisation (B) dielectric breakdown

(C) dielectric strength (D) dielectric constant

22. **The SI unit of dielectric strength of a material is**

(A) Vm^{-1} (B) JC^{-1} (C) farad (D) joule

23. **When a positively charged conductor brought near negatively charged conductor, its capacity (capacitance)**

(A) increases (B) decrease

(C) does not change (D) first increases then decreases

24. **The capacitance of a parallel plate capacitor is independent of**

(A) area of each plate (B) distance between the plates

(C) dielectric constant of the medium between the plates **(D) charge on each plate.**

25. **Capacitance of a parallel plate capacitor can be increased by**

(A) increasing the area of plates.

(B) decreasing the distance between the plates.

(C) using a medium of higher dielectric constant between the plates

(D) any of the above methods will increase the capacitance.

26. **The SI unit of capacitance is**

(A) farad (B) coulomb (C) gauss (D) weber

27. **If C_0 is the capacitance of a capacitor with air as dielectric and C is the capacitance with medium as dielectric, then dielectric constant (K) of the medium between the plates is**

(A) $K = C/C_0$ (B) $K = C_0/C$ (C) $K = C_0 C$ (D) $K = C_0 + C$

28. **The electric field between the plates of a parallel plate air capacitor is**

(σ → surface charge density, ε_0 → permittivity of free space)

(A) $\frac{\sigma}{\varepsilon_0}$ (B) $\frac{\sigma}{2\varepsilon_0}$ (C) $\frac{2\sigma}{\varepsilon_0}$ (D) $\sigma\varepsilon_0$

29. **Permittivity of medium ε, permittivity of free space ε_0 and dielectric constant of the medium K are related as**

(A) $\varepsilon_0 = K\varepsilon$ (B) **$\varepsilon = K\varepsilon_0$** (C) $K = \varepsilon\,\varepsilon_0$ (D) $K = \varepsilon_0 + \varepsilon$

30. When two capacitors of different value are connected in series,

(A) Only charge stored in each capacitor is same.

(B) Only potential difference across each capacitor is same.

(C) Both charge stored and potential difference on each capacitor are the same.

(D) Charge stored in the capacitors is different.

31. When two capacitors of different value are connected in parallel,

(A) Only charge stored in each capacitor is same.

(B) **Only potential difference across each capacitor is same.**

(C) Both charge stored and potential difference each capacitor is same.

(D) Energy stored in each capacitor is same.

32. The INCORRECT expression for the energy stored in a capacitor of is (Capacitance = C , potential difference between plates =V, magnitude of charge on each plate = Q)

(A) $U = \frac{1}{2}CV^2$ (B) $U = \frac{1}{2}QV$ (C) $U = \frac{1}{2}\frac{Q^2}{C}$ **(D)** $\mathbf{U = \frac{1}{2}\frac{V^2}{C}}$

33. The electric field inside the cavity of a charged conductor is zero. This is known as:

(A) Discharging (B) Grounding **(C) Electrostatic shielding** (D) Electrification

CHAPTER – 3: CURRENT ELECTRICITY

1. **Resistance of a metallic wire is independent of**
(A) its length (B) its resistivity (C) its cross sectional area **(D) current through it**

2. **When both length and area of cross-section of a wire are doubled, then its resistance**
(A) will become half (B) will be doubled
(C) will remain the same (D) will become four times

3. **Resistivity of a conducting wire is ρ. It is stretched to twice it initial length. New resistivity is**
(A) 2ρ **(B) ρ** (C) ρ/2 (D) ρ^2

4. **Resistivity and resistance of a conducting wire are ρ and R respectively. Now it is cut into two equal pieces. The resistivity and resistance are respectively**
(A) ρ and R (B) ρ/2 and R **(C) ρ and R/2** (D) ρ/2 and R/2

5. **Resistivity of a conducting wire depends on**
(A) length (B) area of cross section **(C) temperature** (D) radius of cross section

6. **Drift velocity per unit electric field is called**
(A) relaxation time (B) conductivity (C) current density **(D) mobility**

7. **Current per unit area is called**
(A) relaxation time (B) conductivity **(C) current density** (D) mobility

8. **The average velocity with which free electrons move in a conductor opposite to the applied electric field is called**
(A) mobility (B) conductivity (C) thermal velocity **(D) drift velocity**

9. **Average time between two successive collisions is called**
(A) relaxation time (B) conductivity (C) current density (D) mobility

10. **The resistance offered by a 1m long conductor having a cross sectional area 1 sq m is called**
(A) Electrical resistance of the conductor **(B) Electrical resistivity of the conductor**
(C) Electrical conductance of the conductor (D) Electrical conductivity of the conductor

11. **The reciprocal of resistivity is**
(A) conductance **(B) conductivity** (C) current density (D) mobility

12. **The vector quantity among the following is**
(A) electric current (B) electric potential (C) electromotive force **(D) current density**

13. **The correct expression for current density (j) is**
(A) $j = nev_d$ (B) $j = nAev_d$ (C) $j = nAv_d$ (D) $j = eAv_d$

14. **The correct expression for drift velocity of electrons in a conductor is**
(A) $\vec{v_d} = -\frac{e\tau\vec{E}}{m}$ (B) $\vec{v_d} = -\frac{e\vec{E}}{m}$ (C) $\vec{v_d} = \frac{e\tau\vec{E}}{m}$ (D) $\vec{v_d} = \frac{m\tau\vec{E}}{e}$

15. **The correct expression for conductivity(σ) is**
(A) $\sigma = \frac{n e \tau}{m}$ **(B) $\sigma = \frac{ne^2\tau}{m}$** (C) $\sigma = \frac{m}{ne^2\tau}$ (D) $\sigma = \frac{n e^2}{m}$

16. **The electric field E, current density j and conductivity σ of a conductor are related as**
(A) $E = \sigma j$ **(B) $j = \sigma E$** (C) $j = 1/(\sigma E)$ (D) $\sigma = j E$

17. **SI unit of electric current is** **(A) ampere** (B) coulomb (C) volt (D) ohm

18. **SI unit of current density is** (A) ampere (B) Am^2 **(C) $A\,m^{-2}$** (D) Am^{-1}

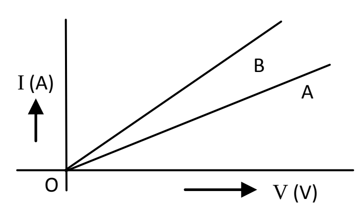
19. **SI unit of resistivity is** (A) ohm (Ω) **(B) Ωm** (C) $\Omega\,m^{-1}$ (D) $\Omega\,m^{-2}$

20. **SI unit of mobility is** **(A) $m^2V^{-1}s^{-1}$** (B) $Vm^{-2}s$ (C) $m\,V^{-1}s^{-2}$ (D) $m^{-1}Vs^2$

21. **Which of the following characteristics of electrons determines the current in a conductor?**
(A) Drift velocity alone. (B) Thermal velocity alone.
(C) Both drift velocity and thermal velocity. (D) Neither drift nor thermal velocity.

22. **The various bulbs and other electrical appliances in a house are connected**
(A) In a complicated manner (B) In series **(C) In parallel** (D) Bulbs in series and others in parallel

23. **The I – V graphs for two different electrical appliances A and B are as shown in the diagram. If R_A and R_B be the resistance of the devices then**



(A) $R_A = R_B$ **(B) $R_A > R_B$**
(C) $R_A < R_B$ (D) Can-not be determined.

24. **As the temperature increases, resistivity of**
(A) conductor increases and semiconductor decreases.
(B) conductor decreases and semiconductor increases.
(C) both conductor and semiconductor increases.
(D) both conductor and semiconductor decreases.

25. **A piece of Aluminium (Al) and Germanium (Ge) are cooled from 300K to 100K, then the resistivity of**
(A) both increases (B) Al increases and Ge decreases
(C) both decreases **(D) Al decreases and Ge increases**

26. **The resistivity of a wire**
(A) increases with the increase in length of the wire.
(B) decreases with the increase in area of cross-section of wire.
(C) decreases with the increase in length and increases with the increase in area of cross-section of wire.
(D) increases with increase in temperature.

27. **The terminal potential difference of a cell is equal to emf of the cell when**
(A) during charging (B) during discharging
(C) during charging or discharging **(D) current I= 0**

28. **Nichrome, constantan and manganin wires are used in making standard resistance boxes or in rheostats or wire bound resistors instead of copper or aluminium wires because they have**
(A) Low temperature coefficient of resistivity (α) and high resistivity (ρ).
(B) High temperature coefficient of resistivity (α) and low resistivity (ρ).
(C) Low temperature coefficient of resistivity (α) and low resistivity (ρ).
(D) High temperature coefficient of resistivity (α) and high resistivity (ρ).

29. **Identify the wrong statement among the following options**
(A) Ohm's law is not applicable to devices in which the relation between voltage and current is non-unique.
(B) Ohm's law is not applicable to conductors at very low and very high temperatures.
(C) Ohm's law is applicable to semiconductors devices like diode and transistors.
(D) Ohm's law is not applicable to electron tubes, discharge tubes and electrolytes.

30. **Identify the one, which does not obey Ohm's law (non-ohmic device)**
(A) ammeter (B) voltmeter **(C) p-n junction diode** (D) galvanometer

31. **The conductivity of a conductor is**
(A) Infinite **(B) Very high** (C) Very small (D) Zero

32. **Kirchhoff 's junction rule is a reflection of**
(A) conservation of current density vector.
(B) conservation of energy. (C) conservation of momentum.
(D) the fact that there is no accumulation of charges at a junction (or conservation of charge).

33. **Kirchhoff's junction rule signifies the law of conservation of**
(A) Charge (B) Energy (C) Mass (D) Momentum

34. **Kirchhoff's loop rule is the consequence of the law of conservation of**
(A) Charge **(B) Energy** (C) Mass (D) Momentum

35. **10 cells, each of emf E and internal resistance r, are connected in series. If, by mistake, one of the cells is connected wrongly, the equivalent emf and internal resistance of the combination are**
(A) 10E, 10r **(B) 8E, 10r** (C) 9E, 10r (D) 8E, 8r

36. **Terminals of a cell are open. Now the potential difference across its terminals is**

(A) less than emf of the cell (B) more than emf of the cell

(C) equal to emf of the cell (D) equal to potential drop across internal resistance

37. **Terminals of a cell are closed by connecting a resistor. The potential difference across its terminals is**

(A) less than emf of the cell (B) more than emf of the cell

(C) equal to emf of the cell (D) equal to potential drop across internal resistance

38. **On increasing the temperature of a conductor, its resistance increases because**

(A) Relaxation time decreases (B) mass of the electrons increases

(C) number density of electron decreases (D) charge of the electrons increases

CHAPTER – 4 : MOVING CHARGES AND MAGNETISM

1. **The concept that moving charges or currents produce a magnetic field was discovered by**

(A) Ampere (B) Faraday (C) Fleming **(D) Oersted**

2. **The correct expression for Lorentz force is**

(A) $\vec{F} = q(\vec{E} + \vec{v} \times \vec{B})$ (B) $\vec{F} = q(\vec{B} + \vec{v} \times \vec{E})$ (C) $\vec{F} = q(\vec{E} + \vec{B} \times \vec{v})$ (D) $\vec{F} = (\vec{E} + \vec{v} \times \vec{B})$

3. **Lorentz force is the force experienced by a charged particle moving in**

(A) electric and gravitational fields (B) magnetic and gravitational fields

(C) electric and magnetic fields (D) gravitational field only

4. **Magnetic field is a**

(A) scalar quantity **(B) vector quantity**

(C) dimensionless quantity (D) a quantity without unit

5. **Force acting on a charged particle moving in a uniform magnetic field is maximum when**

(A) the charged particle moves parallel to the magnetic field.

(B) the charged particle moves perpendicular to the magnetic field.

(C) the charged particle moves antiparallel to the magnetic field.

(D) the charged particle moves at an angle of 45^o to the magnetic field.

6. **Force acting on a charged particle moving in a uniform magnetic field is zero when the angle between its velocity and magnetic field is**

(A) 0^o (B) 45^o (C) 60^o (D) 90^o

7. **A magnetic field exerts no force on**

(A) stream of electrons (B) stream of protons

(C) un-magnetised piece of iron **(D) stationary charge**

8. **A neutron moves with a uniform velocity at an angle of 90^o to a uniform magnetic field. Its path will be**

(A) a circular (B) a parabolic (C) elliptical **(D) a straight line**

9. **A proton moves with a uniform velocity at an angle of 90^o to a uniform magnetic field. Its path will be**

(A) circular (B) parabolic (C) elliptical (D) straight line

10. **A charged particle moves parallel to a magnetic field. Its path is**
(A) circular (B) parabolic (C) elliptical **(D) straight line**

11. **An alpha particle enters a uniform magnetic field neither parallelly nor perpendicularly. Its path is**
(A) circular (B) parabolic **(C) helical** (D) straight line

12. **A charged particle moving in a magnetic field region describes helical path, when the angle between the velocity of the charge and the magnetic field is:**
(A) 0° (B) 90° **(C) Between 0° and 90°** (D) 180°

13. **An electron moves along positive X-axis in a magnetic field parallel to positive Y-axis.**
The direction of magnetic force on the electron will be along
(A) X-axis (B) Z-axis **(C) negative Z-axis** (D) Y-axis

14. **A charged particle moving with a certain speed enters a uniform magnetic field aligned in some other direction to its motion. Now,**
(A) its speed changes (B) its kinetic energy changes
(C) its charge changes **(D) its direction of motion and hence velocity changes**

15. **SI unit of magnetic field is**
(A) ampere **(B) tesla** (C) weber (D) henry

16. **Choose the WRONG relationship out of the following**
(A) $1\ T = 1\ N\ A^{-1}\ m^{-1}$ (B) $1\ T = 1\ Wb/m^2$ **(C) $1\ T = 1\ Wb\ A^{-1}\ m^{-1}$** (D) $1\ T = 10^4 G$

17. **Force acting on a conductor carrying current placed in a uniform magnetic field will be minimum if**
(A) It is placed parallel to the magnetic field
(B) It is placed at an angle of 45^o to the magnetic field.
(C) It is placed perpendicular the magnetic field
(D) It is placed at an angle of 60^o to the magnetic field.

18. **Which of the following in motion cannot be deflected by magnetic fields?**
(A) Protons (B) Cathode rays (C) Alpha particles **(D) Neutrons**

19. **Moving with the same kinetic energy and in the same uniform magnetic field, which one of the following describes a circular path of greatest radius?**
(A) proton (B) electron **(C) deuteron** (D) alpha particle.

20. **An electron is fired parallel to uniform electric and uniform magnetic fields acting simultaneously and in the same direction. The electron**
(A) gains kinetic energy **(B) loses kinetic energy**
(C) moves in circular path (D) moves in a parabolic path.

21. **A proton moves vertically upwards in a uniform magnetic field directed to the west. The force on the proton will be towards**
(A) North **(B) South** (C) East (D) West

22. **A proton and a deuteron of equal momenta enter a uniform magnetic field normally. The ratio of the radii of their orbits is**
(A) 1 : 2 **(B) 1 : 1** (C) 2 : 1 (D) 1 : 4

23. **An electron and a proton both moving with the same energy enter a uniform magnetic field directed perpendicular to the velocity of the particles. The particles will now move in circular orbits such that**
(A) The period of electron is greater (B) The radius of electron orbit is greater
(C) The radius of the proton orbit is greater (D) The radii are the same

24. **Relation between current and magnetic field produced by a current element is given by**
(A) Ampere's law (B) Coulomb's law **(C) Biot-Savart's law** (D) Maxwell's law

25. **Magnetic field produced by a circular coil carrying current is maximum**
(A) at the centre of the coil.
(B) near the circumference of the coil.
(C) at infinite distance from the centre of the coil along the axis of the coil.
(D) at a distance √2 times the radius from the centre of the coil.

26. **Magnetic field due to an infinitely long straight current carrying wire at a distance r outside is**
(A) directly proportional to r **(B) inversely proportional to r**
(C) directly proportional to r^2 (D) inversely proportional to r^2

27. **Magnetic field (B) inside a solenoid is given by the expression**
(μ_0 – permeability of vacuum, n – number of turns per unit length, I – current through solenoid)
(A) $B = \mu_0 nI$ (B) $B= \mu_0 /nI$ (C) $B = \mu_0 n/I$ (D) $B = \mu_0 I /n$

28. **A current carrying loop placed in a uniform magnetic field**
(A) experiences only force **(B) experiences only torque**
(C) experiences both torque and force (D) does not experience both torque and force

29. **A current carrying loop placed in a non-uniform magnetic field**
(A) experiences only force (B) experiences only torque
(C) experiences both torque and force (D) does not experience both torque and force

30. **Product of area and current through a current loop is called**
(A) magnetic induction **(B) magnetic dipole moment**
(C) magnetic permeability (D) magnetic intensity

31. **The magnetic dipole moment of a current carrying coil is independent of**
(A) number of turns in the coil (B) area of each turn of the coil
(C) current flowing through the coil (D) magnetic field in which coil is placed.

32. **SI unit of magnetic dipole moment is** (A) Am **(B) Am^2** (C) A/m (D) Am^{-2}

33. **Net force acting on a circular current loop placed in a uniform magnetic field is**
(A) BIL/2 (B) BIL (C) 2BIL **(D) zero**

34. **For a galvanometer, deflection per unit current is**
(A) voltage sensitivity **(B) current sensitivity** (C) figure of merit (D) resistance

35. **For a galvanometer, deflection per unit voltage is**
(A) voltage sensitivity (B) current sensitivity (C) figure of merit (D) resistance

36. **In a moving coil galvanometer, to make the field radial**

(A) Coil is wound on wooden frame (B) A bar magnet is used

(C) A horse shoe magnet is used

(D) Magnetic poles are concave shaped & soft iron core cylindrical in shape

37. **Current sensitivity of a galvanometer can be increased by**

(A) increasing the number of turns in the coil

(B) decreasing the area of the coil.

(C) increasing the torsional constant of the spring

(D) decreasing the strength of the magnetic field of the pole pieces

38. **To increase the current sensitivity of a moving coil galvanometer by 100%, its resistance is increased by increasing the number of turns so that, the new resistance becomes twice its initial resistance. Then new voltage sensitivity is**

(A) increased by 25% (B) decreased by 25%

(C) remains same (D) increased by 25%

39. **Current flowing in a circuit can be measured using**

(A) voltmeter (B) galvanometer (C) generator **(D) ammeter**

40. **A potential difference across a resistor can be measured using**

(A) voltmeter (B) galvanometer (C) generator (D) ammeter

41. **A galvanometer is converted into ammeter by**

(A) Connecting a high resistance in series with it

(B) Connecting a low resistance in series with it

(C) Connecting a high resistance in parallel with it

(D) Connecting a low resistance in parallel with it

42. **A galvanometer is converted into voltmeter by**

(A) Connecting a high resistance in series with it.

(B) Connecting a low resistance in series with its coil

(C) Connecting a high resistance in parallel with its coil

(D) Connecting a low resistance in parallel with its coil

FILL IN THE BLANKS (FIB) QUESTIONS:

1) Moving charges or currents produced a ________________ in the surrounding space.

2) Force on a negative charge is ____________ to that on a positive charge.

3) The particle will describe a circle if velocity and magnetic field are _______ to each other.

4) Two infinitely long conductors carrying currents in the same direction _____ each other.

5) _________ rule is used to determine the direction of the magnetic field due to a long wire.

6) The net force experienced by charged particle in both magnetic field and electric field is called ______________

7) The resistance of an ideal voltmeter is __________

8) A moving coil galvanometer with a shunt resistance in parallel is called ______________

9) Nature of path traced by a charged particle when it enters an electric field in the direction of electric field is ___________

10) ____________ is always connected in parallel with the circuit elements.

11) The line integral of magnetic field around the boundary of any closed surface is equal to μ_0 times the net ________ passing through the surface.

12) The concept of a field was incorporated by __________ in his unification of electricity and magnetism.

13) The resistance of an ideal ammeter is __________

14) The relation between current and the magnetic field it produces is given by the ___________

15) ________ consists of a long wire wound in the form of a helix where the neighbouring turns are closely spaced.

Answers : 1) magnetic field 2) opposite 3) perpendicular 4) attract 5) Right-hand 6) Lorentz force 7) infinite 8) ammeter 9) straight line 10) voltmeter 11) current 12) Maxwell 13) zero 14) Biot-Savart's law 15) solenoid

CHAPTER – 5 : MAGNETISM AND MATTER

1. **Which of the following is WRONG statement regarding magnetic field lines?**
(A) Magnetic field lines do not intersect.
(B) Magnetic field lines form closed loops.
(C) The tangent to the magnetic field line gives the direction of magnetic field at that point.
(D) Magnetic field lines are directed from north to south inside a magnet.

2. **Identify the WRONG statement among the following options about magnetism :**
(A) Earth behaves as a huge magnet.
(B) When a bar magnet is freely suspended, it points in the north-south direction.
(C) Like poles repel and unlike poles attract each other.
(D) We can isolate the north and south pole of a magnet.

3. **Magnetic field at a distance r on the axial line of a magnetic dipole (or a bar magnet) is**
(A) directly proportional to r^2 (B) inversely proportional to r^2
(C) directly proportional to r^3 **(D) inversely proportional to r^3.**

4. **Potential energy stored in a magnetic dipole placed with its magnetic moment (m) inclined at an angle θ to the external magnetic field (B) is given by**
(A) $U = -mB\cos\theta$ (B) $U = -mB\sin\theta$ (C) $U = mB\cos\theta$ (D) $U = mB\sin\theta$

5. **Potential energy of a magnetic dipole with its magnetic moment aligned at an angle θ to the external uniform magnetic field is maximum (most unstable orientation of dipole) when**
(A) $\theta = 0^o$ (B) $\theta = 90^o$ **(C) $\theta = 180^o$** (D) $\theta = 45^o$

6. **Potential energy of a magnetic dipole with its magnetic moment aligned at an angle θ to the external uniform magnetic field is minimum (most stable orientation of dipole) when**
(A) $\theta = 0^o$ (B) $\theta = 90^o$ (C) $\theta = 180^o$ (D) $\theta = 45^o$

7. **Potential energy of a magnetic dipole with its magnetic moment aligned at an angle θ to the external uniform magnetic field is zero when**
(A) $\theta = 0^o$ **(B) $\theta = 90^o$** (C) $\theta = 180^o$ (D) $\theta = 45^o$

8. **Gauss's law in magnetism states that**
(A) The net magnetic flux through any closed surface is μ_0 times the current
(B) The net magnetic flux through any closed surface is zero
(C) The net magnetic flux through any closed surface is unity
(D) The net magnetic flux through any closed surface is μ_0 times magnetic moment.

9. **The net magnetic flux through any closed surface is (A-area of closed surface)**
(A) unity (B) $\mu_0 A$ (C)) μ_0 I **(D) zero**

10. **Net magnetic moment per unit volume of a magnetic material is called**
(A) magnetisation (B) magnetic intensity
(C) magnetic permeability (D) magnetic susceptibility

11. **SI unit of magnetisation and magnetic intensity is**
(A) Am (B) Am^2 **(C) A/m** (D) Am^{-2}

12. **SI unit of magnetic permeability is**
(A) $TA^{-1}m$ (OR Hm^{-1}) (B) TAm^2 (C) Am^{-1} (D) Am^{-2}

13. **The ratio of magnetisation to magnetic intensity is called**
(A) relative permeability (B) absolute permeability
(C) magnetic susceptibility (D) retentivity

14. **Relative permeability (μ_r), absolute permeability of a medium (μ) and permeability of vacuum or free space (μ_0) are related as**
(A) $\mu = \mu_0\mu_r$ (B) $\mu_r = \mu_0\mu$ (C) $\mu_0 = \mu_r \mu$ (D) $\mu = \mu_0 + \mu_r$

15. **Relative permeability (μ_r) and susceptibility (χ) of a magnetic material are related as**
(A) $\mu_r = \chi$ **(B) $\mu_r = 1+\chi$** (C) $\mu_r \chi = 1$ (D) $\mu_r = 1-\chi$

16. **The property of perfect diamagnetism in superconductors exhibited is called**
(A) Meisner effect (B) curie law (C) Hysteresis (D) Retentivity

17. **In which of the following he materials, the magnetic permeability is independent of temperature?**
(A) diamagnetic (B) paramagnetic (C) hard ferromagnetic (D) soft ferromagnetic

18. **The substances (materials) which are weakly repelled by a strong magnet are called as**
(A) diamagnetic (B) paramagnetic (C) hard ferromagnetic (D) soft ferromagnetic

19. **Magnetic materials whose susceptibility is low and negative are**
(A) diamagnetic (B) paramagnetic (C) hard ferromagnetic (D) soft ferromagnetic

20. **Magnetic materials whose susceptibility is small and positive are**
(A) diamagnetic **(B) paramagnetic** (C) ferromagnetic (D) superconductors

21. **Magnetic materials whose susceptibility is high and positive are**
(A) diamagnetic (B) paramagnetic **(C) ferromagnetic** (D) superconductors

22. **Which among the following is a not a diamagnetic material?**
(A) Bismuth (B) Copper (C) Lead **(D) Iron**

23. **Which among the following is a not a paramagnetic material?**
(A) Aluminium (B) Sodium (C) Calcium **(D) Copper**

24. **Which among the following is a not a ferromagnetic material?**
(A) Aluminium (B) Nickel (C) Cobalt (D) Iron

25. **Identify the property exhibited by diamagnetic substances:**

(A) They are repelled by a magnet.

(B) Their susceptibility varies inversely as absolute temperature.

(C) Their susceptibility value is positive

(D) They have very high value of susceptibility.

26. **Identify the wrong statement regarding paramagnetic substances:**

(A) They are attracted by a magnet.

(B) Their susceptibility varies inversely as absolute temperature.

(C) Their susceptibility value is positive.

(D) They have very high value of susceptibility.

FILL IN THE BLANKS (FIB) QUESTIONS:

1. The direction of magnetic dipole moment of a magnet is from _________inside the magnet.
2. In the northern hemisphere, magnetic field lines due to earth's field points__________
3. The net magnetic flux through a closed surface is __________
4. The materials which develop feeble (weak) magnetization in the direction of the magnetizing field are called _____
5. The susceptibility of a _____ substance is independent of magnetizing field and temperature.
6. The phenomenon of exhibiting diamagnetic property by the superconductors is called_____

ANSWERS:

1. south to north 2.towards earth 3.zero 4 . paramagnetic 5. Diamagnetic 6.Meisner effect

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CHAPTER – 6: ELECTROMAGNETIC INDUCTION

1. **Electromagnetic induction was discovered by**
   (A) Michael Faraday (B) Lenz (C) Gauss (D) Tesla

2. **Electromagnetic induction is**
   (A) the magnetic field developed due to displacement current.
   (B) The magnetic field developed due to conduction current
   (C) induction of emf in a coil when the magnetic flux through it varies with time.
   (D) The magnetic field developed due to timely varying electric flux.
3. **An emf will be induced in a coil when**
   (A) the coil is rotated near a magnet. (B) area of cross section of coil is varied.
   (C) a magnet is moved towards and away from the coil. **(D) by any of the above method.**
4. **SI unit of magnetic flux is** (A) ampere (B) tesla **(C) weber** (D) henry
5. **SI unit of magnetic flux is** **(A) Tm^2** (B) Wb m^2 (C) Tm^{-2} (D) Wb m^{-2}
6. **SI unit of magnetic field is** (A) Tm^2 (B) Wb m^2 (C) Tm^{-2} **(D) Wb m^{-2}**
7. **SI unit of self(or mutual)) inductance is** (A) ampere (B) tesla (C) weber **(D) henry**

8. **Scalar quantity among the following is**
(A) magnetic moment (B) magnetic intensity **(C) magnetic flux** (D) magnetisation

9. **The magnitude of induced emf in a circuit is equal to time rate of change of magnetic flux through the circuit is**
(A) Faraday's law (B) Lenz's law (C) Gauss's law (D) Kirchhoff's law

10. **The law which gives polarity of induced emf in a circuit due to rate of change of magnetic flux is**
(A) Faraday's law **(B) Lenz's law** (C) Gauss' law (D) Kirchhoff's law

11. **Lenz's law is the consequence of (or based on or significance)**
(A) the law of conservation of charge **(B) the law of conservation of energy**
(C) the law of conservation of momentum (D) the law of conservation of angular momentum

12. **The direction of induced current in electromagnetic induction is given by**
(A) Faraday's law **(B) Lenz's law** (C) Maxwell's law (D) Ampere's law

13. **Emf induced (ε) in a metallic rod of length L moving perpendicular (normal) to a uniform magnetic field B with a speed v is**
(A) ε = BLv (B) ε = BL/v (C) ε = Bv/L (D) ε = Lv/B

14. **A rod of finite length is moved perpendicular to the uniform magnetic field. No emf induced it at all. The material of the rod should be**
(A) Iron (B) Copper (C) Aluminium **(D) Wood**

15. **Emf induced (ε) in a metallic rod of length L moving along (parallel) or opposite to the uniform magnetic field B with a speed v is**
(A) ε = BLv **(B) ε = 0** (C) ε = Bv/L (D) ε = Lv/B

16. **The unit of mutual inductance of pair of coils is**
(A) henry (B) ohm (C) farad (D) ohm-metre

17. **Mutual induction principle is used in**
(A) Choke coil **(B) Transformer** (C) Rectifier (D) Cyclotron

18. **Self induction principle is used in**
(A) Choke coil (B) Transformer (C) rectifier (D) Cyclotron

19. **Self inductance of a solenoid independent of**
(A) number of turns in the solenoid (B) area of cross section of solenoid
(C) length of the solenoid **(D) current through the solenoid**

20. **Self-inductance of a solenoid can be increased by**
(A) increasing the current flowing through it (B) decreasing the area of cross section
(C) decreasing the number of turns **(D) inserting an iron rod inside it.**

21. **Mutual inductance between a pair of co-axial solenoids is independent of**
(A) number of turns in both the solenoids (B) permeability of medium between solenoids
(C) length of solenoids **(D) current through the solenoid**

22. **If the number of turns of a solenoid is doubled without changing it length , the self inductance of the solenoid will**
(A) remains unchanged (B) be doubled (C) be halved **(D) becomes four times**

23. An iron rod is introduced into to a solenoid. Now its self-inductance

(A) increases (B) decreases

(C) remains the same (D) may increase or decrease depending on size of the rod

24. Energy stored in an inductor of self-inductance L, when the current increases from zero to I is

(A) U = ½ LI (B) U= ½ I/L **(C) $U = \frac{1}{2} LI^2$** (D) $U = \frac{1}{2} L^2 I$

25. AC generator works on the principle of

(A) Force on a current carrying conductor placed in magnetic field

(B) electromagnetic induction

(C) production of displacement current due to varying electric flux

(D) magnetic effect of electric current.

26. AC generator converts

(A) mechanical energy to chemical energy **(B) mechanical energy to electrical energy**

(C) electrical energy to mechanical energy (D) chemical energy to mechanical energy

27. Maximum value of emf generated in an ac generator is independent of

(A) Number of turns in the generator coil (B) area of the coil

(C) frequency of rotation of the coil **(D) resistance of the coil.**

28. Peak value (or maximum value or amplitude) of emf generated (ε_0) in an ac generator having coil of N turns , area of each turn - A, turning in a magnetic field B at an angular velocity ω is given by

(A) $\varepsilon_0 = NA^2B$ (B) $\varepsilon_0 = NAB^2\omega$ (C) $\varepsilon_0 = N^2AB\omega$ **(D) $\varepsilon_0 = NAB\omega$**

29. Number of cycles of ac generated per second is called

(A) Frequency of ac (B) period of ac (C) amplitude of ac (D) instantaneous emf

30. In AC generator induced emf is maximum when:

(A) Plane of the armature is parallel to the magnetic field

(B) Plane of the armature is perpendicular to the magnetic field

(C) Plane of the armature is either parallel or perpendicular to the magnetic field

(D) Plane of the armature is neither parallel nor perpendicular to the magnetic field

31. A coil is rotated with a constant angular speed ω in a uniform magnetic field, the equation for instantaneous value of emf induced (ε_0) in an AC generator coil is given by

(A) $\varepsilon = \varepsilon_0 \sin\omega t$ (B) $\varepsilon = \varepsilon_0 \sin^2\omega t$ (C) $\varepsilon = \varepsilon_0 \sin\omega^2 t$ (D) $\varepsilon = \varepsilon_0 \sin 2\omega t$

32. The value of induced emf in an AC generator coil is maximum when ωt =

(A) 0^o (B) 30^o (C) 60^o **(D) 90^o**

FILL IN THE BLANKS (FIB) QUESTIONS:

1) The induced emf in a coil can be increased by ___________ the number of turns.

2) Total number of magnetic lines of force crossing a surface normally is called _________ .

3) Phenomenon of production of induced emf due to change of magnetic flux linked with a closed circuit is known as _________ .

4) Direction of induced current is such that it always__________ the cause which produces it.

5) The self-induced emf is also called the ____________as it opposes any change in the current in a circuit.

6) Energy stored in the inductor is in the form of ________________ energy.

7) Lenz's law gives ___________ of induced emf.

8) The induced emf in a conductor moving in a magnetic field is called ___________

9) Mechanical energy is converted to electrical energy by ____________

10) Self-inductance plays the role of ___________

11) The pioneering experiments of ________________ have led directly to the development of modern day generators and transformers.

12) ____________ designed ac generator.

13) The direction of the current changes periodically and therefore current is called ________

14) S I unit of coefficient of self-induction (or self inductance) is _______________

15) The SI unit of magnetic flux is _______________

ANSWER:

1) increasing 2) magnetic flux 3) electromagnetic induction 4) opposes
5) back emf 6) magnetic 7) polarity 8) motional emf 9) generator 10) inertia
11) Faraday and Henry 12) Nicola Tesla 13) alternating current 14) henry 15) weber

CHAPTER – 7: ALTERNATING CURRENT

1. The amount of opposition offered by series LCR circuit is known as

(A) impedance (B) resistance (C) capacitance (D) inductance

2. The relation connecting rms value (V) and peak value (v_m) of alternating voltage is

(A) $V=\frac{v_m}{\sqrt{2}}$ (B) $V=\sqrt{2}\, v_m$ (C) $V = 2v_m$ (D) $V = \frac{1}{2} v_m$

3. An alternating voltage, $v=v_m \sin\omega t$ is applied across a resistor. The current through the resistor is

(A) $i = i_m \sin\omega t$ (B) $i = im \sin(\omega t + \pi/4)$ (C) $i = im \sin(\omega t+\pi/2)$ (D) $i = im \sin(\omega t-\pi/2)$

4. In the case of alternating voltage applied to a resistor:

(A) the current leads the voltage by a phase angle of $\pi/2$

(B) the current lags behind the voltage by a phase angle of $\pi/2$

(C) the current and the voltage are in-phase

(D) the current leads the voltage by a phase angle of $\pi/4$.

5. **When an alternating emf applied to a resistor, identify the wrong statement among the following**
   (A) The average current over a compete cycle is zero
   (B) The average current over a compete cycle is zero.
   (C) The phase difference between the current and the voltage is zero.
   (D) The average power over a compete cycle is zero.

6. **Power factor in a pure resistive ac circuit is**
   (A) unity (or one) (B) infinity (C) zero (D) $1/\sqrt{2}$

7. **Phase difference between voltage and current in a pure resistive AC circuit is**
   (A) zero (B) π (C) $\pi/2$ (D) $\pi/4$

8. **In an ac circuit,**
   (A) The average power dissipated by a resistor over a compete cycle is zero.
   (B) The average power dissipated by a capacitor or by an inductor over a compete cycle is zero.
   (C) The average power dissipated by a series LCR over a compete cycle is zero.
   (D) The average power dissipated by a series LCR over a compete cycle at resonance is zero.

9. **In an ac circuit, as the frequency of ac increases, find the wrong statement.**
   (A) capacitive reactance decreases (B) inductive reactance increases
   (C) resistance decreases (D) impedance first decreases and then increases

10. **AC voltage, $v=v_m \sin\omega t$ is applied across a pure inductor. Current through the inductor is**
    (A) $i = i_m \sin\omega t$ (B) $i = i_m \sin(\omega t + \pi/4)$ (C) $i = i_m \sin(\omega t+\pi/2)$ **(D) $i = i_m \sin(\omega t-\pi/2)$**

11. **When an alternating voltage is applied to an inductor,**
    (A) the current leads the voltage by a phase angle of $\pi/2$
    (B) the current lags behind the voltage by a phase angle of $\pi/2$
    (C) the current and the voltage are in phase
    (D) the current leads the voltage by a phase angle of $\pi/4$

12. **Phase difference between voltage and current in AC circuit containing only a pure inductor is**
    (A) zero (B) π **(C) $\pi/2$** (D) $\pi/4$

13. **Power factor in a pure inductive ac circuit is**
    (A) unity (or one) (B) infinity **(C) zero** (D) $1/\sqrt{2}$

14. **An inductor stores energy in the form of**
    (A) gravitational field **(B) magnetic field** (C) electric field (D) heat

15. **A capacitor stores energy in the form of**
    (A) gravitational field (B) magnetic field **(C) electric field** (D) heat

16. **An AC voltage, $v=v_m \sin\omega t$ is applied across a capacitor. Current through the capacitor is**
    (A) $i = i_m \sin\omega t$ (B) $i = i_m \sin(\omega t+\pi/4)$ **(C) $i = i_m \sin(\omega t+\pi/2)$** (D) $i = i_m \sin(\omega t-\pi/2)$

17. **In the case of alternating voltage applied to an capacitor:**

(A) The current leads the voltage by a phase angle of $\pi/2$

(B) The current lags behind the voltage by a phase angle of $\pi/2$

(C) The current and the voltage are in phase

(D) The current leads the voltage by a phase angle of $\pi/4$

18. **Phase difference between voltage and current in AC circuit containing only a capacitor is**

(A) zero (B) π **(C) $\pi/2$** (D) $\pi/4$

19. **The average power dissipated over a cycle by a capacitor (or pure inductor) connected to AC source is**

(A) zero (B) π (C) $\pi/2$ (D) $\pi/4$

20. **SI unit of inductive reactance or capacitive reactance or impedance is**

(A) ohm (B) tesla (C) weber (D) henry

21. **In a series RLC circuit, at resonance**

(A) inductive reactance is equal to resistance of resistor.

(B) capacitive reactance is equal to resistance of resistor.

(C) inductive reactance is equal to capacitive reactance.

(D) net impedance of the circuit is zero.

22. **In a series RLC circuit, at resonance**

(A) power factor is unity. (B) impedance of the circuit is equal to resistance

(C) current and voltages are in phase. **(D) All the above statements are correct.**

23. **The resonance condition in series LCR circuit is**

(A) $X_L = X_C$ (B) $X_L = R$ (C) $X_C = R$ (D) $X_C > X_L$

24. **Current will be wattless in an ac circuit containing**

(A) inductor, capacitor and resistor (B) inductor and resistor

(C) capacitor and resistor **(D) Inductor and capacitor**

25. **As the frequency of ac in a series RLC circuit is increased, the total impedance of the circuit,**

(A) increases (B) decreases

(C) decreases up to resonance and then increases. (D) remains the same

26. **Electrical components needed for electrical resonance in a circuit are**

(A) Resistor and capacitor (B) Resistor and Inductor

(C) Inductor and capacitor (D) Resistor and diode

27. **Principle of working of a transformer is**

(A) Self-induction (B) Ampere-Maxwell's law

(C) Mutual induction (D) Balanced Wheatstone bridge

28. **Transformer is a device**

(A) which converts ac to dc (B) which converts dc to ac

(C) which increases or decreases the amplitude of AC. (D) used to measure emf of a cell

29. In a step-up transformer

(A) number of turns in the secondary are more than the number turns at the primary

(B) number of turns in the secondary are less than the number turns at the primary

(C) number of turns in the primary and secondary are equal.

(D) primary and secondary are connected together by to facilitate current flow.

30. In a step-down transformer

(A) The secondary voltage is equal to primary voltage.

(B) The secondary voltage is more than the primary voltage.

(C) The secondary voltage is less than the primary voltage

(D) number of turns in the primary and secondary are equal.

31. A dc battery is connected to the primary coil of a step-up transformer, then

(A) Voltage at the secondary will be more than the DC battery voltage

(B) Voltage at the secondary will be less than the DC battery voltage

(C) Voltage at the secondary will be equal to the DC battery voltage

(D) Voltage at the secondary will be zero.

32. In a transformer, eddy currents losses are minimised by

(A) using thin copper wires (B) winding more turns of coil

(C) laminated core (D) using heavy large single iron core.

33. In a transformer, heat loss due to resistance of wires are minimised by

(A) using thin copper wires (B) winding more turns of coil

(C) using thick copper wires (D) laminated core.

34. The quantity that doesn't change from input to output of a practical transformer is

(A) Power (B) voltage **(C) frequency of ac** (D) current

CHAPTER – 8: ELECTROMAGNETIC WAVES

1. Inconsistency in Ampere's circuital law was identified by

(A) J.C. Maxwell (B) Gauss (C) Michael Faraday (D) Heinrich Hertz

2. Electromagnetic wave theory was proposed by

(A) J.C. Maxwell (B) Gauss (C) Michael Faraday (D) Heinrich Hertz

3. Electromagnetic wave theory was experimentally proved by

(A) J.C. Maxwell (B) Gauss (C) Michael Faraday **(D) Heinrich Hertz**

4. Current produced due to time varying electric field/flux is called

(A) conduction current **(B) displacement current** (C) drift current (D) induced current

5. By using symbols having their usual meaning, displacement current (i_d) can be expressed as

(A) $i_d = \varepsilon_0 \frac{d\phi_E}{dt}$ (B) $i_d = \varepsilon_0 \frac{d\phi_B}{dt}$ (C) $i_d = \mu_0 \frac{d\phi_E}{dt}$ (D) $i_d = \mu_0 \frac{dE}{dt}$

6. Displacement current arises due to:

(A) time varying electric flux (B) constant electric flux

(C) change in magnetic flux (D) constant magnetic flux

7. **Electromagnetic waves are produced**
(A) by an oscillating charge (B) by an accelerated charge
(C) when electrons undergo transition from higher energy level to lower energy level
(D) by all the above methods

8. **Electromagnetic waves are**
(A) transverse waves (B) longitudinal waves
(C) mechanical waves (D) one dimensional waves

9. **Angle between electric and magnetic field directions in a electromagnetic wave is**
(A) 0^o **(B) 90^o** (C) 180^o (D) 45^o

10. **The speed of a electromagnetic wave (c) in vacuum (or free space) in terms of permeability (μ_o) and permittivity (ε_o) of free space (vacuum) is**
(A) $c = \frac{1}{\sqrt{\mu_0\varepsilon_0}}$ (B) $c = \frac{1}{\mu_0\varepsilon_0}$ (C) $c = \sqrt{\frac{\varepsilon_0}{\mu_0}}$ (D) $c = \sqrt{\mu_0\varepsilon_0}$

11. **Velocity of an electromagnetic wave in vacuum (c) in terms of propagation constant (k) and angular frequency (ω) is**
(A) $c = \omega k$ **(B) $c = \omega/k$** (C) $c = k/\omega$ (D) $c = \omega + k$

12. **Velocity of an electromagnetic wave in vacuum (c) in terms of amplitudes of electric field (E_0) and magnetic (B_0) field is**
(A) $c = E_0/B_0$ (B) $c = E_0 B_0$ (C) $c = B_0/E_0$ (D) $c = B_0 + E_0$

13. **Momentum (p) of an electromagnetic wave having energy E is**
(A) p = E/c (B) p = Ec (C) p = c/E (D) p = c + E

14. **The ultraviolet region of the electromagnetic spectrum lies between**
(A) X-ray region and visible region (B) Microwave region and radio-wave region
(C) γ-rays region and X-rays region (D) Visible region and microwave region

15. **Electromagnetic waves having shortest wavelength among the following are**
(A) radio waves (B) ultraviolet rays (C) infrared waves **(D) gamma rays**

16. **Radio waves are used**
(A) To ionize atoms (B) in the treatment of cancer
(C) in communication (D) to sterilize water

17. **Microwaves waves are used**
(A) To ionize atoms (B) in the treatment of cancer
(C) **microwave ovens** (D) sterilize water

18. **The electromagnetic waves used in RADAR communication systems are**
(A) Radio waves **(B) Microwaves** (C) Infrared waves (D) ultraviolet rays

19. **Which electromagnetic waves are referred as heat waves?**
(A) Micro waves (B) radio waves (C) ultraviolet waves **(D) Infra-red waves**

20. **A very hot object emits**
(A) Infra-red (IR) rays (B) X-rays (C) Gamma rays (D) UV rays

21. **The electromagnetic radiation used to diagnose the fracture in bones is**
(A) IR rays **(B) X-rays** (C) Gamma rays (D) UV rays

22. When high energy electrons are bombarded with metal target, electromagnetic waves produced are
(A) IR rays **(B) X-rays** (C) Gamma rays (D) UV rays

23. Electromagnetic waves used in LASIK eye surgery is
(A) IR rays (B) X-rays (C) Gamma rays **(D) UV rays**

24. A radioactive source emits
(A) Radio waves (B) Laser **(C) Gamma rays** (D) Microwaves

25. Which of the following electromagnetic wave used in the treatment of cancer
(A) IR –rays (B) visible rays **(C) X-rays/Gamma rays** (D) Ultraviolet rays

26. The radiation which can produce more melanin and cause skin burn (cancer) is
(A) IR rays **(B) UV rays** (C) Gamma rays (D) Microwaves

27. The electromagnetic waves used to kill germs in water purifiers are:
(A) Microwaves (B) Infrared waves (C) Visible rays (D) Ultraviolet ray

28. The wavelength range of visible light is
(A) 400 Å to 700 Å **(B) 400nm to 700nm** (C) 1nm to 400nm (D) 400 Å to 1Å

29. The wavelength range of ultraviolet rays is
(A) 400 Å to 700 Å (B) 400nm to 700nm **(C) 1nm to 400nm** (D) 400 Å to 1Å

30. The wavelength range of Infra-red ((IR) waves is
(A) 400 Å to 700 Å **(B) 700nm to 1mm** (C) 1nm to 400nm (D) 400 Å to 1Å

31. The wavelength range of microwaves is
(A) 400 Å to 700 Å (B) 700nm to 1mm **(C) 1mm to 10 cm** (D) 400 Å to 1Å

32. The electromagnetic waves arranged in decreasing (descending) order of wavelength as
(A) Micro waves, Infrared waves, Ultraviolet rays, Gamma rays.
(B) Infrared waves, Micro waves, Ultraviolet rays, Gamma rays.
(C) Gamma rays, Infrared waves, Micro waves, Ultraviolet rays.
(D) Infrared waves, Gamma rays, Micro waves, Ultraviolet rays.

33. In which of the following options, electromagnetic waves are in the ascending (increasing) order of energy (or frequency)?
(A) Infrared waves, Radio waves, X-rays, Visible light
(B) Radio waves, Infrared waves, Visible light, X-rays
(C) Radio waves, Visible light, Infrared waves, X-rays
(D) X-rays, Visible light, Infrared waves, Radio waves

CHAPTER – 9 : RAY OPTICS AND OPTICAL INSTRUMENTS

1. Geometric centre of a spherical mirror is called
(A) aperture **(B) pole** (C) vertex (D) focus

2. Geometric centre of a spherical refracting lens is called
(A) aperture (B) pole **(C) optic centre** (D) focus

3. If f is the focal length of a curved mirror of radius of curvature R, then
(A) f = R/2 (B) f =2R (C) f =2/R (D) f = R

4. **For a mirror, object distance (u), image distance (v) and focal length (f) are related as**

(A) $\mathbf{\frac{1}{f}=\frac{1}{u}+\frac{1}{v}}$ (B) $\frac{1}{u}=\frac{1}{f}+\frac{1}{v}$ (C) $\frac{1}{v}=\frac{1}{f}+\frac{1}{v}$ (D) $\frac{2}{f}=\frac{1}{u}+\frac{1}{v}$

5. **Which mirror can produce both real and virtual images of a real object?**

(A) Concave mirror (B) convex mirror (C) plane mirror (D) Both convex and plane mirror

6. **For an object kept in front of a convex mirror, the magnification is**

(A) always greater than one and positive (B) always less than one and negative

(C) always less than one and positive (D) always greater than one and negative

7. **When a ray of light travels from one medium to another (during refraction), the quantity that doesn't change (remains same) is**

(A) speed of light (B) wavelength of light

(C) wave number of light **(D) frequency of light**

8. **The colour of light which travels with highest speed in a medium (other than air) is**

(A) Red (B) Blue (C) violet (D) yellow

9. **The colour of light which travels with highest refractive index in a medium (other than air) is**

(A) Red (B) Blue **(C) violet** (D) yellow

10. **Optical fiber works on the principle of**

(A) Total internal reflection (B) refraction (C) interference (D) diffraction

11. **The critical angle of incidence in the denser medium:**

(A) Light ray refracts to the rarer medium. (B) Light ray reflects to the denser medium.

(C) Light ray grazes the refracting surface. (D) Angle of refraction is 0°.

12. **If the light travels from denser medium to a rarer medium and $i > i_C$ then light :**

(A) refracts into rarer medium (B) grazes the interface of two media

(C) undergoes TIR into denser medium. (D) partially reflected and refracted..

13. **A convex lens (concave mirror) is producing same sized real image. The object distance is**

(A) f (B) 4f **(C) 2f** (D) 3f

14. **Optic fibres are used**

(A) to transmit optical signals (B) in decorative lamps

(C) to facilitate visual examination of internal organs like stomach and intestines (endoscopy)

(D) in all the above applications.

15. **Focal length of a lens does not depend on**

(A) refractive index of lens and refractive index of surrounding medium.

(B) wavelength of light

(C) radii of curvature of the two surfaces of the lens.

(D) distance of the object from the lens.

16. **Reciprocal of focal length of a lens is called**

(A) power (B) critical angle (C) refractive index (D) magnification

17. **SI unit of power of lens is**

(A) watt (W) **(B) dioptre (D)** (C) horse power (hp) (D) joules/second

18. A lens is always producing virtual diminished image irrespective of object distance. The lens is

(A) Concave lens (B) convex lens (C) Plano convex lens (D) Glass sphere

19. An object is placed at a distance 2f from a convex lens (or concave mirror). The magnification(m) of image is

(A) m = –2 (B) m = +1 (C) m=+2 **(D) m= –1**

20. For an object kept in front of a concave lens, the magnification is

(A) is always less than one and positive. (B) is always less than one and negative

(C) is always greater than one and positive (D) is always greater than one and negative.

21. For a thin lens, object distance (u), image distance (v) and focal length (f) are related as

(A) $\frac{1}{f}=\frac{1}{u}+\frac{1}{v}$ (B) $\frac{1}{v}=\frac{1}{f}-\frac{1}{u}$ **(C) $\frac{1}{f}=\frac{1}{v}-\frac{1}{u}$** (D) $\frac{2}{f}=\frac{1}{u}+\frac{1}{v}$

22. In a prism, as the angle of incidence is increased, angle of deviation

(A) decreases continuously (B) increases continuously

(C) first decreases, reaches a minimum value and then increases (D) does not change

23. At the minimum angle of deviation position of a prism,

(A) Angle of incidence and angle of emergence are equal (i=e).

(B) Angle refraction at first surface (r_1) is equal to angle of incidence (r_2) at the second surface. i.e., $r_1 = r_2$

(C) Angle of the prism is equal to double the angle of retraction, i.e., A = 2 r_1.

(D) All the above statements are correct.

24. A thin prism is one whose refracting angle is

(A) equal to 60^o (B) equal to 45^o (C) equal to 90^o **(D) less than 10^o**

25. Image formed by a simple microscope is

(A) enlarged, real and erect (B) diminished, virtual and erect

(C) enlarged, virtual and erect (D) enlarged, real and erect

26. If D is least distance of distinct vision, f – focal length, magnification (m) of a simple microscope for the image formed at least distance of distinct vision is

(A) $m=1+\frac{D}{f}$ (B) $m=1-\frac{D}{f}$ (C) $m=1+\frac{f}{D}$ (D) $m=1-\frac{f}{D}$

27. Magnification of a simple microscope when the image is formed at infinity is (D – least distance of distinct vision, f – focal length of lens)

(A) $m=-\frac{D}{f}$ **(B) $m=\frac{D}{f}$** (C) $m=\frac{f}{D}$ (D) $m=-\frac{f}{D}$

28. If D is least distance of distinct vision, f_o is focal length of objective lens, f_e is the focal length of eyepiece and L is tube length then the magnification of compound microscope for the final image at least distance of distinct vision is

(A) $m=\frac{L}{f_o}\left(1+\frac{D}{f}\right)$ (B) $m=\frac{L}{f_o}\left(1-\frac{D}{f}\right)$ (C) $m=\frac{L}{f_o}\left(1+\frac{f}{D}\right)$ (D) $m=\frac{L}{f_o}\left(1-\frac{f}{D}\right)$

29. If D is least distance of distinct vision, f_o is focal length of objective lens, f_e is the focal length of eyepiece and L is tube length then the magnification of compound microscope for image at infinity is

(A) $m = \frac{L}{f_o} \times \frac{D}{f_e}$ (B) $m = \frac{L}{f_o}\left(-\frac{D}{f_e}\right)$ (C) $m = \frac{L}{f_o} \times \frac{f_e}{D}$ (D) $m = \frac{L}{f_o} \times \frac{f_e}{D}$

30. If f_o be focal length of objective lens, f_e be the focal length of eyepiece then the magnification of telescope is

(A) $m = f_o/f_e$ (B) $m = f_e/f_o$ (C) $m = 1+ f_o/f_e$ (D) $m = 1+ f_e/f_o$

31. If f_o is focal length of objective, f_e is the focal length of eyepiece, then the tube length of telescope is

(A) $L = f_o/f_e$ (B) $L = f_e/f_o$ (C) $L = f_o\, f_e$ **(D) $L = f_o + f_e$**

CHAPTER – 10: WAVE OPTICS

1. Corpuscular theory was initially proposed by

(A) Descartes (B) Christian Huygens (C) J C Maxwell (D) Snell

2. Wave theory of light was proposed by

(A) Descartes **(B) Christian Huygens** (C) J C Maxwell (D) Newton

3. Electromagnetic theory of light was proposed by

(A) Descartes (B) Christian Huygens **(C) J C Maxwell** (D) Newton

4. Quantum theory of light was proposed by

(A) Heinrich hertz (B) Christian Huygens (C) J C Maxwell **(D) Max Planck**

5. Which phenomenon associated with light could only be explained using quantum theory light?

(A) Interference (B) Diffraction (C) Polarisation **(D) Photoelectric effect**

6. According to Huygens principle, wavefront emitted from a point source of light is

(A) cylindrical wavefront **(B) spherical wavefront**

(C) plane wavefront (D) parallel rays

7. According to Huygens principle, wavefront emitted from a linear source of light is

(A) cylindrical wavefront (B) spherical wavefront (C) plane wavefront (D) parallel rays

8. According to Huygens principle, wavefront emitted from a linear source of light at infinity is

(A) cylindrical wavefront (B) spherical wavefront

(C) plane wavefront (D) convergent rays

9. A plane wavefront is incident on a convex lens, the refracted wavefront is

(A) spherical wavefront converges at 2F **(B) spherical wavefront converges at F**

(C) plane wavefront moving towards infinity (D) spherical wavefront converging at 4F

10. A point source of light is placed at the principal focus of a convex lens, the refracted wavefront is

(A) spherical wavefront converges at 2F (B) spherical wavefront converges at F

(C) plane wavefront moving towards infinity (D) spherical wavefront converging at 4F

11. Modification in the distribution of light energy due to the superposition of two or more light waves from coherent sources is known as

(A) Polarisation (B) Refraction **(C) interference** (D) diffraction

12. The image of a point object is not a point but spreads over a small area due to the phenomenon:

(A) refraction (B) polarization (C) interference **(D) diffraction**

13. Which phenomenon of light is involved in the colourful appearance of soap bubble or thin film of oil on the surface of water?

(A) Photoelectric effect (B) diffraction **(C) interference** (D) polarisation

14. If I_o is the intensity of each coherent source of same amplitude, the intensities at the maxima and minima of interference pattern are respectively

(A) I_o and zero (B) zero and I_o **(C) $4I_o$ and zero** (D) zero and $4I_o$

15. If a is the amplitude of coherent sources, amplitude of the resultant wave at the maxima and at minima are

(A) a and zero **(B) 2a and zero** (C) zero and 2a (D) 4a and zero

16. Distance between two successive bright fringes or two successive dark fringes is called

(A) Lateral Shift (B) Normal Shift **(C) Fringe width** (D) slit width

17. Fringe width in Young's double slit experiment is

(A) directly proportional to distance of separation between two slits.

(B) directly proportional to wavelength of light.

(C) directly proportional to square of the wavelength of light.

(D) inversely proportional distance of screen from plane of slits.

18. As the distance between the coherent sources in Young's double slit experiment is increased,

(A) both fringe width and angular fringe width decreases

(B) fringe width increases and angular fringe width decreases.

(C) fringe width increases and angular fringe width remains the same.

(D) fringe width decreases and angular fringe width remains the same.

19. As the screen is moved away from the coherent sources in Young's double slit experiment is

(A) both fringe width and angular fringe width increases.

(B) fringe width increases and angular fringe width decreases

(C) fringe width increases and angular fringe width remains the same

(D) fringe width decreases and angular fringe width remains the same

20. Fringe width in Young's double slit experiment is not be affected when

(A) wavelength of light is changed

(B) distance from coherent sources (slits) to the screen is changed.

(C) brightness of sources is changed

(D) distance between the coherent sources (slits) is changed.

21. Bending of light around narrow edges/obstacle and its spreading into geometrical shadow is called

(A) refraction (B) polarisation (C) interference **(D) diffraction**

22. Compact disks or spider web appears coloured against sunlight, due to the phenomenon of

(A) refraction of light (B) polarisation of light

(C) interference of light **(D) diffraction of light**

23. When a light of wavelength 'λ' diffracts at an angle 'θ' at a single slit of width 'a', the path difference (asinθ) condition for the formation of minima and secondary maxima are respectively

(A) $a \sin \theta = n\lambda$ and $a \sin \theta = (2n+1)\lambda$; where n = 1, 2, 3, 4, 5…..

(B) $a \sin \theta = (2n+1)\lambda/2$ and $a \sin \theta = n\lambda$; where n = 1, 2, 3, 4, 5…..

(C) $a \sin \theta = n \lambda$ and $a \sin \theta = (2n+1)\lambda/2$; where n = 1, 2, 3, 4, 5…..

(D) $a \sin \theta = (n + ½) \lambda /2$ and $a \sin \theta = (2n+1)\lambda$; where n=1,2,3,4,5…..

24. For diffraction of light of wavelength λ at a single slit of width *a*, angular width of central maxima is

(A) $\theta = \lambda /a$ **(B) $\theta = 2\lambda/a$** (C) $\theta = \lambda /2a$ (D) $\theta = a \lambda$

25. In a single slit diffraction pattern,

(A) All fringes are equally bright **(B) only central maximum is brightest and widest**

(C) All fringes are of equal width (D) All fringes are of equal width but not of equal brightness.

26. The phenomenon exhibited by light which confirms its transverse nature is

(A) diffraction (B) interference (C) photoelectric effect **(D) polarisation**

27. Which one of the following does not use polaroid?

(A) Sunglasses to reduce the intensity of light

(B) window panes to reduce intensity of light

(C) 3D movie cameras

(D) Thin coating on reading lenses

28. Which among the following correctly represents Malus' law (with terms having usual meaning)?

(A) $I = I_0 \cos\theta$ (B) $I = I_0 \cos 2\theta$ **(C) $I = I_0 \cos^2\theta$** (D) $I = I_0 \sin^2\theta$

FILL IN THE BLANKS

1. A wavefront is the locus of all points vibrating in **same phase**.
2. A surface of constant phase is called as **wavefront.**
3. A point source at finite distance is the source of **spherical wavefront.**
4. The physical quantity which remains same when a wave gets refracted from one medium to another of different optical density (during refraction) is **frequency.**
5. The nature of the reflected plane wavefront from a concave mirror is a **spherical wavefront**.

6. The superposition of two coherent waves resulting in zero intensity is called **destructive** interference.
7. The path difference between 2 coherent waves resulting in **destructive** interference is odd multiple of $\lambda/2$
8. The alternate dark and bright bands of equal width and intensities resulting due to superposition of waves are called **interference fringes.**
9. Central fringe in the interference pattern is a **bright fringe.**

CHAPTER – 11 : DUAL NATURE OF RADIATION AND MATTER

1. **Specific charge is defined as**
   (A) ratio of charge to velocity (B) ratio of velocity to charge
   (C) ratio of charge to mass (D) ratio of mass to charge
2. **The specific charge (e/m) of cathode ray (or electron) particles is**
   (A) 1.76×10^{11} C/kg (B) 9.1×10^{-31} C/kg (C) 1.6×10^{-19} C/kg (D) 1.76×10^{-11} C/kg
3. **Who performed the pioneering oil-drop experiment for the precise measurement of the electron charge?**
   (A) H Hertz **(B) R A Millikan** (C) C A Coulomb (D) Albert Einstein
4. **The photoelectric effect occurs only when the incident light has more than certain minimum**
   (A) wavelength (B) speed (C) intensity **(D) frequency**
5. **Specific charge of electron was experimentally determined by**
   (A) J.J. Thomson (B) Rutherford (C) Heinrich Hertz (D) Roentgen
6. **Photoelectric effect was discovered by**
   (A) J.J. Thomson (B) Rutherford **(C) Heinrich Hertz** (D) W. Roentgen
7. **Minimum energy required to remove an electron from metal surface is called**
   (A) excitation energy (B) ionization energy **(C) work function** (D) chemical energy
8. **Emission of electrons from the surface of a metal by supplying energy in the form of heat is called**
   (A) Photo electric emission (B) field emission
   (C) secondary emission **(D) thermionic emission**
9. **Emission of electrons from the surface of a metal by supplying energy in the form of light is called**
   (A) Photoelectric emission (B) field emission
   (C) secondary emission (D) thermionic emission
10. **The phenomenon associated with light which can be explained by quantum theory of radiation is**
    (A) Interference (B) Diffraction (C) Polarization **(D) Photoelectric effect**
11. **Photoelectric current during photoelectric emission depends on**
    (A) frequency of incident radiation **(B) intensity of incident radiation**
    (C) speed of incident radiation (D) wavelength of incident radiation

12. **Above the threshold frequency, kinetic energy of photoelectrons is independent of**

(A) frequency of incident radiation (B) wavelength of incident radiation
(C) Energy of incident radiation **(D) intensity of incident radiation**

13. **Einstein's photoelectric equation was experimentally verified by**

(A) Heinrich Hertz (B) Max Planck (C) J J Thomson **(D) R A Millikan**

14. **Einstein's photoelectric equation is based on law of conservation of**

(A) momentum (B) charge **(C) energy** (D) angular momentum

15. **The waves associated with material particles in motion are called**

(A) matter waves (B) light waves (C) motional waves (D) particle waves

16. **The minimum negative potential applied to the collector plate so that photoelectric current becomes zero (just stop the electrons reaching the collector plate) is called as**

(A) stopping potential (B) accelerating potential
(C) work function (D) threshold wavelength

17. **Which of the following is the type of electron emission?**

(A) Thermionic emission (B) field emission
(C) Photoelectric emission **(D) all of these**

18. **Dual nature of matter is proposed by**

(A) Louis de Broglie (B) Albert Einstein (C) Heinrich Hertz (D) R A Millikan

19. **The de-Broglie wavelength of a moving particle is**

(A) inversely proportional to the momentum of the particle
(B) inversely proportional to the velocity of the particle
(C) inversely proportional to the mass of the particle
(D) All the above statements are correct.

20. **Moving with the same velocity which among following has longest de Broglie wavelength?**

(A) electron (B) proton (C) alpha particle (D) neutron

21. **Moving with the same kinetic energy which among following has shortest de Broglie wavelength?**

(A) electron (B) proton **(C) alpha particle** (D) neutron

22. **The slope of the graph plotted between stopping potential and frequency of incident radiation in photoelectric effect is**

(A) h (B) e **(C) h/e** (D) e/h

23. **The slope of the graph plotted between kinetic energy (in joules) of photoelectrons and frequency (in Hz) of incident radiation in photoelectric effect is**

(A) h (B) e (C) h/e (D) e/h

24. **The slope of the graph plotted between kinetic energy (in eV) of photoelectrons and frequency (in Hz) of incident radiation in photoelectric effect is**

(A) h (B) e **(C) h/e** (D) e/h

25. **Which of the following is WRONG regarding photon?**

(A) Momentum of a photon is $p = h/\lambda$ (B) Mass of a photon is $m = E/c^2$
(C) Energy of a photon is $E = hc/\lambda$ **(D) Photon is a charged particle.**

CHAPTER – 12 : ATOMS

1. Who proposed plum pudding model of an atom?

(A) J.J Thomson (B) Rutherford (C) Neil Bohr (D) Pauli

2. Planetary model of the atom was proposed by

(A) J.J Thomson **(B) Rutherford** (C) Neil Bohr (D) Pauli

3. In α-particle scattering experiment, it is found that

(A) Most of the α-particles are scattered at small angles and very few deflected backwards.

(B) Most of the α-particles deflected backwards and very few scattered at small angles.

(C) Equal number of α-particles scattered at small angles and reflected back.

(D) All the α-particles were absorbed by gold foil.

4. Inside the nucleus of an atom,

(A) almost all the mass of an atom is concentrated. (B) entire positive charge is present.

(C) nuclear force exists **(D) All are correct**

5. In Rutherford's α-particle scattering experiment, distance of closest approach is of the order

(A) 10^{-14}m (B) 10^{-10}m (C) 10^{-6}m (D) 10^{-3}m

6. Perpendicular distance between the initial velocity direction of alpha particle and center of the nucleus is called

(A) nuclear radius (B) Energy gap **(C) impact parameter** (D) mean free path

7. In Rutherford's α-particle scattering experiment, when impact parameter is zero, then the

(A) angle of scattering is zero **(B) angle of scattering is 180°**

(C) angle of scattering is equal to 90° (D) alpha particle enters the gold nucleus.

8. In alpha particle scattering experiment conducted by Geiger and Marsden, in case of head-on collision, the impact parameter (b) and angle of scattering (θ) are respectively

(A) b=0 and θ=π (B) b=0 and θ=π/2 (C) b =0 and θ=0 (D) b = large and θ = π

9. When an electron revolves round the nucleus,

(A) Its electrostatic potential energy is zero and kinetic energy is positive

(B) Its electrostatic potential energy is negative and kinetic energy is positive.

(C) Its electrostatic potential energy is negative and kinetic energy is zero.

(D) Its electrostatic potential energy and kinetic energy, both are zero

10. According to Rutherford's model, centripetal force for the electron moving round the nucleus is provided by

(A) nuclear force of attraction between electron and nucleus.

(B) electrostatic force of attraction between positively charged nucleus and negatively charged electron.

(C) gravitational force between heavy nucleus and lighter electron.

(D) magnetic force between nuclear magnetic moment and electron magnetic moment.

11. Rutherford's nuclear atom model failed to explain

(A) the distribution of positive and negative charge inside the nucleus.

(B) Size of the nucleus (C) Size of the atom **(D) Stability of the atom**

12. According to Bohr's postulates, angular momentum of an electron in its orbit around a nucleus is equal to

(A) equal to an integral multiple of $h/2\pi$ (B) equal to an integral multiple of $2\pi/h$

(C) equal to an integral multiple of $h^2\pi$ (D) equal to an integral multiple of $2h/\pi$

13. According to Bohr's hydrogen atom model, the radius of the n^{th} stationary orbit of electron is proportional to

(A) n^2 (B) n (C) 1/n (D) $1/n^2$

14. According to Bohr's hydrogen atom model, the radii of 1^{st}, 2^{nd} and 3^{rd} electron orbits are in the ratio

(A) 1:2:3 **(B) 1:4:9** (C) 3:2:1 (D) 9:4:1

15. Radius of the first orbit of hydrogen atom is (in angstroms)

(A) 0.529Å (B) 5.29 Å (C) 52.9 Å (D) 0.0529 Å

16. According to Bohr's hydrogen atom model, the speed of the electron in n^{th} stationary orbit is proportional to

(A) n^2 (B) n **(C) 1/n** (D) $1/n^2$

17. According to Bohr's hydrogen atom model, the total energy of electron in nth stationary orbit is proportional to

(A) $-n^2$ (B) n (C) $-1/n$ **(D) $-1/n^2$**

18. According to Bohr's hydrogen atom model, as long as electron moves in a stationary orbit,

(A) Its radius will shrink (B) Electron loses energy

(C) It emits radiation of certain frequency. **(D) Electron does not lose energy**

19. According to Bohr's hydrogen atom model, as the electron move to outer orbits

(A) speed of electron increases **(B) speed of electron decreases**

(C) speed does not change (D) acceleration of electron increases

20. Total energy of an electron revolving round in a stationary orbit around hydrogen nucleus is

(A) always positive **(B) always negative**

(C) zero (D) independent of quantum number n

21. Minimum energy required to remove an electron from the ground state of an atom is called

(A) ionization energy (B) excitation energy (C) work function (D) binding energy

22. Energy required to excite an electron from lower energy state to higher energy state is called

(A) ionization energy **(B) excitation energy** (C) work function (D) Binding energy

23. The total energy of an electron in the ground state of hydrogen atom is

(A) –13.6eV (B) –3.4eV (C) +13.6eV (D) 13.6J

24. The ionization energy of an electron in the ground state of hydrogen atom is

(A) –13.6eV (B) –3.4eV **(C) +13.6eV** (D) 13.6J

25. According to Bohr's hydrogen atom model, as the electrons move to outer(higher) orbits, its

(A) total energy decreases and kinetic energy increases

(B) total energy increases and kinetic energy decreases

(C) total energy and kinetic energy both decrease.

(D) total energy and kinetic energy both increases

26. Bohr's hydrogen atom model fails in explaining

(A) stability of the atom
(B) different series in hydrogen spectrum
(C) ionization energy of hydrogen atom
(D) intensity of different spectral lines of hydrogen atom

27. Bohr's hydrogen atom model successfully explained

(A) the intensity of different spectral lines
(B) the spectrum of atoms having more number of electrons
(C) fine structure of spectral lines.
(D) wavelength of different series of hydrogen spectrum.

CHAPTER – 13 : NUCLEI

1. Atomic number of a nucleus represents

(A) number of protons (B) number of protons and neutrons
(C) number of neutrons (D) number of nucleons

2. Mass number of a nucleus represents

(A) number of protons (B) number of electrons
(C) number of neutrons **(D) number of nucleons**

3. Difference between mass number and atomic number of a nucleus represents

(A) number of protons (B) number of electrons
(C) number of neutrons (D) number of nucleons

4. If Z represents atomic number and A represents mass number of a nucleus, then charge of the nucleus is (e = magnitude of charge of electron)

(A) +Ae (B) +(A–Z)e (C) +(A+Z)e **(D) +Ze**

5. Volume of a nucleus is directly proportional to

(A) Atomic number **(B) mass number** (C) radius of nucleus (D) density of nucleus

6. If A is the mass number, radius of a nucleus is

(A) directly proportional to $A^{1/3}$ (B) directly proportional to A^3
(C) inversely proportional to $A^{1/3}$ (D) inversely proportional to A^3

7. Radius of a nucleus of mass number A is given by (R_0 is a constant)

(A) $\mathbf{R=R_0A^{1/3}}$ (B) $R=R_0A^{1/2}$ (C) $R=R_0A^2$ (D) $R=R_0A^3$

8. Density of a nucleus is

(A) directly proportional to mass number (B) inversely proportional to mass number
(C) independent of mass number (D) directly proportional to atomic number

9. Ratio of the density of ${}_{29}Cu^{64}$ nucleus to the density of ${}_{8}O^{16}$ nucleus is

(A) 1:1 (B) 4:1 (C) 2 : 1 (D) 29 : 8

10. Density of a nucleus is about

(A) 2.29×10^{17} kg m^{-3} (B) 2.29×10^{10} kg m^{-3} (C) 2.29×10^{-17} kg m^{-3} (D) 2.29×10^{18} kg m^{-3}

11. Mass defect is

(A) Uncertainty in determining the mass of a nucleus
(B) The difference in mass of a nucleus and its constituent particles.

(C) Sum of the mass of constituents and mass of nucleus.

(D) Difference between mass of nucleus and mass of electrons.

12. If Z is atomic number, A is mass number, m_p is mass of proton, m_n is mass of a neutron, then mass defect (Δm) of the nucleus is

(A) $\Delta m = Zm_n + (A-Z)m_p$ (B) $\Delta m = Zm_p + (A+Z)m_n$

(C) $\Delta m = Zm_p + (A-Z)m_n$ (D) $\Delta m = Zm_n + (A+Z)m_p$

13. Atoms of nuclei having same number of protons but different mass number are called

(A) isotones **(B) isotopes** (C) isobars (D) isomers

14. Atoms of nuclei having same number of neutrons are called

(A) isotones (B) isotopes (C) isobars (D) isomers

15. Atoms of nuclei having same mass number but different atomic number are called

(A) isotones (B) isotopes **(C) isobars** (D) isomers

16. Among the following, which set of nuclei are isotopes?

(A) ${}^{14}_{6}C$ and ${}^{14}_{7}N$ (B) ${}^{3}_{2}He$ and ${}^{3}_{1}H$ **(C) ${}^{235}_{92}U$ and ${}^{238}_{92}U$** (D) ${}^{28}_{14}Si$ and ${}^{73}_{32}Ge$

17. Among the following, which set of nuclei are isobars?

(A) ${}^{14}_{6}C$ and ${}^{16}_{8}O$ **(B) ${}^{3}_{2}He$ and ${}^{3}_{1}H$** (C) ${}^{235}_{92}U$ and ${}^{238}_{92}U$ (D) ${}^{28}_{14}Si$ and ${}^{73}_{32}Ge$

18. Among the following, which set of nuclei are isotones?

(A) ${}^{14}_{6}C$ and ${}^{16}_{8}O$ (B) ${}^{3}_{2}He$ and ${}^{3}_{1}H$ (C) ${}^{235}_{92}U$ and ${}^{238}_{92}U$ (D) ${}^{28}_{14}Si$ and ${}^{73}_{32}Ge$

19. 1 unified atomic mass unit is defined as

(A) $^{1}/_{12}$ th of the mass of one C^{12} atom. (B) $^{1}/_{14}$ th of the mass of one C^{14} atom.

(C) $^{1}/_{16}$ th of the mass of one C^{16} atom. (D) $^{1}/_{16}$ th of the mass of one O^{16} atom

20. 1 atomic mass unit is equal to

(A) 9.1×10^{-19} kg **(B) 1.66×10^{-27} kg** (C) 9.1×10^{-31} kg (D) 1.66×10^{-24} kg

21. Energy equivalent of 1 atomic mass unit (1 u) is

(A) 931.5 eV (B) 1MeV **(C) 931.5 MeV** (D) 1 eV

22. Select the WRONG statement with regard to neutrons

(A) Neutrons are electrically neutral (uncharged).

(B) Two neutrons inside the nucleus experience nuclear force.

(C) Two neutrons inside the nucleus experience electrostatic force of repulsion.

(D) Neutron is stable inside the nucleus and a free neutron outside the nucleus is unstable.

23. According to Einstein, energy equivalent of mass m is (c is speed of light in vacuum)

(A) E = mc/2 (B) E = 2mc **(C) $E = mc^2$** (D) $E = m^2c$

24. Energy equivalent of 1kg mass is

(A) 931.5 eV **(B) 9×10^{16}J** (C) 931.5 MeV (D) 9J

25. The energy equivalent of mass defect of a nucleus is

(A) kinetic energy (B) potential energy **(C) binding energy** (D) pressure energy

26. Nuclear binding energy is the

(A) energy equivalent of mass defect

(B) energy required to form a nucleus from its individual (constituent) nucleons

(C) energy required to break a nucleus into constituent nucleons.

(D) all the above answers are correct

27. **Binding energy per nucleon (specific binding energy) is**

(A) the ratio of the binding energy of a nucleus to the number of the nucleons (mass number).

(B) the ratio of the binding energy of a nucleus to the atomic number.

(C) the ratio of the binding energy of a nucleus to the number of the neutrons.

(D) the ratio of the binding energy of a nucleus to the number of the electrons.

28. **Select the CORRECT statement among the following:**

(A) Nuclei having highest binding energy are most stable.

(B) Nuclei having least binding energy are most stable.

(C) Nuclei having highest binding energy per nucleon are most stable

(D) Nuclei having least binding energy per nucleon are most stable.

29. **Which of the following pair of particles cannot experience strong nuclear force between them?**

(A) Neutron and proton (B) Proton and proton

(C) electron and proton (D) neutron and neutron

30. **Select the WRONG statement among the following:**

(A) Nuclear force is short ranged forced and hence saturated.

(B) Nuclear force is strongest force in nature.

(C) Nuclear force is charge independent and spin dependent.

(D) Nuclear force varies as the square of the distance between nucleons.

31. **Which is not found during radioactive decay?**

(A) emission of alpha particles (B) emission of β-particles

(C) emission of X-ray (D) emission of γ-rays

32. **Alpha-particles found during radioactive decay process**

(A) contains 2 protons and one neutron. (B) are neutral particles.

(C) are negatively charged. **(D) contains 2 protons and 2 neutrons.**

33. **Gamma(γ)-decay of radioactivity involves**

(A) positively charged particles (B) negatively charged particles

(C) electromagnetic radiations (D) particles similar to He nuclei

34. **During nuclear fission and nuclear fusion processes**

(A) Energy is converted into mass **(B) mass is converted in to energy**

(C) Energy is not released. (D) a lighter nucleus splits in to heavier nuclei.

35. **The process in which two lighter nuclei combine together to form a heavier nucleus at high temp is called**

(A) Nuclear fission **(B) nuclear fusion** (C) Radioactivity (D) photoelectric effect

36. **The process taking place in stars and generating energy is**

(A) nuclear fission **(B) nuclear fusion** (C) chemical reaction (D) combustion

37. **Which one of the following is also called as thermonuclear reaction?**

(A) nuclear fission **(B) nuclear fusion** (C) chemical reaction (D) radioactivity

FILL IN THE BLANKS:

1. Protons and neutrons present in the nucleus are together called the **nucleons.**
2. The number of proton present in the nucleus is called the **atomic number.**
3. The number of nucleons in the nucleus is called the atomic **mass number.**
4. Nuclei of the same element having same atomic number but different mass number are called **isotopes.**
5. Nuclei of different elements having same mass number but different atomic number are called **isobars.**
6. Nuclei of different elements having same number of neutrons are called **isotones.**
7. Neutrons were discovered by **James Chadwick.**
8. Mass - energy relation is given by **Albert Einstein.**
9. **Mass spectrometer** is the instrument use to measure the atomic masses accurately.
10. The order of nuclear density is **10^{17} kg m^{-3}**.
11. Nuclear density is a **constant and very high**.
12. Energy equivalent of a mass 1 amu (or 1u) is **931.5MeV**.
13. The difference between the sum of the masses of the nucleons forming the nucleus and the rest mass of the nucleus is called **mass defect**.
14. The minimum amount of energy required to split the nucleus into its constituents is called nuclear **binding energy.**
15. The forces that hold the nucleons together inside the nucleus are called **nuclear forces.**
16. **Nuclear** forces are **strongest** forces in nature.
17. **Nuclear** forces are **short range** forces.
18. The amount of energy released in per fission of $_{92}U^{235}$ is about **200MeV**.
19. The phenomenon by which energy is produced in a sun or stars is **Nuclear Fusion.**
20. **Nuclear fusion** reactions require **very high temperature** of the order of **10^9K.**
21. The phenomenon of spontaneous disintegration of heavy nuclei with the emission of certain radiations is called **radioactivity**.
22. **Henry Becquerel** discovered radioactivity.
23. **Alpha-particle** is a **helium nucleus** consists of two protons and two neutrons.
24. **Gamma rays** are the uncharged (neutral) radiation emitted by radioactive substances.

CHAPTER – 14 : SEMICONDUCTOR ELECTRONICS

1. **Which one of the following is an example for a semiconductor?**
   (A) Copper (Cu) (B) Gold (Au) **(C) Germanium (Ge)** (D) Aluminium (Al)
2. **An example for elemental semiconductor is**
   (A) Silicon (Si) (B) gallium arsenic (GaAs) (C) anthracene (D) polypyrrole
3. **Carbon, silicon and germanium have four valence electrons each. These are characterized by valence and conduction bands separated by energy band gap respectively equal to $(E_g)_C$, $(E_g)_{Si}$ and $(E_g)_{Ge}$. Which of the following statements is true?**
   (A) $(E_g)_{Si} < (E_g)_{Ge} < (E_g)_C$ (B) $(E_g)_C < (E_g)_{Ge} > (Eg)_{Si}$
   (C) $(E_g)_C > (E_g)_{Si} > (E_g)_{Ge}$ (D) $(E_g)_C = (Eg)_{Si} = (E_g)_{Ge}$

4. **The energy band gap in conductor, insulator and semiconductor are respectively E_1 , E_2 and E_3. The relation between them is**
(A) $E_1 = E_2 = E_3$ (B) $E_1 < E_2 < E_3$ (C) $E_1 > E_2 > E_3$ **(D) $E_1 < E_3 < E_2$**

5. **Energy gap (E_g) between the valence band and the conduction band for conductor is**
(A) $E_g = 0$ (B) $E_g < 3eV$ (C) $E_g > 3eV$ (D) $E_g = 3eV$

6. **Energy gap between the valence band and the conduction band for germanium(Ge) and silicon(Si) are respectively**
(A) $E_{Ge} = 0.72$ eV and $E_{Si} = 1.1$ eV (B) $E_{Ge} = 1.1$ eV and $E_{Si} = 0.72$ eV
(C) $E_{Ge} = 0.72$eV and $E_{Si} = 3$ eV (D) $E_{Ge} = 3$ eV and $E_{Ge} = 1.1$ eV

7. **The purpose of doping in semiconductors is to**
(A) increase the conductivity (B) decrease the conductivity
(C) increase the resistivity (D) increase the strength of the material

8. **In semiconductors at room temperature,**
(A) The valence band is partially empty and the conduction band is partially filled.
(B) The valence band is completely filled and the conduction band is partially filled.
(C) The valence band is completely filled.
(D) The conduction band is completely empty.

9. **In the insulators**
(A) The valence band is partially filled with electrons.
(B) The conduction band is partially filled with electrons.
(C) The conduction band is partially filled with electrons and valence band is empty.
(D) The conduction band is empty and the valence band is filled with electrons.

10. **Tetravalent among the following is**
(A) Silicon (B) Boron (C) Indium (D) Aluminium

11. **An example for a trivalent impurity atom is**
(A) Phosphorous (B) Arsenic (C) Bismuth **(D) Aluminium**

12. **An example for a pentavalent impurity atom is**
(A) **Antimony** (B) Boron (C) Indium (D) Gallium

13. **The element that can be used as acceptor impurity to dope silicon is**
(A) antimony (B) arsenic **(C) boron** (D) phosphorous

14. **The element that can be used as donor impurity to dope germanium is**
(A) gallium (B) indium (C) boron **(D) phosphorous**

15. **In a material, conduction band and valence band overlap. The material is a**
(A) semiconductor **(B) metal (conductor)** (C) insulator (D) doped semiconductor

16. **In an intrinsic semiconductor, number of free electrons is**
(A) greater than number of holes (B) lesser than number of holes
(C) equal to number of holes (D) more than number of atoms

17. **Which one of the following statements is WRONG about intrinsic semiconductor?**

(A) An intrinsic semiconductor is a pure semiconductor.

(B) A pure germanium or silicon crystal has the same number of free electrons and holes.

(C) The conductivity of an intrinsic semiconductor is comparable with that of metals.

(D) The conductivity of an intrinsic semiconductor increases with the rise in temperature.

18. **Among the following, the incorrect statement in the case of pure semiconductor is**

(A) Resistivity is in between that of a conductor and insulator.

(B) Temperature coefficient of resistance is negative.

(C) Doping increases conductivity

(D) At absolute zero temperature it behaves like a conductor.

19. **An n- type and a p-type semiconductor can be obtained by doping pure silicon respectively with**

(A) Arsenic and phosphorous (B) indium and gallium

(C) Phosphorous and indium (D) aluminium and boron.

20. **A p-type semiconductor is**

(A) Positively charged (B) negatively charged

(C) electrically neutral (D) an intrinsic semiconductor

21. **A n-type semiconductor is**

(A) Positively charged (B) negatively charged

(C) electrically neutral (D) an intrinsic semiconductor

22. **In p- type semiconductor conduction is due to**

(A) Greater number of holes and less number of electrons (B) Only electrons

(C) Greater number of electrons and less number holes. (D) Only holes

23. **Which of the following statement is WRONG?**

(A) the resistance of intrinsic semiconductors decreases with increase of temperature.

(B) doping pure Si with trivalent impurities give p-type semiconductors.

(C) the majority charge carriers in n- type semiconductors are holes

(D) a p-n junction can act as a semiconductor diode.

24. **In an unbiased p-n junction, holes diffuse from the p-region to n-region because**

(A) free electrons in the n-region attract them.

(B) they move across the junction by the potential difference.

(C) hole concentration in p-region is more as compared to n-region. (D**) all the above.**

25. **In an n-type silicon, which of the following statement is true?**

(A) Electrons are majority carriers and trivalent atoms are the dopants.

(B) Electrons are minority carriers and pentavalent atoms are the dopants.

(C) Holes are minority carriers and pentavalent atoms are the dopants.

(D) Holes are majority carriers and trivalent atoms are the dopants.

26. When a p-n junction diode is forward biased, the current across the junction is mainly due to

(A) diffusion of charges (B) drift of charges

(C) both diffusion and drift of charges (D) motion of holes

27. During forward bias of a p-n junction diode

(A) p-side of the diode is connected to positive and n-side of the diode is connected to negative of the battery

(B) n-side of the diode is connected to positive and p-side of the diode is connected to negative of the battery.

(C) both p and n sides of the diode are connected to positive of the battery.

(D) both p and sides of the diode are connected to negative of the battery

28. During biasing of a p-n junction diode, the width of the depletion region

(A) decreases in forward bias and increases in reverse bias.

(B) increases in forward bias and decreases in reverse bias.

(C) remains same in both forward bias and reverse bias.

(D) decreases in both forward bias and reverse bias.

29. During biasing of a p-n junction diode, the resistance offered by the p-n junction diode is

(A) high in forward bias and low in reverse bias.

(B) low in forward bias and high in reverse bias.

(C) low in both forward bias and reverse bias.

(D) high in both forward bias and reverse bias.

30. The reverse voltage across a p-n junction at which a large current results is known as

(A) Reverse saturation voltage (B) Knee voltage

(C) Breakdown voltage (D) Cut-in voltage

31. When a forward bias is applied to a p-n junction, it

(A) raises the potential barrier. (B) reduces the majority carrier current to zero.

(C) lowers the potential barrier. (D) None of the above.

32. The device which can convert alternating current (ac) in to direct current (dc) is

(A) Transformer **(B) p-n junction diode** (C) capacitor (D) resistor

33. Rectifier is a circuit which

(A) converts alternating current to direct current

(B) converts direct current to alternating current

(C) increases or decrease the amplitude of ac

(D) which changes the frequency of ac

34. The frequency of input AC given to a rectifier circuit is 50 Hz. What is the output frequency in the case of (i) half-wave rectifier (ii) full-wave rectifier respectively?

(A) (i)50 Hz (ii)50 Hz **(B) (i) 50 Hz (ii)100 Hz**

(C) (i) 50 Hz (ii) 25 Hz (D) (i)100 Hz (ii) 50 Hz

FILL IN THE BLANKS

1. The atoms in a semiconductor are bonded by ___________ bond. **(Covalent)**
2. The gap between the top of the valence band and bottom of the conduction band is called ___________ . **Ans.: energy band gap (or energy gap)**
3. Conductivity of a pure semiconductor __________ with the increase of temperature. **(increases)**
4. Resistivity of a pure semiconductor __________ with the increase of temperature. **(decreases)**
5. Pure semiconductor at zero kelvin (0 K) behave as an __________. **(insulator)**
6. In intrinsic semiconductor, at room temperature, the number of electrons and holes will be ______ **(equal)**
7. Majority charge carrier in n-type semiconductors is ___________ **(electron)**
8. Majority charge carrier in p-type semiconductors is ___________ **(hole)**
9. Rectification is a process of converting alternating current into ________ current. **(direct)**
10. P-n junction under _______ bias acts as an open switch. **(reverse)**
11. The region of immobile positive and negative ions in a semiconductor is called ________ region. **(depletion)**
12. The potential in the depletion region is due to _______ **(ions)**

Instructions to find the correct answer in Multiple Choice Questions (MCQ) and Fill In the Blanks(FIB)

1. Read the questions and all the options carefully, make sure whether the sentence or statement has words NOT, WRONG, INCORRECT etc giving negative of the answers. Be careful while answering this type of questions.
2. Choose the most relevant/appropriate answer from the options. Because some answers may be partially correct but not perfectly.
3. If all the three (A), (B), (C) are correct then (D) will have **ALL OF THESE**, which is MOST RELEVANT.
4. In the above collection, **CORRECT ANSWERS** are made with **BOLD FACES (thick words/letters)**