ELECTRIC CHARGES AND FIELDS

1. When a glass rod is rubbed with silk, a glass rod is said to be charged
   *a) positively b) negatively c) either positive or negative d) none
2. When the ebonite rod is rubbed with fur, the rod is said to be charged
   a) Negatively *b) positively c) either positive or negative d) none
3. The concept of positive and negative charge was introduced by
   a) Newton b) Maxplank *c) Benjamin franklin d) Faraday
4. The fundamental metjods of charging are ____
   a) charging by friction b) charging by conduction
   c) charging by induction *d) All the above
5. In charging by friction
   *a) Law of conservation of charge holds good
   b) Law of conservation of energy holds good
   c)) Law of conservation of momentum holds good
   d) None of the above
6. In charging by conduction , nature of charge acquired by the conductor.
   a) is opposite as that of charging body *b) is same as that of charging body
   c) both (a) and (b) d) nothing can be said
7. In charging by induction, nature of charge acquired by the conductor
   *a) is opposite as that of charging body b) is same as that of charging body
   c) either (a) or (b) d) none
8. When charge is given to an insulator
   a) charges flows on its surface *b) charges remains to localized
   c) charges enter into the body d) charges disappear
9. Coulomb's law is applicable for
   a) Two neutral bodies b) Any two bodies
   *c) two point charges d) two insulators
10. When two point charges are take from vacuum to water, the force between them.
    a) increases *b) decreases c) remains same d) becomes zero
11. The force between two point charges varies as
    a) $(\text{distance})^2$ *b) $\frac{1}{(\text{distance})^2}$ c) distance d) $\frac{1}{\text{distance}}$
12. Force between two point charges is
    a) attractive b) repulsive
    *c) atractive or repulsive d) both attractive and repulsive
13. Charge is
    a) additive *b) cnserved c) quantised d) All the above
14. charge is a
    *a) scalar b) vector c) tensor d) fundamental physical quantity
15. Gold leaf electroscope is used to detect
    a) current *b) charge c) potential d) capacitance
16. S.I unit of permittivity is
    *a) $C^2N^{-1}m^{-2}$ b) C^2Nm^{-2} c) Nm^2C^{-2} d) $Nm^{-2}C^{-2}$
17. The value of $\frac{1}{4\pi\varepsilon_0}$ is nearly
    a) 8.1×10^{-12} b) 9×10^{-9} *c) 9×10^{9} d) 3×10^{8}
18. Coulomb's law follows
    a) Faraday's law *b) Newton's 3rd law c) Newton's 2nd law d) Newton's 1st law
19. 1 coulomb = _____ electrons
    a) one b) 10^6 *c) 6.25×10^{18} d) 6.25×10^{20}

20. S.I unit of charge is
a) farad b) ampere c) newton *d) coulomb

21. Charge on a body may be
a) $+\frac{2}{3}e$ b) $-\frac{2}{3}e$ *c) $\frac{+10}{2}e$ d) $-\frac{5}{2}e$

22. When a body is negatively charged, its mass
*a) increases b) decreases c) remains same
d) may increases or decrease

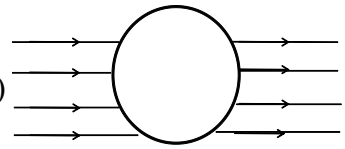
23. Force between two point charged at some distance in vacuum is F. The force between the same charged in a medium of dielectric constant k at the same distance is
a) KF *b)F/ K c) (K+1) F d) F/(K+1

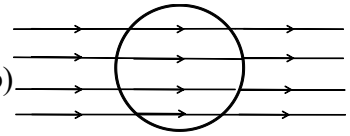
24. The value of relative permittivity for metals is
a) zero b) one *c) infinity d) negative

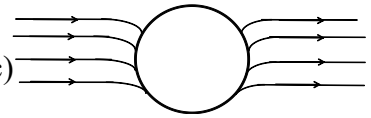
26. Force experienced by a unit charge at a point is called _____ at that point
a) Electric potential b) Electric current c) Electric, field lines *d) Electric field

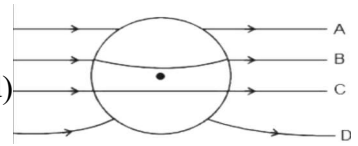
27. Identify the wrong statement?
a) Electric field lines never intersect each other
*b) Electric field lines always forms closed loops
c) Electric field lines starts from positive charge and ends at negative charge
d) Electric field lines are normal to the conductors

28. Identify the correct representation of electric field lines

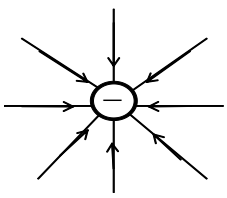
a) 

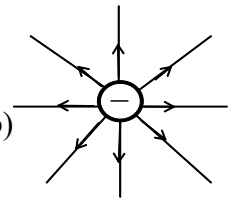
b) 

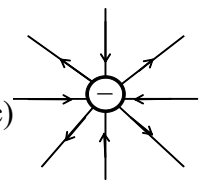
*c) 

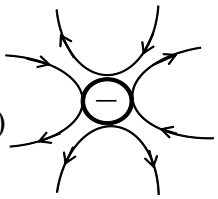
d) 

29. Electric field lines due to an isolated negative charge are represented by

*a) 

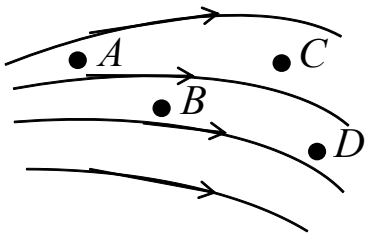
b) 

c) 

d) 

30. An electron released from rest in a uniform electric field moves
a) in a circular path
b) in a helical path
c) in a straight line along the direction of electric field
*d) none of the above

31. For a non - uniform electric field shown below



a) $E_A = E_D$ b) $E_A < E_B$ *c) $E_A > E_C$ d) $E_D = E_A + E_B + E_C$

32. S.I unit of electric dipole moment is

a) mC *b) Cm c) CM d)mc

33. An electric dipole placed in a non - uniform electric field experiences

a) only force b) only torque

*c) both force & torque d) neither force nor torque

34. Electric field due to a short dipole at a point on equatorial line is given by

a) $\vec{E} = \frac{1}{4\pi\varepsilon_0}\frac{2\vec{P}}{r^3}$ b) $\vec{E} = \frac{1}{4\pi\varepsilon_0}\frac{2\vec{P}}{r^3}$ c) $\vec{E} = -\frac{1}{4\pi\varepsilon_0}\frac{\vec{P}}{r^3}$ *d) $\vec{E} = \frac{1}{4\pi\varepsilon_0}\frac{\vec{P}}{r^3}$

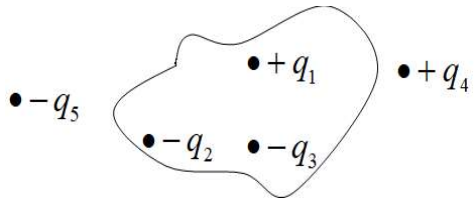
35. The angle between dipole moment and electric field at a point on axial line is

*a) 0^0 b) 90^0 c) 180^0 d) 270^0

36. Electric flux through a surface is given by

a) $\phi = \vec{E} \times \vec{A}$ *b) $\phi = \vec{E} \bullet \vec{A}$ c) $\phi = \vec{E} + \vec{A}$ d) $\phi = \vec{E} - \vec{A}$

37. The total electric flux through the given closed surface



a) $\phi = \frac{(q_1 - q_2 - q_3 + q_4 - q_5)}{\varepsilon_0}$ b) $\phi = \frac{(q_4 - q_5)}{\varepsilon_0}$ *c) $\phi = \frac{(q_1 - q_2 - q_3)}{\varepsilon_0}$ d) $\phi = \frac{q_1}{\varepsilon_0}$

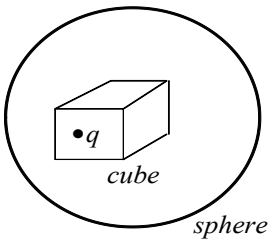
38. Electric flux is a

*a) scalar b) vector c) dimensionless quantity d) constant

39. Electric flux through a cube enclosing a dipole is

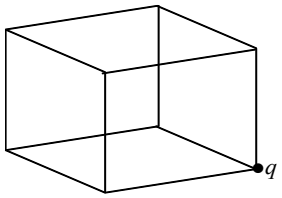
a) $\frac{q}{\varepsilon_0}$ b) $\frac{2q}{\varepsilon_0}$ c) $\frac{q}{2\varepsilon_0}$ *d) zero

40. Choose the correct option for the following



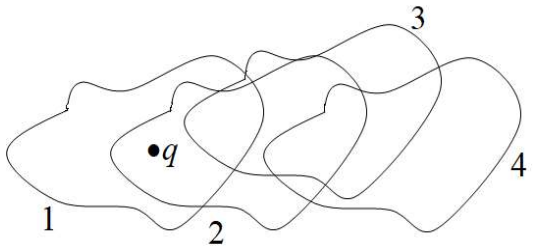
a) $\phi_{cuve} > \phi_{sphere}$ b) $\phi_{sphere} > \phi_{cube}$ *c) $\phi_{cube} = \phi_{sphere}$ d) None

41. The electric flux through the cube is



a) $\frac{q}{16\varepsilon_0}$ *b) $\frac{q}{8\varepsilon_0}$ c) $\frac{q}{4\varepsilon_0}$ 4) $\frac{q}{2\varepsilon_0}$

42. Choose the correct option



a) $\phi_1 = \phi_2 = \phi_3 = \phi_4 = 0$ b) $\phi_1 = \phi_2 = 0, \phi_3 = \phi_4 = \frac{q}{\varepsilon_0}$

*c) $\phi_1 = \phi_2 = \frac{q}{\varepsilon_0}, \phi_3 = \phi_4 = 0$ d) $\phi_1 = \phi_2 = \phi_3 = \phi_4 = \frac{q}{\varepsilon_0}$

43. S.I unit of linear charge density is

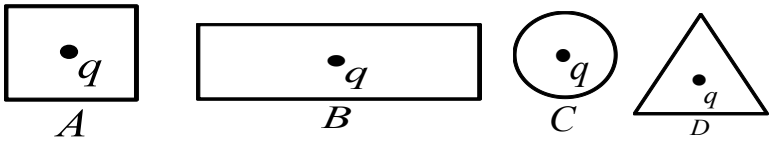
a) cm^{-3} b) cm^{-2} *c) cm^{-1} 4) cm

44. A charge Q is enclosed by a Gaussian spherical surface of radius R. If the radius is doubled the flux through surface is

a) increases four times b) reduced to half

c) doubled *d) remains same

45. The charge q is enclosed as shown below below, the electric flux is



a) maximum in B b) minimum in D c) Minimum in C and D *d) Equal in all

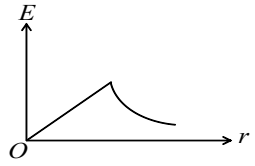
46. Electric field due to an infinitely charged straight wire at a distance r is

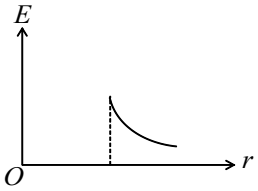
*a) $E \propto \frac{1}{r}$ b) $E \propto \frac{1}{r^2}$ c) $E \propto \frac{1}{r^3}$ d) $E =$ constant

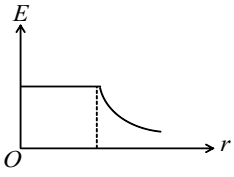
47. Electric field inside a charged spherical shell is

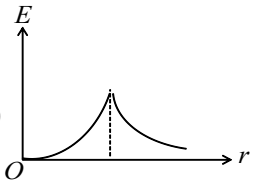
*a) $E = 0$ b) $E = \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}$ c) $E = \frac{1}{4\pi\varepsilon_0}\frac{q}{R^2}$ d) $E = \frac{1}{4\pi\varepsilon_0}\frac{q}{r^3}$

48. Variation of E and r for a charged spherical conductung shell is

a) 

*b) 

c) 

d) 

49. The dielectric constant of metal is

a) 1 *b) ∞ c) 0 d) None of these

50. The unit of intensity of electric field is

*a) Newton / Coulomb b) Joule/ Coulomb c) Volt- metre d) Newton/ metre

51. Which of the following is deflected by electric field

a) X- rays b) $\gamma-$ rays c) Neutrons *d) $\alpha-$ particles

52. An electron is moving towards x-axis. An electric field is along y - direction then path of electron is

a) Circular b) Elliptical *c) Parabola d) None of these

53. A proton enters in an electric field with its velocity in the direction of the electric lines of force. 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

54. A region surrounding a stationary electric dipoles has
a) Magnetic field only *b)Electric field only
c)Both electric and magnetic fields d)No electric and magnetic fields

55. Gauss's law in electrostatics should be invalid if
a)There were magnetic monopoles
*b)The inverse square law were not exactly true
c)The velocity of light were not a universal constant
d)None of these

56. A spherical conductor has the charge on it. Then total flux emitted through the gaussian surface drawn around conductor will be

*a) $\frac{1}{\varepsilon_0}\times$ (the charge enclosed by surface) b) $\varepsilon_0 \times$ (charge enclosed by surface)

c) $\frac{1}{4\pi\varepsilon_0}\times$ (charge enclosed by surface) d) 0

57. Gauss's law is true only if force due to a charge varies as
a) r^{-1} *b) r^{-2} c) r^{-3} d) r^{-4}

58. 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 directly proportional to

*a) $\frac{1}{x^2}$ b) $\frac{1}{x}$ c) x d) x^2

FILL IN THE BLANKS

1. A body can be charged by the method of _____. (A: Induction)
2. _____ is the simple apparatus with which the presence of electric charge on a body is detected (A: Electroscope)
3. SI unit of linear charge density is _____.(A: coulomb per metre)
4. The direction of electric field is _____ from the positive charge. (A: away)
5. The direction of electric field is _____ the negative charge. (A: towards)
6. Electric Field lines do not exist inside a _____.(A: conductor)
7. If ($q_1q_2<0$) then nature of force between charges is _____.(A: attractive)
8. SI unit of dipole moment is _____.(A: coulomb-metre)

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2. ELECTRIC POTENTIAL AND CAPACITANCE

1. Work done in taking a charge q once round a circle of radius R is
a) positive b) Negative *c) zero d) none

2. Workdone in taking a charge q from point A to B is

a) $W = q\left(V_A - V_B\right)$ *b) $W = q\left(V_B - V_A\right)$ c) $W = \frac{q}{\left(V_A - V_B\right)}$ d) zero

3. Work done in taking a unit positive charge from infinity to a point without acceleration against electric field is called _____ at that point
a) Electric field b) Electric force *c) Electric potential d) Electric flux

4. Electrostatic force is a
*a) conservative force b) non - conservative force
c) Frictional force d) Restoring force

5. Electric potential due to a point charge varies with distance as

a) $V \propto r$ *b) $V \propto \frac{1}{r}$ c) $V \propto r^2$ d) $V \propto \frac{1}{r^2}$

6. Electric potential due to a short - dipole varies with distance as

a) $V \propto r$ b) $V \propto \frac{1}{r}$ c) $V \propto r^2$ *d) $V \propto \frac{1}{r^2}$

7. Potential at any point on an equipotential surface is

a) increases with distance b) decreases with distance

*c) remain same d) nothing can be said

8. Work done in moving a charge from one point to another point on an equipotential surface is

*a) zero b) depends on the points c) depends on the path followed d) none

9. Equipotential surface due to a single point charge are

a) parallel planes b) concentric circles *c) concentric sphere d) of any shape

10. Choose the wrong statement / statements

(i) Equipotential can intersect each other

(ii) Direction of electric field is always parallel to the equipotential surfaces

a) (i) only b) (ii) only *c) both (i) and (ii) d) Neither (i) nor (ii)

11. The relation between electric field and electric potential is

*a) $E = -\frac{dV}{dx}$ b) $E = +\frac{dV}{dx}$ c) $E = -\frac{dE}{dx}$ d) $E = +\frac{dE}{dx}$

12. Potential energy of two charges is given by

a) $U = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}$ *b) $U = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r}$ c) $U = \frac{1}{4\pi\varepsilon_0}\left[\frac{q_1}{r_1} + \frac{q_2}{r_2}\right]$ d) $U = \frac{1}{4\pi\varepsilon_0}\left[\frac{q_1}{r_1^2} + \frac{q_2}{r_2^2}\right]$

13. Electric field near the surface of a charged conductor

*a) $\vec{E} = \frac{\sigma}{\varepsilon_0}\hat{n}$ b) $\vec{E} = \frac{\sigma}{2\varepsilon_0}\hat{n}$ c) $\vec{E} = \frac{2\sigma}{\varepsilon_0}\hat{n}$ d) $\vec{E} = \frac{4\sigma}{\varepsilon_0}\hat{n}$

14. Excess charge given to the conudctor resides

a) inside the conductor *b) on the surface of the conductor

c) outside the conductor d) at the centre of the conductor

15. The electric field inside the cavity of the conductor is always zero. This is known as_____

a) Magnetic shielding b) Magnetic coupling

*c) Electrostatic shielding d) Electrosttaic coupling

16. S.I unit of dielectric strength is

a) Vm^{-1} b) NC^{-1} c) Nm^2C^{-2} *d) both (a) and (b)

17. The correct expression for charge on a conductor

*a) $Q = CV$ b) $Q = \frac{C}{V}$ c) $Q = \frac{V^2}{C}$ d) $Q = \frac{V}{C}$

18. Capacitance of a conductor depends on

*a) size and shape of the conductor b) charge on the conductor

c) potential of the conductor d) all the above

19. Capacitance of a spherical conductor of radius R is air is

a) $C = \frac{1}{4\pi\varepsilon_0}\frac{Q}{R}$ *b) $C = 4\pi\varepsilon_0 R$ c) $C = \frac{1}{4\pi\varepsilon_0}R$ d) $C = \frac{1}{4\pi\varepsilon_0 R}$

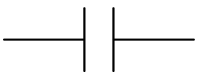
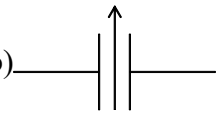
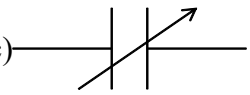
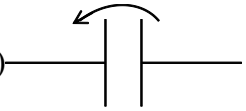
20. Capacitance of earth is nearly

*a) $711\mu F$ b) $791\mu F$ c) $989\mu F$ d) $919\mu F$

21. A system of two conductor separated by a dielectric medium is called

a) resistor *b) Capacitor c) inductor d) Oscillator

22. Electrical symbol for variable capacitor is

a)  b)  *c)  d) 

23. The electric field between the plates of a parallel plate capacitor is

a) $E = \frac{\sigma}{4\varepsilon_0}$ b) $E = \frac{\sigma}{2\varepsilon_0}$ *c) $E = \frac{\sigma}{\varepsilon_0}$ d) zero

24. Electric field outside the plates of a parallel plate capacitor

a) $E = \frac{\sigma}{4\varepsilon_0}$ b) $E = \frac{\sigma}{4\varepsilon_0}$ c) $E = \frac{\sigma}{\varepsilon_0}$ *d) zero

25. Electric field between the plates of a parallel plate capaitor is

*a) uniform b) non - uniform c) E = 0 d) None

26. The bending electric field lines at the edge of parallel plate capacitor is called_____

a) plate effect b) line effect *c) edge effect d) plane effect

27. Capacitance of parallel plate capacitor is given by

a) $C = \varepsilon_0 \frac{d}{A}$ *b) $C = \frac{\varepsilon_0 A}{d}$ c) $C = \frac{d}{\varepsilon_0 A}$ d) $C = \frac{A}{\varepsilon_0 d}$

28. If we increase distance between plates of a parallel plate capacitor then its capacitance

a) increases *b) decreases c) remains constant d) none

29. If we increase charge on the plates of a parallel plate capacitor then its capacitance

a) increases b) decreases *c) remains constant d) none

30. If a dielectric slab of dielectric constant is iserted into a parallel plate capacitor then its capacitance

*a) increases by K b) decreases by K c) increases by K^2 d) decrease by K^2

31. In series combination of capacitors _____ on each capacitor remains same

a) potential b) capacitance *c) charge d) force

32. If n identical capacitors are connected in series, then their equivalent capacitance is

a) nC *b) $\frac{C}{n}$ c) $(n+1)C$ d) $\frac{C}{(n+1)}$

33. In parallel combination of capacitors,

a) charge on each capacitor is same b) P.d across each capacitor is same

c) total capaitance increases *d) Both (b) and (c)

34. In nidentical capacitors are connected in parallel then their equivalent capacitance is,

*a) nC b) $\frac{C}{n}$ c) $(n+1)C$ d) $(n+2)C$

35. Energy stored in the capacitor is given by

a) $U = \frac{1}{2}CV^2$ b) $U = \frac{1}{2}\frac{Q^2}{C}$ c) $U = \frac{1}{2}QV$ *d) All the above

36. Energy density between the plates of parallel plate capacitor is given by

*a) $\frac{1}{2}\varepsilon_0 E^2$ b) $\frac{1}{2}\varepsilon_0 CE^2$ c) $\frac{1}{2}\varepsilon_0 CV^2$ d) $\frac{1}{2}\varepsilon_0 Q^2$

37. 'A' represents a molecule in which centers of positive and negative charges coincide. 'B' represents a molecule in which centers of positive and negative charges are separate. Then, which of the following is TRUE for A and B?

a) A and B are both polar molecules

b) A and B are both non-polar molecules

c) A is a polar molecule, B is a non-polar molecule

*d) A is a non-polar molecule, B is a polar molecule

38. An example for polar molecule is:
a) Oxygen (O_2) molecule b) Nitrogen (N_2) molecule
c) Hydrogen (H_2) molecule *d) Water (H_2O) molecule

39. Capacitors are used to
a) Destroy electric charges *b) Store electric charges
c) Produce electric charges d) Produce high potential differences

40. For three capacitors connected in series, which of the following formulae is INCORRECT?
a) $V_s = V_1 + V_2 + V_3$ b) $Q_s = Q_1 = Q_2 = Q_3$
*c) $C_s = (C_1C_2C_3)/(C_1 + C_2 + C_3)$ d) $C_s = C_1C_2C_3/(C_1C_2 + C_2C_3 + C_3C_1)$

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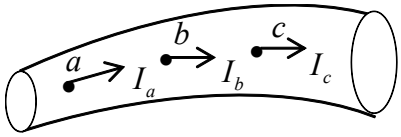
3. CURRENT ELECTRICITY

1. S.I unit of electric current is
a) coulomb b) henry c) farad *d) ampere

2. Current is a _____ quantity
*a) scalar b) vector c) tensot d) none

3. The current at points a,b & c are I_a, I_b & I_c respectively for the following diagram. choose the current option.



a) $I_a > I_b > I_c$ b) $I_a < I_b < I_c$ *c) $I_a = I_b = I_c$ d) $I_a = I_b > I_c$

4. The net charge of a current carrying conductor is
a) positive b) negative *c) zero d) can not be determined.

5. The direction of convectional current is along
*a) direction of flow of positive charges
b) direction of flow of negative charges
c) direction opposite to the flow of positive chrages
d) current has no direction, since it is a scalar

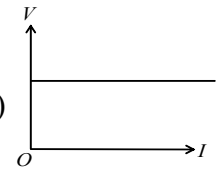
6. Even though current has direction , it is a scalar. The reason is
a) it obeys laws of vector addition
*b) it does not obeys laws of vector addition
c) it some time obeys and some times does not obeys laws of vector addition
d) current has dual nature

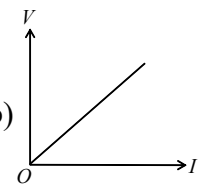
7. Match the followings

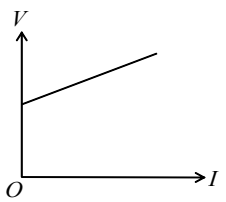
Substances	charge carries
A) Metal	p) positive ions & free electrons
B) Liquid electrolytes	q) Free electrons
C) Gases	r) positive ions & negative ions
D) semiconductors	s) Free electrons & holes

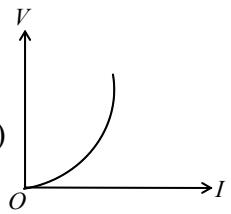
a) $A-p, B-s, C-q, D-r$ b) $A-r, B-q, C-p, D-s$
*c) $A-q, B-r, C-p, D-s$ d) $A-s, B-p, C-q, D-r$

8. The V - I graph for ohmic devices is

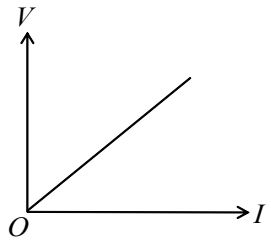
a) 

*b) 

c) 

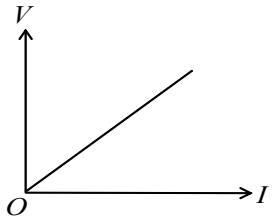
d) 

9. The slope of the flowing graph gives



a) potential difference b) current *c) resistance d) $\frac{1}{\text{resistance}}$

10. The slope of the following graph gives



a) potential difference b) current c) resistance *d) $\frac{1}{\text{resistance}}$

11. Ohmic device among the following
a) semiconductor b) Transistor *c) resistor d) thermistor

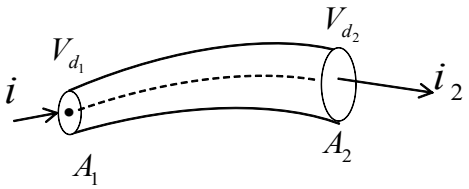
12. The expression for drift velocity is

a) $\overrightarrow{V_d} = -\frac{e\vec{E}m}{\tau}$ b) $\overrightarrow{V_d} = -\frac{e\tau}{m}$ *c) $\overrightarrow{V_d} = -\frac{e\vec{E}\tau}{m}$ d) $\overrightarrow{V_d} = -\frac{m\vec{E}\tau}{e\tau}$

13. The order of drift velocity is about

*a) $10^{-4} ms^{-1}$ b) $10^{-3} ms^{-1}$ c) $10^{3} ms^{-1}$ d) $10^{4} ms^{-1}$

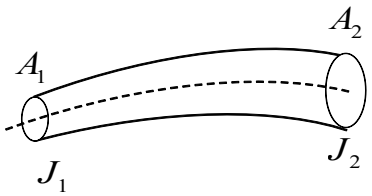
14. Choose the correct option $(V_d \rightarrow drift\ velocity)$



*a) $V_{d_1} > V_{d_2}$ b) $V_{d_1} < V_{d_2}$ c) $V_{d_1} = V_{d_2}$ d) $V_{d_1} \leq V_{d_2}$

15. Drift velocity of free electrons depends on,
a) nature of material b) electric field c) temperature *d) all the above

16. For the fig, choose the correct option,



*a) $J_1A_1 = J_2A_2$ b) $J_1A_1 > J_2A_2$ c) $J_1A_1 < J_2A_2$ d) $\frac{J_1}{A_1} > \frac{J_2}{A_2}$

17. Choose the correct option
1) electric field inside a charged conductor is zero
2) electric field inside a current carrying conductor zero
a) both (1) & (2) are correct *b) (1) is correct (2) is wrong
c) both (1) & (2) are wrong d) (1) is wrong (2) is correct

18. With the increase in temperature, the drift velocity of free electrons
a) increases *b) decreases c) remains same d) nothing can be said

19. S.I unit of electron mobility is
a) $m^2 / volt / \sec$ b) $m^2 / volt - \sec$ c) $m^2 / volt$ *d) $m^2 / volt$

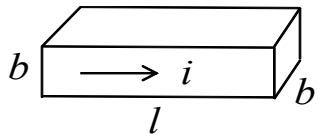
20. Resistance of conductor depends on
a) length b) Area of cross- section c) temperature *d) all the above

21. Resistivity of a material depends on
a) length b) area of cross- section c) both (a) & (b) *d) none

22. S.I unit of resistivity is
*a) Ωm b) Ωm^{-1} c) Ω d) ampere

23. Reciprocal of resistance is called
a) impedance b) reactance c) admittance *d) conductance

24. The resistance of the following conductor is



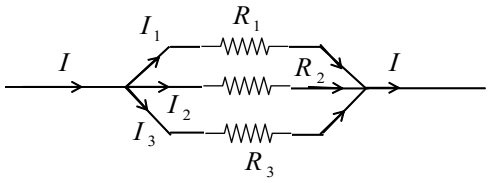
*a) $R = \frac{\rho l}{bh}$ b) $R = \frac{\rho h}{bl}$ c) $R = \frac{\rho b}{hl}$ d) $R = \frac{bh}{\rho l}$

25. Resistance of a carbon resistor is $12 \times 10^3 \pm 10\%$. Its fourth color band is
a) Gold *b) silver c) no color d) red

26. The third colour band on a carbon resistor represents
a) Tolerance b) resistance value c) Percentage variation *d) Decimal multiplier

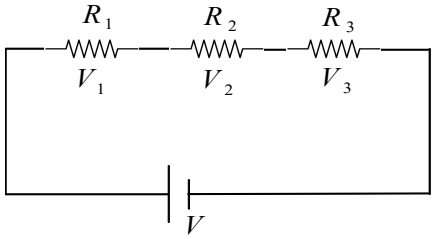
27. In parallel combination of resistors, the total resistance
a) increases *b) decreases c) remains same d) mass increase or decrease

28. For the following circuit.



a) $I_1 > I_2 > I_3$ b) $I_1 < I_2 < I_3$ c) $I_1 R_1 = I_2 R_2 = I_3 R$ *d) both (b) and (c)

29. For the following circuit the ratio $V_1 : V_2 : V_3$ is



a) $\frac{1}{R_1} : \frac{1}{R_2} : \frac{1}{R_3}$ *b) $R_1 : R_2 : R_3$ c) 1:1:1 d) 1:2:3

30. When the length & area of cross - section both are doubled the its resistance will
a) become half b) be doubled *c) remain same d) becomes four times

31. The device which c onverts chemical energy into electrical energy is
a) generator *b) cell c) transformer d) dynamo

32. The maximum P.d between two terminals of a cell in an open circuit is
a) terminal P.d b) maximum P.d *c) electromative force d) open P.d

33. For a charging cell the correct relation is
*a) $V = \varepsilon + ir$ b) $V = \varepsilon - ir$ c) $V = \frac{\varepsilon - i}{r}$ d) $V = \varepsilon r - i$

34. For a discharging cell
*a) $V < \varepsilon$ b) $V > \varepsilon$ c) $V = \varepsilon$ d) none

35. For a discharging cell terminal P.dis always less than
a) external resistance *b) internal resistance c) temperature change d) skin effect

36. The current through a simple circuit is given by
a) $i = \frac{\varepsilon}{R - r}$ b) $i = \frac{\varepsilon R}{R + r}$ c) $i = \frac{\varepsilon r}{R + r}$ *d) $i = \frac{\varepsilon}{R + r}$

37. Power transferred in a network is maximum if
a) $R > r$ *b) $R = r$ c) $R < r$ d) none

38. If n identical cells are connected in parallel , then equivalent emf and internal resistance are
a) $n\varepsilon, nr$ b) $\frac{\varepsilon}{n}, \frac{r}{n}$ *c) $\varepsilon, \frac{r}{n}$ d) ε, nr

39. If n identical cells are connected in series, then equivalent emf and internal resistance are
*a) $n\varepsilon, nr$ b) $\frac{\varepsilon}{n}, \frac{r}{n}$ c) $\varepsilon, \frac{r}{n}$ d) ε, nr

40. For two cells connected in parallel,
a) $\varepsilon_{eff} = \frac{\varepsilon_1 r_1 + \varepsilon_2 r_2}{r_1 + r_2}$ b) $\varepsilon_{eff} = \frac{\varepsilon_1 r_1 - \varepsilon_2 r_2}{r_1 + r_2}$ *c) $\varepsilon_{eff} = \frac{\varepsilon_1 r_2 + \varepsilon_2 r_1}{r_1 + r_2}$ d) $\varepsilon_{eff} = \frac{\varepsilon_1 r_2 - \varepsilon_2 r_1}{r_1 + r_2}$

41. The significance of KCL is, law of conservation of
a) mass b) energy *c) charge d) momentum

42. The significane of KVL is, law of conservation of
a)mass *b) energy c) charge d) momentum

43. The wheatstone network is balanced if
a) current through the circuit is zero b) current through the circuit is maximum
*c) current through the galvanometer is zero d) current through the galvanometer is maximum

44. Meter bridge works on the principle of
*a) Balance wheatstone's bridge b) Balanced Wien's bridge
c) Balanced Kelvin's bridge d) Balanced Maxwell's bridge

45. If the temperature of resistor connected in the left gap of meter ridge is increased, then balancing point
a) shift towards left *b) shifts towards right
c) does not change d) both (a) & (b)

46. Use of potentiolmeter is
a) to measure potential drop b) to compare emf two cells
c) to determine internal reisstance of a cell *d) all the above

47. S.I unit of electric power
a) joule *b) watt c) kelvin d) ohm

48. The electric power is given by
a) $P = \frac{V^2}{R}$ b) $P = I^2 R$ c) $P = I^2 R$ *d) All the above

49. The commercial unit of power is
a) watt *b) Kwh c) Mw d) GW

50. Ohm's law is true
*a) For metallic conductors at low temperature
b) For metallic conductors at high temperature
c) For electrolytes when current passes through them
d) For diode when current flows

51. The example for non-ohmic resistance is
a) Copper wire b) Carbon resistance *c) Diode d) Tungsten wire

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4. MOVING CHARGES & MAGNETISM

1. A charge at rest produces
*a) only electric field b) only magnetic field c) both electric & magnetic field d) none

2. A moving charge produces
a) electric field b) magnetic field *c) both electric & magnetic field d) none

3. Force on a charge moving in a magnetic field is
*a) $\vec{F} = q\left(\vec{\upsilon} \times \vec{B}\right)$ b) $\vec{F} = q\left(\vec{E} \times \vec{B}\right)$ c) $\vec{F} = q\left(\vec{P} \times \vec{E}\right)$ d) $\vec{F} = q\left(\vec{M} \times \vec{B}\right)$

4. Magnetic force on a moving charge is maximum when the angle between $\vec{\upsilon}$ and $\vec{B}$ is
a) 0^0 b) 180^0 *c) 90^0 d) 360^0

5. When a charged particle moves perpendicular to the magnetic field, it follows _____path
a) straight line *b) circular c) elliptical d) helical

6. The radius of the circular path followed by a charged particle in a magnetic field is given by
a) $r = \frac{mV^2}{qB}$ b) $r = \frac{qB}{mV^2}$ c) $r = \frac{qB}{m}$ *d) $r = \frac{mv}{qB}$

7. A compass needle is placed above a straight conducting wire. If a current passes through the conducting wire from south to north . Then deflection of the north pole of the compass _____
*a) is towards west b) is towards east c) is towards north d) is towards south

8. Lorentz force is given by
a) $\vec{F} = q\left[\vec{E} + \vec{B} \times \vec{\upsilon}\right]$ b) $\vec{F} = q\left[\vec{B} + \vec{E} \times \vec{\upsilon}\right]$ *c) $\vec{F} = q\left[\vec{E} + \vec{\upsilon} \times \vec{B}\right]$ d) $\vec{F} = q\left[\vec{B} + \vec{\upsilon} \times \vec{E}\right]$

9. Velocity selector condition is
*a) $|\upsilon| = \frac{E}{B}$ b) $|\upsilon| = \frac{B}{E}$ c) $|\upsilon| = \frac{mE}{B}$ d) $|\upsilon| = \frac{mB}{E}$

10. Time period of revolution of a charged particle in a magnetic field is independent of _____
a) mass b) charge c) magnetic field strength *d) velocity

11. Kinetic energy of a charged particle revolving in a magnetic field is
a) $K = \frac{1}{2}\frac{q^2B^2m^2}{R}$ b) $K = \frac{1}{2}\frac{q^2B^2R^2}{m^2}$ *c) $K = \frac{1}{2}\frac{q^2B^2R^2}{m}$ d) $K = \frac{1}{2}\frac{q^2}{m}$

12. A current carrying conductor experiences a force in a magnetic field. This is known as _____
a) Magnetic effect of electric current
*b) Mechanical effect of electric current
c) Electric effect of magnetic field
d) None of the above

13. Biot -Savart's law is given by the expression
a) $dB = \frac{\mu 0}{4\pi}\frac{Idl\cos\theta}{r^2}$ *b) $dB = \frac{\mu 0}{4\pi}\frac{Idl\sin\theta}{r^2}$ c) $dB = \frac{\mu 0}{4\pi}\frac{Idl\sin^2\theta}{r^2}$ d) $dB = \frac{\mu 0}{4\pi}\frac{Idl\sin\theta}{r^3}$

14. Magnetic field lines due to a straight current carrying conductor are
a) straight lines b) Elliptical *c) circular d) parabolic

15. Magnetic field due to a current carrying straight conductor at a distance r from its centre on axial line is

a) $B = \frac{\mu_0}{4\pi}\frac{2I}{r}$ b) $B = \frac{\mu_0}{4\pi}\frac{I}{r}$ c) $B = \frac{\mu_0}{4\pi}\frac{I}{r^2}$ *d)Zero

16. A current carrying conductor produces

a) Electric field around it *b) Magnetic field around it

c) Both electric and magnetic fields around it d) none

17. Magnetic field due to a current coil at a point on its axis given by

a) $B = \frac{\mu_0}{4\pi}\frac{2Ir^2}{\left(r^2+x^2\right)^{3/2}}$ *b) $B = \frac{\mu_0}{4\pi}\frac{2\pi Ir^2}{\left(r^2+x^2\right)^{3/2}}$

c) $B = \frac{\mu_0}{4\pi}\frac{2\pi Ir}{\left(r^2+x^2\right)^{3/2}}$ d) $B = \frac{\mu_0}{4\pi}\frac{2\pi I}{\left(r^2+x^2\right)^{3/2}}$

18. The magnetic field due to a circular current coil at its centre is given by _____

*a) $B = \frac{\mu_0}{4\pi}\frac{2\pi I}{r}$ b) $B = \frac{\mu_0}{4\pi}\frac{2\pi I}{r^2}$ c) $B = \frac{\mu_0}{4\pi}\frac{2\pi I}{r^3}$ d) $B = \frac{\mu_0}{4\pi}\frac{I}{r}$

19. Force between two parallel current carrying conductors is given by

*a) $\frac{F}{l} = \frac{\mu_0}{4\pi}\frac{2I_1I_2}{d}$ b) $\frac{F}{l} = \frac{\mu_0}{4\pi}\frac{I_1I_2}{d}$ c) $\frac{F}{l} = \frac{\mu_0}{4\pi}\frac{2I_1I_2}{d^2}$ d) $\frac{F}{l} = \frac{\mu_0}{4\pi}\frac{I_1I_2}{d^2}$

20. If two parallel straight conductors carrying current in the same direction, then nature of force between them is

*a) Attractive b) repulsive c) both attractive & repulsive d) None

21. Magnetic dipole moment of a coil of area A and carrying I is given by

*a) $M = IA$ b) $M = I^2A$ c) $M = NIA^2$ d) $M = NI^2A$

22. The value of Bohr magnetion is

a) $9.1\times10^{-31}\,Am^2$ *b) $9.27\times10^{-24}\,Am^2$ c) $9.1\times10^{-28}\,Am^2$ d) $9.27\times10^{-28}\,Am^2$

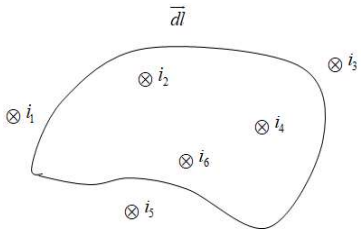
23. The value of gyromagnetic ratio for electron is

a) $8.8\times10^{12}\,C\,kg^{-1}$ *b) $8.8\times10^{10}\,C\,kg^{-1}$ c) $8.8\times10^{8}\,C\,kg^{-1}$ d) $8.8\times10^{6}\,C\,kg^{-1}$

24. Ampere's circuital law is mahematically given by

a) $\oint \vec{B}.\vec{dl} = \varepsilon_0 I_e$ b) $\oint \vec{B}.\vec{dl} = \frac{1}{\mu_0} I_e$ *c) $\oint \vec{B}.\vec{dl} = \mu_0 I_e$ d) $\oint \vec{B}.\vec{dl} = \frac{1}{\varepsilon_0} I_e$

25. The correct expression for the following fig. is



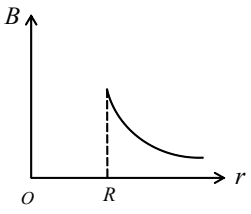
a) $\oint \vec{B}.\vec{dl} = \mu_0\left(i_1+i_3+i_5\right)$ b) $\oint \vec{B}.\vec{dl} = \mu_0\left(i_1+i_5-i_3\right)$

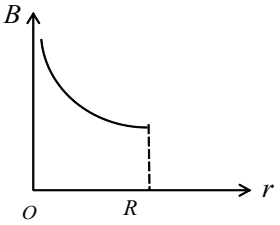
c) $\oint \vec{B}.\vec{dl} = \mu_0\left(i_2+i_4+i_6\right)$ *d) $\oint \vec{B}.\vec{dl} = \mu_0\left(i_2+i_4-i_6\right)$

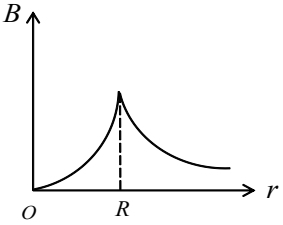
26. The magnetic field due to a current carrying straight infinite conductor at a point 'r' m from it is

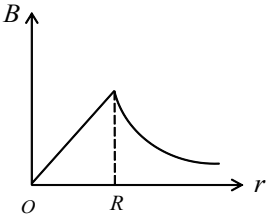
a) $B = \frac{\mu_0}{4\pi}\frac{i}{r}$ *b) $B = \frac{\mu_0}{4\pi}\frac{2i}{r}$ c) $B = \frac{\mu_0}{4\pi}\frac{i}{2r}$ d) $B = \frac{\mu_0}{4\pi}\frac{2i}{r^2}$

27. The variation of magnetic field from the axis of a cylindrical conductor to any point is represented by the graph

a) 

b) 

c) 

d) 

28. The magnetic field due to an ideal long solenoid inside it is
a) uniform b) strong c) along the axis of solenoid *d) all the above

29. The magnetic field due to an ideal long solenoid out side it is
a) strong b) uniform c) along the axis of solenoid *d) zero

30. The magnetic field due to an ideal long solenoid is given by

a) $B = \mu_0 i$ *b) $B = \mu_0 ni$ c) $B = \frac{\mu_0}{4\pi} ni$ d) $B = \mu_0 n^2 i$

31. The magnetic field due to a toroid inside it is given by

*a) $B = \mu_0 ni$ b) $B = \frac{\mu_0}{4\pi} ni$ c) $B = \mu_0 n^2 i$ d) $B = \mu_0 ni^2$

32. A current carrying coil placed in a uniform magnetic field experiences
*a) only torque b) only force c) both torque & force d) none

33. The torque acting on a coil in a uniform magnetic field is given by
a) $\tau = MB\cos\theta$ *b) $\tau = MB\sin\theta$ c) $\tau = MB\tan\theta$ d) $\tau = MB\cot\theta$

34. The torque acting on a coil in a uniform magnetic field is maximum when
*a) plane of the coil is parallel to magnetic field
b) plane of the coil is making an angle of 150^0 with magnetic field
c) plane of the coil is perpendicular to the magnetic field
d) plane of the coil is making an angle $\theta < 90^0$ with magnetic field

35. Moving coil galvanometer works on the principle of
a) A current carrying coil experiences a force in a uniform magnetic field
*b) A current carrying coil experiences a torque in a uniform magnetic field
c) A current carrying coil experiences a frictional force in a uniform magnetic field
d) none of the above

36. In a moving coil galvanometer the magnetic pole pieces are made concave because
a) To produce uniform magnetic field
b) To produce circular magnetic field
*c) To produce radial magnetic field
d) To produce both electric and magnetic field

37. Current sensitivity of a galvanometer depends on
a) Number of turns b) Area of the coil c) couple per unit twist *d) All the above

38. Voltage sensitivity of a galvanometer is independent of
*a) Number of turns b) Area of the coil
c) Couple per unit twist d) Strength of magnetic field

39. Ammeter is used to measure
a) potential difference *b) current c) Electric power d) speed of a body

40. Resistance of an ideal ammeter is
*a) zero b) Infinity c) finite d) $100\ \Omega$

41. How an ammeter could be connected in a circuit to measure electric current
*a) series b) parallel c) perpendicular d) at 30^0

42. A galvanometer can be converted into an ammeter by connecting
a) A high resistance in series to it
b) A low resistance in series to it
c) A high resistance in parallel to it
*d) A low resistance in parallel to it

43. A device used to measure potential difference between two points in a circuit is
a) Ammeter *b) voltmeter c) galvanometer d) power meter

44. The resistance of an ideal voltmeter is
a) zero *b) infinity c) low resistance d) 100 Ω

45. How a voltmeter could be connected in a circuit to measure potential difference.
a) series *b) parallel c) perpendicular d) at 45^0

46. A galvanometer can be converted into a voltmeter by connecting
*a) A high resistance in series to it
b) A low resistance in series to it
c) A high resistance in parallel to it
d) A low resistance in parallel to it

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5. MAGNETISM AND MATTER

1. Magnetic field lines _____
*a) are always closed loops
b) are always open loops
c) intersect each other
d) do not exist

2. Direction of magnetic dipole moment of a bar magnet is always from
a) East pole to west pole
*b) South pole to north pole
c) West pole to east pole
d) North pole to south pole

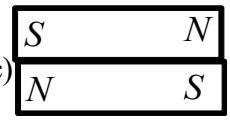
3. By cutting a bar magnet , its magnetic moment
a) increase
*b) decreases
c) remains same
d) Increases or decreases depending on how we cut the magnet

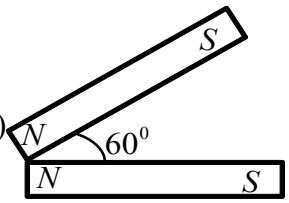
4. If we bend a bar magnet its dipole moment decreases it is because
a) pole strength decreases
b) pole strength increases
c) magnetic length increases
*d) magnetic length decreases

5. The net magnetic dipole moment is maximum for

a) 

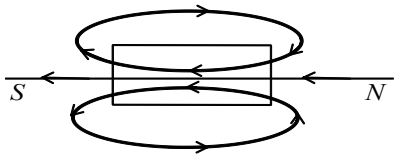
*b) 

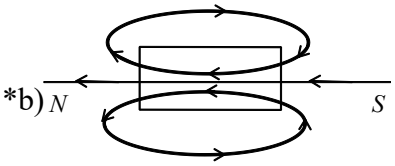
c) 

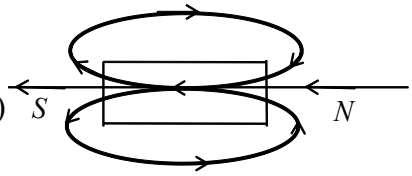
d) 

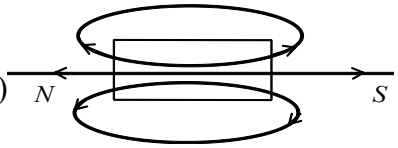
6. Dimensional formula for magnetic dipole moment is
*a) $M^0L^2T^0A^1$ b) $M^0L^{-1}T^0A^2$ c) $M^0L^2T^0A^2$ d) $M^0L^0T^1A^1$

7. The correct representation of magnetic field lines :

a) 

*b) 

c) 

d) 

8. The time period of oscillation of a bar magent in a magnetic field is given by

a) $T=\sqrt{\frac{M}{IB}}$ b) $T=\sqrt{\frac{IB}{M}}$ *c) $T=\sqrt{\frac{I}{MB}}$ d) $T=\sqrt{\frac{MB}{I}}$

9. Torque acting on a magnetic dipole in a uniform magnetic field is given by

*a) $\vec{\tau}=\vec{M}\times\vec{B}$ b) $\vec{\tau}=\vec{B}\times\vec{M}$ c) $\tau=\vec{M}\ .\ \vec{B}$ d) $\tau=\vec{B}\ .\ \vec{M}$

10. Magnetic dipole moment for a circular current loop of radius r is

a) $M=ir$ *b) $M=i\pi r$ c) $M=\frac{i}{\pi r^2}$ d) $M=0$

11. S.I unit of magnetic flux is

a) tesla b) gauss *c) Weber d) maxwell

12. Relative permeability of free space is

a) zero *b) one c) less than one d) more than one

13. Maathematic expresison for Gauss's law in magnetism

*a) $\oint \vec{B}.\vec{ds}=0$ b) $\oint \vec{B}.\vec{ds}=\frac{1}{\mu_0}$ c) $\oint \vec{B}.\vec{dl}=\mu_0 I$ d) $\oint \vec{B}.\vec{ds}=\frac{m}{\mu_0}$

14. Earth's magentism is best explained by

a) Rotational effect *b) Dynamo effect c) Meissner's effect d) Curie effect

15. Angle of declination at equator is

a) 0^0 b) 90^0 *c) 17^0 d) 45^0

16. Angle of dip at equator is

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

17. Angle of dip at poles is

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

18. The line joining the places of equal angle of dip is

*a) Isoclinic lines b) Aclinic lines c) Isogonic lines d) Agonic lines

19. Magnetic susceptibility is negative for _____ materials

*a) Diamagnetic b) Paramagnetic c) Ferromagnetic d) Ferrimagnetic

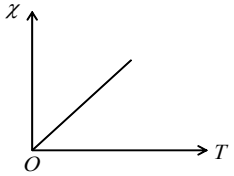
20. The relation between relative permeability and magnetic susceptibility is

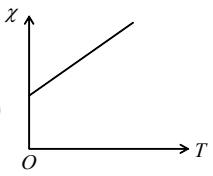
a) $\mu_r=(1-\chi_m)$ *b) $\mu_r=(1+\chi_m)$ c) $\mu_r=(\chi_m-1)$ d) $\mu_r=\frac{1}{\chi_m}$

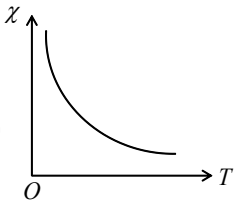
21. Perfect diamagnetism is shown by

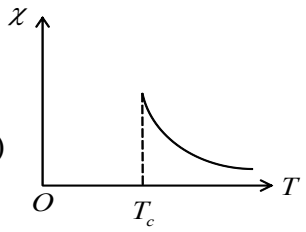
a) conductors b) insulators c) semiconductor *d) super conductors

22. The graph for curies law for paramagnetic materials is

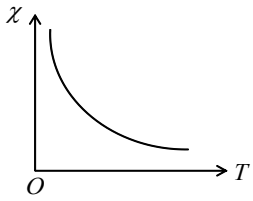
a) 

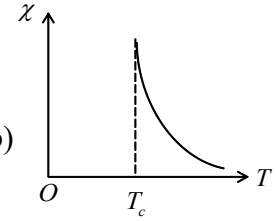
b) 

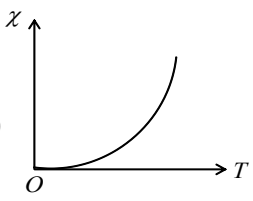
*c) 

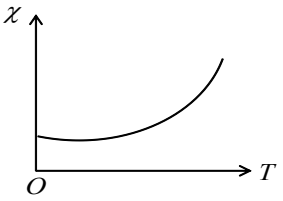
f) 

23. The graph for curies law for ferromagnetic materials

a) 

* b) 

c) 

d) 

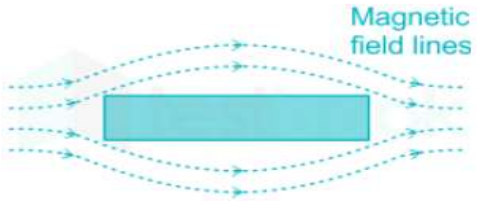
24. Identify the paramagnetic material
*a) Aluminium b) Iron c) Cobalt d) Nickel

25. If the susceptibility of ida, para and ferromagnetic materials are χ_d, χ_p and χ_d then

*a) $\chi_d < \chi_p < \chi_f$ b) $\chi_p < \chi_d < \chi_f$ c) $\chi_d < \chi_f < \chi_p$ d) $\chi_f < \chi_d < \chi_p$

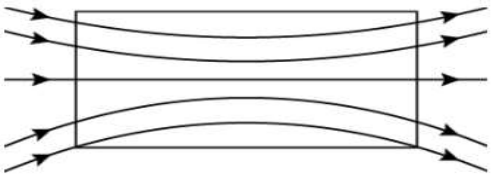
26. When a ferromagnetic material is heated to temperature above its curie temperature the material
*a) Remains ferromagnetic
b) Behaves like diamagnetic material
c) Behaves like paramagnetic material
d) is permanently magnetised

27. The material which shows the following effect when placed in a uniform magnetic field is



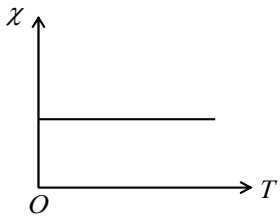
a) Diamagnetic materials
b) Paramagnetic materials
c) Ferro magnetic materials
*d) super conductor

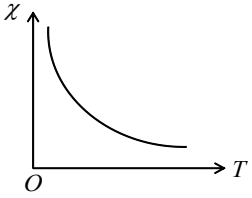
28. The material which shows the following effect when placed in a uniform magnetic field is

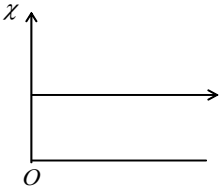


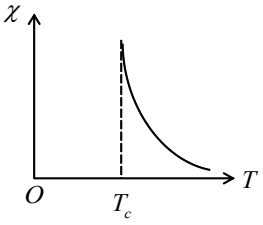
a) Diamagnetic materials
b) Paramagnetic materials
*c) Ferro magnetic materials
d) super conductors

29. The variation of magnetic susceptilibility (χ) with temperature for a diamagnetic substance is best represented by

a) 

b) 

*c) 

d) 

30. The magnetic induction left in the ferro magnetic material even when the magnetic intensity is zero is called
a) Retentivity b) Remanence c) Residual magnetic field *d) All the above

31. The materials used for making permanent magnets should have
a) High retentivity
b) High permeability
c) High coercivity
*d) All the above

32. The core of teh electromagnets are made of ferro magnetic material which have
a) High permeability
b) High retentivity
c) Low retentivity
*d) Both (a) and (c)

FILL IN THE BLANKS

1. The direction of magnetic dipole moment $(\vec{M})$ of a magnet is from …….. inside the magnet.
2. In the northern hemisphere, magnetic lines of force due to earth's field points…….
3. The net magnetic flux through a closed surface is……..
4. The vertical component of earth's magnetic field exists everywhere except at……

5. The materials which develop feeble magnetization in the direction of the magnetizing field are called……. Surface
6. The susceptibility of a …….substance is independent of magnetizing field and temperature.
7. The phenomenon of exhibiting diamagnetic property by the superconductors is called……

(1. South and North 2. Towards earth 3. zero 4 . Magnetic equator
5. Paramagnetic 6. Diamagnetic 7. Meisner effect)

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6. ELECTROMAGNETIC INDUCTION

1. The phenomenon in which an emf is induced in the coil due to the variation of magnetic flux linking the coil is called

*a) self induction b) Mutual induction
c) Electromagnetic induction d) Eddy current

2. Acocridng to Faraday's second law of electromagnetic induciton the induced emf is given by

a) $\varepsilon = -\frac{dI}{dt}$ b) $\varepsilon = -\frac{dL}{dt}$ *c) $\varepsilon = -\frac{d\phi}{dt}$ d) $\varepsilon = -\frac{dV}{dx}$

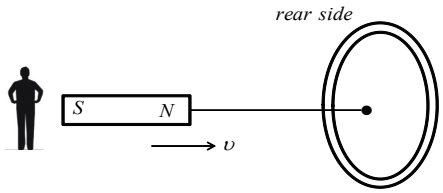
3. Lenz's law is based on

a) Law of conservation of charge
*b) Law of conservation of energy
c) Law of conservation of linear momentum
d) Law of conservation of angular momentum

4. Induced emf always

*a) Opposes the change in magnetic flux
b) Supports the change in magnetic flux
c) Sometimes opposes & some time supports the change in magnetic flux
d) None

5. The direction of induced current in the following case is



a) Clockwise *b) Anti- clockwise
c) No current is induced d) Nothing can be said

6. Magnetic flux through a surface is given by

*a) $\phi_B = \vec{B}.\vec{A}$ b) $\phi_B = \vec{B} \times \vec{A}$ c) $\phi_B = BA\sin\theta$ d) $\phi_B = BA\tan\theta$

7. Motional emf is given by

*a) $\varepsilon = Blv$ b) $\varepsilon = B\upsilon$ c) $\varepsilon = Bl$ d) $\varepsilon = l\upsilon$

8. When an open loop moves through a uniform magnetic field $(\theta \neq 0)$ then

a) a current induces *b) An emf induces
c) both emf and current induced d) none

9. When a disc of radius is rotating in a uniform magnetic field with its plane perpendicular to the magnetic field, then emf induced between the centre of the disc and a point on its circumference is given by

a) $\varepsilon = B\omega r^2$ *b) $\varepsilon = \frac{1}{2}B\omega r^2$ c) $\varepsilon = \frac{1}{2}B\omega r$ d) $\varepsilon = B\omega r$

10. The induced currents in the bulk pieces of conductors when they are subjected to charging magnetic flux are called

a) AC current b) DC currents *c) Eddy currents d)Fluctuating current

11. Induction furnace works on the production of
*a) Eddy current b) Pressure variation
c) change in kinetic energy d) change in momentum

12. S.I unit of self induction is

a) Weber b) Farad *c) Henry d) Maxwell

13. Emf induced in an inductor is given by

*a) $\varepsilon = -L\frac{d\phi}{dt}$ b) $\varepsilon = -L\frac{dI}{dt}$ c) $\varepsilon = -L\frac{dV}{dx}$ d) $\varepsilon = -L\frac{dq}{dt}$

14. Energy stored in the inductor is given by

a) $U = \frac{1}{2}CV^2$ b) $U = \frac{1}{2}\frac{Q^2}{C}$ *c) $U = \frac{1}{2}LI^2$ d) $U = \frac{1}{2}LQ^2$

15. Energy stored in an inductor is in the form of
a) Mechanical energy *b) Magnetic potential energy
c) Electric potential energy d) Kinetic energy

16. Magnetic energy density is given by

*a) $u = \frac{B^2}{2\mu_0}$ b) $u = \frac{2B^2}{\mu_0}$ c) $u = \frac{\mu_0}{2}B^2$ d) $u = \frac{\mu_0}{4\pi}B$

17. Self - inductance of solenoid is given by

*a) $L = \frac{\mu_0 n^2 \pi r^2}{l}$ b) $L = \frac{\mu_0 n_1 n_2 \pi r^2}{l}$ c) $L = \mu_0 n^2 \pi r^2 l$ d) $L = \mu_0 n_1 n_2 \pi r^2 l$

18. Mutual - inductance of two co- axial solenoids of same is given by

*a) $M = \mu_0 n_1 n_2 \pi r^2 l$ b) $M = \frac{\mu_0 n_1 n_2 \pi r^2}{l}$ c) $M = \frac{\mu_0 n_1 n_2 \pi r^2}{l^2}$ d) $M = \frac{\mu_0 n_1 n_2 \pi r^2}{l_1 l_2}$

19. AC generator converts
a) chemical energy into electrical energy b) magnetic energy into electrical energy
*c) mechanical energy into electrical energy d) solar energy into electrical energy

20. AC generator works on the principle of
a) Electromagnetic b) Self - induction c) Mutual indution d) Electrostatic shielding

21. Induce emf in a coil depends on
a) Area of the loop b) No. of turn in the coil
c) Rate of change of magnetic flux *d) all the above

22. Lenz's law gives
*a) polarity of induced emf b) magnitude of induced emf
c) both polarity and magnitude of induced emf d) none of the above

23. If M_{12} is the mutual inductance of coil 1 due to coil 2 and M_{21} is the mutual inductance of coil 2 due to coil 1 if $r_1 > r_2$ the coils are of same length and co -axial , then

a) $M_{12} > M_{21}$ b) $M_{12} < M_{21}$ *c) $M_{12} = M_{21}$ d) None

24. The peak emf induced in an AC generator is given by

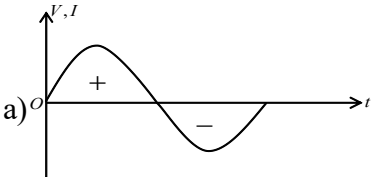
*a) $\varepsilon_0 = NBA\omega$ b) $\varepsilon_0 = INBA$ c) $\varepsilon_0 = BAN$ d) $\varepsilon_0 = MBA$

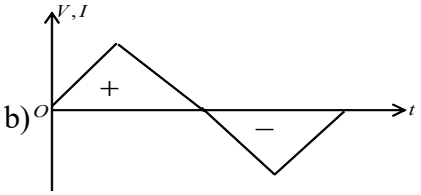
25. In the coil magnet experiment, the deflection in the galvanometer is larger when,
a. A Coil moves faster towards or away from the magnet.
b. Magnet moves faster towards or away from the coil.
a) a only. b) b only. *c) Both a and b . d) None of the above.

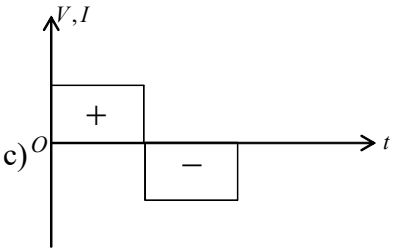
26. Self-inductance plays the role of.
*a) Inertia. b) Impedance. c) Mutual inductance. d) None of the above.

7. ALTERNATE CURRENT

1. Identify the AC waveform

a) 

b) 

c) 

*d) All the above

2. AC current is

a) unidirectional *b) Bidirectioanl c) Multidirectional d) Has no direction

3. RMS current is given by

a) $I_{rms} = \sqrt{2} I_0$ b) $I_{rms} = \frac{\sqrt{2}}{I_0}$ *c) $I_{rms} = \frac{I_0}{\sqrt{2}}$ d) $I_{rms} = \frac{2I_0}{\pi}$

4. Mean AC current is given by

*a) $I_{mean} = \frac{2I_0}{\pi}$ b) $I_{mean} = \frac{2\pi}{I_0}$ c) $I_{mean} = \frac{\sqrt{2} I_0}{\pi}$ d) $I_{mean} = \frac{I_0}{\sqrt{2}}$

5. The voltages of domestic AC is 230 V. It represents

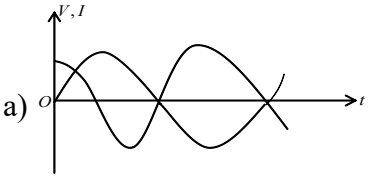
a) Mean voltage b) Peak voltage

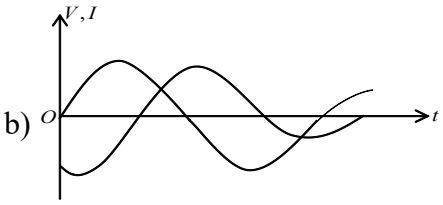
c) Root mean voltage *d) Root mean square voltage

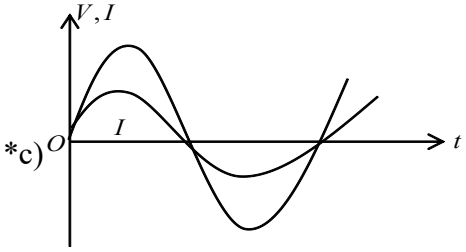
6. In pure resistor the voltgae and currents

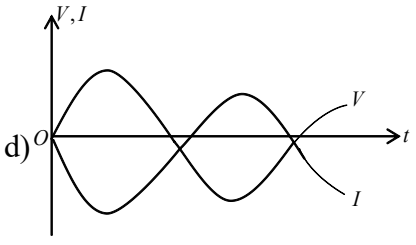
*a) are in phase b) are out of phase c) differ by $\frac{\pi}{2}$ d) differ by $\frac{\pi}{4}$

7. The waveforms of AC voltage and AC current in a pure resistor is given by

a) 

b) 

*c) 

d) 

8. When AC voltage is applied to a pure inductor then

a) current and voltage are in same phase b) current leads the voltage by 90^0

*c) current lags the voltage by 90^0 d) current does not flow

9. When AC voltage is applied to a pure capacitor, then

a) the current and voltages are in same phase *b) the current leads the voltage by $\frac{\pi}{2}$

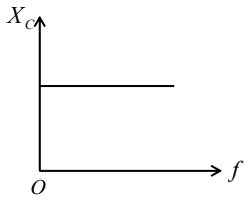
c) the current lags the voltage by $\frac{\pi}{2}$ d) the current leads the voltage by $\frac{\pi}{4}$

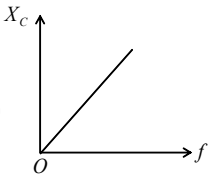
10. Alternating current can not be measured by DC ammeter because

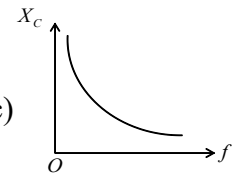
a) AC can not pass through DC ammeter *b) Average value of complete cycle is zero

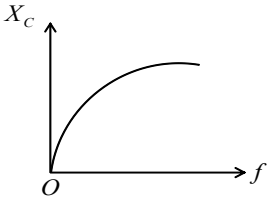
c) AC is virtual d) AC changes its direction

11. The variation of capacitive reactance with frequency is best represented by

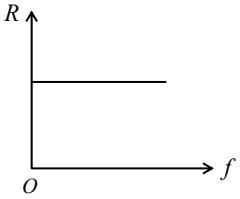
a) 

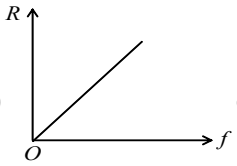
b) 

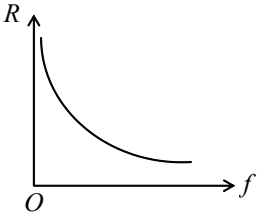
*c) 

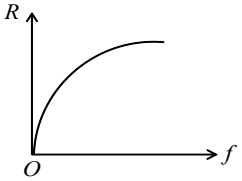
d) 

12. The variation of resistance with frequency is best represented by

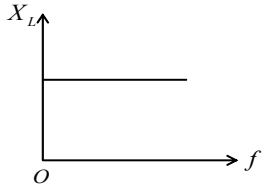
*a) 

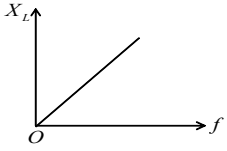
b) 

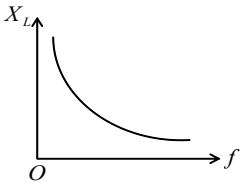
c) 

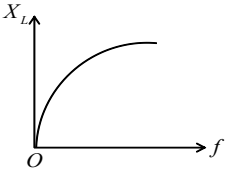
d) 

13. The variation of inductive reactance with frequency is best represented by

a) 

*b) 

c) 

d) 

14. Inductive reactance and capacitive reactances are respectively given by

a) $\frac{1}{\omega L}, \omega C$ b) $\omega C, \frac{1}{\omega L}$ *c) $\omega L, \frac{1}{\omega C}$ d) $\frac{1}{\omega C}, \omega L$

15. Frequency of AC in India is

a)60 Hz *b) 50 Hz c) 40 Hz d) 70 Hz

16. The total opposition offered by series LCR circuit to the flow of AC current through it is called

a) Reactance b) Admittance *c) Impedance d) Resistance

17. Impedance of series LCR circuit is given by

a) $Z = \sqrt{R^2 + \left(X_C^2 - X_L^2\right)}$ b) $Z = \sqrt{R^2 + \left(X_L^2 - X_C^2\right)}$

c) $Z = \sqrt{R + \left(X_C - X_L\right)}$ *d) $Z = \sqrt{R + \left(X_C - X_L\right)^2}$

18. The reciprocal of impedance is called

a) Reactance *b) Admittance c) Resistance d) Acceptance

19. The voltage across series LCR circuit is given by

a) $V = \sqrt{V_R^2 + V_L^2 + V_C^2}$ b) $V = \sqrt{V_R^2 + \left(V_L^2 - V_C^2\right)}$

*c) $V = \sqrt{V_R^2 + \left(V_L - V_C\right)^2}$ d) $V = \sqrt{V_R + \left(V_L - V_C\right)}$

20. In series LCR circuit if $X_L > X_C$, then

a) current and voltages are in same phase b) current leads the voltage by same angle

*c) current lags the voltage by same angle d) nothing can be said, since data is insufficient

21. In series LCRcircuit if $X_L < X_C$, then

a) current and voltages are in same phase *b) current leads the voltage by same angle

c) current lags the voltage by same angle d) nothing can be said, since data is insufficient

22. In series LCR circuit if $X_L = X_C$, then

*a) current and voltages are in same phase b) current leads the voltage by $\frac{\pi}{2}$

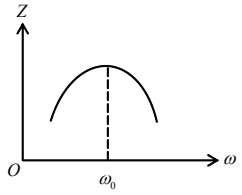
c) current lags the voltage by $\frac{\pi}{2}$ d) Nothing can be said, since the data is insufficient

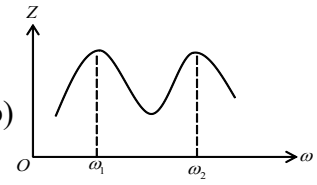
23. In series LCR circuit, the phase angle between the current and voltage is given by

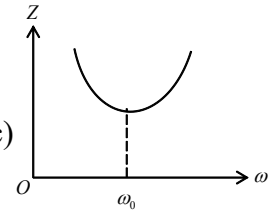
a) $\tan\phi = \frac{(X_C - X_L)}{Z}$ *b) $\tan\phi = \frac{(X_C - X_L)}{R}$

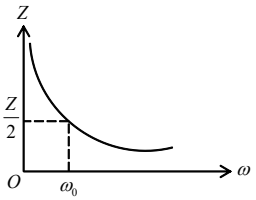
c) $\tan\phi = \frac{Z}{(X_C - X_L)}$ d) $\tan\phi = \frac{R}{(X_C - X_L)}$

24. In series LCR circuit the variation of impedance with frequency is given by

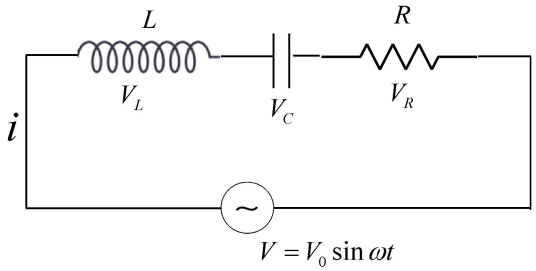
a) 

b) 

*c) 

d) 

25. For the given series LCR circuit, select the correct of



a) $V_L = iL$ b) $V_C = iC$ *c) $V_R = iR$ d)All the above

26. Identify the correct option for the series LCR circuit at resistance

a) current is maximum b) power factor is unity

c) phase difference between current voltage is zero

*d) all the above

27. power factor is given by

*a) $\cos\phi = \frac{R}{Z}$ b) $\sin\phi = \frac{R}{Z}$ c) $\cos\phi = \frac{Z}{R}$ d) $\sin\phi = \frac{Z}{R}$

28. Powe factor for a pure resistance is

*a) 1 b) 0 c) 0.5 d) 0.25

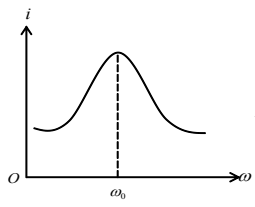
29. Power factor for a pure capacitor is

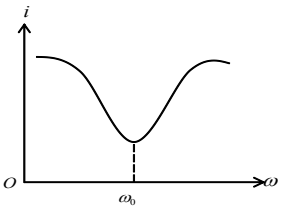
a) 1 *b) 0 c) 0.5 d) 0.25

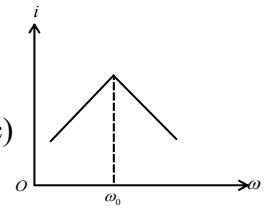
30. For series LCR circuit, the resonant frequency is given by (in rad s^{-1})

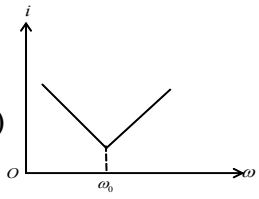
a) $\omega_0 = \sqrt{LC}$ b) $\omega_0 = \frac{1}{2\pi\sqrt{LC}}$ *c) $\omega_0 = \frac{1}{\sqrt{LC}}$ d) $\omega_0 = 2\pi\sqrt{LC}$

31. In series LCR circuit, the variation of current of current with frequency is given by

*a) 

b) 

c) 

d) 

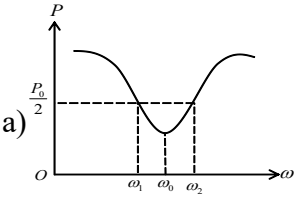
32. In series LCR circuit , the resonant frequency is independent of

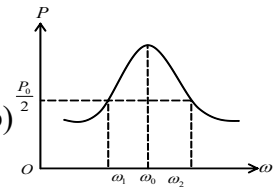
a) inductance b) capacitance *c) resistance d) none

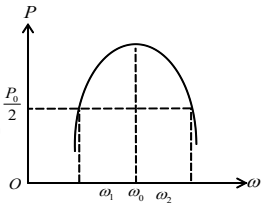
33. Power dissipated through AC circuit is given by

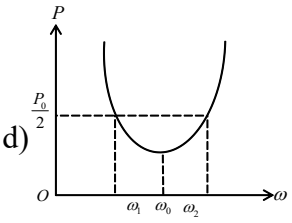
a) $P = V_{rms} I_{rms}$ b) $P = V_0 I_0$ c) $P = V_0 I_0 \cos\phi$ *d) $P = V_{rms} I_{rms} \cos\phi$

34. The variation of power dissipated in AC circuit with frequency is represented by

a) 

*b) 

c) 

d) 

35. The difference between half - power frequencies is called

a) power width b) power band *c) band width d) frequency

36. The ratio of resonant frequency to the band width is called

a) P - factor *b) Q- factor c) R- factor d) S- factor

37. Quality factor is given by

a) $Q = \frac{\omega_0 L}{R}$ b) $Q = \frac{1}{\omega_0 CR}$ c) $Q = \frac{1}{R}\sqrt{\frac{L}{C}}$ *d) All the above

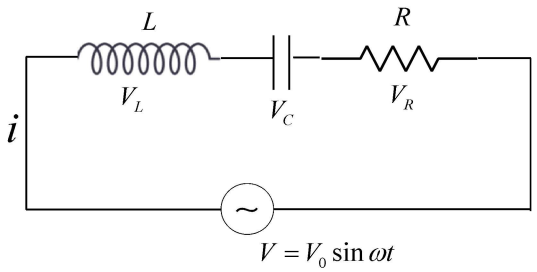
38. S.I unit of quality factor is

a) $rads^{-1}$ b) rad c) Ωm *d) Has no unit

39. Wattless current is given by

a) $I_{rms} \cos\phi$ *b) $I_{rms} \sin\phi$ c) $I_{rms} \tan\phi$ d) $I_{rms} \cot\phi$

40. For the following figure, At resonance



*a) $V_L = V_C$ b) $V_L = V_R$ c) $V_C = V_R$ d) All the above

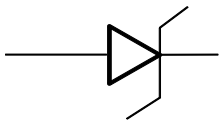
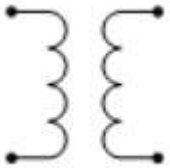
41. The device used to increase or decrease AC voltage is

a) transistor b) Rectifier *c) transformer d) general

42. Transformer works on the principle of

a) self - induction *b) mutual - induction c) Alternating current d) direct current

43. Circuit symbol for transformer is

a)  b)  c)  *d) 

44. Transformers are used in
a) DC circuit only *b) AC circuit only
c) Both AC & DC circuits d) Integrated circuits

45. For step- down transformer
*a) $N_S < N_P$ b) $N_S > N_P$ c) $N_S = N_P$ d) None

46. For step - up transformer
a) $N_S < N_P$ *b) $N_S > N_P$ c) $N_S = N_P$ d) None

47. For an ideal transformer, efficiency is
a) $\eta > 100\%$ b) $\eta < 100\%$ *c) $\eta = 100\%$ d) $\eta = 99\%$

48. For a real transformer efficiency is
a) $\eta > 100\%$ *b) $\eta < 100\%$ c) $\eta = 100\%$ d) None

49. To increase AC voltage of 220 V to 480 V, the transformer to be used is
a) step- down transformer b) step-up transformer
c) sit-down transformer d) stand up transformer

50. For an ideal transformer
*a) $\frac{V_S}{V_P} = \frac{N_S}{N_P}$ b) $\frac{V_S}{V_P} = \frac{N_P}{N_S}$ c) $\frac{V_S}{V_P} > \frac{N_S}{N_P}$ d) $\frac{V_S}{V_P} > \frac{N_P}{N_S}$

51. For an ideal transformer
a) $\frac{I_S}{I_P} = \frac{N_S}{N_P}$ *b) $\frac{I_S}{I_P} = \frac{N_P}{N_S}$ c) $\frac{I_S}{I_P} > \frac{N_S}{N_P}$ d) $\frac{I_S}{I_P} > \frac{N_P}{N_S}$

52. When the frequency of AC is doubled, the impedance of an LCR circuited
a) Is doubled *b) increase c) Decreases d) is halved

53. A metal ring is held horizontally and bar magnet is dropped through the ring with its length along the axis of the ring .the acceleration of the falling magnet is.
a) more than g b)equal to g
*c) less than g d) depends on the diameter of the ring and length of the magnet

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8. ELECTROMAGNETIC WAVES

1. A velocity of electromagnetic waves in free space is
a) $3\times10^{-8}\,ms^{-1}$ *b) $3\times10^{8}\,ms^{-1}$ c) $3\times10^{8}\,kms^{-1}$ d) $3\times10^{-8}\,kms^{-1}$

2. Maxwell in his famous equation of electromagnetism introduced the concept of
a)AC current *b) displacement current c) DC current d) impedance

3. One of the inconsistencies of ampere's circuital law
a) Fails to determine magnetic field to conduction current
*b) Fails to determine magnetic field due to displacement current
c) Fails to explain both (A) and (B)
d) None of these

4. Which of the following rays is not an electromagnetic wave
a) $X-$ rays b) $\gamma-$ rays c) $\beta-$ rays *d) heat rays

5. The part of the spectrum of the electromagnetic radiation used to cook food is
a) UV- rays b) cosmic rays c) $\gamma-$ rays *d) microwaves

6. The wave used by artificial satellites for communication is
*a) Microwaves b) infrared waves c) radio waves d)x-rays

7. Which of the electromagnetic waves has smallest wavelength
a) X-rays b) microwave c) radio waves *d)x-rays

8. The decreasing order in wavelength in this electromagnetic wave is , Infrared, microwave, UV rays and gamma rays is
*a) Microwave, Infrared, Ultraviolet, Gamma rays
b) Infrared, Microwave, Ultraviolet, Gamma rays
c) Gamma, Infrared, Microwave, Ultraviolet rays
d) Infrared, Gamma, Microwave, Ultraviolet rays

9. The ultra-high frequency band of radio waves in electromagnetic wave is used as in
a) television waves *b) cellular phone communication
c) commercial FM radio d) both (A) and (C)

10. The quantity $\sqrt{\mu_0 \in_0}$ represents
*a) Inverse of speed of light in vacuum b) speed of light
c) speed of sound d) Speed of electromagnetic wave

11. Which radiation is used in the treatment of muscle pains
a) Infrared rays b) Ultraviolet rays *c) microwave d) X-rays

12. Which of the following electromagnetic wave used in the treatment of cancer
a) IR –rays b) visible rays c) Gamma rays *d) Ultraviolet rays

13. Which of the following has the maximum energy?
a) Micro waves b) IR-rays c) Ultraviolet rays *d) Gamma rays

14. Which of the following has the minimum energy?
a) Micro waves b) IR-rays c) Ultraviolet rays *d) radio waves

15. Which of the following laws was modified by Maxwell by introducing the displacement current?
a) Gauss's law *b) Ampere's law c)Biot-Savart's law d) none of these

16. What is the nature of electromagnetic waves
*a) Transverse wave b) longitude wave c) mechanical wave d) sound wave

17. What is the angle between electric field vector and magnetic field of electromagnetic waves?
*a) 90^0 b) 30^0 c) 45^0 d) 15^0

18. Displacement current is a
a) it is the current due to time varying magnetic field
*b) it is the current due to time varying electric field
c) it is the current due to time varying both magnetic field and electric field
d) it is the current due to constant magnetic field

19. Correct expression for displacement current is
*a) $I_d = \in_0 \frac{d\varphi}{dt}$ b) $I_d = \frac{d\varphi}{dt}$ c) $I_d = \mu_0 \frac{d\varphi}{dt}$ d) $I_d = \mu_0 \in_0 \frac{d\varphi}{dt}$

20. Expression for speed of light in terms of permittivity and permeability in free space
*a) $\frac{1}{\sqrt{\mu_0 \varepsilon_0}}$ b) $\frac{1}{\mu_0 \varepsilon_0}$ c) $\frac{1}{\sqrt{\mu_0 + \varepsilon_0}}$ d) $\mu_0 \varepsilon_0$

21. What is the wave length range of electromagnetic spectrum
a) 10 Hz to 10^{10}Hz b) 8Hz to 6 Hz *c) 10 Hz to 10^{22}Hz d) 10 Hz to 10^{24}Hz

22. The maximum frequency wave in the spectrum is
*a) Gamma ray b) X-ray c) UV- rays d) IR-rays

23. The minimum frequency wave in the electromagnetic spectrum is
a) Gamma ray *b) Radio wave c) UV- rays d) IR-rays

24. Which ray is used in photosynthesis
a) X-rays *b) UV –rays c) IR –rays d) visible ray

25. For dehydrated fruits the ray used
a) X-rays b) UV –rays *c) IR –rays d) visible ray

26. Fundamental source of electromagnetic wave is
a) Alternating current *b) oscillating charged particles
c) changing magnetic field d) none of these

27. Among the following, which of the ray is used in photocells
*a) UV-rays b) visible rays c) X-rays d) micro waves

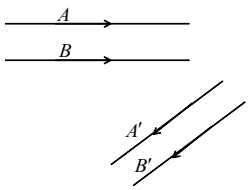
28. RADAR system use
a) Radio wave *b) micro waves c) IR-rays d) UV-rays

9. RAY OPTICS

1. A point source of light is placed in front of a plane mirror
*a) All the reflected rays meet at a point when produced backward
b) only the reflected rays close to the normal meet at a point when produced backward
c) only the reflected rays making a small angle with the mirror
d) all the reflected rays does not meet at a point when produced backward.

2. In image formation from spherical mirrors, only paraxial rays are considered because they
a) are easy to handle geometrically
b) contain most of the intensity of the incident light
*c) form nearly a point image of a point source
d) show minimum dispersion effect

3. Figure shows two rays A and B being reflected by a mirror and going as A' and B'. The mirror



*a) is plane b) is convex c) is concave d) may be any spherical mirror

4. The image formed by a concave mirror
a) is always real
b) is always virtual
*c) is certainly real of the object is virtual
d) is certainly virtual if the object is real.

5. Ray optics is valid, when the dimensions of object interacting with light
a) of the same order as the wave length of light b) much smaller than the wave length of light
*c) much larger than the wave length of light d) none of these

6. Which of the following statements wrong for a real object
a) The magnification produced by a convex mirror is always less than one
b) A virtual , inverted, same - sized image can be obtained using a plane mirror
c) A virtual , erect, magnified image can be formed using a concave mirror
*d) A real, inverted, same sized image can be formed using a convex mirror

7. The mirror which is used as a rear view mirror is
*a) convex mirror b) concave mirror c) plane mirror d) parabolaidal mirror

8. A real, inverted and equal in size image is formed by
*a) a concave mirror b) a convex mirror
c) a plane mirror d) none of these

9. When an object is placed between two parallel mirrors, then number of images formed are
a) 1 b) 4 c) 8 *d) infinite

10. A plane mirror reflects a beam of light to form a real image. The incident beam is
a) parallel *b) convergent c) divergent d) any one of these

11. The distance of real object when a concave mirror produce a real image of magnification 'm' is (f is focal length)

a) $\left(\frac{m-1}{m}\right)f$ *b) $\left(\frac{m+1}{m}\right)f$ c) $(m-1)f$ d) $(m-1)f$

12. Advanced sunset and delayed sunset is due to
a) atmospheric reflection *b) atmospheric refraciton
c) atmospheric scattering d) atmospheric dispersion

13. If lifeguard sitting outside a swimming pool observes a boy drowing in water, has travel with maximum possible speeds in air and water to reach the boy in shortest time
a) along shortest path from his initial position to boy
b) parallel to bank of the pool on ground and normal to it to reach the boy
*c) along the path followed by a refracted light ray from his position to the boy
d) along any path of his choice

14. The colour of light is determined by its
a) velocity *b) frequency c) amplitude d) intensity

15. μ_a, μ_b, μ_c are refractive indices of the media A,B,C respectively , so that $\mu_a > \mu_b > \mu_c$. The critical angle arises when a ray of light travels from
a) C to A b) C to B c) B to A *d) A to C

16. A, B and C are three optical media of respective critical angle C_1, C_2 and C_3. Total internal reflection of light can occur from A to B and also from B to C but not from C to A. Then the correct relation between critical angles is

a) $C_1 > C_2 > C_3$ b) $C_1 = C_2 = C_3$ c) $C_3 > C_1 > C_2$ *d) $C_1 < C_2 < C_3$

17. Which of the following is used in optical fibres?
a) refraction b) scattering c) diffraction *d) Total internal reflection

18. The phenomenon used in optical fibres for transmission of light energy is
*a) total internal reflection b) scattering c) diffraction d) refraction

19. Consider the telecommunication through optical fibres. Which of the following statements is not true?
a) optical fibres can be graded refractive index
*b) optical fibres are subjected to electromagnetic interference from outside
c) optical fibres may have homogeneous core with a suitable cladding
d) optical fibres have extremely low transmission loss.

20. Relation between critical angles of water and glass is :

*a) $C_w > C_g$ b) $C_w < C_g$ c) $C_w = C_g$ d) $C_w = C_g = 0$

21. A plane glass slab is kept ver various coloured letters: the letter which appears least raised is
a) blue b) violet c) green *d) red

22. If ε_0 and μ_0 are respectively, the electric permitivity and the magnetic permeability of free space ε and μ the corresponding quantities in a medium, then the refractive index of the medium is

a) $\frac{\sqrt{\mu\varepsilon}}{\mu_0\varepsilon_0}$ *b) $\sqrt{\frac{\mu\varepsilon}{\mu_0\varepsilon_0}}$ c) $\frac{\sqrt{\mu_0\varepsilon_0}}{\mu\varepsilon}$ 4) $\frac{\sqrt{\mu_0\mu}}{\varepsilon\varepsilon_0}$

23. If a spherical mirror is immersed in a liquid. It's focal length will
a) increase b) decrease *c) remain unchanged d) depend on the nature of lliquid

24. Light of frequency n, wave length λ travelling with a velocity v enters into a glass slab of refractive index μ then frequency, wave length and velocity of the wave in glass slab respectively are

a) $\frac{n}{\mu}, \lambda\frac{v}{\mu}$ *b) $n, \frac{\lambda}{\mu}\frac{v}{\mu}$ c) $n, \lambda, \frac{v}{\mu}$ d) $\frac{n}{\mu}, \frac{\lambda}{\mu}, v$

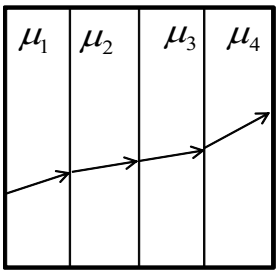
25. Absolute refractive index of a material depends upon
a) nature of material
b) nature , wavelength and size of material
c) density, temperature, wavelength of material
*d) nature, temperature , wavelength of material

26. If a ray of light takes t_1 and t_2 time in two media of absolute refractive indices μ_1 and μ_2 respectively to travel same distance, then

a) $\mu_1 t_1 = \mu_2 t_2$ *b) $\mu_1 t_2 = \mu_2 t_1$ c) $t_1\sqrt{\mu_1} = t_2\sqrt{\mu_2}$ d) $t_1\sqrt{\mu_2} = t_2\sqrt{\mu_1}$

27. In cold countries, the phenomenon of looming takeesplace , because refractive index of air
a) decreases with height b) increases with height
c) does not change with height d) become infinity at the surface.

28. A ray of light passes through four transparent media with refractive indices μ_1, μ_2, μ_3 and μ_4 as shown in figure. The surfaces of all media are parallel . If the emergent ray is parallel to the incident ray, we must have



a) $\mu_1 = \mu_2$ b) $\mu_1 = \mu_2$ c) $\mu_3 = \mu_4$ *d) $\mu_4 = \mu_1$

29. A rectangular solid piece is placed in a lqiuid whose refractive index is the same as that of the solid
a) the sides of the solid will appear to be bent inward
b) the sides of the solid will appear to be bent outward
*c) the solid will not be seen at all
d) the solid will appear as in air.

30. As temperature of medium increases the critical angle
a) increases b) decreases c) remain same d) first increases than decreases

31. A ball coated with lamp black put in a glass tank containing water appears silvery white due to
a) refraction b) diffraction c) interfernece *d) total internal reflection

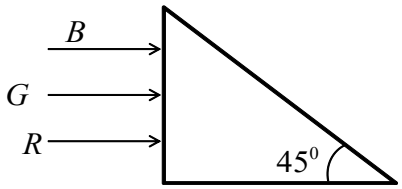
32. In an optical fibre
a) core region is transparent, cladding is opaque b) core region is opaque, cladding is transparent
*c) both core and cladding regions are transparent d) both core and cladding regions are opaque

33. In an optical fibre during transmission of light
a) energy increases b) energy decreases
*c) no loss of propagation of energy takes place d) light partially reflects and refracts

34. If ${}_i\mu_j$ represents refractive index when a light rays goes from medium i into j, then ${}_2\mu_1 \times {}_3\mu_2 \times {}_4\mu_3$ is equal to

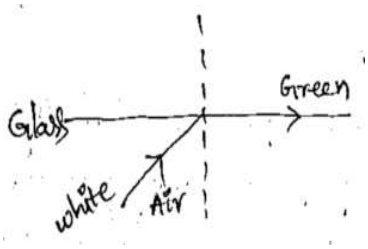
a) ${}_3\mu_1$ b) ${}_3\mu_2$ *c) $\frac{1}{{}_1\mu_4}$ d) ${}_4\mu_2$

35. The fig shows a mixture of blue, green , red colours incident on a right angled prims. The cirtical angles of the material of prism for red, green and blue colours are $46^0, 44^0, 43^0$ respectively. The arrangement will separate



*a) Red from green and blue
b) Blue from green and red
c) Green from red and blue
d) all the colours

36. White light in incident on the interface of glass and air as shown in the figure. If figure light is just totally internally reflected then the emergent ray in air contain



*a) yellow, orange, red
b) violet, indigo, blue
c) all colours
d) all colours except green

37. If the angle of incidence is twice the angle of refraction in a medium of refractive index ' μ ' then the angle of incidence is

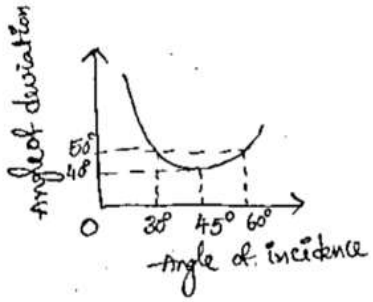
a) $\cos^{-1}\frac{\mu}{2}$ b) $\sin^{-1}\frac{\mu}{2}$ c) $2\sin^{-1}\left(\frac{\mu}{2}\right)$ *d) $2\cos^{-1}\left(\frac{\mu}{2}\right)$

38. By placing the prism in minimum deviation position, images of the spectrum.
a) becomes inverted b) becomes broader *c) becomes distinct d) become intensive

39. In the position of minimum deviation when a ray of yellow light passes through the prism , then its angle of incidence is
a) less than the emergent angle
b) greater than the emergent angle
c) sum of angle of incidence and emergent angle is 90^0
*d) Equal to the emergent angle

40. When a white light passes through a hollow prism, then
*a) there is no dispersion and no deviation
b) dispersion but no deviation
c) deviation but no dispersion
d) there is dispersion and deviation both

41. A plot of angle of deviation (D) versus angle of incidence
(i) for a triangular prism is shown below. The angle of incidence for which the light ray travels parallel to the base



*a) 30^0 b) 60^0 c) 45^0 d) 25^0

42. Lens maker's formula is applicable to
*a) thin lenses and paraxial rays which subtend very small angles with the principal axis
b) thick lenses and paraxial rays which subtend very small angles with the principal axis.
c) thin lenses and for marginal rays
d) thick lenses and for marginal rays

43. The focal length of lens depends upon
a) nature of the material of lens
b) colour of light
c) the medium in which lens is placed
*d) all of the above

44. A point source of light is placed at a distance of 2f from a converging lens of focal length f. The intensity on the other side of the lens is maximum at a distance
a) f b) between f and 2f *c) 2f d) more than 2f

45. A thin lens is made with a material having refractive index $\mu = 1.5$. Both the sides are convex. It is dipped in water $(\mu = 1.33)$. It will behave like
*a) convergent lens b) a divergent lens c) a rectangular slab d) a prism

46. A convex lens is made of a material having refractive index 1.2 both the surfaces of the lens are convex. If it is dipped into water $(\mu = 1.33)$ it will behave like
a) convergent lens *b) a divergent lens c) a rectangular slab d) a prism

47. For which of the following colour, the magnifying power of a microscope will be maximum.
a) white colour b) red colour *c) violet colour d) yellow color

48. When the length of a microscope tube increases, its magnifying power
a) decreases *b) increases
c) does not change d) may decrease or increase

49. The magnifying power of a simple microscope can be increased. If we use an eye piece of
a) higher focal length *b) smaller focal length
c) higher diammeter d) smaller diameter

50. Finger prints are observed by the use of
a) telescope *b) microscope c) gallilean telescope d) concave lens

51. In order to increase the magnifying power of a compound microscope
*a) the focal lengths of the objective and the eye piece should be small
b) objective should have small focal length and the eye piece large
c) both should have large focal lengths.
d) the objective should have to large focal length and eye piece should have small.

52. If the focal length of the objective lens is increased, then
a) magnifying power of microscope will increases, but that of telescope will decrease.
b) magnifying power of microscope and telescope both will increases
c) magnifying power of microscpe and telescope both will decrease
*d) magnifying power of microscope will decrease, but taht of telescope will increase

53. Rising and setting of the sun appears to be reddish because of
a) reflection b) refraction c) total internal reflection
*d) scattering due to dust particles and air molecules.

54. The objective of a compound microscope is essentially
a) a concave lens of small length and small aperture
b) convex lens of small focal length and length large aperture
c) convex lens of large focal length and large aperture
*d) convex lens of small focal l ength and small aperture

55. If the red light is replaced by blue light illuminating the object in a microscope then the resolving power of the microscope
a) decreases *b) increases c) gets halved d) remains unchanged

56. In a compoun d microscope . The cross- wires are fixed at the point
*a) where the image is formed by the objective
b) where the image is formed by the eye piece
c) where the focal point of the objective lies
d) where the focal point of the eye piece lies

57. In a compound microscope , the intermediate image is
a) virtual, erect and magnified b) real, erect and magnified
*c) real, inverted and magnified d) virtual, erect and reduced

58. The angular magnification of a simple micoscope can be increased by increasing
a) focal length of lens b) size of object c aperture of lens *d) power of lens

59.

60. The maixmum focal length of the eye - lens of a person is greater than its distance from the retina. The eye is
*a) always strained in looking at an object
b) strained for objects at large distances only
c) strained for objects at short distances only
d) unstrained for all distances

61. The image formed by an objective of a compound microscope is
a) virtual and enlarged b) virtual and diminished
c) real and diminished *d) real and enlarged.

62. The magnifying power of a telescope can be increased by
a) increasing focal length of the system *b) fitting eye piece of high power
c) fitting eye piece of low power d) none of these

63. A photograph of the moon was taken with a telescope later on, it was found that a housefly was sitting on the objective lens of the telescope. In photograph
a) The image of housefly will be reduced
*b) There is a reduction in the intensity of the image.
c) There is an increase in the intensity of the image
d) The image of the housefly will be enlarged.

64. For a telescope to have large resolving power, then the
a) focal length of its objective should be large b) focal length of its eye piece should be large
c) focal length of its eye piece should be small *d) aperture of its objective should be large

65. To increase the magnifying power of telescope (f_0 = focal length of the objective and f_e = focal length of the eye lens)
*a) f_0 should be large and f_e should be small b) f_0 should be small and f_e should be large
c) f_0 and f_e both shoul be large d) f_0 and f_e both should be small

66. If the telescope is reversed i.e., seen from the objective side
*a) object will appear very small
b) object will appear very large
c) There will be no effect on the image formed by the telescope
d) image will be slightly greater than the earlier one

67. In Gallilean telescope, the final image formed is
a) Real, erect and enlarged *b) virtual, erect and enlarged
c) Real, inverted and enlarged d) virtual, inverted and enlarged

68. An astronomical telescope has a large aperture to
a) reduce spherical aberration *b) have high resolution
c) increase span of bservation d) have low dispersion

Fill in the blanks

1. The ratio of the velocity of red colour light to the velocity of violet colour of light in vacuum is _____ (A: one)
2. Concave mirror can produce both real and virtual images of _____(A: real object)
3. The geometric centre of the spherical surface is a _____(A: pole)
4. All the distances are measured from the _____ of a mirror (A: pole)
5. Any incident light ray parallel to the principal axis, after reflection passes through the _____(A: focus)

6. The relation between radius of curvature and focal length of mirror is _____(A: $f = \frac{R}{2} (or) R = 2f$

7. Convex mirror can produce only virtual image of a _____(A: real object)

8. The Relation between object distance u, focal length f and magnification of mirror m is ____

(A: $m = \frac{f}{f-u}$)

9. The relation between image distance V, focal length of and magnification of mirror m is ___

(A: $m = \frac{f-V}{f}$)

10. A stick partially immersed in water appears to be bent due to _____(A: refraction of light)

11. Twinkling of starts at night are because of the apparent shift in their position due to _____ (A: refraction of light)

12. Rain bow is a natural phenomenon due t o the combined effect of _____ of sun light by spherical water droplets of rain. (A: dispersion, refraction and reflection)

13. S.I unit of power of lens is _____(A: diopter (D)

14. One diopter is the power of a lens whose focal length is _____(A: one meter)

15. The magnifying power of simple microscope, when the image is formed at near point

(Normal adjust ment) is _____(A: $m = 1 + \frac{D}{f}$)

16. The magnifing powe rof simple microscope, when the image is formed at far point (At intinity) is

_____(A: $m = \frac{D}{f}$)

17. The nature of focal length of concave lens is _____ (A: Negative)

18. The nature of power of convex lens is _____(A: Positive)

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10. WAVE OPTICS

1. Wave theory of light is not initially accepted because
   a) it does not explain reflection and refraction
   b) it does not explain photoelectric effect
   c) it doe not explain doppler's effect
   *d) it does not explain propagation of light through vacuum

2. Which one of the following phenomena is not explained by Huygens construction of wave front?
   a) refraction b) reflection c) diffraction *d) origin of spectra

3. In newton's corpuscular theory, no attempt was made to explain
   a) the different colours of light b) the speed of light
   c) the laws of reflection d) interference diffraction and polarization

4. The magnetic splitting spectral lines are called zeeman effect was confirmed by
   a) Newton's corpuscular theory b) Huygen's wave theory
   *c) Electromagnetic theory d) Quantum theory

5. Rotation of plane of polarization under influence of magnetic field called Faraday effect was con formed by
   a) Newton's corpuscular theory b) Huygen's wave theory
   *c) Electromagnetic theory d) Quantum theory

6. A wave front is an imaginary surface
   *a) phase is same for all points
   b) phase changes at constant rate at all points along surface
   c) constant phase difference contineously changes between the points
   d)phase changes all over the surface

7. A rectangular illuminated slit priduces
   a) spherical wave front b) plane wave front
   c) cylindrical wave front d) all the above
8. Huygen's principle is used
   a) to determine the velocity of light *b) to find the position of a wave front
   c) to determine the wave length of light d) to find the focal length of a lens
9. Geometrical shadow is formed due to the phenomenon of
   a) diffraction of light b) polarisation of light
   c) interference of light *d) rectilinear propagation of light
10. Nature of wave front depends on
   a) shape of source b) distance of source
   *c)both (a) and (b) d) none of the above
11. When a light wave in a rarer medium is reflected from the surface of an optically denser medium. it suffers a phase change of

   a) 2π b) $\frac{\pi}{2}$ *c) π d) zero
12. Two waves are said to be coherent if they have
   a) different frequency, and same phase
   *b) same frequency and same phase
   c) same frequency but different phase
   d) different frequency and different phase
13. A pair of coherent sources may be
   a) one virtual and the other real b) both real c) both virtual *d) A and c
14. Two coherent waves of light produce
   a) constructive interference if the phase difference between them is 90^0
   *b) destructive interference if the path difference between them is $\frac{\lambda}{2}$
   c)either constructive or destructive interference only if they are of same amplitude
   d) either constructive or destructive interference even though they are of different wavelengths
15. To demonstrate the phenomenon of interference we required two source which emit radiation of
   a) nearly the same frequency b) the same frequency
   c) different wave length *d) the same frequency and having a difinite phase relationship
16. The phenomenon of interference is possible in the case of
   a) longitudinal waves b) transverse waves
   *c) both d) none
17. During interference of light
   a) energy is destroyed at the dark bands
   b) energy is created at the bright bands
   *c) energy is conserved but distributed among bright and dark bands
   d) all the above are true
18. In the young's double slit experiment, the fringe width depends upon
   a) distance between the two slits
   b) wave length of light
   c) distance between the slits and the screen
   *d) all the above
19. Colours of soap film in sun light is due to
   a) dispersion b) diffraction *c) interference d) double refraction
20. In YDSE, sodium light is replaced by blue lamp, then the fringe width.
   1) increases *b) decreases c) remains same d) becomes zero
21. In YDSE, the band width is minimum for the colour
   a) red b) yellow c) green d) blue

22. Interference is produced with two coherent sources of same intensity. If one of the sources is covered with a thin film so as to reduce the intensity of light coming out of it, then
*a) Bright fringes willbe less bright and dark fringes will be less dark
b) Bright fringes will be more bright and dark fringes will be
c) The brightness of the bright fringes and the darkness of the dark fringes remain same
d) cannot be decided

23. The graph between the separation of the slits and fringe width in young's double slit experiment is (assume that the distance between the source and screen and the wave length of the source are kept constant)
a) straight line with negative slope
b) rectangular hyperbola
c)straight line with positive slope
d) parabola

24. In YDSE, both the slits are similar. If with of one of the slits is doubled then
a) Dark fringes become narrower
b) Bright fringes become less bright
*c) Dark fringes become slightly brighter
c) Bright fringes become narrower

25. The contrast between the fringes in any interference pattern depends on
a) fringe width
*b) Intensity ratio of the sources
c) Distance between the slits
d) wavelength

26. If young's double slit apparatus is shifted from air to water, then
*a) Fringe width decreases
b) Fringe width increases
c) Fringe width remains same
d) Fringe system disappears

27. Alternate bright and dark fringes appear in young's double slit experiment due to the phenomenon of
a) polarisation b) diffraction *c) interference d) none

28. In young's double slit experiment the phase difference between the waves reaching the central fringe and fourth bright fringe will be
a) zero b) 4π c) 6π *d) 8π

29. Interference pattern is obtained using white light, then
a) the central fringe is dark
*b) the bright fringe nearest the central white fringe is voilet
c) the bright fringe nearest the central white fringe is red
d) the fringe system is not formed

30. In YDSE, if one of the slits is closed
a) the contrast between the bright and dark bands decreases
b) the width of the bands decreases
c) the central becomes dark band
*d) the interference bands disappear producing uniform

31. Youngs experiment establishes that
a) light consist of particles
*b) light consist of waves
c) light is both particle and wave
d) none of above

32. In YDSE a mica plate of thickness 't' and refractive index ' μ ' is introduced in one of the interfering beams. Then the cnetral fringe will be displaced through (d= distance between the slits ; D= distance between the slits and the screen)

a) $\frac{dt}{D(\mu-1)}$ *b) $\frac{(\mu-1)tD}{d}$ c) $\frac{Dt\mu}{d}$ d) $\frac{dt\mu}{D}$

33. Two coherent sources S_1 and S_2 produce interference fringes. If a thin mica plate is introduced in the path of light from S_1 then the central maximum

a) shift towards S_2 b) shift towards S_1 c) do not shift to any side d) disappear

34. When a thin metal plate is placed in the path of one of the interfering beams of light
a) the fringes become blurred
b) the fringes become brighter
c) the fringes disappear
d) the fringe width increase

35. In YDSE uses a monochromatic source the shape of interference fringes formed on a screen is
a) straight line b) parabola *c) hyperbola d) circle

36. In YDSE, the central bright fringe can be identified
a) As it has greater intensity than the other bright fringes
b) As it is wider than the other bright fringes
c) As it is narrower than the other bright fringes
d) By using white light instead of monochromatic light

37. The phenomenon of diffraction of light was discovered by
a) Fresnel b) Fraunhofer c) young d) Grimaldi

38. Diffraction of light is
a) the bending of light at the surface of separation when it travels from rarer medium to denser medium
b) the bending of light at the surface of separation when it travels from denser medium to rarer medium
c) encroachment of light into the geometrical shadow of the obstacle placed in its path
d) emergence of a light ray grazing the surface of separation when it travels from denser to rarer medium

39. Both light and sound waves produce diffraction. it is more difficult to observe the diffraction with light waves because
a) light wave do not require meidum
*b) wavelength of light waves is far smaller
c) light waves are transverse
d) speed of light is far greater

40. When a compact disc is illuminated by a source of white light, coloured lines are observed. This is due to:
a) dispersion *b) diffraction c) interference d) refraction

41. Golden view of sea- shell is due to:
a) diffraction b) dispersion *c) polarisation d) reflection

42. The structure of crystals can be studied using
a) diffraction of visible light *b) diffraction of x- rays
c) interference of sound waves d) refraction of radio waves

43. In Fresnel's diffraction wave front must be
a) spherical b) cylindrical c) plane *d) both A and B

44. A diffraction pattern is obtained using a beam of red light. what happens if the red light is replaced by blue light
a) no change
*b) diffraction bands become narrower and crowded together
c) bands become broader and farther apart
d) bands disappear

45. In a diffraction pattern the width of any fringe is
a) directly proportional to slit width
*b) inversely proportional to slit width
c) independent of the slit width
d) none of the above

46. The correct relation between limit of resolution and resolving power is

*a) limit of resolution $= \frac{1}{\text{resolving power}}$

b) limit of resolution $\propto$ resolving power

c) limit of resolution $\propto \frac{1}{\text{resolving power}}$

d) limit of resolution $\propto (1 - \text{resolving power})$

47. In telescope, the radius of the central bright region (r_0) is

*a) $\frac{0.61\lambda f}{a}$ b) $\frac{0.75\lambda f}{a}$ c) $\frac{1.94\lambda f}{a}$ d) $\frac{2.43\lambda f}{a}$

48. For better resolution, a telescope must have a
*a) large diameter objective b) small diameter objective
c) may be large d) neither large nor small

49. In Fresnel experiment, a quantity Z_F is given by

a) $Z_F \simeq \frac{\lambda}{a^2}$ b) $Z_F \simeq \frac{2\lambda}{a^2}$ c) $Z_F \simeq \frac{a^2}{\lambda}$ d) $Z = \frac{a}{\lambda}$

50. Transverse wave nature is established by
a) interference b) diffraction *c) polarization d) all the above

51. Which one of the waves cannot be polarized
a) radiowaves b) x- rays c) ultraviolet rays *d) sound waves

52. In the propagation of electromagnetic waves the angle between the direction of propagation and plane of polarization is
*a) zero b) 45^0 c) 90^0 d) 180^0

53. In the case of light waves the angle between plane of vibration and plane of polarization is
a) 180^0 b) 90^0 c) 45^0 *d) zero

54. polarization can be produced by
a) reflection b) double refraction c) scattering *d) all the above

55. In case of linearly polarized light, the magnitude of the electric field vector:
a) is parallel to the direction of propagation
b) does not change with time
c) increases and decreases linearly with time
*d) varies periodically with time

56. The tangent to polarizing angle is numerically equal to
a) diversity of the reflecting medium
*b) refractive index of the reflecting medium
c) velocity of light in reflecting medium
d) elastic modulus of reflecting medium

57. The intensity of the polarized light transmitted through the analyzer is given by
a) Brewster's *b) Malus law
c) Fresnel's assumptions d) Law of super position

58. If polaroids are to be used to avoid glares of in coming light then
*a) visibility will decreases b) transmittivity of windhield will decrease
c) vehicles will move slowly d) cost will increase

59. Polaroid sunglasses are preferred because they
*a) reduce the intensity of light b) have soothing colours
c) are cheaper d) can change colours

FILL IN THE BLANKS

1. Wavefront is the locus of all the particles of the medium which oscillates in the _____ (A: same phase)
2. The phase difference between any two points on the given wave front is _____(A : Zero)
3. The angle between the direction of propagation of light energy and the surface of wavefront is _____(A: 90^0)

4. If the source of light is a point source, the wave fronts emerging from the source at smaller distances from it are _____(A: spherical wave fronts)
5. When a wave travells from rarer medium to denser medium the speed of light _____ (A: decreases)
6. When a wave travels from rarer medium to denser medium. The frequency of light _____ (or) _____ (A: remains constant , doesnot change)
7. The intensity at any point is directly proportional to the _____(A: square of the amplitude)
8. The condition for constructive interference of phase difference between two waves is _____ (or) _____(A: $\phi = 2n\pi$, even integral multiples of π)
9. The condition for constructive interference of path difference between two waves is _____ (or) _____

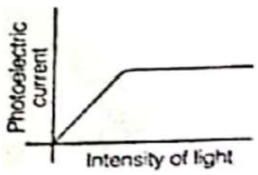
   (A: $\delta = n\lambda$ (or) integral multiples of λ , even integral multiples of $\frac{\lambda}{2}$)
10. The conditions for destructive interference of phase different between two wave is _____

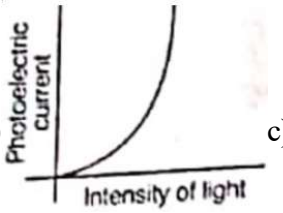
    (A: $\phi = (2n+1)\pi$ (or) integral multiples π)
11. Th condition for destructive interference of path difference between two waves is _____

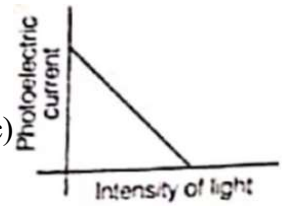
    (A: $\delta = (2n+1)\frac{\lambda}{2}$ (or) odd integral multiples of $\frac{\lambda}{2}$)
12. The principle of interference in youngs double slit experiment is _____ (A: Division of wave front)
13. If the two waves coming from two coherent sources superpose at a point in phase to give maximum intensity , then it is called _____ interference (A: constructive)
14. If the two waves coming from two coherent sources superpose at a point in phase to give minimum intensity , then it is called _____(A: destructive inteference)
15. The idea of secondary wavelets for the propagation of a wave was first given by _____ (A: Huygens)
16. In YDSE, the fringe width _____ on increasing the separation between two slits (A: decreases)
17. In YDSE, the fringe width _____ on increasing the separation between slits & screen. (A: increase)
18. In YDSE is one of the slit is covered by the opaque substances the fringes are _____ (A: disappear)
19. When the entire young's boulde slit apparatus is immersed in water, the fringe width is _____(A: descreases)
20. The resolving power of a microscope is given by the reciprocal of its _____ (A: limit of resolution)
21. Resolving power of a microscope can be increased by decreasing the _____ used (A: wavelength)
22. The resolving power of a telescope is given by the reciprocal of its _____ (A: limit of resolution)
23. Resolution power of a telescope can be increased by decreasing the _____used (A: wavelength)
24. The angle of incidence at which the reflected light is completely plane polarised is called _____ angle (A: polarising angle (or) Brewter's angle)
25. The device used to produce and analyse the plane polarised light is called _____(A:polaroid).

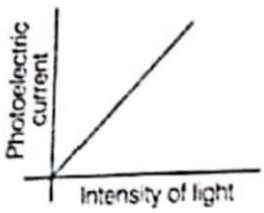
11. DUAL NATURE OF RADIATION AND MATTER

1. Photo electric effect involves
   a) Conversion of nuclear energy into electrical energy
   b) Conversion of atomic energy into electrical energy
   c) Conversion of electronic energy into electrical energy
   *d) Conversion of light energy into electrical energy
2. Visible region of electromagnetic spectrum is not suitable for photoemission from
   a) Caesium b) Zinc c) lithum *d) rubidium
3. While studying effect of variation of intensity on the photo current, intensity of light is changed in a photo cell by
   a) using a prism in the path of light beam
   b) using a thickn glass sheet
   c) tilting the cathode
   *d) changing the distance of light source from the emitter
4. To observe the effect of intensity of light on photocurrent
   a) collector is maintained at positive potential with respect to emitter
   b) frequency of incident light is kept fixed
   c) accelerating potential is fixed
   *d) distance of source from emitter is kept constant
5. Variation of photoelectric current with intensity of light is

a) 

b) 

c) 

*d) 

6. When stopping potential is applied in an experiment of photoelectric effect, no photo current is observed . This means that
   a) The emission of photo electrons is stopped
   *b) The photo electrons are emitted but are reabsorbed by the emitter
   c) The photoelectrons are accumulated near the collector
   d) The photoelectrons are dispersed from the sides of the apparatus
7. If the frequency of incident ligh is tripled , the stopping potential will
   a) be tripled b) become one third
   *c) become more than triple d) become less than triple but more than doubled
8. A point source of light is used in a photo electric effect. If the source is moved farther away from the emitting metal the stopping potential
   a) will increase b) will decrease
   *c) will remain same d) either increases or decreases
9. A non- mono chromatic light is used in an experiment on photoelectric effect. The stopping potential is related to the
   a) mean wavelength b) longest wave length
   *c) shortest wave length d) distance of the source from the metal
10. If the wavelength of light in an experiment on photoelectric effect is doubled keeping the intensity constant
    a) The photo electrons may or may not be emitted
    b) The stopping potential decreases if electrons are emitted
    c) The photoelectric current does not change if electrons are emitted
    *d) all the above

11. Photo electric current
a) does not obey ohm's law b) does not depend on exposure time
c) does not depend on frequency of incident light *d) all the above

12. The best photo electric substance is
a) Nickel b) Sodium *c) Cesium d) Potassium

13. It is easier to remove an electron from sodium than from copper. If $(\upsilon_0)_s$ and $(\upsilon_0)_C$ are their thresh old frequencies respectively . Then
a) $(\upsilon_0)_s = (\upsilon_0)_C$ b) $(\upsilon_0)_s > (\upsilon_0)_C$ *c) $(\upsilon_0)_s < (\upsilon_0)_C$ d) $(\upsilon_0)_s \geq (\upsilon_0)_C$

14. Blue light can eject photo electron from a photosensitive surface while orange light cannot. Then
a) violet light can eject electron b)red light cannot eject electron
c) green and yellow lights may *d) all the above

15. Will photo electron be wmitted by a copper surface, whose threshold wave length is $2800A^0$ when illuminated by visible light
*a) No b) Yes c) Yes if light is very intense d) Yes , if light is very bright

16. Intensity of light incidenct on a photo sensitive surface is doubled . then
a) The number of emitted electrons is trebled *b) The number of emitted electrons is doubled
c) The KE of emitted electrons is doubled d) The momentum of emitted electron is doubled

17. Light of wave length λ falls on a metal having work function $\frac{hc}{\lambda_0}$, photoelectric effect will take place only of
a) $\lambda \geq \lambda_0$ b) $\lambda \geq 2\lambda_0$ *c) $\lambda \leq \lambda_0$ d) $\lambda \leq \frac{\lambda_0}{2}$

18. Relation between the stopping potential V_0 of a metal and the maximum velocity V of the photo electrons is
*a) $V_0 \propto \frac{1}{V^2}$ b) $V_0 \propto V^2$ c) $V_0 \propto V$ d) $V_0 \propto \frac{1}{V}$

19. Stopping potential depends on
*a) Frequency of incident light b) Intensity of incident light
c) Number of emitted electrons d) Number of incident photons

20. The saturation of photoelectric current depends on
a) Work function b) Frequency of radiation
*c) Intensity of radiation d) stopping potential

21. A photo electric cell converts
a) light energy into heat energy b) light energy into sound energy
*c) light energy into electrical energy d) electrical energy into light energy

22. Photo electric effect can be explained only by assuming that light
a) is a form of transverse waves b) is a form of longitutinal waves
c) can be polarized *d) consists of quanta

23. If the energy and momentum of a photon are E and P respectively, then the velocity of photon will be
*a) $\frac{E}{P}$ b) $\left(\frac{E}{P}\right)^2$ c) EP d) $3\times10^7 m/s$

24. The number of electrons emitted by a surface exposed to light is directly proportional to
a) frequency of light b) work function of metal
c) threshold wave length *d) Intensity of light

25. In photoelectric phenomenon, the number of photoelectros emitted depends on
*a) The intensity of incident radiation b) the frequency of incident radiation
c) The velocity of incident radiation d) The work function of photo cathode

26. When frequency of incident light is lower then threshold frequency then
*a) photoelectric current is zero
b) photoelectric current increases
c) photoelectric current decreases
d) photoelectric emission takes wave but with zero velocity

27. With increase in intensity f incident light having frequency less than threshold frequency then
*a) no photoelectric effect takes place
b) photo electric effect takes place with low current
c) photoelectric effect takes place with low current
d) photoelectric effect takes place but electrons have zeor KE

28. The slope of the graph drawn between stopping potential and frequency of incident radiation will be

*a) $\frac{h}{e}$ b) he c) eh^2 d) e^2h

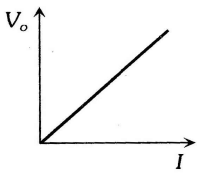
29. The relation between stopping potentials (V_0) and frequency υ of incident light is

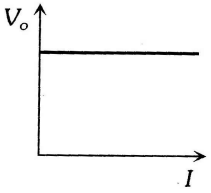
a) $V_0 = \frac{e}{n}(\upsilon - \upsilon_0)$ *b) $V_0 = \frac{h}{e}(\upsilon - \upsilon_0)$ c) $V_0 = \frac{h}{e}(\upsilon_0 - \upsilon)$ d) $V_0 = \frac{h}{e}(\upsilon_0 - \upsilon)$

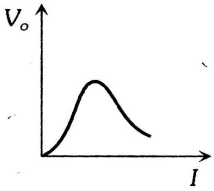
30. The pprinciple of photo cell is
a) To convert electrical energy into light energy
*b) To convert light energy into electrical energy
c) To convert light energy into heat energy
d) To convert electrical energy into heat energy

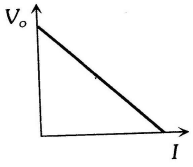
31. Stopping potential is more negative for
*a) higher frequency of incident radiation
b) lower frequency of incident radiation
c) higher intensity of incident radiation
d) lower intensity of incident radiation

32. The correct curve between the stopping potential (V_0) and of incident light (I) is

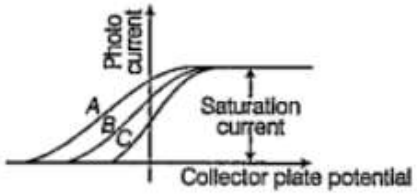
a) 

*b) 

c) 

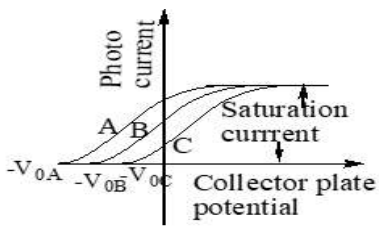
d) 

33. For the graph of collector potential very photoelectric current shown if I denotes intensity of incident radiation, then



a) $I_A > I_B > I_C$ b) $I_A < I_B < I_C$ *c) $I_A = I_B = I_C$ d) $I_B > I_A$ and $< I_C$

34. For the graph shown if f denotes frequency incident light



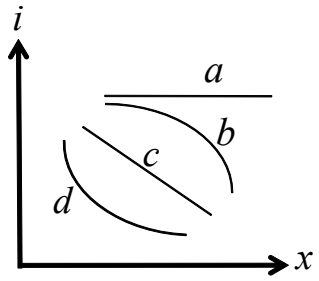
*a) $f_A > f_B > f_C$ b) $f_A < f_B < f_C$ c) $f_A = f_B = f_C$ d) $f_B > f_C$ and $f_B > f_A$

35. V_0 versus V curve is a

a) straight line with slope = ϕ_0 b) straight line with slope = $\frac{\phi_0}{e}$

*c) straight line with slope = $\frac{h}{e}$ d) straight line with zero slope

36. A point source of light is used in an experiment on photoelectric effect. which of the following curves best represents the variation of photoelectric current 'i' with distance 'd' of the source from the matter?



a) a b) b c) c *d) d

37. The mass of electron varies with
*a) electron velocity
b) the size of cathode ray tube
c) variation of g
d) the size of electron

38. The wavelength of a photon an electron and a uranium nucleus are same - maximum energy will be of
*a) photon b) electron
c) it will depend on their properties and wavelength d) uranium nucleus

39. The matter waves are
a) light waves b) sound waves c) stationary waves *d) probabilistic waves

40. The wavelength of a proton and a photon are same, then
a) velocity of photon = velocity of proton *b) momentum of photon = momentum of proton
c) momentum of photon < momentum of proton d) momentum of photon > momentum of proton

41. The wave nature of electron was verified by
a) photoelectric effect b) compton effect
c) the incidence of electron on metallic surface *d) diffraction of electron by crystal

42. The frequency of a photon of momentum P will be

*a) $\frac{PC}{h}$ b) $\frac{Ph}{C}$ c) $\frac{mh}{C}$ d) $\frac{mC}{h}$

43. If the value of plank's constant is more than its present value then the De Broglie wavelength associated with a material particle will be

*a) more b) less c) same d) more for light particles and less for heavy particles

44. The wavelength of matter waves does not depend on
a) momentum b) velocity c) mass *d) charge

45. The ratio of wavelength of a photon and that of an electron of same energy will be

a) $\sqrt{\frac{m}{E}}$ b) $\sqrt{\frac{E}{2m}}$ *c) $\sqrt{\frac{2m}{E}}$ d) $\sqrt{\frac{EC}{2m}}$

46. Neglecting the variation of mass with energy, the De Broglie wavelength of an electron with energy E will be proportional to

*a) $E^{-1/2}$ b) $\sqrt{E}$ c) E d) $E^{1/2}$

47. The De broglie wavelength of a particle is equal to that of a proton, then the energy of photon will be
a) equal to the kinetic energy of the particle
b) less than the kinetic energy of particle
c) equal to the total energy of the particle
*d) more than the kinetic energy of the particle

48. The phenomena of interference and diffraction of light will contain
*a) wave theory of light b) particle nature of light
c) Dual nature of light d) corpuscular theory of light

49. The phenomena of photoelectric effect and compton effect wil confirm
a) wave theroy of light *b) particle nature of light
c) Dual nature of light d) electromagnetic theory

50. De -Broglie suggested that the elementary particles like electrons , protons and neutrons will exhibit
*a) dual nature i.e., thye behave like particles & waves b) only particle nature
c) only wave nature d) electromagnetic waves

51. A positron (m & proton (M) are accelerated by the same accelerating potential. Then the ratio of the associated wavelength of positron and proton will be

a) $\frac{M}{m}$ *b) $\sqrt{\frac{M}{m}}$ c) $\frac{m}{M}$ d) $\sqrt{\frac{m}{M}}$

52. Davison and Germer's and G.P Thomson's experiments gives
*a) evidence of de Broglie's waves associated with electrons
b) evidence of particle nature of electrons
c) evidence of -ve charge on electrons
d) evidence of specific charge of electron

53. The photon of frequency V has a momentum associated with it if C is the velocity of light, the momentum is

*a) $\frac{h\upsilon}{C}$ b) $\frac{\upsilon}{C}$ c) $h\upsilon C$ d) $\frac{h\upsilon}{C^2}$

54. de- Broglie hypothesis is a conclusion drawn from
a) photoelectric effect b) convertibility of mass into energy
c) symmetry of matter and energy *d) compton effect

55. Wave is associated with matter
a) when it is stationary b) when it is in motion with velocity of light
*c) when it is in motion with any velociyt d) never associated with matter

56. A particle which has zero rest mass and non - zero energy and momentum must travel with a speed
*a) equal to C , the speed of light in vaccum b) greater than C
c) less than C d) tending to infinity

57. An electron, an α – particle and a proton have the same kinetic energy shortest de Broglie wave length is assciated with
a) electrons *b) α – particle c) proton d) all produces same wavelength

58. Davision - germer experiment confirms de Broglie relation by
a) converting electrons into waves
b) converting light into particles
c) varying angle of incidence of an electron beam over a metal targer and observing scattering pattern
*d) comparing theoretical value of wave length associated with moving electrons and partial value of wavelength measured by observing diffraction pattern produced by electrons

59. de- Broglie hypothesis is true for
a) particle which are very light like electrons
b) only subatomic particles
c) only for photons and electrons
*d) fast moving particles much - much heavier than electrons

60. Wave nature of electrons is exploited in
a) mass spectrometer b) coolidge tube
c) synhrotons *d) electron microscopes

61. In Davison experiment , if applied accelerating voltage is increased .
a)will be larger than the earlier value b) will be same as earlier value
*c) will be less than the earlier value d) will depend on target

62. Photoelectric effect is based upon
*a)energy b) mimentum c) mass d) charge

63. Photons are electrically
a) positive b) negative *c) neutral d) all of these

64. Work function isthe energyrequired
a) to produce x-rays b) to exhibit an atom
*c) to eject an electron just out of thesurface d) explore an atom

65. The photoelectric effect occurs only when the incident light has more than certain minimum
a) wavelength b) speed c) charge *d) frequency

66. The maximum number of photo electrons released in a photocell is independent
a) nature of the cathode surface *b) frequency of the incident ray
c) intensity of radiation incident oncathode surface d) none of the above

67. If the frequency of light in photoelectric experiment is doubled, the stopping potential will
a) be doubled b) be halved
*c) become more than doubled d) become less than doubled

68. The best metal to be used for photo emission is
a) potassium b) sodium *c) caesium d) lithium

69. de Brogile wavelength depends on the mass and energy according to the relation
*a) $(mass \times enegy)^{-1/2}$ b) $(mass \times enegy)^{1/2}$ c) $(mass / enegy)^{1/2}$ d) $mass \times enegy$

70. If wavelength of an electron and a photon is same then they will have same
a) velocity *b) momentum c) energy d) all of these

71. A proton and an electron move with a same velocity. The associated wavelength for proton is
*a) shorter than that of the electron b) longer than that of the electron
c) the same of as that of the electron d) zero

72. For a given metal, the maximum kinetic energy of emitted electrons in a photoelectric effect does not depend upon
*a) intensity b) stopping potential d) wavelength d) frequency

73. In photoelectric effect, the number electrons ejected per second is directly
a) proportional to the wavelengthof the light *b) proportional to the intensity ofthe light
c) proportional to the workfunction of the light d) proportional to the frequencyof the light

74. The electromagnetic theory of light failed to explain
*a) photoelectric effect b) polarisation c) diffraction d) interference

75. The phenomenon of photoelectric emission was discovered by
a) R. A Millikan b) Albert Einstein c) Roentgen *d) Heinrich hertz

76. Which of the followings is the type of electron emission?
a) Thermionic emission b) field emission
c) Photoelectric emission *d) all of the above

77. The work function depends on the
a) properties of the metal b) the nature of metal surface
*c) both (a) and (b) d) none of the above

78. _____metal has highest workfunction of 5.65eV
*a) platinum b) caesium c) iron dD) cobalt

79. Dual nature of matter is proposed by
* a) louis de Brogile b) Albert Einstein c) Heinrich Hertz d) R. A Millikan

80. Photoelectric current is directly proportional to
a) time b) velocity *c) intensity of incident radiation d) distance

12. ATOMS

1. Rutherford's experiments suggested that the size of the nucleus is about

   a) 10^{-14} m to 10^{-12} m b) $10^{-15} m$ to $10^{-13} m$

   *c) $10^{-15} m$ to $10^{-14} m$ d) $10^{-15} m$ to $10^{-12} m$

2. In the Geiger - Marsden scattering experiment in case of head on collision the impact parameter should be

   a) maximum *b) minimum c) infinite d) zeor

3. In the Geiger -Marsden scattering experiment of the number of scattered particles detected are maximum and minimum at the scattering angles respectively at

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

4. The volume occupied by an atom is greater than the volume of the nucleus by a factor of about

   a) 10^1 b) 10^5 c) 10^{10} *d) 10^{15}

5. According to Bohr principle the relation between principle quantum number (n) and radius of the orbit (r) is

   a) $r \propto \frac{1}{n}$ b) $r \propto n$ *c) $r \propto n^2$ d) $r \propto \frac{1}{n^2}$

6. The region of electromagnetic spectrum that contains lyman series

   *a) ultraviolet b) infrared c) visible d) x- ray

7. Visible region contains

   a) Lyman lines *b) Balmer lines c) Paschen lines d) All of the above

8. The wavelength involved in the spectrum of deuterium $\left({}_1D^2\right)$ are slightly different from that of hydrogen spectrum because

   a) the size of the nuclei are different
   b) the nuclear forces are different in two cases
   *c) the masses of the two nuclei are different
   d) the attraction between electron and the nulceus is different in the two cases

9. Hydrogen atom does not emit X- rays because

   *a) its energy levels are zero close to each other b) its energy levels are too far apart
   c) it has a very small mass d) it has a single electron

10. Atomic hydrogen is excited from the ground state to the n^{th} states . The number of lines in the emission spectrum will be

    a) $\frac{n(n+1)}{2}$ *b) $\frac{n(n-1)}{2}$ c) $\frac{(n-1)^2}{2}$ d) $\frac{(n+1)^2}{2}$

11. The Bohr's model of atoms :

    *a) assumes that the angular momentum of electrons is quantized
    b) uses einstein's photoelectric equation
    c) predicts continuous emission spectra for atoms
    d) predicts the same emission spectra for are types of atoms

12. Bohr's model for the hydrogen atom predicts that the absorption spectra involve

    a) accelerating electrons
    b) dccelarting electrons
    c) electrons going to highe kinetic energy levels
    *d) electrons going to lower momentum levels

13. Whenever a hydrogen atom emits a photon in the Balmer series

    a) it need not emit any more photon
    b) it may emit another photon in the Paschen series
    *c) it may emit another photon in the Lyman series
    d) it may emit another photon in the Balmer series

14. If $n >> 1$ then the dependence of frequency of photon emitted as a result of transition of an electron n[th] orbit to $(n-1)^{th}$ orbit on n will be

a) $\upsilon \propto \frac{1}{n}$ b) $\upsilon \propto \frac{1}{n^2}$ *c) $\upsilon \propto \frac{1}{n^3}$ d) $\upsilon \propto \frac{1}{n^4}$

15. When a hydrogen atom is raised from the ground state to fifth state:
a) both KE & PE increase b) both KE & PE decrease
*c) PE increase and KE decrease d) PE decrease and KE increase

16. When an electron jumps from n_1^{th} orbit to n_2^{th} orbit the energy radiated given by

a) $h\upsilon = E_1 / E_2$ b) $h\upsilon = K_2 / E_1$ *c) $h\upsilon = E_1 - E_2$ d) $h\upsilon = E_2 - E_1$

17. When a hydrogen atom is raised from the ground state to an excited state
a) both kinetic energy (KE) and potential energy (PE) increase
b) both KE and PE decrease
*c) PE increase, KE decrease
d) PE decreases , KE increases

18. In Bohr's model of hydrogen atom, let PE represent potential energy and TE the total energy. In going to a higher orbit
a) PE increases, TE decreases b)PE decreases, TE increases
*c) PE increases, TE increase d) PE decreases, TE decreases

19. If the radius of an orbit is r and the velocity of electron in it is V, then the frequency of electron in the orbit will be

a) $2\pi rv$ b) $\frac{2\pi}{vr}$ c) $\frac{vr}{2\pi}$ *d) $\frac{v}{2\pi r}$

20. As the quantum number increases, the difference of energy between conservative energy level
*a) decreases b) increases c) first decreases and then increases d) remains the same

21. The angular momentum of an electron in a hydrogen atom is proportion to

a) $\frac{1}{\sqrt{r}}$ b) $\frac{1}{r}$ *c) $\sqrt{r}$ d) r^2

22. The electron in a hydrogen atom makes a transition from an excited state to the ground state Which of the following statements is true?
*a) its kinetic energy increases and its potential & total energies
b) Its kinetic energy decreases, potential energy increases, and its total energy remain the same
c) its kinetic and total energies decrease and its potential energy increases
d) its kinetic potential and totale energies decrease

23. The number of spectral lines in hydrogen atom is
a) infinite b) 3 *c) 6 d) 15

24. An electron in the ground state of hydrogen atom is revolving in anti clockwise direction in circular orbit of radius R, the orbital magnetic dipole moment of the electron will be

*a) $\frac{eh}{4\pi m}$ b) $\frac{eh}{2\pi m}$ c) $\frac{eh^2}{4\pi m}$ d) $\frac{e^2h}{4\pi m}$

25. When electron falls from a higher energy to a lower energy level the difference in the energies appears in the form of
*a) electromagnetic radiation only b) Thermal radiation only
c) Both electromagnetic and thermal radiations d) none of these

26. The de- Broglie wavelength of an electron in the first Bohr orbit is
a) equal to one fourth the circumference of the first orbit
b) equal to half the circumference of first orbit
c) equal to twice the circumference of first orbit
*d) equal to the circumference of the first orbit

27. The excitation energy of Lyman last line is
a) The same as ionization energy
b) The same as the last absorption line is lyman series
*c) Both (A) and (B)
d) Different from (A) and B)

28. The series corresponding to minimum wavelength transition in H - atom
a) Balmer series *b) Lyman series
c) paschen series d) Brackets series

29. The minimum magnetic dipole moment of electron in hydrogen atom is
a) $\frac{2h}{2\pi m}$ b) $\frac{eh}{\pi m}$ *c) $\frac{eh}{4\pi m}$ d) 0

30. Total energy of the electron in hydorgen atom above 0 eV leads to
*a) continuation of energy states b) Larger number of discrete ionised states
c) Balmer series d) Paschen series

31. In Bohr model of hydrogen atom , which of the following is quanlized
a) Linear momentum of electron b) Linear velocity of electron
*c) Angular momentum of electron d) Angular velocity of electron

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13. NUCLEI

1. The distance of closest approach of α – particle to the nucleus was taken as a measure of
a) atomic radius b) diameter of the nucleus
*c) nuclear radius d) size of atom

2. The nuclear mass density is of the order of
a) $10^{10} kg/m^3$ *b) $10^{17} kg/m^3$ c) $10^{15} kg/m^3$ d) $10^{8} kg/m^3$

3. A particle having no charge and almost norest mass
*a) neutrino b) neutron c) electron d) positron

4. The mass number of a nucleus is
a) always less than its atomic number
b) always more than its atomic number
c) equal to its atomic number
*d) sometimes more than and some times equal to atomic number

5. The graph between $\log\left(\frac{R}{R_0}\right)$ and $\log A$ (R - radius of nucleus 'A' mass number) is
*a) straight line b) parabola c) ellipse d) hyperbola

6. Density 'D' of nuclear matter varies with nuclear number as
a) $D \propto A^3$ b) $D \propto A^2$ c) $D \propto A$ *d) $D \propto A^0$

7. The ratio of volume of atom to that of nucleus
*a) 10^{15} b) 10^{10} c) 10^5 d) 10^7

8. In heavy stable nuclei, neution number is more than proton number. It is because
a) neutrons are heavier than proton
*b) electrostatic force between protons are repulsive
c) neutrons decay in to through beta decay
d) nuclear forces between neutrons are weaker than between protons

9. The nuclear forces are
a) attractive b) repulsive *c) A to B d) always attractive

10. Nuclear forces are
a) non - central forces b) saturated c) spin dependent *d) all the above

11. The relative strengths of gravitational, coulomb's and nuclear forces of protons are in he ratio (nearly)
a) 1:1:1 *b) $1:10^{36}:10^{38}$ c) $10^{38}:10^{36}:1$ d) $1:10^{30}:10^{34}$

12. The origin of nuclear force between nucleons is due to the exhange of
*a) mesons b) photons c) positions d) electrons

13. Two nucleons are at a separation of $1\times10^{-15}m$. The net force between them is F_1, if both are neutrons, F_2 if both are protons and F_3 if one is a proton and other is a neutron. In such a case
a) $F_2 > F_1 > F_3$ b) $F_1 = F_2 > F_3$ c) $F_1 = F_2 = F_3$ *d) $F_1 = F_3 > F_2$

14. If $F_{P-P}\ F_{P-n}, F_{n-n}$ are nuclear forces given two protons , a proton and a neutron, two neutrons respectively inside a nucleus , then
a) $F_{P-P} < F_{P-n} < F_{n-n}$ *b) $F_{P-P} = F_{P-n} = F_{n-n}$ c) $F_{P-P} < F_{P-n} = F_{n-n}$ d) $F_{P-P} > F_{P-n} = F_{n-n}$

15. Binding energy per nucleon is more for
*a) intermediate nuclei b) lighter nuclei c) heavier nuclei d) none of the above

16. The binding energy per nucleon is maximum at A = 56 and its value is around _____ MeV/ Nucleon
a)8.4 *b) 8.7 c) 9 d) 7.8

17. As the mass number 'A' increases, the binding energy per nucleon in a nucleus
a) increases b) decreases *c) first increases and then decreases d) remains same

18. The stability of a nucleus can be measured by
a) average binding energy b) packing fraction
c) ratio of umber of neutrons and protons *d) all the above

19. In nuclear reaction ${}^4_2He + {}^A_Z X \rightarrow {}_{Z+2}Y^{A+3} + R$, Re denotes
a) electron b) positron c) proton *d) neutron

20. The penetrating powers of α and β and rediatiosn in decreasing order are
a) γ, α, β *b) γ, β, α c) α, β, γ d) β, γ, α

21. When α, β, γ radiation pass through a gas their ionizing powers, in decreasing order are
a) γ, α, β b) γ, β, α *c) α, β, γ d) β, γ, α

22. In a radioactive series, ${}^{238}_{92}U$ changes to ${}^{206}_{82}Pb$ through $n_1\alpha-$ decay processes and $n_2\beta-$ decay processes
a) $n_1 = 8, n_2 = 8$ b) $n_1 = 6, n_2 = 6$ *c) $n_1 = 8, n_2 = 6$ d) $n_1 = 6, n_2 = 8$

23. A radioactive nuclei can decay simultaneously by two different processes which have decay constants λ_1 and λ_2 . The effective decay constant of the nucleide is λ
*a) $\lambda = \lambda_1 + \lambda_2$ b) $\lambda = \sqrt{\lambda_1\lambda_2}$ c) $\frac{1}{\lambda} = \frac{1}{\lambda_1} + \frac{1}{\lambda_2}$ d) $\lambda = \frac{1}{2}(\lambda_1 + \lambda_2)$

24. A fraction f_1 of a radioactive sample decays in one mean life, and a fraction f_2 decays in one half life
*a) $f_1 > f_2$ b) $f_1 < f_2$ c) $f_1 = f_2$ d)may be (1),(2) or (3)

25. The half life period of a radioactive sample depends upon
a) temperature b) pressure *c) nature of substance d) all the above

26. Which of the following radioactive substance is used in archeological surve?
*a) ${}_6C^{14}$ b) ${}^1_1H$ c) ${}^{235}_{92}U$ d) ${}_2HC^3$

27. Which of the following changes in the artificial transmutation of elements
a) number of neutrons b) number of electrons c) atomic weight *d) nucleus

28. A free neutron decays spontaneously into
*a) a proton, an electron and an anti neutrino
b) a proton, an electron and a neutrino
c) a proton and electron
d) a proton, an electron, a neutrino and an anti neutrino

29. Neutron was discovered by the experiment of

*a) artificial transmutation of $\left({}^{9}_{4}Be\right)$ by alpha particles

b) artificial transmutation of $\left({}^{11}_{7}N\right)$ by alpha particles

c) rutherford scattering of alpha particles by heavy nuclei

d) becquerel with ratio activity

30. Thermal neutrons energy is

*a) $< 1eV$ b) $> 1eV$ c) $= 2MeV$ d) $= 4MeV$

31. The particle which is more effective for bombarding

*a) neutron b) proton c) $\alpha -$ particle d) neutron

32. What is missing in the following nuclear reaction ${}^{2}_{1}H + {}^{2}_{1}H \rightarrow {}^{3}_{2}He + ?$

a) positron b) meson *c) neutron d) electron

33. The α - rays are

a) electromagnetic radiation b) stream of electrons

c) stream of uncharged particles *d) stream of positively charged particles

34. $\beta -$ rays, emitted from a radioactive material, are known as

*a) charged particles emitted by nucleus

b) neutral particles

c) electrons orbiting around the nucleus

d) electromagnetic radiations

35. A nucleus of ${}^{9}_{4}Be$ absorbs an alpha particle and emits a neutron. The resulting nucleus will be

a) ${}^{13}_{5}C$ *b) ${}^{12}_{6}C$ c) ${}^{13}_{6}C$ d) ${}^{8}_{4}B$

36. Emissions of β - rays in radioactive decay results in the change of

a) both mass and charge b) mass but not in charge

c) either mass and charge *d) charge but not in mass

37. Gamma decay takes place

a) prior to alpha decay b) prior to beta decay

*c) prior to positron decay d) due to de- excitement of nuclei levels

38. The average number of neutrons released per fission in the fission of U^{235} is

a) 7 b) 3.5 c) 1.5 *d) 2.5

39. The fission of uranium nuclide

a) always leads to the same pair of fission produce say barium and krypton

*b) doesn't always produce barium and krypton but different pair of fission produces

c) produce barium and any other fission product

d) always produces at last one radioactive fission product

40. Most of energy released in the fission is carried by

a) neutrons *b) fission fragments c) neutrons and fragments cary equally d) positrons

41. Nuclear reactions obey the law of conservation of

a) mass and energy b) charge c) momentum *d) all the above

42. The working principle in atom bomb is

a) under - critical chain reaction b) critical chain reaction

*c) super- critical chain reaction d) all the above

43. In a critical chain reaction

a) energy is released at increasing rate *b) energy is released at steady rate

c) enegry is released at decreasing rate d) energy is not released

44. Chain reaction can be initiated by

a) prompt neutrons b) delayed neutrons

*c) slowed prompt neutrons d) B or C

45. Heavy water is used as moderator in a nuclear reactor. The function of the moderator is
a) to control the energy released in the reactor *b) to slow down the neutrons to thermal energies
c) to cool the reactor faster d) to absorb neutrons and stop chain reaction

46. In fission of U - 235, the percentage of mass converted into energy is about
*a) 0.1% b) 0.25 % c) 0.01 % d) 2%

47. To surtain the chain reaction, the mass of the material should be
a) less than the critical mass b) equal to critical mass
c) less than or equal or critical mass *d) greater than critical mass

48. Nuclear fission can be explained by
a) optical model of the nculeus b) shelll model of nucleus
c) collective model of the nucleus *d) liquid drop model of the nucleus

49. The main source of sun's energy
*a) nuclear fusion b) nuclear fission c) gravitation contraction d) combustion

50. Fusion reaction take place at high temperature because
a) atoms are ionized at high temperature
b) molecules break up at high temperature
c) nuclei break up at high temperature
*d) kinetic energy is high enough to over come coulomb repulsion between nuclei

51. Nuclear fusion is possible
*a) only between light nuclei b) only between heavy nuclei
c) between both light and heavy nuclei d) only between nuclei which are stable against $\beta-$ decay

52. In sun, the important source of energy is
*a) proton proton cycle b) carbon - nitrogen cycle
c) carbon - carbon cycle d) nitrogen - nitrogen cycle

53. When two deuterium nuclei fuse together to form a tritium nuclei, we get a
a) neutron b) deuteron c) $\alpha-$ paticle *d) proton

54. Particle and their antiparticles have
a) the same masses but opposite spins
*b) the same masses but opposite magnetic moment
c) the same masses and same magnetic moment
d) opposite spins and same magnetic moment

55. In gamma ray emission from a nucleus
a) only the neutron number changes
b) only the proton number changes
c) both the neutron a nd the proton number changes
*d) there is no change in the proton number and the neutron number

56. ${}_{+1}e^0 + {}_{-1}e^0 \rightarrow 2\gamma$. The above equation satisfies the law of conservation of
a) charge b) energy and mass c) momentum *d) all the above

57. Nuclear energy is released in fission because binding energy per nucleon is
*a) greater for fission fragments than for parent nucleus
b) smaller for fission fragments than for parent nucleus
c) same for fission fragments and nucleus
d) none of the above

58. As the age of star increases
*a) helium quantity increased b) helium quantity decreases
c) helium quantity doesnot change d) helium, hydrogen both quantities increases

59. ${}_1^1H + {}_1^1H \rightarrow {}_1^2H + X + {}_1e^0 + energy$. The emitted particles is
a) Neutron b) proton c) $\alpha-$ particle *d) neutron

60. During radioactive decay of a nucleus, the mass number decreases by 4 units and atomic number decreases by 2 units. Then the type of radioactive decay is
a) $\gamma-$ decay *b) $\alpha-$ decay c) β^-- decay d) β^+- decay

61. In a radioactive decay, neither the atomic number nor the mass number changes. Following particle is emitted in the decay
a) proton b) neutron *c) photon d) electron

62. Which of the following are not emitted by radioactive substance
a) electron *b) protons c) $\gamma-$ rays d) helium nuclei

FILL IN BLANKS

1. _____ number remains same in isotope (A: atomic)
2. _____ number remains same in isotone (A: neutron)
3. _____ number remains same in isobar (A: mass)
4. The difference between the sum of the masses of the nucleons forming a stable nucleus and the rest mass of the nucleus is called _____ defect (A: mass)
5. |a.m.u (or) | u= _____ (A: 931.5 MeV)
6. _____is the significance of binding energy per nucleon (A: the stability of a nucleus)
7. The process of producing a new stable nucleus from the other stable nucleus is called _____(A: artificial transmutation)
8. The process in which a heavy nucleus splits into two lighter nuclei of comparable masses is called _____ (A: nuclear fission)
9. In nuclea reactors, the control rods are made of _____ (A: Cadmium)
10. The principle of atomic bomb is _____(A: Nuclear fission)
11. The principle of hydrogen bomb is _____(A: nuclear fusion)
12. The reciprocal of the decay constant of a radioactive sample gives it _____(A: mean life)
13. _____ is the source of energy out put in the interior of stars (A: thermonuclear fusion)
14. Half life period _____(A: $T_{1/2}=\frac{0.693}{\lambda}$)
15. Relation between half life and average life _____(A: $T_{1/2}=0.693\tau$)
16. Cadmium and Boron rods are used in a nuclear reactor to _____ (A: Absorb excess number of thermal neutrons)
17. Unstable fission fragments decay by emitting neutrons and electrons , neutrons so emitted are called _____(A: delayed neutrons)

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14. SEMICONDUCTOR DEVICES

1. 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 $(Eg)_c$,$(Eg)_{Si}$ and $(Eg)_{Ge}$. Which of the following statements is true?

a) $(Eg)_{Si}<(Eg)_{Ge}<(Eg)_C$ b)$(Eg)_C<(Eg)_{Ge}<(Eg)_{Si}$

*c) $(Eg)_C<(Eg)_{Si}<(Eg)_{Ge}$ d)$(Eg)_C=(Eg)_{Si}=(Eg)_{Ge}$

2. Carbon silicon and germanium have same lattice structure. But carbon is an insulator, silicon and germanium are semiconductors because
a) number of free electrons for conduction in carbon is negligibly small
b) more energy is requered for the electron to remove in carbon
c) the bonding electrons exist in first orbit in case of carbon
*d) all the above

3. The bond that exists in a semi conductor is
*a) covalent bond b) ionic bond c) metallic bond d) hydrogen bond

4. At absolute zero, si acts as
a) non metal b) metal *c) insulator d) none

5. The condution band and valence band in a good conductor
a) are well separated by a forbidden band *b) are overlapped
c) some time overlap and sometimes separated d) have forbidden band

6. By increasing the temperature the sepcific resistance of a conductor and semi conductor
a) increases for both b) decreases for both
*c) increases decreases d) decreases, increases

7. A solid which is transparent to visible light and whose conductivity increases with temperature is formed by
a) metallic bonding b) ionic bonding
c) covalent bonding d) vander walls bonding

8. A strip of copper and another of germanium are cooled from room temperature to 80 K. The resistance of
a) each of these decreases
b) copper strip increases and that of germanium decreases
*c) copper strip decreases and that of germanium increases
d) each of these increases

9. In a condution , the forbidden energy gap is of the order of
a) 1.1 eV *2) zero c) 0.7 eV d) 6.7 eV

10. In a semiconductors the separation between condution band and valence band is of the order of
a) 100 eV b) 10 eV *c) 1 eV d) 0 eV

11. The intrinsic semi conductor behaves as insulator at
a) $0^0 C$ b) $-100^0 C$ c) $100\ K$ *d) $0\ K$

12. The forbidden energy gap in an insulator is of the order of
a) 0.7 eV b) 0.1 MeV 3) 1.1 eV *d) 5 eV

13. Electric conduction in a semiconductor takes place due to
a) electrons only b) holes only
*c) both electrons and holes d) neither electrons nor holes

14. An electric field is applied to a semiconductor . Let the number of charge carriers be n and the average drift speed be V. if the temperature is increased
a) both n and v will increase *b) n will increase but v will decrease
c) v will increase but n will decrease d) both n and v will decrease

15. Let n_p and n_e be the number of holes and conduction electrons in an intrinsic semiconductor
a) $n_p > n_e$ *b) $n_p = n_e$ c) $n_p < n_e$ d) $n_p \neq n_e$

16. When an impurity is depend into an intrinsic semiconductor the conductivity of the semiconductor
*a) increases b) decreases c) remains the same d) becomes zero

17. If the two ends of an p - n junction are joined by a wire
a) there will not be a steady current in the circuit
b) there will be a steady current from the n - side to the p - side
c) there will a steady current from the p-side to the n-side
d) there may or may not be current depending upon the resistance of the connecting wire.

18. The drift current in a p-n junction is
*a) from the n-side to the p-side
b) from the p-side to the n-side
c) from the n-side to the p-side if the junction is forward -biased and in the opposite direction if it is reverse - biased
d) from the p-side to the n-side if the junction is forward biased and in the opposite direction if it reverse- biased

19. The diflusion current in a p-n junction is
a) from the n-side to the p - side
*b) from the p -side to the n- side
c) from the n -side to the p -side if the function is forward biased and in the opposite direction if it is reverse biased
d) from the p -side to the n -side if the junction is forward biased and in the opposite direction if it is reverse - biased

20. Diflusion current in a p- n junction is greater than the drift current in magnitude
*a) if the junciton is forward biased
b) if the junction i reverse- biased
c) if the junction is unbiased
d) in no case

21. At absolute zero temperature a crystal of pure germanium
a) behaves as a perfect conductor
b) behaves as semiconductor
*c) behaves as a perfect isnulator
d) behaves as super conductor

22. Considering the band structure of Si or Ge crystal of N atoms, at zero Kelvin it has CB & VB formed by
*a) 4N empty energy states, 4N filled energy states
b) 2N empty energy states, 6N filled energy states
c) 3N empty energy states, 5N filled energy states
d) 4N filled energy states, 4N empty energy states

23. At Ok, the CB and VB
a) Both are partially filled in the case of conductor
b) empty and completely filled in the case of semiconductor
c) empty and completely filled in the case of insulators
*d) all the above

24. In an intrinsic semiconductor, the fermi enegy level lies
a) nearer to valence band
b) nearer to conduction band
*c) exactly at the middle of the forbidden energy gap
d) cant say

25. The mobility of electrons is greater than that of holes because they
a) are lighter
b) have negative charge
*c) need less additional energy to move
d) experience collisions less frequently

26. The value indicated by fermi enegry level in an intrinsic semiconductor is
*a) the average energy of electrons and holes
b) the energy of electrons in conduction band
c) the energy of holes in valence band
d) the energy of forbidden region

27. A semiconducting device is connected in a series circuit with a battery and a resistances. A current is found to pass through the circuit if the polarity of the battery is reversed, the current drops to almost zero. The device may be
a) an intrinsic semiconductor
b) a p - type semiconductor
c) an n- type semiconductor
*d) a p-n junction

28. A pure semiconductor has
a) an infinite resistance at $0^0 C$
b) a finite resistance which doesnt depend upon temperatue
c) a finite resistance which increases with increase of temperature
*d) a finite resistance which decreases with increase of temperature

29. The conductivity of semi conductors like Si or Ge
a) increases when it is doped with tetravalent impurity
b) increses when it is doped with trivalent impurity and decreases when it is doped with pentavalent impurity
*c) increases when it is doped with trivalent or pentavalent impurity
d) increases whe it is doped with pentavalent impurity and decreases when it is doped with trivalent impurity

30. A doped semiconductor
a) positively charged b) Negatively charged
*c) electrically neutral d) may be positive or negative

31. The polential in the depletion layer is due to
a) electrons b) holes *c) ions d) fobidden band

32. A hole is
a) A positively charge electron b) A electron in valence band
*c) An unfilled covalent bond d) An excess electron in covalent bond

33. The donor impurity to be added for doping germanium crystal will be of valency
a) 2 2) 3 c) 4 *d) 5

34. A p-type semiconductor can be formed by doping Si or Ge with
a) Boron b) Aluminium c) Galium *d) All the above

35. An n-type semi conductor can be formed by doping Si or Ge with
a) III group element b) IV group elements *c) V group element d) VI group elements

36. A n-type and p - type silicon can be obtained by doping pure silicon with
a) Arsenic and phosphorous b) Indium and Aluminium
*c) Phosphorous and Indium d) Aluminium and Boron

37. At room temperature a p- type semiconductor has
*a) large number of holes and few electrons b) large number of free electrons and few holes
c) equal number of free electrons and holes d) large number of holes and electrons

38. In an n-type semiconductor the fermi energy level lies
*a) in the forbidden energy gap nearer to the conduction band
b) in the forbidden energy gap nearer to the valence band
c) in the middle of forbidden energy gap
d) outside the forbidden energy gap

39. The element that can be used as an acceptor impurity to doped silicon is
a) Antimony b) Arsenic *c) Boron d) Phosphorous

40. In exterinsic semiconductors
a) The conduction band and valence band overlap
b) The gap between conduciton band and valence band is more than 16 eV
*c) The gap between C.B and V. B is nearly about 1 eV
d) The gap between C.B and V. B will be 100 eV and more

41. If an intrinsic semiconductor is heated the ratio of free electrons to holes is
a) gretaer than one b) less than one
c) equal to one d) decreases and becomes zero

42. The neutral region formed at p-n junction due to recombination of electrons and holes is
a) fermi layer *b) depletion layer c) acceptor layer d) all the above

43. The potential barrier at a p- n junction is due to the charge on either side of teh junction. These charges are
*a) fixed ions b) mahority and minority carriers
c) majority carriers d) minority carriers

44. In an unbiase p-n junction holes diffuse form the p -region to n - region because
a) free electrons in the n - region attract then
b) they move across the junction by the potential differnce
*c) hole conecntration in p - region is more as compared to n - region
d) all the above

45. When a forward bias is applied to a P- n junction is
a) raises the potential barrier b) reduces the majority carrier current to zero
*c) lowers the potential barrier d) none of the above

46. If a p - n junction diode is not connected to any circuit
a) the potential is the same everywhere
b) the p- type side is at a heigher potential than the n-type side
*c) there is an electric field at the junction directed form the n- type side to p-type side
d) there is an electric field at the junction directed from the p- type side to the n-type side

47. The electrical resistance of deplection layer is large because
a) it contains electrons as charge carriers
b) it contains holes as charge carrier
c) it has large number of charge carriers
*d) it has no charge carrier

48. In a PN junction
*a) high potential at N side and low potential at P side
b) high potential at P side and low potential at N side
c) P and N both are at same potential
d) undetermined

49. The barrier potentials for silicon and germanium diodes are about
*a) 0.7 V; 0.3 V b) 0.2 V, 0.3 volts c) 1.1 V, 0.7 V d) 1.1 V, 0.3 V

50. The dominant mechanisms for motion of charge carriers in forward and reverse biased silicon p - n junctions are
a) drift in forward bias, diffusion in reverse bias *b) diffusion in forward bias, drift in revrse bias
c) diffusion in both forward and reverse bias d) drift in both forward and reverse bias

51. In a semiconductor diode the barrier potential opposes diffusion of
a) free electrons from n - region b)holes from p -region
*c) majority carriers from both the region d) minority carriers from both regions

52. When p- n junction diode is forward biased
a) the depletion region is reduced and barrier height is increased
b) the depletion region is widened and barrier height is reduced
c) both the depletion region and barrier height are reduced
d) both the depletion region and barrier height are increased

53. The resistance of an ideal diode in forward biased condition is
*a) zero b) infinity c) finite d) negative

54. The resistance of an ideal diode in reverse biased condition is
a) zero *b) infinity c) finite d) negative

55. In forward biased condition the p-n junction diode behaves as
a) high resistance connection b) An off switch
*c) A low resistance connection d) A capacitor

56. Reverse bias applied to a junction diode
a) lowers the potential barrier
*b) raises the potential barrier
c) increases the majority carrier current
d) increases the minority carrier current

57. In the middle of he depletion layer of a reverse biased p -n junction the
a) Electric field is zero b) potential is maximum
c) electric field is maximum *d) potential is zero

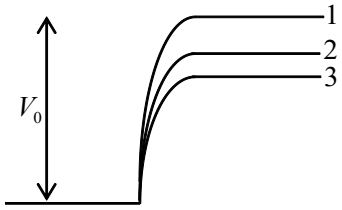
58. Avalanche breakdown in a semiconductor diode occurs when
a) forward current exceeds a certain value
*b) reverse bias voltage exceeds a certain value
c) forward bias voltage exceeds a certian value
d) the potential barrier is reduced to zero

59. When a p-n junction diode is reverse biased the flow of current across the junction is mainly due to
a)) diffusion of charges *b) drift of charges
c) both drift and diffusion of charges d) neither diffusion nor drift of charges

60. The small currents in reverse biased condition of p- n diode are due to
a) electrons b) holes
c) majority charge, carriers *d) thermal agitation of minority charge carriers

61. The reverse stuation of pn junction depends on
a) doping concentration
b) diffusion lengths of carriers
c) doping concentration diffusion lengths
*d) doping concentration diffusion lengths and device temperature

62. In figure V_0 is the potential barrier across a p- n junction when no battery is connected across the junction then



a) 1 and 3 both correspond to forward bias of junction
*b) 3 correspond to forward bias of junction and 1 corresponds to reverse bias of junction
c) 1 corresponds to forward bias and 3 corresponnds to reverse bias of junction
d) 3 and 1 both correspond to reverse bias of junction

63. A p- n junction diode can be used as
a) A sitch b) A capacitor c) Rectifier *d) All the above

64. A diode as a rectifier converts
*a) A.C into D.C b) D.C into A.C
c) varying D.C curret into constant D.C current
d) High voltage into low voltage and vice versa

65. In half - wave rectifier maximum percentage of A.C power that in be converted into D.C power is
a) 25% *b) 40.6 % c) 81.2 % d) 10%

66. In a half - wave rectifier the load current flows for
a) the complete cycle of the input signal
b) more than half cycle but less than the complete cycle of the input signal
c) less than half cycle of the input signal
*d) only for every half cycle of the input signal

67. Maximum efficiency of a full - wave rectifier is
a) 40.6 % *b) 81.2 % c) 25% d) 50%

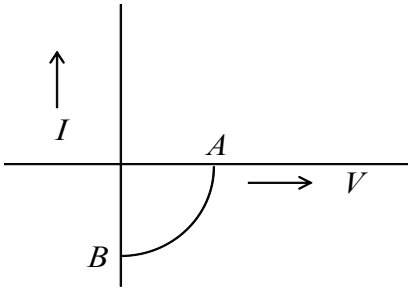
68. In a full -wave rectifier the load current flows for
*a) the complete cycle of the input signal
b) only for the positive half cycle of the input signal
c) less than half cycle of the input signal
d) more than half - cycle but less than complete cycle of the input signal

69. Zener breakdown occurs
a) under forward biased condition *b) under reverse biased condition
c) under high temperature d) due to manufacturing defect

70. At breakdown region of a zener diode which of the following does not change much
a) current *b) voltage c) dynamic impedence d) capacitance

71. Zener diode can be used
*a) As voltage regulator b)As amplifier c) As oscillator d) All the above

72. The given graph represents V - I characteristics for a semicodnuctor device



Which of the following is correct

*a) It is V- I characteristics of solar cell, whose point A represent open circuit voltage and B short circuit current

b) It is of solar cell and points A and B represent open circuit voltage and current respectively

c) It is for a photodiode and points A & B represent open circuit voltage and current respectively

d) It is for LEB, points A & B represent open circuit voltage and short circuit current respectively

73. Elmentory semiconductors are not used to make visible LED because

a) They have low conductivity

b) They have low melting point

*c) They have low boiling point

d) They have band gap such that emissions are in IR region

74. A solid which is transparent to visible light and whose conductivity increases which temperature is formed by

a) metallic binding

b) ionic binding

*c) covalent binding

d) vanderwadl's binding

75. The reason for the photodiodes are operated in reverse bias condition when light falls on it

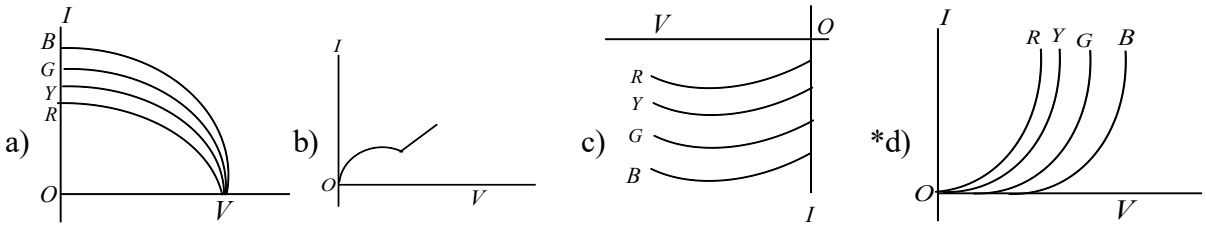
a) Current in forward bias is greater than in reverse

b) current in reverse bias is greater than in forward bias

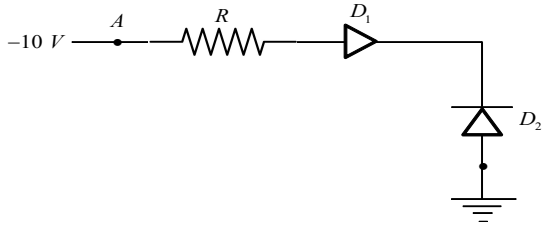
c) the fractional change in reverse bias current is greater than the fractional change in forward bias current

d) all

76. The I - V characteristic of an LED is



77. In the figure assuming the diodes to be ideal



a) D_1 and D_2 are the both forward biased and hence current flows from A to B

b) D_1 and D_2 are both reverse biased and hence no current flows from A to B

c) D_1 is forward biased and D_2 is reverse biased and hence current flows from A to B

*d) D_2 is forward biased and D_1 is reverse biased and hence no current flows from B to A

78. The logic gate is an electric circuit which
*a) makes logic decisions
b) allows electrons flow only in one
c) works binary algebra
d) alternates between 0 & 1 value

79. The output of two input OR gate is 1
a) if both inputs are zero
*b) if either or both the inputs are 1
c) only if both inputs are 1
d) if either input is zero

80. The output of a two input AND gate is one, only when its
a) either input is one
b) either input is zero
*c) both inputs are one
d) both inputs are zero

81. An OR gate
*a) implements logic addition
b) is a univbersal gate
c) implements logic multiplication
d) implements logic subtraction

82. An AND gate
a) implements logic addition
b) is a universeal gate
c) implements logic multiplication
d) implements logic subtraction

83. NAND and NOR gates are called universal gate primarily because they
a) are avaibale universitly
*b) can be combined to produce OR, AND & NOT gates
c) are widely used in integrated circuits
d) are easiest to manufacture

84. Digital circuit can be made by repetitive use of
a) OR gates
b) NOT gates
c) AND gates
*d) NAND gates

85. The minimum number of NAND gates are used to form AND gate is
a) 1
*b) 2
c) 3
d) 4

86. Two input of NAND gate are shorted. This gate is equivalents to
a) OR
b) AND
*c) NOT
d) NOR

87. An AND gate can be prepared by repetitive use of
a) NOT gare
b) OR gate
*c) NAND gate
d) AND gate

88. The value of $A+\overline{A}$ in the Boolean algebra is
a) 0
*b) 1
c) A
d) $\overline{A}$

89. The valu of $A.\overline{A}$ in Boolean algebra is
*a) 0
b) 1
c) A
d) $\overline{A}$

90. If $A=1, B=0$, then in terms of Boolean algebra $A+\overline{B}$ equals
*a) A
b) B
c) $\overline{A}$
d) $\overline{A+B}$

91. In the Boolean expression $\overline{A}.\overline{B}$ is equal to
a) $A+B$
b) $\overline{A}+\overline{B}$
c) $\overline{A}+\overline{B}$
*d) $\overline{A+B}$

92. Two NOT gates are connected at the two inputs of a NAND gate This combination will behave like
a) NAND gate
b) AND gate
*c) OR gate
d) NOT gate

93. The minimum no of NOR gate require to get AND gate
a) 2
b) 5
*c) 3
d) 4

FILL IN THE BLANKS

1. The group of closely packed energy levels is called _____(A: energy band)
2. The energy bands which are completely filled with electrons at zero Kelvin are called _____(A: Valence band)
3. Valence band contains electrons and _____(A: holes)
4. Condution band contains only _____(A: electrons)
5. The gap between valence band and the conduction band is called _____(A: energy gap)

6. The atoms in a semiconductor are bonded by _____ band (A: Covalent)
7. Conductivity of a pure semiconductor _____ with the increase of temperature(A:Increase)
8. Semiconductors at ok behave as _____(A: insulator)
9. Number of holes in valence band is equal to number of electrons in conduction band are called _____(A: intrinsic semiconductors)
10. Number of holes in valence band is not equal to number of electrons in conduction band are called _____(A: extrinsic semiconduction)
11. The process of adding impurity to an intrinsic semiconductor is called _____(A: doping)
12. The level formed due to impurity atom, in the forbidden energy gap, very near to the valence band in a p- type semiconductor is called _____ level (A: acceptor)
13. When electric field across a semiconductor is increased, the number of charge carriers will _____(A: increase)
14. In intrinsic semiconductor at room temperature, the number of electrons and holes will be _____(A: equal)
15. Majority charge carrier in n - type semiconductor is _____(A: electrons)
16. majority charge carrier in p-type semiconductor is _____(A: holes)
17. Resistance of ideal diode in forward bias is _____(A:Zero)
18. Rectification is approces of converting alternating current in to _____current (A: Direct)
19. A heavity doped reverse biased p - n junction diode operated at breakdown potential is called _____(A: Zener diode)
20. _____ is used as voltage regulators (A: Zener diode)
21. Solar cell iperated under _____(A: Unbiased)
22. LED operated under _____(A: Forward biased)
23. Photo diode operated under _____ (A: reverse bias)
24. p-n junction under _____ bias act as an open switch (A: Reverse)
25. The region of immobile positive and negative ions in a semiconductor is called _____ region (A: depletion)
26. The potential in the depletion region is due to _____(A: ions)
27. IV characteristics of _____ is drawn in the fourth quandrant of the co-r=ordinate system (A: solar cell)
28. NAND and NOR gates are called _____gates (A: universal)
29. NAND gate is the combination of NOT and _____gate (A: AND)
30. NOR gate is the combination of NOT and _____gate (A: OR)
31. _____gate has only one input (A: NOT)
32. If $A = 0, B = 1$ the out put of OR gate _____(A: 1)
33. If $A = 1, B = 1$ the out put of NAND gate _____(A: (0) Zero)