+2

PHYSICS

(One Mark Question Without answer)

1.ELECTROSTATICS

BOOK BACK ONE MARKS:

1. **A glass rod rubbed with silk acquires a charge of $+8 \times 10^{-12}$C. The number of electrons it has gained or lost**
   a) 5×10^{-7}(gained) b) 5×10^{7}(lost) c) 2×10^{-8}(lost) d) -8×10^{-12}(lost)

2. **The electrostatic force between two point charges kept at a distance d apart, in a medium $\varepsilon_r = 6$, is 0.3 N. The force between them at the same separation in vacuum is**
   a) 20 N b) 0.5 N c) 1.8 N d) 2 N

3. **Electric field intensity is 400 V m^{-1} at a distance of 2 m from a point charge. It will be 100 V m^{-1} at a distance?**
   a) 50 cm b) 4 cm c) 4 m d) 1.5 m

4. **Two point charges +4q and +q are placed 30 cm apart. At what point on the line joining them the electric field is zero?**
   a) 15 cm from the charge q b) 7.5 cm from the charge q
   c) 20 cm from the charge 4q d) 5 cm from the charge q

5. **A dipole is placed in a uniform electric field with its axis parallel to the field. It experiences**
   a) only a net force b) only a torque
   c) both a net force and torque d) neither a net force nor a torque

6. **If a point lies at a distance x from the midpoint of the dipole, the electric potential at this point is proportional to**
   a) $1/x^2$ b) $1/x^3$ c) $1/x^4$ d) $1/x^{3/2}$

7. **Four charges +q, +q, −q and −q respectively are placed at the corners A, B, C and D of a square of side a. The electric potential at the centre O of the square is**
   a) $\frac{1}{4\pi\varepsilon_0}\frac{q}{a}$ b) $\frac{1}{4\pi\varepsilon_0}\frac{2q}{a}$ c) $\frac{1}{4\pi\varepsilon_0}\frac{4q}{a}$ d) zero

8. **Electric potential energy (U) of two point charges is**
   a) $\frac{q_1 q_2}{4\pi\varepsilon_0 r^2}$ b) $\frac{q_1 q_2}{4\pi\varepsilon_0 r}$ c) pEcos θ d) pE sin θ

9. The work done in moving 500 μC charge between two points on equipotential surface is
a) zero b) finite positive c) finite negative d) infinite

10. Which of the following quantities is scalar?
a) dipole moment b) electric force c) electric field d) electric potential

11. The unit of permittivity is
a) $C^2 N^{-1} m^{-2}$ b) $N m^2 C^{-2}$ c) $H m^{-1}$ d) $N C^{-2} m^{-2}$

12. The number of electric lines of force originating from a charge of 1 C is
a) 1.129×10^{11} b) 1.6×10^{-19} c) 6.25×10^{18} d) 8.85×10^{12}

13. The electric field outside the plates of two oppositely charged plane sheets of charge density σ is
a) $\frac{+\sigma}{2\varepsilon_0}$ b) $\frac{-\sigma}{2\varepsilon_0}$ c) $\frac{\sigma}{\varepsilon_0}$ d)zero

14. The capacitance of a parallel plate capacitor increases from 5 μf to 60 μf when a dielectric is filled between the plates. The dielectric constant of the dielectric is
a) 65 b) 55 c) 12 d) 10

15. A hollow metal ball carrying an electric charge produces no electric field at points
a) outside the sphere b) on its surface
c) inside the sphere d) at a distance more than twice

PUBLIC ONE MARKS:

16. The unit of electric flux is
a) Nm^2C^{-1} b) $Nm^{-2}C^{-1}$ c) Nm^2C d) $Nm^{-2}C$

17. The work done in moving 4μC charges from one point to another in an electric field is 0.012J.The potential difference between them is
a) 3000 V b) 6000 V c) 30 V d) 48×10^3V

18. Torque on a dipole in a uniform electric field is maximum when the angle between P and E is
a) 0^0 b) 90^0 c) 45^0 d) 180^0

19. The potential energy of two equal point charges of magnitude 2 μC placed 1 m apart in air is
a) 2 J b) 0.36 J c) 4 J d) 0.036 J

20. The unit of electric field intensity is
a) NC^{-2} b) NC c) Vm^{-1} d) Vm

21. The value of permittivity of free space is
a) $8.854 \times 10^{12} C^2N^{-1}m^{-2}$ b) $9 \times 10^9 C^2N^{-1}m^{-2}$
c) $1/9 \times 10^9 C^2N^{-1}m^{-2}$ d) $1/4\pi \times 9 \times 10^9 C^2N^{-1}m^{-2}$

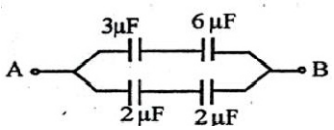
22. A lightning arrestors works on the principle of
a) corona discharge b) diffusion of charge
c) discharge of electricity d) separation of charges

23. The unit of electric dipole moment is
a) volt/metre (v/m) b) coulomb/metre (c/m) c) volt . metre d) Coulom. metre (Cm)

24. Electric potential energy of an electric dipole in an electric field is given as
a) pEsinθ b) – pEsinθ c) pEcosθ d) –PEcosθ

25. Which of the following is not a dielectric?
a) Ebonite b) Mica c) Oil d) Gold

26. In the given circuit, the effective capacitance between A and B will be



a) 3 μF b) 36/13 μF c) 13 μF d) 7 μF

27. The direction of electric field at a point on the equatorial line due to an electric dipole is
a) along the equatorial line towards the dipole
b) along the equatorial line away from the dipole
c) parallel to the axis of the dipole and acts opposite to the direction of the dipole moment
d) parallel to the axis of the dipole and in the direction of dipole moment

28. The effective capacitance of two capacitors connected in series is 1.5 μF. If the capacitance of one capacitor is 4 μF , then the capacitance of the other is
a) 2.4 μF b) 0.24 μF c) 0.417 μF d) 4.17 μF

29. The law which govern the forces between the charges is
a) Ampere's law b) Faraday's law c) Coulomb's law d) Ohm's law

30. An electric dipole is placed in a non-uniform electric field with its experiences
a) only a net force b) only torque
c) both a net force and torque d) Neither a net force and a torque

31. A capacitor of capacitance 6 μF is connected to a 100 V battery. The energy stored in the capacitor is
a) 30 J b) 3 J c) 0.03 J d) 0.06 J

32. The potential energy of an electric dipole of dipole moment P aligned in the direction of electric field E is
a)PE b) zero c) –PE d) PE /√2

33. The quantization of electric charge is given
a) q = ne b) q = cv c) q = e/n d) q = c/v

34. An example of conductor is
a) glass b) human body c) dry wood d) ebonite

35. An electric dipole is placed in a non-uniform electric field with its axis at an angle θ with the field experiences
a) only a net force b) only torque
c) both a net force and torque d) Neither a net force and a torque

36. The magnitude of charge acting on a charge of 2×10^{-10}C placed in a uniform electric field of 10 Vm^{-1} is

a) 2×10^{-9}N b) 4×10^{-9}N c) 2×10^{-10}N d) 4×10^{-10}N

37. The capacitance of a parallel plate capacitor increases from 5μF to 50 μF when a dielectric is filled between the plates. The permittivity of dielectric is

a) $8.854 \times 10^{-24}C^2N^{-1}m^{-2}$ b) $8.854 \times 10^{-11}C^2N^{-1}\ m^{-2}$ c) 12 d) 10

38. The negative gradient of potential is

a) electric force b) torque c) electric current d) electric field intensity

39. The torque (τ) experienced by an electric dipole placed in a uniform electric field (E) at an angle θ with the field is

a) PEcosθ b) –PEcosθ c) PEsinθ d) 2 PEsinθ

40. When a point charge of 6 μC is moved between two points in an electric field, work done is 1.8×10^{-5} J. The potential difference between the two points is

a) 1.08 V b) 1.08 μV c) 3 V d) 30 V

41. Torque on a dipole in a uniform electric field is maximum when the angle between $\vec{P}$ and $\vec{E}$ is

a) 0^0 b) 90^0 c) 45^0 d) 180^0

42. Three capacitances 1 μF, 2 μF and 3 μF are connected in series. The effective capacitance of the capacitors is

a) 6 μF b) 11/6 μF c) 6/11 μF d) 1/6 μF

43. An electric dipole of moment $\vec{P}$ is placed in a uniform electric field of intensity $\vec{E}$ at an angle θ with respect to the field. The direction of torque is

a) along the direction of $\vec{P}$ b) opposite to the direction $\vec{P}$

c) along the direction of $\vec{E}$ d) perpendicular to the plane containing $\vec{P}$and $\vec{E}$

44. The electric field intensity at a distance r from an infinitely long uniformly charged straight wire is directly proportional to

a) r b) 1/r c) r^2 d) $1/r^2$

45. The ratio of electric potentials at points 10 cm and 20 cm from the centre of an electric dipole along its axial line is

a) 1:2 b) 2:1 c) 1:4 d) 4:1

46. The intensity of electric field at point is equal to

a) the force experienced by a charge q
b) the work done in bringing unit positive charge from infinity to that point
c) the positive potential gradient
d) the negative gradient of potential V

47. The capacitance of a capacitor is

a) directly proportional to charge q given to it
b) inversely proportional to its potential
c) directly proportional to charge q and inversely proportional to its potential V
d) independent of both charge q and potential V

48. Intensity electric field produces a force of 10^{-5}N on a charge of 5 μC is
a) $5 \times 10^{-11}NC^{-1}$ b) $50\ NC^{-1}$ c) $2\ NC^{-1}$ d) $0.5\ NC^{-1}$

49. The unit of number of electric lines of force passing through a given area is
a) no unit b) NC^{-1} c) Nm^2C^{-1} d) Nm

50. A dielectric medium is placed in an electric field E_0. The field induced inside the medium is
a) acts in the direction of electric field E_0 b) acts opposite to E_0
c) acts perpendicular to E_0 d) is zero

51. A non-polar dielectric is placed in an electric field (E). Its induced dipole moment
a) zero b) acts in the direction of E
c) acts opposite to the direction of E d) acts perpendicular to E

52. n capacitors of capacitance C connected in series. The effective capacitance is
a)n/C b) C/n c) nC d) C

53. The unit of relative permittivity is
a) $C^2N^{-1}m^{-2}$ b) Nm^2C^{-2} c) No unit d) $NC^{-2}m^{-2}$

54. **The value of relative permittivity of air is**
a) $8.854 \times 10^{-12}C^2N^{-1}m^2$ b) $9 \times 10^9\ N^{-1}m^{-2}$ c) 1 d) 8.854×10^{12}

55. An electric dipole of dipole moment 'p' is kept parallel to an electric field of intensity 'E'. The work done in rotating the dipole through 90^0 is :
a) Zero b) –pE c) pE d) 2pE

56. The total flux over a closed surface enclosing a charge 'q' (in Nm^2C^{-1})
a)8πq b)9×10^9 q c)$36\pi\times10^9$ q d)8.854×10^{-12} q

57. Two point charges +q and –q are placed at points A and B respectively separated by a Small distance. The electric field intensity at the midpoint of AB
a) is zero b) acts along AB
c) acts along BA d) acts perpendicular to AB

58. The electric field inside (between) the plates of two oppositely charged plane sheets each of charge density σ is
a)$+\frac{\sigma}{2\varepsilon_0}$ b) $-\frac{\sigma}{2\varepsilon_0}$ c) $\frac{\sigma}{\varepsilon_0}$ d) zero

59. The electric field intensity at a short distance r from a uniformly charged infinite plane sheet of charge is
a) proportional to r b) proportional to 1/r
c) proportional to $1/r^2$ d) independent of r

60. The number of lines that radiate outwards from one coulomb charge is
a) 1.13×10^{11} b) 8.85×10^{-11} c) 9×10^9 d) infinite

61. When the charge given to the capacitor is doubled, its capacitance
a)increases twice b) decreases twice c) increases four times d) does not change

62. On moving a charge of 20 C by 2 cm, 2J of work is done, then the potential difference between the points is

a) 0.5 V b)0.1 V c) 8 V d) 2 V

63. The repulsive force between two like charges of 1 coulomb each separated by a distance of 1 m in vacuum is equal to

a)9×10^9 N b) 10^9N c)9×10^{-9}N d) 9 N

64. What must be the distance between two equal and opposite point charges (say +q and –q) For the electrostatic force between them to have a magnitude of 16 N?

a) $4\sqrt{kq}$ metre b) $\frac{q}{4}\sqrt{k}$ metre c)4 kq metre d) $\frac{4k}{q}$ metre

65. A non-polar molecule is placed in an external electric field $\vec{E}$. The induced dipole moment acts

a) in the direction of $\vec{E}$ b) opposite to the direction of $\vec{E}$

c) perpendicular to the direction of $\vec{E}$ d) at random

66. Van de Graaff generator works on the principle of

a) electromagnetic induction and action of points

b) electrostatic induction and action of points

c) electrostatic induction only

d) action of points only

67. For which of the following medium, the value of relative permittivity ε_r = 1:

a)mica b)air c)glass d)water

68. Point charges +q, +q, -q and –q are placed at the corners A, B, C and D respectively of a square. O is the point of intersection of the diagonals AC and BD. The resultant electric field intensity at the point O

a) acts in a direction parallel to AB b) acts in a direction parallel to BC

c) acts in a direction parallel to CD d) is zero

69. The unit of molecular polarisability is

a) $C^2N^{-1}m$ b)Nm^2C^{-1} c)$N^{-1}m^{-2}C^2$ d)$C^{-1}m^2V$

70. Two point charges +q and -q are Placed in air at a distance of 2 m apart. One of the charges is moved towards the other through a distance of 1m. the work done is :

a) $\frac{q_1q_2}{4\pi\varepsilon_0}$ b) $\frac{2q_1q_2}{4\pi\varepsilon_0}$ **c)** $\frac{q_1q_2}{8\pi\varepsilon_0}$ d) $\frac{q_1q_2}{16\pi\varepsilon_0}$

71. The capacitances 0.5 μF and 0.75 μF are connected in parallel. Calculate the effective capacitance of the capacitor

a) 0.80 μF b) 0.70 μF c) 0.25 μF d) 1.25 μF

2 - CURRENT ELECTRICITY

BOOK BACK ONE MARKS:

1. **A charge of 60 C passes through an electric lamp in 2 minutes. Then the current in the lamp is**
   a) 30 A b) 1 A c) 0.5 A d) 5 A

2. **The material through which electric charge can flow easily is**
   a) quartz b) mica c) germanium d) copper

3. **The current flowing in a conductor is proportional to**
   a) drift velocity b) 1/ area of cross section
   c) 1/no of electrons d) square of area of cross section.

4. **A toaster operating at 240V has a resistance of 120 Ω. The power is**
   a) 400 W b) 2 W c) 480 W d) 240 W

5. **If the length of a copper wire has a certain resistance R, then on doubling the length its specific resistance**
   a) will be doubled b) will become $1/4^{th}$
   c) will become 4 times d) will remain the same.

6. **When two 2Ω resistances are in parallel, the effective resistance is**
   a) 2 Ω b) 4 Ω c) 1 Ω d) 0.5 Ω

7. **In the case of insulators, as the temperature decreases, resistivity**
   a) decreases b) increases c) remains constant d) becomes zero

8. **If the resistance of a coil is 2 Ω at 0^oC and $\alpha = 0.004\ /^oC$, then its resistance at 100^oC is**
   a) 1.4 Ω b) 0 Ω c) 4 Ω d) 2.8 Ω

9. **According to Faraday's law of electrolysis, when a current is passed, the mass of ions deposited at the cathode is independent of**
   a) current b) charge c) time d) resistance

10. **When n resistors of equal resistances (R) are connected in series, the effective resistance is**
    a) n/R b) R/n c) 1/nR d) nR

PUBLIC ONE MARKS:

11. **Resistance of a metal wire of length 10 cm is 2 Ω. If the wire stretched uniformly to 50 cm, the resistance is**
    a) 25 Ω b) 10 Ω c) 5 Ω d) 50 Ω

12. **The color code of carbon resistor is red-red-black. The resistance of the resistor**
    a) 2.2 Ω b) 22 Ω c) 220 Ω d) 2.2 k Ω

13. **The brown ring at one end of a carbon resistor indicates a tolerance of**
    a) 1% b) 2% c) 5% d) 10%

14. **The unit of conductivity is**
    a) mho b) ohm c) ohm-m d) mho-m^{-1}

15. The transition temperature of mercury is

a) 4.2 ^{0}C b) 4.2 K c) 2.4^{0}C d) 2.4 K

16. The relation between current and drift velocity is

a) I = nAVd/e b) I = nAVd e c) I = neVd/A d) I = nAVde

17. When the diameter of a conductor is doubled, its resistance

a) decreases twice **b) decreases four times**
c)decreases sixteen times d) increases four times

18. The electrical resistivity of a thin copper wire and a thick copper rod are respectively $\rho_1\Omega$ m and $\rho_2\Omega$ m. Then

a) $\rho_1 < \rho_2$ b) $\rho_1 > \rho_2$ c) $\rho_1 = \rho_2$ d) $\frac{\rho 1}{\rho 2} = \propto$

19. The resistance of the filament of a 110 w, 220 V electric bulb is

a) 440 Ω b) 220 Ω c) 484 Ω d) 848 Ω

20. A cell of emf 2.2 V sends a current of 0.2 A through a resistance of 10 Ω. The internal resistance of the cell is

a) 0.1 Ω b) 1 Ω c) 2 Ω d) 1.33 Ω

21. The unit of electrochemical equivalent is

a)kg.coulomb b) $\frac{kg}{ampere}$ c) $\frac{kg}{ampere\ sec}$ d) $\frac{coulomb}{kg}$

22. When 'n' resisters of equal resistance (R) are connected in series and in parallel respectively, then the ratio of their effective resistance is

a) 1 : n^2 b) n^2 : 1 c) n:1 d) 1 : n

23. A graph is drawn taking potential difference across the ends of a conductor along X- axis and current through the conductor along the Y- axis. The slope of the straight line gives:

a)resistance b) conductance c) resistivity d) conductivity

3– EFFECTS OF ELECTRIC CURRENT

BOOK BACK ONE MARKS:

1. Joule's law of heating is
a) H = 2IRt b) H = V^2 Rt c) H = VIt d) H = IR^2t

2. Nichrome wire is used as the heating element because it has
a) low specific resistance b) low melting point
c) high specific resistance d) high conductivity

3. Peltier coefficient at a junction of a thermocouple depends on
a) the current in the thermocouple b) the time for which current flows
c) the temperature of the junction d) the charge that passes through the thermocouple

4. In a thermocouple, the temperature of the cold junction is 20°C, the neutral temperature is 270°C. The temperature of inversion is
a) 520°C b) 540°C c) 500°C d) 510°C

5. Which of the following equations represents Biot-savart law?
a) dB = $\frac{\mu_0}{4\pi}\frac{Idl}{r^2}$ b) $\overrightarrow{dB} = \frac{\mu_0}{4\pi}\frac{Idl\ sin\theta}{r^2}$
c) $\overrightarrow{dB} = \frac{\mu_0}{4\pi}\frac{\overrightarrow{Idl} \times \vec{r}}{r^2}$ d) $\overrightarrow{dB} = \frac{\mu_0}{4\pi}\frac{\overrightarrow{Idl} \times \vec{r}}{r^3}$

6. Magnetic induction due to an infinitely long straight conductor placed in a medium of permeability μ is
a) $\frac{\mu_0 I}{4\pi a}$ b) $\frac{\mu_0 I}{2\pi a}$ c) $\frac{\mu I}{4\pi a}$ d) $\frac{\mu I}{2\pi a}$

7. In a tangent galvanometer, for a constant current, the deflection is30°. The plane of the coil is rotated through 90°. Now, for the same current, the deflection will be
a) 30^0 b) 60^0 c) 90^0 d) 0^0

8. The period of revolution of a charged particle inside a cyclotron does not depend on
a) the magnetic induction b) the charge of the particle
c) the velocity of the particle d) the mass of the particle

9. The torque on a rectangular coil placed in a uniform magnetic field is large, when
a) the number of turns is large b) the number of turns is less
c) the plane of the coil is perpendicular to the field d) the area of the coil is small

10. Phosphor – bronze wire is used for suspension in a moving coil galvanometer, because it has
a) high conductivity b) high resistivity
c) large couple per unit twist d) small couple per unit twist

11. Of the following devices, which has small resistance?
a) moving coil galvanometer b) ammeter of range 0 – 1A
c) ammeter of range 0–10 A d) voltmeter

12. A galvanometer of resistance G Ω is shunted with S Ω. The effective resistance of the combination is Ra. Then, which of the following statements is true?
a)G is less than S b) S is less than Ra but greater than G.
c) Ra is less than both G and S d) S is less than both G and Ra

13. An ideal voltmeter has

a) zero resistance b) finite resistance less than G but greater than Zero
c) resistance greater than G but less than infinity d) infinite resistance

PUBLIC ONE MARKS:

14. The unit of reduction factor of tangent galvanometer is

a) no unit b) tesla c) ampere d) ampere/degree

15. The galvanometer can be converted into voltmeter by connecting

a) low resistance in series b) high resistance in parallel
c) high resistance in series d) low resistance in parallel

16. In a thermocouple, the temperature of the cold junction is 20^0C, the temperature of inversion is 600^0C, then the neutral temperature is

a) 310^0C b) 320^0C c) 300^0C d) 315^0C

17. In a TG a current 1 A, produces a deflection of 30^0. The current required to produce a deflection of 60^0 is

a) 3 A b) 2 A c) √3 A d) 1/√3 A

18. Peltier effect is the converse of

a) Joule effect b) Raman effect c) Thomson effect d) Seebck effect

19. The torque experienced by a rectangular current loop placed perpendicular to a uniform magnetic field is

a) maximum b) zero c) finite minimum d) infinity

20. In which of the following pairs of metals of a thermocouple the e.m.f is maximum?

a) Fe –Cu b) Cu – Zn c) Pt – Ag d) Sb – Bi

21. Which of the following principles used in a thermopile

a) Thomson effect b) Peltier effect c) Seebeck effect d) Joule's effect

22. Fuse wire is an alloy of

a) Lead and Tin b) Tin and copper c) Lead and copper d) Lead and Iron

23. Thermopile is used to

a) measure temperature b) measure current
c) detect thermal radiation d) measure pressure

24. The magnitude and direction of the magnetic Lorentz force is given by

a) $\vec{F} = (\vec{V} \times \vec{B})$ b) $\vec{F}$ =q/($\vec{V} \times \vec{B}$) c) $\vec{F}$ = q($\vec{V} \times \vec{B}$) d) $\vec{F} = \vec{V}\ (q \times \vec{B})$

25. Unit of peltier coefficient is

a) ohm b) mho c) Volt d) ampere

26. For a given thermocouple the neural temperature

a) depends upon the temperature of cold junction
b) depends upon the temperature of the hot junction
c) is a constant
d) depends upon the temperature of cold junction and the temperature of the hot junction

27. When the number of turns (n) in a galvanometer is doubled, current sensitivity
a) remains constant b) decreases twice c) increases twice d) increases four times

28. An electron is moving with a velocity of 3×10^6m/s perpendicular to a magnetic field of induction 0.5 T. The force experienced by the electron is
a) 2.4×10^{-13}N b) 13.6×10^{-27}N c) 13.6×10^{-11}N d) zero

29. Fuse wire
a)is an alloy of lead and copper b) has low resistance
c) has high resistance d) has high melting point

30. In the experiment to verify Joule's law when the current passed through the circuit is doubled keeping resistance (R) constant and time of passage of current (t) constant, the temperature of the liquid is
a) increases twice b) increases four times
c) increase sixteen times d) decreases four times

31. AB is a rod of lead. The end A Is heated. A current I is allowed to flow along AB. Now, due to Thomson effect, in rod AB:
a) heat is absorbed b) heat is liberated
b) heat is neither absorbed nor liberated d) heat is first absorbed and then liberated

32. The direction of force on a current carrying conductor placed in a magnetic field is given by :
a) Fleming's Left hand Rule b) Fleming's Right hand Rule
b) End Rule d) Right Hand Palm Rule

33. Which of the following produces large joule heating effect
a) 1 A current through 2 Ω resistor for 3 second
b) 1 A current through 3 Ω resistor for 2 second
c) 2 A current through 1 Ω resistor for 2 second
d) 3 A current through 1 Ω resistor for 1 second

34. In a thermocouple, the temperature of the cold junction is 20^0C, the temperature of inversion is 520^0C. The neutral temperature is
a) 500^0C b) 54^0C c) 270^0 d) 510^0C

35. In a thermocouple, the temperature of the cold junction is -30^0C, and the neutral temperature is270^0C. Then the temperature inversion is
a) 520^0C b) 540^0C c) 500^0C d) 570^0C

36. Consider a circular coil of radius 10 cm in an air medium. If 5A current passes through it, what would be the magnetic induction at its centre?
a) $\pi \times 10^{-5}$ T b) $\pi \times 10^{5}$ T c) $\pi \times 10^{-15}$ T d) $\pi \times 10^{-6}$ T

37. In Joule's Calorimeter experiment, when the current of 1 ampere is passed through a coil for a known interval of time 't' , the temperature of water increases from 30℃ to 33℃. When a current of 2 A is passed through the same coil placed in the same quantity of water and for the same time, the temperature of water increases from 30℃ to :
a)33℃ b)36℃ c)39℃ d)42℃

38. A proton and an α Particle are Projected with the same velocity normal to a uniform magnetic field. The ratio of the magnetic Lorentz force experienced by the proton and α particle is
a) 1 : 1 b) 1 : 2 c) 2 : 1 d) 1 : 0

4.ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENT

BOOK BACK ONE MARKS:

1. **Electromagnetic induction is not used in**
   a) transformer b) room heater c) AC generator d) choke coil

2. **A coil of area of cross section 0.5 m^2 with 10 turns is in a plane which is perpendicular to an uniform magnetic field of 0.2 Wb/m^2.The flux though the coil is**
   a)100 Wb b) 10 Wb c) 1 Wb d) zero

3. **Lenz's law is in accordance with the law of**
   a) conservation of charges b) conservation of flux
   c) conservation of momentum d) conservation of energy

4. **The self – inductance of a straight conductor is**
   a) zero b) infinity c) very large d) very small

5. **The unit henry can also be written as**
   a) Vs A^{-1} b) Wb A^{-1} c) Ωs d) all

6. **An emf of 12 V is induced when the current in the coil changes at the rate of 40 A S^{-1}. The coefficient of self induction of the coil is**
   a) 0.3 H b) 0.003 H c) 30 H d) 4.8 H

7. **A DC of 5A produces the same heating effect as an AC of**
   a) 50 A rms current b) 5 A peak current c) 5A rms current d) none of these

8. **Transformer works on**
   a) AC only b) DC only
   c) both AC and DC d) AC more effectively than DC

9. **The part of the AC generator that passes the current from the coil to the external circuit is**
   a) field magnet b) split rings c) slip rings d) brushes

10. **In an AC circuit the applied emf e = Eosin (ωt + π/2) leads the current i = Io sin (ωt – π/2) by**
    a) π/2 b) π/4 c) π d) 0

11. **Which of the following cannot be stepped up in a transformer?**
    a) input current b) input voltage c) input power d) all

12. **The power loss is less in transmission lines when**
    a) voltage is less but current is more b) both voltage and current are more
    c) voltage is more but current is less d) both voltage and current are less

13. **Which of the following devices does not allow d.c. to pass through?**
    a) resistor b) capacitor c) inductor d) all the above

14. **In an ac circuit**
    a)the average value of current is zero. b) the average value of square of current is zero
    c)the average power dissipation is zero d) the rms current is 2time of peak current.

PUBLIC ONE MARKS :

15. The average power consumed over one cycle in an A.C circuit is
a) Erms Irms b) Erms Irms cosϕ c) Erms Irms sinϕ d) $E_0 I_0 \cos\phi$

16. The angle between area vectors $\vec{A}$ and plane of the area A is
a) π b) 2π c) $\pi/2$ d) zero

17. If the flux associated with a coil varies at the rate of 1wb/minute then the induced emf is
a) 1V b) 1/60 c) 60V d) 0.60V

18. In a.c circuit with an inductor
a) Voltage lags current by $\pi/2$ b) voltage and current are in phase
c) voltage leads current by π d) current lags the voltage by $\pi/2$

19. In LCR series a.c circuit, the phase difference between current and voltage is 30^0 The reactance of the circuit is 17.32 Ω. The value of resistance is
a) 30 Ω b) 10 Ω c) 17.32Ω d) 1.732Ω

20. The generator rule is
a) Fleming's left hand rule b) Fleming's right hand rule
c) Maxwell's cork screw rule d) right hand palm rule

21. The power loss is less in transmission line when
a) voltage is less but current is more b) both voltage and current are more
c) voltage is more but current is less d) both voltage and current are less

22. In a step up transformer, the input voltage is 220 V and the output voltage is 11 kV. The ratio of number of turns of primary to secondary is
a) 50 : 1 b) 1: 50 c) 25 : 1 d) 1 : 25

23. In LCR circuit when $X_L = X_C$, the current
a) is zero b) is in phase with the voltage
c) leads the voltage d) lags behind the voltage

24. In an AC circuit with capacitor only, if the frequency of the signal is zero, then the capacitive reactance is
a) infinity b) zero c) finite maximum d) finite minimum

25. In a step up transformer, the output voltage is 11 kV and the input voltage is 220 V The ratio of number of turns of secondary to primary is
a)20:1 b)22:1 c)50:1 d)1:50

26. The reactance offered by 300 mH inductor to an AC supply of frequency 50 Hz is
a)1046 Ω b)94.2 Ω c)9420Ω d)104.6Ω

27. The r.m.s value of an AC voltage with a peak value of 311 V
a) 110 V b) 220 V c) 50 V d) 70.7 V

28. The core used in audio frequency choke is
a) iron b) carbon c) lead d) air

29. A power of 11,000 W is transmitted at 220 V. The current through the line wire is
a) 50 A b) 5 A c) 500 A d) 0.5 A

30. In a transformer, eddy current loss can be minimized by using
a) laminated core made of Mumetal b) laminated core made of stelloy
c) shell type core d) thick copper wires

31. The Q - factor of an a.c circuit containing a resistance R, inductance L, and capacitor C is
a) $Q = \frac{1}{L}\sqrt{\frac{R}{C}}$ b) $Q = \frac{1}{R}\sqrt{\frac{L}{C}}$ c) $Q = \frac{1}{R}\sqrt{\frac{C}{L}}$ d) $Q = \frac{1}{C}\sqrt{\frac{L}{R}}$

32. In a three phase AC generator the three coils are fastened rigidly together and are displaced from each other by an angle
a) 90^0 b) 180^0 c) 120^0 d) 360^0

33. In RLC circuit, at resonance
a) current is minimum b) impedance is maximum
c) circuit is purely inductive d) current is in phase with the voltage

34. In LCR series circuit at resonance
a) impedance (Z) is maximum b) current is minimum
c) impedance (Z) is equal to R d) $\nu_0 = 1/\sqrt{LC}$

35. A coil of the area of cross section 0.5 m^2 with 10 turns is in a plane which is parallel to a uniform magnetic field of 0.2 wb/m^2. The magnetic flux through the coil is
a) 100 Wb b) 10 Wb c) 1 Wb d) zero

36. The rms value of AC flowing through a resistor is 5 A. Its peak value is
a) 3.536 A b) 70.7 A c) 7.07 A d) 7 A

37. The effective value of alternating current is
a) $I_0/2$ b) $I_0/\sqrt{2}$ c) $I_0\sqrt{2}$ d) $2I_0$

38. In an AC circuit average power consumed is 200 W and the apparent power is 300 W. The power factor is
a) 1.5 b) 0.66 c)0.33 d) 1

39. A rectangular coil is uniformly rotated in a uniform magnetic field such that the axis of rotation is perpendicular to the direction of the magnetic field. When the plane of the coil is perpendicular to the magnetic field
a) (i) magnetic flux is zero (ii) induced emf is zero
b) (i) magnetic flux is maximum (ii) induced emf is maximum
c) magnetic flux is maximum (ii) induced emf is zero
d) (i) magnetic flux is zero (ii) induced emf is maximum

40. In a series LCR circuit, at resonance
a) $X_L = X_C$ b) $X_L > X_C$ c) $X_L < X_C$ d) $\omega = \frac{1}{LC}$

41. In a.c circuit voltage leads the current by a phase of $\pi/2$, then the circuit has
a) only an inductor L b) only a capacitor (C) c) Only resistor (R) d) L, C and R in series

42. The resonant frequency of RLC circuit is ν_0. The inductance is doubled. The capacitance also doubled. Now the resonant frequency of the circuit is
a) $2\nu_0$ b) $\nu_0/2$ c) $\nu_0/4$ d) $\nu_0/\sqrt{2}$

43. When the frequency of AC increases , the capacitive reactance offered by capacitor connected in the circuit
a) increases b) decreases c) remains the same d) becomes zero

44. The instantaneous emf and current equations of an a.c. circuit are respectively e = 200 sin (ωt+$\pi/3$) and i = 10 sin ωt .The average power consumed over one complete cycle is:
a) 2000 W b) 1000 W c) 500 W d) 707 W

45. In a series RLC circuit, the instantaneous values of current and emf are $i = I_0 \sin(\omega t - \pi/3)$ and $e = E_0 \sin \omega t$ respectively. The phase difference between the current and voltage is :
a) zero b) 180^0 c) 60^0 d) 45^0

46. For a D.C circuit the value of capacitive reactance is
a) zero b) infinity c) $\pi/2$ d) π

47. In an A.C circuit the applied emf $e = E_0 \sin(\omega t + \pi/2)$ leads the current $i = I_0 \sin(\omega t - \pi/2)$ by
a) $\pi/2$ b) $\pi/4$ c) π d) 0

48. A DC of 5A produces the same heating effect of as an AC (alternating current) of
a) 50 Arms current b) 5 A peak current c) 15 Arms current d) none of these

49. If an emf of 25 V is induced when the current in the coil changes at the rate of $100As^{-1}$, then the coefficient of self induction of the coil is
a) 0.3 H b) 0.25 H c) 2.5 H d) 0.25 mH

50. Eddy current in a transformer can be minimized by using a laminated core made of
a) Stelloy b) mumetal
c) Soft iron d) Silicon steel

51. In LCR series a.c circuit, the phase difference between current and voltage is 60^0 The reactance of the circuit is 17.32 Ω. The value of resistance is
a) 30 Ω b) 17.32Ω c) 10 Ω d) 1.732Ω

52. In an A.C circuit , the instantaneous values of emf and current are respectively $e = 200 \sin\left(\omega t - \frac{\pi}{3}\right)$; $I = 10 \sin\left(\omega t + \frac{\pi}{6}\right)$. The phase relation between current and voltage is :
a) voltage lags behind current by a phase angle of $\frac{\pi}{3}$
b) current leads voltage by a phase angle of $\frac{\pi}{6}$
c) current leads voltage by a phase angle of $\frac{\pi}{2}$
d) voltage leads current by a phase angle of $\frac{\pi}{2}$

53. If the frequency of AC circuit connected with an inductor of inductance 0.03 H only is 50 Hz, then inductive reactance is:
a) 3.14 Ω b) 9.42 Ω c) 3 Ω d) 6.28 Ω

54. The Q - factor of series resonant circuit is
a) $Q = \frac{1}{LC}$ b) $Q = \frac{1}{R}\sqrt{\frac{C}{L}}$ c) $Q = \frac{1}{\sqrt{LC}}$ d) $Q = \frac{1}{R}\sqrt{\frac{L}{C}}$

5.ELECTROMAGNETIC WAVES AND WAVE OPTICS

BOOK BACK QUESTIONS:

1. **In an electromagnetic wave**
   a)power is equally transferred along the electric and magnetic fields
   b)power is transmitted in a direction perpendicular to both the fields
   c)power is transmitted along electric field
   d)power is transmitted along magnetic field

2. **Electromagnetic waves are**
   a) transverse b) longitudinal
   c) may be longitudinal or transverse d) neither longitudinal nor transverse

3. **Refractive index of glass is 1.5. Time taken for light to pass through a glass plate of thickness 10cm is**
   a) 2×10^{-8}s b) 2×10^{-10}s c) 5×10^{-8}s d) 5×10^{-10}s

4. **In an electromagnetic wave the phase difference between electric field $\vec{E}$ and magnetic field $\vec{B}$ is**
   a) $\pi/4$ b)$\pi/2$ c)π d) zero

5. **Atomic spectrum should be**
   a) pure line spectrum b) emission band spectrum
   c) absorption line spectrum d) absorption band spectrum.

6. **When a drop of water is introduced between the glass plate and plano convex lens in Newton's rings system, the ring system**
   a) contracts b) expands
   c) remains same d) first expands, then contracts

7. **A beam of monochromatic light enters from vacuum into a medium of refractive index μ. The ratio of the wavelengths of the incident and refracted waves is**
   a) $\mu : 1$ b) $1 : \mu$ c) $\mu^2 : 1$ d) $1 : \mu^2$

8. **If the wavelength of the light is reduced to one fourth, then the amount of scattering is**
   a) increased by 16 times b) decreased by 16 times
   c) increased by 256 times d) decreased by 256 times

9. **In Newton's ring experiment the radii of the m th and (m + 4)th dark rings are respectively $\sqrt{5}$mm and $\sqrt{7}$mm. What is the value of m?**
   a) 2 b) 4 c) 8 d) 10

10. **The path difference between two monochromatic light waves of wavelength 4000 Å is 2×10^{-7}m. The phase difference between them is**
    a) π b) 2π c) $3\frac{\pi}{2}$ d) $\pi/2$

11. In Young's experiment, the third bright band for wavelength of light 6000 Å coincides with the fourth bright band for another source in the same arrangement. The wave length of the another source is

a) 4500 Å b) 6000 Å c) 5000 Å d) 4000 Å

12. A light of wavelength 6000 Å is incident normally on a grating 0.005 m wide with 2500 lines. Then the maximum order is

a) 3 b) 2 c) 1 d) 4

13. A diffraction pattern is obtained using a beam of red light. What happens if the red light is replaced by blue light?

a) bands disappear b) no change
c) diffraction pattern becomes narrower and crowded together
d) diffraction pattern becomes broader and farther apart

14. The refractive index of the medium, for the polarising angle 60°is

a) 1.732 b) 1.414 c) 1.5 d) 1.468

PUBLIC QUESTIONS

15. The existence of electromagnetic waves was confirmed by

a)Hertz b)Maxwell c) Huygens d) Plank

16. When a ray of light is incident on a glass surface at polarising angle of 57.5°, the angle between the incident ray and the reflected ray is

a) 57.5° b) 32.5° c)115° d) 90°

17. Unpolarised light passes through a tourmaline crystal. The emergent light is analysed by an analyser. When the analyser is rotated through 90°, the intensity of light

a) remains uniformly bright b) remains uniformly dark
c) varies between maximum to minimum d) varies between maximum to zero

18. Velocity of the electromagnetic waves through vacuum is

a)$\sqrt{\mu_o \varepsilon_o}$ b) $\frac{1}{\sqrt{\mu_o \varepsilon_o}}$ c)$\sqrt{\mu_o/\varepsilon_o}$ d)$\sqrt{\varepsilon_o/\mu_o}$

19. In a plane transmission grating, the unit of grating element is

a) no unit b) metre c) metre^{-1} d) degree

20. A ray of light is incident on a glass plate at its polarising angle. The angle between the Incident ray and the reflected ray is

a) 57.5° b) 32.5° c)90° d)115°

21. Which one of the following is not an electromagnetic wave?

a) X – rays b) γ – rays c) UV – rays d) β – rays

22. If C is the velocity of light in vacuum, the velocity of light in a medium with refractive index μ is

a) μ C b) C/μ c)μ /C d) 1/μC

23. A ray of light passes from a denser medium into a rarer medium. For an angle of incidence of 45°, the refracted ray grazes the surface of separation of the two media. The refractive index of the denser medium is

a) 3/2 b) 1/√2 c) √2 d) 2

24. Of the following, which one is a uniaxial crystal?
a) Mica b) Aragonite c) Topaz d) Quartz

25. The radiations used in physiotherapy are
a) Ultra violet b) infra red c) radio waves d)microwaves

26. In Newton's rings experiment, light of wavelength 5890 Å is used. The order of the dark ring produced where the thickness of the air film is 0.589 μm is
a) 2 b) 3 c) 4 d) 5

27. Of the following, optically active material is
a) Sodium chloride b) calcium chloride c) sodium d) chlorine

28. Electric filament lamp gives rise to
a) Line spectrum b) continuous spectrum
c) band spectrum d) line absorption spectrum

29. In Young's double slit experiment, the separation between the slits is halved, and the distance between the slits and the screen is doubled. Then the fringes width is
a) Unchanged b) halved c) doubled d) quadrupled

30. The phenomenon of light used in the formation of Newton's rings is
a) Diffraction b) interference c) refraction d) polarisation

31. An example for uniaxial crystal is
a) Tourmaline b) Mica c) Topaz d) Selenite

32. In Raman effect, the spectral line with lower frequency than the incident frequency is
a) Fraunhofer line b) Rayleigh line c) Stokes' line d) Anti stokes' line

33. The optical rotation does not depend on
a) Concentration of the solution b) frequency of the light used
c) the temperature of the solution d) intensity of the light used

34. Which of the following gives rise to continuous emission spectrum ?
a) Electric filament lamp b) sodium vapour lamp
c) gases in the discharge tube d) calcium salt in Bunsen flame

35. The transverse nature of light waves is demonstrated by the phenomenon
a) interference b) diffraction c) polarization d) reflection

36. If the velocity of light in a medium is 2.25×10^8 ms^{-1} then the refractive index of the medium is
a) 1.5 b) 0.5 c) 1.33 d) 1.73

37. The polarising angle for water is 53°4′if the light is incident at the angle on the surface of water, the angle of refraction in water is
a) 53°4′ b) 26°30′ c)30°4′ d) 36°56′

38. In Raman effect, if the scattered photon gains energy, it gives rise to
a) Stokes' line b) Anti stokes' line
c) Stokes' and Anti stokes' line d) Rayleigh line

39. In case of Fraunhofer diffraction, the wave front undergoing diffraction is
a) Spherical wave front b) Cylindrical wave front
c) elliptical wave front d) Plane wave front

40. A ray of light is incident on a glass surface such that the reflected ray completely plane polarized. The angle between the reflected ray and the refracted ray is
a) 57.5° b) 32.5° c)90° d)115°

41. Soap bubbles exhibit brilliant colours in sunlight due to
a)scattering of light b)diffraction of light
c)polarization of light d) interference of light

42. The radii of Newton's dark rings are in the ratio
a) 1:2:3 b) $\sqrt{1} : \sqrt{2} : \sqrt{3}$ c) $\sqrt{1} : \sqrt{3} : \sqrt{5}$ d) 1 : 4 : 9

43. In the grating formula $\sin\theta = Nm\lambda$, the unit of N is
a) metre b) $metre^{-1}$ c) No unit d) $(metre)^2$

44. The ratio of the radii of the 4th and 9th dark rings in Newton's rings experiment is
a) 4 : 9 b) 2 : 3 c) 16 : 81 d) $\sqrt{2} : \sqrt{3}$

45. **Which of the following is not an optically active material?**
a) Quartz b) Sugar crystals c) Turpentine oil d) Calcium chloride

46. In Raman effect, the incident photon makes collision with an excited molecule of the substance. The scattered photon gives rise to
a) Stokes' line b) Anti Stokes' line c) Rayleigh line d) Zeeman line

47. Refractive index of glass is 1.5. The velocity of light in glass is
a) $2 \times 10^8 ms^{-1}$ b) $4.5 \times 10^8 ms^{-1}$ c) $3 \times 10^8 ms^{-1}$ d) $1.33 \times 10^8 ms^{-1}$

48. The dark lines found in the solar spectrum are called
a) Raman lines b) Fraunhofer lines c) Stokes lines d) anti – stokes lines

49. A ray of light travelling in a rarer medium and reflected at the surface of a denser Medium automatically undergoes a
a) Phase change $\pi/2$ b) phase change 2π
c) path difference λ d) path difference $\lambda/2$

50. Waves from two coherent sources interfere with each other. At a point where the trough of one wave superposes with the trough of the other wave, the intensity of light is
a) maximum b) minimum c) zero d) no change

51. Nature of wave front corresponding to extraordinary ray inside a calcite crystal is
a) plane b) spherical c) elliptical d) cylindrical

52. A ray of light is incident on a plane glass surface at an angle of 57˚30'. The angle between the reflected ray and the refracted ray is
a) 32˚ 30' b) 90˚ c) 115˚ d) 57˚ 30'

53. In a pile of plates arrangement, the angle between the incident light and the reflected plane polarized light is
a) 32.5˚ b) 57. 5˚ c) 90˚ d) 115˚

54. An example of uniaxial crystal is
a) Selenite b) Mica c) Topaz d) Calcite

55. Angle between the electric component and magnetic component of an electromagnetic wave is
a)0 b) π/4 c) π/2 d) π

56. If i is the angle of incidence, the angle between the incident wave front and the normal to the reflecting surface is
a) i b) $90^o - i$ c) $90^o + i$ d) $i - 90^o$

57. Refractive index of a material for a polarizing angle of 55°is
a) 1.4281 b) 1.7321 c) 1.4141 d) 1.5051

58. In a Nicol prism, the ordinary ray is prevented from coming out of Canada balsam by the phenomenon of
a) reflection b) polarization
c) diffraction d)total internal reflection

59. In a plane transmission grating the width of the ruling is 12000 A^0 and the width of the slit is 8000 A^0 , the grating element is
a)20μm b) 2μm c) 1μm d) 10μm

60. A nicol prism is based on the principle of
a)refraction b)reflection c)double refraction d)diffraction

61. Of the following which one is biaxial
a)tourmaline b) ice c)calcite d) mica

62. In young's double slit experiment , bandwidth β contains
a) a bright band only b) a dark band only
c) either a bright band or a dark band d) both bright band and dark band

63. According to focault and michelson experiment the velocity of light in a rarer medium is
a)greater than in a denser medium b)lesser than in a denser medium
c)equal to that in a denser medium
d)either greater or lesser than in a denser medium

64. Which of the following is a biaxial crystal ?
a) calcite b) quartz c) tourmaline d) topaz

65. Which of the following is a uniaxial crystal?
a) Tourmaline b) Mica c) Topaz d)selenite

66. The scattering of sunlight by gas molecules in the earth's atmosphere is
a)Raman's effect b)α - scattering c)Tyndal scattering d)Rayleigh scattering

67. A light of wavelength 4000 A^0 after travelling a distance of 2 µm produces a phase change of :
a) zero b) 3π c) $\frac{\pi}{2}$ d) $\frac{\pi}{3}$

68. In snell's law of refraction $\mu = \frac{\sin i}{\sin r}$, μ is :
a) directly proportional to sin i b) inversely proportional to sin r
c) both (a) and (b) d) independent of (a) and (b)

69. A wave of length $'\lambda'$ corresponds to a phase of '$2\pi'$ calculate the phase when a distance of $'\delta'$ corresponds to a phase of $'\phi'$
a) $\phi = \frac{2\pi}{\delta} \times \delta$ b) $\phi = \frac{\lambda}{2\pi} \times \delta$ c) $\phi = \frac{2\pi}{\delta} \times \lambda$ d) $\phi = \frac{\pi}{2\lambda} \times \delta$

6.ATOMIC PHYSICS

BOOK BACK QUESTIONS:

1. **The cathode rays are**
   a) a stream of electrons b) a stream of positive ions
   c) a stream of uncharged particles d) the same as canal rays

2. **A narrow electron beam passes undeviated through an electric field E = 3×10^4 V/m and an overlapping magnetic field B = 2×10^{-3}Wb/m^2. The electron motion, electric field and magnetic field are mutually perpendicular. The speed of the electron is**
   a) 60 ms^{-1} b) 10.3×10^7ms^{-1} c) 1.5×10^7ms^{-1} d) 0.67×10^{-7}ms^{-1}

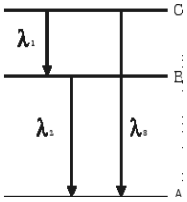
3. **According to Bohr's postulates, which of the following quantities take discrete values?**
   a) kinetic energy b) potential energy
   c) angular momentum d) momentum

4. **The ratio of the radii of the first three Bohr orbit is,**
   a) 1 : 1/2 : 1/3 b) 1 : 2 : 3 c) 1 : 4 : 9 d) 1 : 8 : 27

5. **The first excitation potential energy or the minimum energy required to excite the atom from ground state of hydrogen atom is,**
   a) 13.6 eV b) 10.2eV c) 3.4 eV d) 1.89 eV

6. **According to Rutherford atom model, the spectral lines emitted by an atom is,**
   a) line spectrum b) continuous spectrum
   c) continuous absorption spectrum d) band spectrum

7. **Energy levels A, B, C of a certain atom correspond to increasing values of energy (i.e.,) $E_A < E_B < E_C$. If λ_1, λ_2, λ_3 are the wavelengths of radiations corresponding to the transitions C to B, B to A and C to A respectively, which of the following statements is correct**



   a) $\lambda_3 = \lambda_1 + \lambda_2$ b) $\lambda_3 = \dfrac{\lambda_1\lambda_2}{\lambda_1+\lambda_2}$ c) $\lambda_1 = \lambda_2 + \lambda_3 = 0$ d) $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

8. **The elliptical orbits of electron in the atom were proposed by**
   a) J.J.Thomson b) Bohr c) Sommerfeld d) de Broglie

9. **X−ray is**
   a)phenomenon of conversion of kinetic energy into radiation.
   b)conversion of momentum
   c)conversion of energy into mass
   d)principle of conservation of charge

10. **In an X-ray tube, the intensity of the emitted X−ray beam is increased by**
    a) increasing the filament current b) decreasing the filament current
    c) increasing the target potential d) decreasing the target potential

11. The energy of a photon of characteristic X-ray from a Coolidge tube comes from
a)the kinetic energy of the free electrons of the target
b)the kinetic energy of ions of the target
c)the kinetic energy of the striking electron
d)an atomic transition in the target.

12. A Coolidge tube operates at 24800 V. The maximum frequency of X-radiation emitted from Coolidge tube is
a) 6×10^{18}Hz b) 3×10^{18}Hz c) 6×10^{8}Hz d) 3×10^{8}Hz

13. In hydrogen atom, which of the following transitions produce a spectral line of maximum wavelength
a) 2 →1 b) 4 →1 c) 6 →5 d) 5 →2

14. In hydrogen atom, which of the following transitions produce a spectral line of maximum frequency
a) 2 →1 b) 6 →2 c) 4 →3 d) 5 →2

15. After pumping process in laser,
a) the number of atoms in the ground state is greater than the number of atoms in the excited state.
b)the number of atoms in the excited state is greater than the number of atoms in the ground state.
c)the number of atoms in the ground state is equal to the number atoms in the excited state.
d)No atoms are available in the excited state.

16. The chromium ions doped in the ruby rod
a) absorbs red light b) absorbs green light c) absorbs blue light d) emits green light

PUBLIC QUESTION:

17. The wavelength of D_1 and D_2 lines emitted by sodium vapour lamp is
a) 589.6nm, 589 nm b) 589nm, 589.6nm c)589.3nm, 589nm d) 589nm, 589.3 nm

18. If the minimum wavelength of X–rays produced in a Coolidge tube is 0.62Å,the operating potential is
a) 20 kV b) 0.2 kV c)2 kV d) 10 kV

19. Wave number is defined as the number of waves
a) produced in one second b) in a distance of 1 metre
c) in a distance of 3×10^{8}metre d) in a distance of λ metre

20. The energy of the electron in the first orbit of hydrogen atom is –13.6 eV, its potential energy is
a) –13.6 eV b) 13.6 eV c) –27.2 eV d) 27.2 eV

21. In Sommerfeld atom model, for a given value of n, the number of values *l* can take is
a) n b) n + 1 c)n– 1 d) 2n + 1

22. In holography, which of the following is (are) recorded on the photographic film?
a) Frequency and amplitude b) Phase and frequency
c) Phase and amplitude d) Frequency only

23. If a and b are semi – major and semi – minor axes of the ellipse respectively and l is the orbital quantum number, then the expression to find the possible elliptical orbits is

a) $\frac{b}{a} = \frac{l+1}{n}$ b) $\frac{b}{a} = \frac{l-1}{n}$ c) $\frac{a}{b} = \frac{l+1}{n}$ d) $\frac{a}{b} = \frac{l-1}{n}$

24. A crystal diffracts monochromatic X – Rays, If the angle of diffraction for the second order is 90°, then that for the first order will be

a) 60° b) 45° c)30° d)15°

25. If R is Rydberg's constant, the minimum wavelength of hydrogen spectrum is

a) 1/R b) R/4 c)4/R d) R

26. The unit of Rydberg's constant is

a) m b) no unit c) m^2 d) m^{-1}

27. For the first order X – ray diffraction, the wavelength of the X – ray is equal to the lattice spacing at a glancing angle of

a) 15° b) 60° c)45° d) 30°

28. A Coolidge tube operates at 18600 V. The maximum frequency of X – radiation emitted from it is

a) 4.5×10^{18}Hz b) 45×10^{18}Hz c)4.05×10^{18}Hz d) 45.5×10^{18}Hz

29. If the minimum wavelength of X – ray produced from a Coolidge tube is 0.062 nm , then the potential difference between the cathode and target material is

a) 2000 V b) 20,000 V c) 2×10^5 V d) 6.2×10^3V

30. The spectral series of hydrogen atom in UV region are called

a) Balmer series b) Lymen series c) Paschen series d) Pfund series

31. Maser materials are

a) Diamagnetic ions b) paramagnetic ions
c) ferromagnetic ions d) non – magnetic ions

32. Number of waves per unit length is known as

a) Wavelength b) wave number c) bandwidth d) frequency

33. The three dimensional image of an object can be formed by

a) Atomic spectroscopy b) holography
c) molecular spectroscopy d) MASER

34. In a discharge tube, the source of positive rays (canal rays) is

a) Cathode b) anode
c) gas atoms present in the discharge tube d) fluorescent screen

35. The minimum wavelength of X – rays produced in an X – ray tube at 1000 KV is

a) $0.0124A^0$ b) $0.124\ A^0$ c) $1.24A^0$ d) $0.00124A^0$

36. The ionisation potential of hydrogen atom is

a) 13.6eV b) – 13.6 eV c) 13.6 V d) – 13.6 V

37. The value of Rydberg's constant is

a) $1.094 \times 10^{-7}m^1$ b) $1.094 \times 10^{-7}m^{-1}$ c) $1.094 \times 10^7m^{-1}$ d) $1.094 \times 1^7m^1$

38. When an electric field is applied to an atom each of the spectral lines split into several lines. This effect is known as

a) Zeeman effect b) Stark effect c) Raman effect d) Seebeck effect

39. The direction of viscous force in Millikon's oil drop experiment is

a) always downwards b) always upwards
c) opposite to the direction of motion of the oil drop d) either upwards or downwards

40. In Sommerfeld atom model, for principal quantum number n = 3, which of the following sub shells represents circular orbit?

a) 3s b) 3p c)3d d) None of these

41. In Millikon's experiment, the plates are kept at a distance of 16 mm and are maintained at a potential difference of 10000 V. The electric intensity is

a)62.5 V/m b) 6.25×10^5 V/m c)6.25×10^3 V/m d) 1.6×10^5 V/m

42. If R is Rydberg constant, the shortest wavelength of Paschen series is

a) R/9 b) 9/R c) 16/R d) 25/R

43. $\frac{e}{m}$ of cathode ray particle

a) depends upon the nature of the cathode
b) depends upon the nature of the anode
c) depends upon the nature of the gas atoms present inside the discharge tube
d) is independent of all of these .

44. If c is the velocity ν the frequency and λ the wavelength of a radiation, then its frequency is defined as

a) The number of waves in a distance of one metre
b) The number of waves in a distance of λ
c) The number of waves in a distance of c
d) The number of waves produced in a period of T second

45. The wave number of a spectral line of hydrogen atom is equal to Rydberg's constant. The line is

a) first line of Lymen series b) series limit of Lymen series
c) first line of Pfund series d) series limit of Pfund series

46. In Millikon's oil drop experiment charged oil drop is balanced between the two plates. Now the viscous force

a) acts downwards b) acts upwards
c) is zero d) acts either upwards or downwards

47. If ν is the frequency of characteristic X – ray line emitted by a target element of atomic number Z, then Mosley's law is

a) $\nu \alpha Z$ b)$\nu \alpha \sqrt{Z}$ c)$\nu \alpha Z^2$ d) $\nu \alpha Z^3$

48. When an electron jumps from M shell to the K shell it gives

a) Kα b) K_β c) Lα d) L_β

49. Arrange the spectral line Hα, Hβ, Hγ, Hδ in the increasing order of their wavelength:

a) Hα, H_β, Hγ, H_δ b)H_δ,Hγ, H_β, Hα c) H_β, Hα, H_δ, Hγ d) Hα, H_β, H_δ,Hγ

50. A narrow electron beam passes undeviated through an electric field E of 3×10^4 V/m and an overlapping magnetic field of 2×10^{-3} Wb/m^2 . The electron motion , the electric field and magnetic field are mutually perpendicular. The speed of electron is

a)60 ms^{-1} b) 10.3×10^7 ms^{-1} c)1.5×10^7 ms^{-1} d) 0.67×10^7 ms^{-1}

51. An electron moving with a velocity of 3×10^6ms^{-1} perpendicular to a uniform magnetic field of induction 0.5 T. The force experienced by the electron is

a)2.4×10^{-13}N b) 13.6×10^{-27}N c) 13.6×10^{-11}N d) zero

52. In hydrogen atom which of the following transitions produces minimum wave length

a)2→1 b)6→2 c) 4→3 d)5→ 2

53. In millikan's experiment, an oil drop of mass 4.9×10^{-14} kg is balanced by applying a potential difference 2kV Between two plates which are 2mm apart. The charge of the drop is equal to

a)1.9×10^{-18}C b) 1.602×10^{-19}C c)12C d)4.9×10^{-19}C

54. If the potential difference between cathode and target of Coolidge tube is 1.24×10^5 V then the minimum wavelength of continuous x ray is

a) 10A^0 b) 1A^0 c) 0.1A^0 d) 0.01A^0

55. A Coolidge tube operates at 24800 V. the minimum wave length of X – ray radiation emitted from Coolidge tube is

a)6×10^{18}m b)3×10^{18}m c)0.6×10^{-10}m d)0.5×10^{10}m

56. The ratio of areas enclosed by first three orbits of hydrogen atom is

a)1:2:3 b)1:8:27 c)1:4:9 d)1:16:81

57. In Thomson experiment, cathode rays moving with a velocity 'v' enter perpendicular to an electric field of intensity 'E'. the deflection produced by the cathode rays is directly proportional to

a)v b)v^{-1} c)v^2 d)v^{-2}

58. The direction of electric field in Millikan's oil drop experiment acts:

a) downwards b) upwards
c) first upwards then downwards d)first downwards, then upwards

59. The longest wavelength that can be analysed by a rock salt crystal of spacing d = 2.82 A^0 in the first order is.

a) 2.82 A^0 b) 5.64 A^0 c) 11.28 A^0 d) 21.76 A^0

60. What is the value of Bohr radius

a) 5.3 A^0 b) 0.53 A^0 c) 53 A^0 d) 5.03 A^0

7.DUAL NATURE OF RADIATIONAND MATTER RELATIVITY

BOOK BACK ONE MARKS:

1. **A photon of frequency ν is incident on a metal surface of threshold frequency νo. The kinetic energy of the emitted photoelectron is**
   a) h (ν – νo) b) hν c) hνo d) h (ν+ νo)

2. **The work function of a photoelectric material is 3.3 eV. The threshold frequency will be equal to**
   a) 8×10^{14}Hz b) 8×10^{10}Hz c) 5×10^{20}Hz d) 4×10^{14}Hz.

3. **The stopping potential of a metal surface is independent of**
   a) frequency of incident radiation b) intensity of incident radiation
   c) the nature of the metal surface d) velocity of the electrons emitted.

4. **At the threshold frequency, the velocity of the electrons is**
   a) zero b) maximum c) minimum d) infinite

5. **The photoelectric effect can be explained on the basis of**
   a) corpuscular theory of light b) wave theory of light
   c) electromagnetic theory of light d) quantum theory of light

6. **The wavelength of the matter wave is independent of**
   a) mass b) velocity c) momentum d) charge

7. **If the kinetic energy of the moving particle is E, then the de Broglie wavelength is,**
   a) $\lambda = \frac{h}{\sqrt{2mE}}$ b) $\lambda = \frac{\sqrt{2mE}}{h}$ c) $\lambda = h\sqrt{2mE}$ d) $\lambda = \frac{h}{E\sqrt{2m}}$

8. **The momentum of the electron having wavelength 2Å is**
   a) 3.3×10^{24}kg m s^{-1} b) 6.6×10^{24}kg m s^{-1}
   c) 3.3×10^{-24}kg m s^{-1} d) 6.6×10^{-24}kg m s^{-1}

9. **According to relativity, the length of a rod in motion**
   a) is same as its rest length b) is more than its rest length
   c)is less than its rest length
   d)may be more or less than or equal to rest length depending on the speed of the rod

10. **If 1 kg of a substance is fully converted into energy, then the energy produced is**
    a) 9×10^{16}J b) 9×10^{24}J c) 1 J d) 3×10^{8}J

PUBLIC ONE MARKS:

11. **If the radius of third Bohr orbit in hydrogen atom is r then the de-broglie wave length of electron in this orbit is**
    a) $\frac{r}{3}$ b) 3r c) $\frac{2\pi r}{3}$ d) $3(2\pi r)$

12. **The value of stopping potential when the frequency of light is equal to the threshold frequency is**
    a) maximum b) zero c) minimum d) infinity

13. **Two photons, each of energy 2.5 eV are simultaneously incident on the metal surface. if the work function of the metal is 4.5 eV then from the surface of the metal**
    a) one electron will emitted b) two electrons will emitted
    c) more than two electrons will be emitted d) not a single electron will be emitted

14. According to special theory of relativity the only constant in all frames is
a) mass b) length c) time d) velocity of light

15. The work function of a metal is 6.626×10^{-19}J. The threshold frequency is
a) 1×10^{15}Hz b) 10×10^{-19} Hz c) 1×10^{-15}Hz d) 10×10^{19}Hz

16. When a material particle of rest mass 'm_o' attains the velocity of light its mass becomes
a) 0 b) $2m_o$ c) $4\ m_o$ d) ∞

17. Photon has
a)energy but zero mass b) mass but zero energy
c) zero mass and zero energy d) infinite mass and energy

18. An electron of mass m and charge e associated from rest through a potential of V volt, then its final velocity is
a) $\sqrt{\frac{Ve}{m}}$ b) $\sqrt{\frac{Ve}{2m}}$ c) $\sqrt{\frac{2eV}{m}}$ d) $\frac{2eV}{m}$

19. Einstein's photoelectric equation is
a) $W + h\nu = ½\ mv^2_{max}$ b) $½\ mv^2_{max} = W$ c) $h\nu + ½\ mv^2_{max} = W$ d) $W + ½\ mv^2_{max} = h\nu$

20. Electron microscope works on the principle of
a) photoelectric effect b) particle nature of electron
c) wave nature of moving electron d) dual nature of matter

21. A graph is drawn taking frequency of incident radiation (ν) along the X – axis and its stopping potential (Vo) along the Y – axis . The nature of the graph is
a) a straight line b) a parabola c) an ellipse d) a circle

22. photon of energy2E is incident on a photosensitive surface of photoelectric work function E. The maximum kinetic energy of photoelectron emitted is
a) E b) 2E c) 3E d) 4E

23. The de Broglie wavelength of electron accelerated with a potential V is
a) $\lambda = \frac{h}{\sqrt{Vem}}$ b) $\lambda = \frac{h}{\sqrt{2Vem}}$ c) $\lambda = \frac{h}{\sqrt{2Vem}}$ d) $\lambda = \frac{h}{m\sqrt{\frac{Ve}{m}}}$

24. In the photoelectric phenomenon if the ratio of the frequency of incident radiation incident on a photosensitive surface is 1: 2 : 3 the ratio of the photoelectric current is
a) 1 : 2 :3 b) $\sqrt{1}: \sqrt{2}: \sqrt{3}$ c) 1 : 4 : 9 d) 1 : 1: 1

25. When the momentum of a particle increases its de Broglie wavelength
a) increases b) decreases c) does not change d) infinity

26. The number of de Broglie waves of an electron in the nth orbit of an atom is
a)n b)n-1 c)n+1 d)2n

27. When an electron is accelerated with potential difference V, its de Broglie wavelength is directly proportional to
a)V b) V^{-1} c) $V^{1/2}$ d) $V^{-1/2}$

28. In photoelectric effect, a graph is drawn taking the frequency of incident radiation along X - axis and the corresponding stopping potential along the y -axis. The nature of the graph is:
a) a straight line passing through origin b) a straight line having positive y – intercept
c) a straight line having negative y – intercept d) a parabola

8.NUCLEAR PHYSICS

BOOK BACK QUESTIONS:

1. **The nuclear radius of $_4Be^8$ nucleus is**
   a) 1.3×10^{-15}m b) 2.6×10^{-15}m c) 1.3×10^{-13}m d) 2.6×10^{-13}m

2. **The nuclei $_{13}Al^{27}$ and $_{14}Si^{28}$ are example of**
   a) isotopes b) isobars c) isotones d) isomers

3. **The mass defect of a certain nucleus is found to be 0.03 amu. Its binding energy is**
   a) 27.93 eV b) 27.93 KeV c) 27.93 MeV d) 27.93 GeV

4. **Nuclear fission can be explained by**
   a) shell model b) liquid drop model c) quark model d) Bohr atom model

5. **The nucleons in a nucleus are attracted by**
   a) gravitational force b) electrostatic force c) nuclear force d) magnetic force

6. **The ionisation power is maximum for**
   a) neutrons b) α– particles c) γ– rays d) β –particles

7. **The half life period of a certain radioactive element with disintegration constant 0.0693 per day is**
   a) 10 days b) 14 days c) 140 days d) 1.4 days

8. **The radio-isotope used in agriculture is**
   a) $_{15}P^{31}$ b) $_{15}P^{32}$ c) $_{11}Na^{23}$ d) $_{11}Na^{24}$

9. **The average energy released per fission is**
   a) 200 eV b) 200 MeV c) 200 meV d) 200 GeV

10. **The explosion of atom bomb is based on the principle of**
    a) uncontrolled fission reaction b) controlled fission reaction
    c) fusion reaction d) thermonuclear reaction

11. **Anaemia can be diagnosed by**
    a) $_{15}P^{31}$ b) $_{15}P^{32}$ c) $_{26}Fe^{59}$ d) $_{11}Na^{24}$

12. **In the nuclear reaction $_{80}Hg^{198} + X \rightarrow {}_{79}Au^{198} + {}_1H^1$, X-stands for**
    a) proton b) electron c) neutron d) deuteron

13. **In β– decay**
    a) atomic number decreases by one b) mass number decreases by one
    c) proton number remains the same d) neutron number decreases by one

14. **Isotopes have**
    a)same mass number but different atomic number
    b)same proton number and neutron number
    c)same proton number but different neutron number
    d)same neutron number but different proton number

15. **The time taken by the radioactive element to reduce to 1/e times is**
    a) half life b) mean life c) half life/2 d) twice the mean life

16. The half life period of N^{13} is 10.1 minute. Its life time is

a) 5.05 minutes b) 20.2 minutes c) $\frac{10.1}{0.6931}$ minutes d) infinity

17. Positive rays of the same element produce two different traces in a Bainbridge mass spectrometer. The positive ions have

a) same mass with different velocity b) same mass with same velocity
c) different mass with same velocity d) different mass with different velocity

18. The binding energy of $_{26}Fe^{56}$ nucleus is

a) 8.8 MeV b) 88 MeV c) 493 MeV d) 41.3 MeV

19. The ratio of nuclear density to the density of mercury is about

a) 1.3×10^{10} b) 1.3 c) 1.3×10^{13} d) 1.3×10^{4}

PUBLIC QUESTIONS:

20. The nuclear force is due to the continuous exchange of particles called

a) Leptons b) mesons c) hyperons d) photons

21. In the following nuclear reaction $_7N^{14} + _0n^1 \rightarrow X + _1H^1$, the element X is

a) $_6N^{14}$ b) $_6C^{14}$ c) $_6O^{14}$ d) $_7N^{13}$

22. Which of the following particles is a lepton?

a) Electron b) Proton c) Neutron d) π- meson

23. One amu is equal to

a) 931 eV b) mass of carbon atom
c) 1.66×10^{-27}kg d) mass of oxygen atom

24. The time taken by the radioactive element to reduce to $e^{-1/2}$ times is

a) Half life period b) Half life period /2 c)mean life period d) mean - life period / 2

25. The value of 1 amu is

a) 931 eV b) mass of carbon atom c) mass of one proton d) 1.66×10^{-27}kg

26. The penetrating power is maximum for

a) α- particles b) β- particles c) γ- particles d) protons

27. In the following nuclear reaction $_{13}Al^{27} + _2He^4 \rightarrow X + _0n^1$, X – stands for

a) $_{15}Si^{30}$ b) $_{15}P^{30}$ c) $_{15}S^{30}$ d) $_{15}Si^{29}$

28. The moderator used in nuclear reactor is

a) Cadmium b) Boron carbide c) Heavy water d) Uranium ($_{92}U^{235}$)

29. The number of α and β particles emitted when an isotope $_{92}U^{238}$ undergoes α and β decays to form $_{82}Pb^{206}$ are respectively

a) 6, 8 b) 4, 3 c) 8, 6 d) 3, 4

30. The particles which exchange between the nucleons and responsible for the origin of the nuclear force are

a) photons b) leptons c) mesons d) baryons

31. Which of the following is not a moderator?

a) Liquid sodium b) Ordinary water c) graphite d) Heavy water

32. An element zX^A successively undergoes three α decays and four β – decays and gets converted to an element Y. the mass number and atomic number of the element Y are respectively

a) A–12, Z – 2 b) A–12, Z + 2 c) A–12, Z +4 d) A–8, Z + 2

33. The fuel used in Kamini reactor is

a) $_{92}U^{235}$ b) $_{92}U^{233}$
c) $_{92}U^{239}$ d) low enriched uranium

34. The particle which has zero mass but has energy, is

a) electron b) photon c) proton d) neutron

35. The mean life (τ) and half life ($T_{1/2}$) of a radioactive element are related as

a) $\tau = 2T_{1/2}$ b) $\tau = \frac{T_{1/2}}{0.6931}$ c) $\tau = 0.6931\ T_{1/2}$ d) $\tau = \frac{T_{1/2}}{2}$

36. An element zX^A successively undergoes three α particles and four β – particles is converted to an element Y represented as

a) $_{Z-6}Y^{A-12}$ b) $_{Z+2}Y^{A-12}$ c) $_{Z-2}Y^{A-12}$ d) $_{Z-10}Y^{A-12}$

37. Which of the following is used to detect the presence of blocks in blood vessels?

a) $_{15}P^{31}$ b) $_{15}p^{32}$ c) $_{26}Fe^{59}$ d) $_{11}Na^{24}$

38. If the nuclear radius is 2.6×10^{-15} m ,then its mass number is

a) 2 b) 4 c) 8 d) 16

39. The energy of Slow neutrons

a) 1000 eV – 2000 eV b) 2000 eV-0.5 MeV c) 0 eV - 1000 eV d) 0MeV-10 MeV

40. One amu is equal to

a) 931 eV b) mass of carbon atom c) 1.66×10^{-24} g d) mass of electron

41. Particle that has no charge and no rest mass but travels with velocity of light is

a) baryon b) meson c) lepton d) Photon

42. The half life of a radioactive element is 300 days. The disintegration constant of the radioactive element is

a) 0.00231 day b) 0.00231/ day c) 0.0231/ day d)0.0231 day

43. The mean life of radon is 5.5 days. Its half life is

a) 8 days b) 2.8 days c) 0.38 days d) 3.8 days

44. The energy equivalent to 1 amu is

a) 931 MeV b) 931 meV c) 931 eV d) 913 MeV

45. The fuel used in Kamini (Kalpakkam mini reactor) is

a) mixture of carbides of uranium and plutonium b) $_{92}U^{233}$
c) mixture of oxides of plutonium and uranium d) $_{92}U^{235}$

46. In the nuclear reaction $_4Be^9 + X \rightarrow {}_6C^{12} + {}_0n^1$,X – stands for

a) Proton b) α – particle($_2He^4$) c) electron d) deuteron

47. Which of the following belongs to Baryon group?

a) photon b) electron c) Pion d) proton

48. According to the law of disintegration $N = N_o e^{-\lambda t}$, the number of radioactive atoms that have been decayed during a time of t is

a) N_o b) N c) N_o-N d) $N_o/2$

49. The coolant used in fast breeder reactor is

a) ordinary water b) heavy water c) liquid sodium d) boron carbide

50. Which of the following are isotones?

a) $_{92}U^{235}$ and $_{92}U^{238}$ b) $_8O^{16}$ and $_7N^{14}$ c) $_6C^{14}$ and $_7N^{14}$ d) $_7N^{14}$ and $_6C^{13}$

51. Arrange α, β and γ rays in the increasing order of their ionizing power

a) α, β, γ b) β, α, γ c) γ, β, α d) γ, α, β

52. When mass number increases, nuclear density

a) increases b) decreases
c)remains constant d) may increase (or) decrease

53. The nuclear force between a proton and another proton inside the nucleus is

a) zero b) short range c) repulsive d) long range

54. The cosmic ray intensity is maximum at a latitude of

a) 0° b) 45° c) 90° d) 60°

55. The rays which have the greatest ionising power is

a) neutrons b) α– particles c)γ– rays d) β– particles

56. Hydrogen bomb is based on the principle of

a) nuclear fission b) nuclear fusion
c) nuclear force d) carbon nitrogen cycle

57. The unit of disintegration constant is

a) no unit b) second c) $second^{-1}$ d) curie

58. In proton – proton cycle four protons fuse together to give

a) an α particle, two electrons, two neutrinos and energy of 26.7 MeV
b) an α particle, two positrons, two neutrinos and energy of 26.7 MeV
c) a helium atom, two positrons, two neutrinos and energy of 26.7 MeV
d) an α particle, two positrons, two anti - neutrinos and energy of 26.7 MeV

59. Which of the following is massless and chargeless but carrier of energy and spin ?

a) neutrino b) Muon c) Pion d) Kaon

60. The radio isotope used in the treatment of skin disease is

a) Na^{21} b) I^{131} c) Fe^{59} d)P^{32}

61. The binding energy per nucleon of $_{26}Fe^{56}$ nucleus is

a) 8.8 MeV b) 88 MeV c) 493 MeV d) 41.3 MeV

62. 1 curie is

a) activity of one gram uranium b) 1 disintegration/second
c) 3.7×10^{10} becquerrel d)1.6×10^{12} disintegration/second

9.SEMICONDUCTOR DEVICES AND THEIR APPLICATIONS

BOOK BACK QUESTIONS:

1. **The electrons in the atom of an element which determine its chemical and electrical properties are called**
   a) valence electrons b) revolving electrons
   c) excess electrons d) active electrons

2. **In an N–type semiconductor, there are**
   a) immobile negative ions b) no minority carriers
   c) immobile positive ions d) holes as majority carriers

3. **The reverse saturation current in a PN junction diode is only due to**
   a) majority carriers b) minority carriers c) acceptor ions d) donor ions

4. **In the forward bias characteristic curve, a diode appears as**
   a) a high resistance b) a capacitor c) an OFF switch d) an ON switch

5. **Avalanche breakdown is primarily dependent on the phenomenon of**
   a) collision b) ionization c) doping d) recombination

6. **The colour of light emitted by a LED depends on**
   a) its reverse bias b) the amount of forward current
   c) its forward bias d) type of semiconductor material

7. **The emitter base junction of a given transistor is forward biased and its collector - base junction is reverse biased. If the base current is increased, then its**
   a) V_{CE} will increase b) I_C will decrease c) I_C will increase d) V_{CC} will increase.

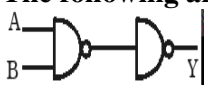
8. **Improper biasing of a transistor circuit produces**
   a) heavy loading of emitter current b) distortion in the output signal
   c) excessive heat at collector terminal d) faulty location of load line

9. **An oscillator is**
   a) an amplifier with feedback b) a convertor of ac to dc energy
   c) nothing but an amplifier d) an amplifier without feedback

10. **In a Colpitt's oscillator circuit**
    a) capacitive feedback is used b) tapped coil is used
    c) no tuned LC circuit is used d) no capacitor is used

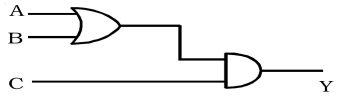
11. **Since the input impedance of an ideal operational amplifier is infinite,**
    a) its input current is zero
    b) its output resistance is high
    c) its output voltage becomes independent of load resistance
    d) it becomes a current controlled device

12. **The following arrangement performs the logic function of _____ gate**



a) AND b) OR c) NAND d) EXOR

13. If the output (Y) of the following circuit is 1, the inputs A B C must be



a) 0 1 0 b) 1 0 0 c) 1 0 1 d) 1 1 0

14. According to the laws of Boolean algebra, the expression (A + AB) is equal to

a) A b) AB c) B d) $\overline{A}$

15. The Boolean expression $\overline{ABC}$ can be simplified as

a) $AB + \overline{C}$ b) $\overline{A}.\overline{B}.\overline{C}$ c) AB + BC + CA d) $\overline{A} + \overline{B} + \overline{C}$

PUBLIC QUESTIONS

16. The forbidden energy gap for germanium is of the order of

a) 1.1 eV b) 0.7 eV c) 0.3 eV d) 10 eV

17. Condition for oscillator is

a) $A\beta = 0$ b) $A = 1/\beta$ c) $A\beta = \infty$ d) $A + \beta = 0$

18. The potential barrier of silicon PN junction diode is approximately

a) 0.3 V b) 0.7 V c) 1.1 V d) 10 V

19. The Boolean expression to represent NAND operation is

a) $Y=\overline{A+B}$ b) $Y=\overline{A.B}$ c) $Y=\overline{A}$ d) Y= A.B

20. The forbidden energy gap for silicon is the order of

a) 0.7 eV b) 0.4 eV c) 1.1 eV d) 10 eV

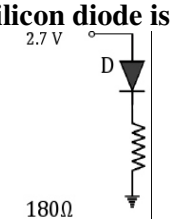
21. In CE single stage amplifier, the voltage gain at mid – frequency is 10. The voltage gain at upper cut off frequency is

a) 10 b) 14.14 c) 7.07 d) 20

22. Barkhausen condition for maintenance of oscillation is

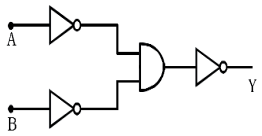
a) $\beta = 1/A$ b) $A\beta = \infty$ c) $A = \beta$ d) $A\beta = \frac{1}{\sqrt{2}}$

23. Find the voltage across the resistor as shown in the figure (silicon diode is used)



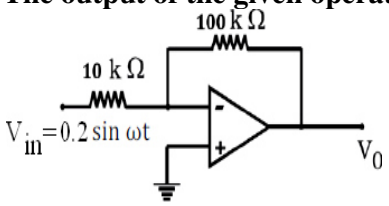
a) 2.4 V b) 2.0 V c) 1.8 V d) 0.7V

24. The output (Y) of the logic circuit given below is



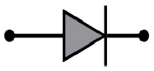
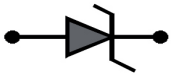
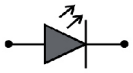
a) A+B b) A.B c) $\overline{A+B}$ d) $\overline{A} + \overline{B}$

25. The output of the given operational amplifier is



a) – 2 sin ωt b) 2 sin ωt c) – 2 sin (ωt+10°) d) 2 sin (ωt+10°)

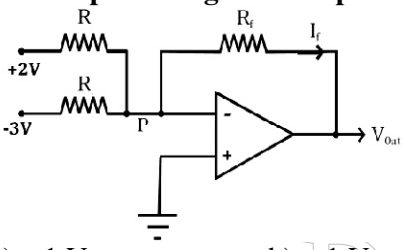
26. The symbol to represent LED is

a)  b)  c)  d) 

27. The logic gate for which there is 'low' output only when both the inputs are 'High' is

a) AND b) NAND c)NOR d) EXOR

28. The output voltage of the operational amplifier(Op-Amp) given below is



a) – 1 V b) + 1 V c) +5V d) -5V

29. In a junction transistor the emitter region is heavily doped since emitter has to supply to the base

a) minority carriers b) majority carriers c)acceptor ions d)donor ions

30. A logic gate which has an output '1' only when the inputs are complement to each other is

a) AND b) NAND c) NOR d) EXOR

31. Of the following, the donor atoms are

a) silicon and germanium b)aluminium and gallium
c)bismuth and arsenic d)boron and iridium

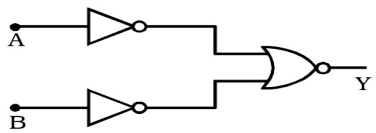
32. In CE amplifiers, the phase difference between input and the output voltage is

a) 0° b) 90° c) 270° d) 180°

33. In common emitter transistor circuit, the base current (I_B) of the transistor is 50μA and the collector current (I_C) is 25 mA. Then the current gain is

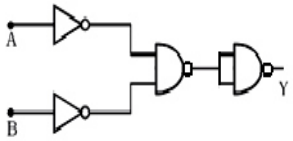
a) 50 b) 500 c) 20 d)200

34. The following arrangement performs the logic function of



a) AND b) EXOR c)OR d)NAND

35. The following arrangement performs the logic function of



a) AND gate b) NAND gate c) OR gate d) NOR gate

36. An example for non – sinusoidal oscillator is

a) multivibrator b) RC oscillator c)colpitts oscillator d)crystal oscillator

37. The Boolean expression of represent NAND operation is

a) Y =A + B b) Y = A . B c)$Y=\overline{A}$ d)$Y=\overline{AB}$

38. In the pin configuration of IC 741, pin 3 represents

a) inverting input b) non – inverting input c) -Vcc d)output

39. The forbidden energy gap for conductors is

a)0.7eV b) 1.1eV c) zero d)3 eV

40. In a transistor the value of $\left[\frac{1}{\alpha} - \frac{1}{\beta}\right]$ is equal to

a) α b) β c)$\frac{\alpha}{\beta}$ d) 1

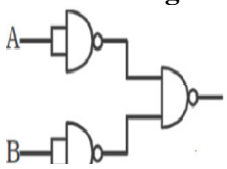
41. A logic gate for which there is an output only when both the Inputs are zero is

a) NAND b) NOR c)EXOR d) AND

42. The phase reversal between the input and output voltages in single stage CE amplifier is

a) $\pi/2$ b) 2π c) π d)$3\pi/2$

43. The following arrangement performs the logic function of



a) AND b) OR c) NAND d) EXOR

44. In a PN junction diode on the side of N but very close to the junction there are

a) donor atoms b) acceptor atoms
c) immovable positive ions d) immovable negative ions

45. In an N type semiconductor donor level lies

a) just below the conduction band b) just above the conduction band
c) just below the valence band d) just above the valence band

46. For a transistor connected in common emitter mode (CE) the slope of the input characteristics curve gives

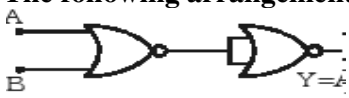
a)input impedance b)current gain
c) reciprocal of input impedance d)voltage gain

47. Which of the following devices has a source of emf inside it ?

48. Improper biasing of a transistor circuit produces

a)heavy loading of emitter current b)distortion in the output signal
c)excessive heat at collector terminal d)faulty location of load line

49. The following arrangement performs the logic function of



a)NOT b)EXOR c)OR d)AND

50. In CE single stage amplifier if the voltage gain at mid frequency A_M , then the voltage gain at lower cut off frequency is

a) $\frac{AM}{2}$ b) $\sqrt{2}$ AM c) $\frac{\sqrt{2}}{AM}$ d) $\frac{AM}{\sqrt{2}}$

51. The forbidden energy gap for semiconductor Ge and Si are respectively

a) 1.1 eV and 0.7 eV b) 0.7 eV and 1.1 eV c) 4 eV and 0.7eV d) 1.1 eV and 7 eV

10.COMMUNICATION SYSTEMS

BOOK BACK QUESTIONS:

1. High frequency waves follow

a) the ground wave propagation b) the line of sight direction
c) ionospheric propagation d) the curvature of the earth

2. The main purpose of modulation is to

a) combine two waves of different frequencies
b) acquire wave shaping of the carrier wave
c) transmit low frequency information over long distances efficiently
d) produce side bands

3. In amplitude modulation

a) the amplitude of the carrier wave varies in accordance with the amplitude of the modulating signal.
b) the amplitude of the carrier wave remains constant
c) the amplitude of the carrier varies in accordance with the frequency of the modulating signal
d) modulating frequency lies in the audio range

4. In amplitude modulation, the band width is

a) equal to the signal frequency b) twice the signal frequency
c) thrice the signal frequency d) four times the signal frequency

5. In phase modulation

a) only the phase of the carrier wave varies
b) only the frequency of the carrier wave varies.
c) both the phase and the frequency of the carrier wave varies.
d) there is no change in the frequency and phase of the carrier wave

6. **The RF channel in a radio transmitter produces**
   a) audio signals b) high frequency carrier waves
   c)both audio signal and high frequency carrier waves d)low frequency carrier waves.

7. **The purpose of dividing each frame into two fields so as to transmit 50 views of the picture per second is**
   a) to avoid flicker in the picture
   b) the fact that handling of higher frequencies is easier
   c) that 50 Hz is the power line frequency in India
   d) to avoid unwanted noises in the signals

8. **Printed documents to be transmitted by fax are converted into electrical signals by the process of**
   a) reflection **b) scanning** c) modulation d) light variation

PUBLIC QUESTIONS:

9. **In television, blanking pulse is applied to**
   a) horizontal plates b) vertical plates c)control grid d)filament

10. **In a AM superheterodyne receiver, the local oscillator frequency is 1.245MHz. The tuned station frequency is**
    a) 455 kHz b) 790 kHz c)690kHz d)990kHz

11. **The radio waves after refraction from different parts of ionosphere on reaching the earth are called as**
    a) ground waves b) sky waves c) space waves d)microwaves

12. **The principle used for transmission of light signals through optical fibre is**
    a) refraction b) diffraction c) polarization d)total internal reflection

13. **Digital signals are converted into analog signals using**
    a) FAX b) modem c)cable d)coaxial cable

14. **In interlaced scanning time taken to scan one line is**
    a) 20 ms b) 64μs c) 50 ms d) 100 μs

15. **The first man – made satellite is**
    a) Aryabhatta b) Sputnik c) Venera d) Rohini

16. **The audio frequency range is**
    a) 20 Hz – 200000 Hz b) 20 Hz – 2000 Hz
    c) 20 Hz to 2000000 Hz d) 20 Hz to 20000 Hz

17. **Skip distance is the shortest distance between**
    a) The point of transmission and the point of reception
    b) The uplink station and the downlink station
    c) The transmitter and the target
    d) The receiver and the target

18. **An FM signal has a resting frequency of 105 MHz and highest frequency of 105.03 MHz , when modulated by a signal. Then the carrier swing is**
    a) 0.03 MHz b) 0.06 MHz c) 0.03 kHz d) 60 MHz

19. In the AM superheterodyne receiver system the value of the intermediate frequency is equal to

a) 445 kHz b) 455 kHz c) 485 kHz d) 465 kHz

20. In an AM receiver, the local oscillator frequency is 2750kHz. The tuned station frequency is

a) 2905 kHz b) 2295 kHz c) 3055 kHz d) 2250 kHz

21. For FM receivers, the intermediate frequency is

a) 455 kHz b) 455 MHz c) 10.7 kHz d) 10.7 MHz

22. intermediate frequency in FM receivers

a) 455 kHz b) 10.7 MHz c) 40 MHz d) 22 MHz

23. In AM receiver, if 900 kHz station is tuned then the local oscillator will have to produce a frequency of

a) 600 kHz b) 455 kHz c) 10.7MHz d) 1355 kHz

Prepared by
Shanmugavelu.J M.Sc, B.Ed
[P.G Assist in Physics]
Lions Mat. Hr. Sec. School
Ph. No: 9952223467
Email : shaam.breeze@gmail.com