II PUC PHYSICS MCQs

ELECTRIC CHARGE AND FIELD AND ELECTRIC POTENTIAL CAPACITORS

1. Which one of the following is the unit of electric field
   a) Coulomb b) Newton c) Volt **d) N/C**
2. If an electric dipole is kept in a uniform electric field then result electric force on it is
   a) always zero b) never zero
   c) depend upon capacity of dipole d) none
3. The work done in rotating an electric dipole in an electric Field
   a) W = PE (1-cosθ) b) W = PEtanθ
   c) W = PE secθ d) W = 0
4. If sphere of a bad conductor is given charge then it is distributed on
   a) surface b) inside the surface
   c) only inside the surface **d) none**
5. A soap bubble is given a negative charge then its radius
   a) decreases **b) increases** c) remains same d) zero
6. Two charges are placed at a distance apart of a glass slab is placed between them force between them will be
   a) zero b) increases
   c) decreases d) remains same
7. The acceleration of a charged particle in a uniform electric field is
   a) proportional to its charge only
   b) inversely proportional to its mass only
   c) proportional to its specific charge
   d) inversely proportional to specific charge
8. Dimensions of ϵ_0
   a) $[M^{-1} L^{-3} T^4 A^2]$ b) $[M^0 L^{-3} T^3 A^3]$
   c) $[M^{-1} L^{-3} T^3 A]$ d) $[M^{-1} L^{-3} T A^2]$
9. The dielectric constant of a metal is
   a) 0 b) 1 **c) α** d) 1
10. Column law in vector form can be written as
    a) $\vec{F} = \frac{1}{4\pi\epsilon_0}\left(\frac{q_1 q_2}{r^2}\right)$ 2) $\vec{F} = \frac{1}{4\pi\epsilon_0}\left(\frac{q_1 q_2}{r}\right)\hat{r}$
    c) $\vec{F} = \frac{1}{4\pi\epsilon_0}\left(\frac{q_1 q_2}{r^2}\right)\hat{r}$ d) $\vec{F} = \frac{1}{8\pi\epsilon_0}\left(\frac{q_1 q_2}{r^2}\right)\hat{r}$
11. S.I unit of 'ϵ_0' will be
    1) $N^{-1} m^{-2} c^{-2}$ b) $N m^{-2} c^2$
    c) $N^{-1} m^{-2} c^2$ d) $Nm^{-2} c^2$
12. When a dipole is placed in a uniform electric field it Experiences
    a) a net force **b) a torque**

c) both net force and torque
d) neither a force or torque

13. The S.I unit of electric dipole moment
a) C b) Cm^{-1} **c) Cm** d) Nm^{-1}

14. $E = -\frac{dV}{dr}$, here negative sign sign signified that
a) E is opposite to b) E is negative
c) E increases when V decreases
d) E is directed in the direction of decreasing V

15. When a dipole moment 'P' is placed in uniform electric field E, then torque acting dipole on
a) $\overline{C} = \overline{P}.\overline{E}$ b) $\overline{C} = \overline{P} + \overline{E}$
c) $\mathbf{\overline{C} = \overline{P} \times \overline{E}}$ d) $\overline{C} = \overline{P} - \overline{E}$

16. The number of electrons contained in 1C of charge
a) 6.25×10^{18} b) 6.25×10^{17}
c) 6.25×10^{19} d) 1.6×10^{19}

17. 1 Volt is equal to
a) 1N b) 1 Mm^{-1} **c) 1 NC^{-1} m** d) $1J^{-1}$

18. The minimum amount of charge observed so far is
a) 1C b) $4.8 \times 10^{-13}C$
c) $1.6 \times 10^{-19}C$ d) $1.6 \times 10^{+19}C$

19. For large distances from a short dipole, the electric field due to it depends on the distance form it as
a) $\frac{1}{(\text{distance})^2}$ **b)** $\mathbf{\frac{1}{(distance)^3}}$
c) $(\text{distance})^3$ d) $(\text{distance})^2$

20. When does the torque acting on electric dipole placed in a uniform electric field is maximum
a) $\theta = 0^0$ b) $\theta = 180^0$
c) $\theta = 90^0$ d) $\theta = 120^0$

21. When does the torque acting on an electric field placed in a uniform electric field is minimum
a) $\theta = 0^0$ b) $\theta = 180^0$ **c) $\theta = 90^0$** d) $\theta = 120^0$

22. S.I unit of electric flux
a) Nm^2/C b) N^2M^2/C c) $Nm^{-1}C^3$ d) Nm^2C^{-2}

23. Name the apparatus used to detect electric charge on a body
a) gold leaf electroscope b) vande gruff generator
c) metal detector d) electroscope

24. S.I unit of linear charge density
a) c/m^2 **b) c/m** c) c/m^3 d) cm

25. S.I unit of surface charge density
a) c/m **b) c/m^2** c) c/m^3 d) cm

26. S.I unit of volume charge density
a) c/m b) c/m^2 **d) c/m^3** d) cm

27. What is the value of electric potential at a point on the equatorial line of an electric dipole

a) zero b) $V = \frac{1}{4\pi\epsilon_0}\frac{q}{r^2}$

c) infinity d) maximum conductor

28. Net electric field in the interior of a charged

a) infinity **b) zero** c) $E = \frac{1}{4n\epsilon_0} \times \frac{q}{r^2}$ d) maximum

29. Why net electric field in the interior of a charged conductor is zero

a) charges always reside on the outer surface of the conductor

b) charges does not reside on the outer surface of the conductor

c) charged reside only inner side of conductor

d) all the above

30. The difference between electric lines of force and magnetic lines of induction is

a) electric lines pass through vacuum and magnetic lines do not

b) Electric lines of force are open and magnetic lines are closed curves

c) magnetic lines exist electric lines do not

d) there is no difference

31. Work required to move a charge from one point to another on the equipotential surface

a) Vq b) Eq **c) zero** d) infinity

32. Direction of dipole moment

a) positive to negative **b) negative to positive**

c) perpendicular to equatorial line

d) parallel to equational line

33. Electric potential at a point on the axial line from the centre of the dipole is (short dipole)

a) directly proportional to (distance)

b) directed proportional to $(distance)^2$

c) inversely proportional to $(distance)^3$

d) inversely proportional to (distance)

34. Expression for electric field due to uniformly charged in infinite plane sheet

a) $\frac{\sigma}{\epsilon_0}$ **b)** $\frac{\sigma}{2\epsilon_0}$ c)$\frac{\sigma}{3\epsilon_0}$ d) $\frac{\sigma}{4\epsilon_0}$

35. Work done in rotating the dipole in the uniform field from position$\theta 1$ to θ_2 is

a) W = PE ($\cos\theta 1 - \cos\theta 2$) b) W = PE ($\cos\theta$)

c) W = PE sin θ d) W = PE ($\cos\theta 2$-cos

36. Work done ion rotating the dipole from its stable equilibrium position through an angle 'θ' is
a) W = PE (1-cos θ) b) W = PE (1-sin θ)
c) W = 0 d) W = PE sin θ

37. Expression for linear charge density (λ)
a) $\frac{q}{r}$ b) $\frac{q}{A}$ c)$\frac{q}{v}$ d) qlAV

38. Expression for surface charge density (σ)
a) $\frac{q}{r}$ **b) $\frac{q}{A}$** c)$\frac{q}{v}$ d) qlAV

39. Expression for volume charge density (b)
a) $\frac{q}{r}$ b) $\frac{q}{A}$ **c)$\frac{q}{V}$** d) qrAV

40. An electron is moving along x-axis and electric field is also in same direction
a) circular b) parabola c) elliptical **d) straight line**

41. Potential at the point of pointed conductor is
a) maximum b) minimum
c) zero **d) same as at any other**

42. An equatorial line and a line of force are
a) perpendicular to each other b) parallel to each other
c) in any direction d) at an angle of 45^0

43. When a positively charged conductor is placed near an earth connected conductor its potential
a) always increases **b) always decreases**
c) may increases or decreases d) remains the same

44. Electric potential at some point in space is zero. Then at that point
a) electric intensity is necessarily zero
b) electric intensity is necessarily non zero
c) electric intensity is may or may not be zero
d) electric intensity is necessary infinity

45. The angle between the electric dipole moment and the electric field strength due to if on the equatorial line
a) 0^0 b) 90^0 **c) 180^0** d) 60^0

46. What will be the value of electric field at the centre of the electric dipole
a) zero
b) equal to the electric field due to one charge at centre
c) twice the electric field due to one charge at centre
d) half the value of electric field due to one charge at centre

47. Write the relation between electric field and electric potential at a point
a) E = - $\frac{dV}{dx}$ b) E = + $\frac{dV}{dx}$ c) = E = - $\frac{dx}{dV}$ d) E = $\frac{dV}{dt}$

48. Example for Non polar molecule _____ O_2, N_2, H_2 etc.

49. Example for poalr molecule HCl, H_2O, etc.

CURRENT ELECTRICITY

1. The slope of V-I graph gives
   a) Resistance b) Impedance
   c) Reactance d) Susceptance
2. The reciprocal of resistance is called
   a) Mobility **b) Conductance**
   c) Admittance d) Conductivity
3. The conductivity is the reciprocal of
   a) Resistivity b) Mobility
   c) Susceptibility d) Permeability
4. A carbon resistance reads red-red-black what is its resistance
   a) 2.2 Ω **b) 22Ω** c) 220 Ω d) 0.22 kΩ
5. ohms law hold good for
   a) All conductors **b) Metallic conductors**
   c) Semiconductors d) Ionic conductors
6. Which of the following is example for non-ohmic device
   a) copper b) iron
   c) semiconductor d) aluminum
7. In series combination which physical quantity remains constant
   a) currentb) potential c) difference d) power
8. Ohms law of valid when the temperature of conductor is
   a) very low b) very high c) varying **d) constant**
9. Current per unit area is called
   a) Mobility **b) current density** c) resistance d) resistivity
10. Average velocity with which free electrons moves in the conductor opposite to applied electric field is called
    a) thermal velocity **b) drift velocity**
    c) specific velocity d) Brownian velocity
11. Kirchhoff's loop rule is a consequence of law of conservation of
    a) energy b) charge c) mass d) momentum
12. Kirchhoff's junction rule is a consequence of law of conservation of
    a) energy **b) charge** c) momentum d) mass
13. Principle of working of meter bride is
    a) balanced wheat stone bridge b) unbalanced
    c) electromagnetic induction d) mechanical effect of current
14. Resistance of a wire is directly proportional to
    a) area **b) length**
    c) cube of the length d) square root of the length

15. Which of the following is vector
    a) current **b) current density**
    c) resistance d) power
16. The S.I unit of resistivity is
    a) ohm $-m^2$ **b) ohm – m** c) ohm/m d) ohm
17. The alloys like constantan and manganese are used to make standard resistance because have
    a) low resistivity b) zero resistivity
    c) very low temperature coefficient of resistance
    d) very high temperature coefficient of resistance
18. The internal resistance of a cell is determined by using
    a) voltmeter b) ammeter
    c) potentiometer d) A.C generator
19. Which of the following instrument is used to measure emf of a cell Accurately
    a) voltmeter b) rheostat
    c) potentiometer d) ammeter
20. Which of the following is used to protect circuits from high currents
    a) resistor **b) fuse** c) voltmeter d) capacitor

MOVING CHARGES AND MAGNETISM

1. Toroid is
   a) ring shaped closed solenoid
   b) ring shaped open solenoid
   c) rectangular shaped solenoid
   d) square shaped solenoid
2. A charge 'q' moves with velocity 'v' through electric field (E) as well as magnetic field (B). Then the force acting on it is
   a) $q(\vec{E}\,X\,\vec{V})$ b) q $(\vec{B}\,X\,\vec{V})$ **c) q** $(\vec{E} + \vec{V}X\vec{B})$ d) q $(\vec{V}\,X\,\vec{B})$
3. Which of the following while in motion cannot be deflected by magnetic field
   a) protons b) cathode rays c) alpha particles **d) neutrons**
4. Maximum kinetic energy gained by the charged particle in the cyclotron in independent of
   a) radius of the does b) charge
   c) mass **d) frequency of revolution**
5. A charged particle enters the magnetic field by an angle 90^0 with the magnetic field. Its path is
   a) circular b) helical c) straight line d) ellipse
6. Two parallel conductors carrying currents in same direction
   a) neither attract nor repel each other b) repel each other
   c) attract each other d) will have rotational
7. Two parallel conductor carrying unequal current in the opposite direction
   a) repel each other b) attract each other
   c) neither repel nor attract d) will have rotational motion
8. Torque acting on a rectangular coil carrying current I situated parallel to magnetic field of induction 'B' having number of turns 'n' and area 'A' is
   a) $ni(\vec{A}.\vec{B})$ b) $\frac{nBA}{i}$ **c) ni**$(\vec{A}\,X\,\vec{B})$ d) $\frac{iBA}{n}$
9. Which of the following is exact expression for bohr Magneton
   a) $\frac{eh}{2\pi m}$ **b)** $\frac{\mathbf{eh}}{\mathbf{4\pi m}}$ c)$\frac{h}{e\pi m}$ d) $\frac{e}{2m}$
10. The magnetic field $\overrightarrow{dB}$ due to small current element $\overrightarrow{dl}$ at a distance$\vec{r}$ and element carrying current 'i' is
    a)$\overrightarrow{dB} = \frac{\mu_0}{4\pi} i \left(\frac{\overrightarrow{dl}x\vec{r}}{r}\right)$ b) $\overrightarrow{dB} = \frac{\mu_0}{4\pi} i^2 \left(\frac{\overrightarrow{dl}x\vec{r}}{r}\right)$
    c) $dB = \frac{\mu_0}{4\pi} i^2 \left(\frac{\overrightarrow{dl}x\vec{r}}{r^2}\right)$ **d)** $\overrightarrow{\mathbf{dB}} = \frac{\mu_0}{4\pi} \mathbf{i} \left(\frac{\overrightarrow{dl}x\vec{r}}{r^3}\right)$

11. The magnetic field at a point inside the solenoid is
    a) $\frac{\mu_0 ni}{2}$ **b) $\mu_0 ni$** c) zero d) $\mu_0 i$
12. A charged particle in the motion may produce
    a) electric field only b) magnitude field only
    c) both of them
    d) sometimes electric and magnetic field
13. The magnetic dipole moment of a current loop is independent of
    a) magnetic field in which it is lying
    b) no of turns c) area of the loop
    d) maximum at the centre and minimum at the edge
14. A cyclotron is used to accelerate
    a) only negatively charged particles
    b) neutron
    c) both positively and negatively charged particles
    d) only positively charged particles
15. A galvanometer can be converted into ammeter by Connecting
    a) a small resistance in series with it
    b) a small resistance in parallel with it
    c) a high resistance in parallel with it
    d) a high resistance in series with it
16. The resistance of ideal voltmeter and ideal ammeter Respectively are
    a) 0, 0 **b) ∞, 0** c) 0, ∞ d) ∞, ∞
17. The line integral of magnetic field induction enclosed by a loop is equal to
    a) $\mu_0 q$ **b) $\mu_0 i$** c) $\frac{q}{\epsilon_0}$ d) zero
18. In moving coil galvanometer, the current flowing through it is proportional to
    a) θ b) tan θ c) cot θ d) sin θ
19. A galvanometer can be converted into a voltmeter by Connecting
    a) high resistance in parallel with it
    b) high resistance in series with it
    c) low resistance in series with it
    d) low resistance in parallel with it
20. Which of the following is/are the sources of magnetic field.
    a) current b) magnet
    c) both 1 and 2 d) data inadequate

MAGNETISM AND MATTER

1. Which of the following is/are wrong statements regarding to magnetic lines of force.
   a) Magnetic lines of force are open loops
   b) Inside the magnet they are from south pole to north pole
   c) Magnetic field lines does not pass through superconductors
   d) Magnetic field lines determines strong and weak field regions
2. Which of the following expression represents gauss law in Magnetism.
   a) $\oint \vec{B}.\overrightarrow{ds} = \mu_0 i$ **b)** $\oint \vec{\mathbf{B}}.\overrightarrow{\mathbf{ds}} = \mathbf{0}$ c)$\oint \vec{B}.\overrightarrow{dl} = \mu_0 i$ d) $\oint \vec{B}.\overrightarrow{ds} = \frac{q}{\epsilon_0}$
3. The magnetic susceptibility is negative for
   a) diamagnetic materials only
   b) ferromagnetic materials
   c) paramagnetic material only
   d) bothdia and ferromagnetic materials
4. Curie temperature is the temperature above which
   a) Ferromagnetic materials converts into paramagnetic
   b) Paramagnetic materials converts into ferromagnetic
   c) paramagnetic materials converts into diamagnetic
   d) ferromagnetic materials converts into diamagnetic
5. Which of the following is one use of electromagnets
   a) loud speaker b) electric crane
   c) telephone diaphragm **d) all of the above**
6. A ferromagnetic material in the magnetic field moves
   a) from stronger to the weaker parts of the field
   b) from weaker to the stronger parts of the field
   c) perpendicular to the field
   d) any other direction
7. Electromagnets are made of soft iron because soft iron has
   a) lowretentivity and high coersivity
   b) lowretentivity and low coersivity
   c) highretentivity and low coersivity
   d) highretentivity and high coersivity
8. The S.I unit of magnetic flux is
   a) ampere b) tesla **c) weber** d) curie
9. A magnetic needle placed in uniform magnetic field experiences
   a) a force and a torque b) a force but not a torque
   c) torque but not a force d) neither a torque nor a force

10. The expression for time period of oscillation of a magnetic needle in the uniform magnetic field is

a) $2\pi\sqrt{\frac{M}{IB}}$ **b)** $\mathbf{2\pi\sqrt{\frac{I}{MB}}}$ c) $2\pi\sqrt{\frac{IB}{M}}$ d) $2\pi\sqrt{\frac{IMB}{3}}$

11. For a paramagnetic material, the dependence of the magnetic susceptibility 'λ' on the absolute temperature 'T' is given by

a) $\chi\ \alpha\ T$ **b)** $\boldsymbol{\chi\ \alpha\frac{1}{T}}$ c) $\chi\alpha\ T^{-2}$ d) $\chi\alpha\ T^{0}$

12. The area enclosed by a hysteresis loop is a measure of

a) retentivity b) coersivity
c) permeability d) energy loss per cycle

13. The relation between relative permeability and susceptibility Is

a) $\mu_r = \chi - 1$ **b)** $\boldsymbol{\mu_r = \chi + 1}$
c) $\mu_r = \chi$ d) $\mu_r = \chi^{-1}$

14. The angle between geographical meridian and magnetic meridian is called

a) dip **b) declination** c) polarization d) electrification

15. The value of dip at poles

a) zero **b)** $\mathbf{90^0}$ c) 45^0 d) 5^0

16. The value of B_H at poles is

a) zero b) constant and non-zero
c) variable and non-zero d) equal to B

17. The expression for potential energy of bar magnet is

a) –PE cosθ b) PE cosθ
c) PE sin θ d) 1-PE sin θ

18. The magnetic moment per unit volume is numerical equal to

a) magnetic intensity **b) magnetization**
c) susceptibility d) permeability

19. The S.I unit of magnetic field induction is

a) Weber/m² b) A/m c) weber d) weber/m^3

20. If the horizontal component of the earth is equal to its vertical component then dip value is

a) $\mathbf{45^0}$ b) 90^0 c) 0^0 d) 180^0

21. For a material the magnetic susceptibility χ=-1 then the material may be

a) super conductor b) platinum
c) iron d) cobalt

E.M.I

1. Which of the following law gives the direction of induced emf.
   a) ampere circuital law **b) lenz's law**
   c) Flemings right hand rule d) Flemings left hand rule
2. Lenz's law is a consequence of law of conservation of
   a) charge **b) energy** c) mass d) momentum
3. Which of the following is an application of eddy currents
   a) speedometer b) optical fibre c) AC generator
   d) brilliance of diamond
4. The core of the transformer is laminated to minise the loss due to
   a) hysteresis **b) eddy currents**
   c) copper losses d) winding losses
5. The self inductance of a solenoid is directly proportional to
   a) N **b) N^2** c) N^{-1} d) N^0
6. The change in magnetic flux in a coil induces current in the same coil. This phenomena is called
   a) mutual induction b) self induction
   c) Magnetisation d) electrification
7. Which of the following electrical analogne of mass
   a) resistance **b) inductance**
   c) capacitance d) conductance
8. The charge induced in a coil
   a) depends on time into which change in flux occurs
   b) independent of time
   c) depends on the resistance of the coil
   d) both 2 and 3
9. Which of the following expression is equal to energy stored in inductor
   a) $\frac{1}{2}$ Li **b) $\frac{1}{2}$ Li^2** c) Li d) $\frac{1}{3}$ Li^2
10. The energy in the inductor is stored in the form of
    a) electric field **b) magnetic field**
    c) both electric and magnetic field
    d) some times electric and some times magnetic field.

11. Whenever the flux linked with a coil changes then
    a) current is always induced
    b) anemf and a current are always induced.
    c) anemf is always induced and current is induced when the coil is a closed one.
    d) anemf is induced but a current is never induced.
12. The frequency of alternating current in India is
    a) 500 Hz **b) 50 Hz** c) 60 Hz d) 70 Hz
13. Where a rod of length 'l' is moving with a speed 'v' in the magnetic field perpendicular to its length then emf induced across the rod is
    a) B^2l^2u **b) blv** c) B/lv d) l/Bv
14. Name the quantity which is measured in Henry/meter
    a) resistance b) capacitance
    c) inductance d) conductance.
15. Which of the following is the exact expression for mutual inductance of two coaxial solenoids
    a) $\frac{\mu_0 NA}{l}$ b) $\frac{\mu_0 N_1 N_2 A}{l}$ c) $\frac{1}{4\pi\epsilon_0}\frac{N_1 N_2 A}{l}$ d) $\frac{\epsilon_0, N_1, N_2 A}{l}$
16. The basic cause of induced emf
    a) change in current b) variable magnetic field
    c) change in magnetic flux d) all the above
17. A metallic piece becomes very hot when it is surrounded by a coil carrying high frequency alternating currents. What is the principle involved in this.
    a) total internal reflection b) magnetic hysteresis
    c) eddy currents d) joule effect
18. The alternating emf can be expressed as $e = e_0 \sin wt$. in this expression 'e_0' is
    a) $\frac{NB}{Aw}$ b) $\frac{AW}{NB}$ **c) NBAW** d) LW
19. The magnitude of induced emf in a coil is directly proportion to rate of change in
    a) resistance b) current
    c) magnetic flux d) reactance.
20. The magnetic flux is the dot product of area vector and
    a) electric flux **b) magnetic flux**
    c) work done d) velocity

ALTERNATING CURRENT

1. In general in an alternating current circuit
   a) The average value of current in zero
   b) The average value of square of current is zero
   c) average power dissipated zero.
   d) The phase difference between voltage and current is zero
2. In an ac circuit the current
   a) Is in the phase with voltage
   b) leads the voltage
   c) lags the voltage
   d) any of the above depending on the circumstances
3. Alternating current is transmitted to distant place at
   a) high voltage and low current
   b) high voltage and high current
   c) low voltage and low current
   d) low voltage and high current.
4. In an ac circuit containing only capacitance in the circuit
   a) leads voltage by 180^0 b) lags the voltage by 90^0
   c) leads the voltage by 90^0
   d) remains in phase with the voltage
5. An LCR circuit is connected to a source of alternating current at resonance the applied voltage and the current at resonance the applied voltage and the current flowing through the circuit will have phase difference of
   a) $\frac{\pi}{4}$ **b) zero** c) π d) $\frac{\pi}{2}$
6. Transformer works on the principle of
   a) mutual induction b) self induction
   c) induced emf d) current
7. Transformer ratio
   a) $\frac{E_S}{E_P} = \frac{N_S}{N_P}$ b) $E_S E_P = N_S N_P$
   c) $E_P N_P = E_S N_S$ d) $\frac{E_P}{E_S} = \frac{N_S}{N_P}$
8. Ideal transformer transformation is equal to
   a) one b) two c) three d) four
9. The efficiency of a transformer is the ratio
   a) n = $\frac{\text{output power}}{\text{input power}}$ b) n = output power x input power
   c) n = $\frac{\text{input power}}{\text{output power}}$ d) n = input power – out put power
10. The electric current whose magnitude changes with time and direction reverses periodically is
    a) alternating current b) direct current

c) average current d) instantaneous current

11. RMS value of A.C

a) $\boldsymbol{I_{rms} = \frac{I_0}{\sqrt{2}}}$ b) $I_{rms} = \sqrt{2}\ I_O$

c) $I_{rms} = \frac{\sqrt{2}}{I_0}$ d) $I_{rms} = 2I_0$

12. RMS value of voltage of AC

a) $\boldsymbol{V_{rms} = \frac{V_0}{\sqrt{2}}}$ b) $V_{rms} = \sqrt{2}\ V_0$

c) $V_{rms} = \frac{\sqrt{2}}{V_0}$ d) $V_{rms} = 2V_0$

13. Inductive reactance=

a) Lω b) L-ω c) $\frac{L}{\omega}$ d) ωR

14. Capacitive reactance is=

a) $\frac{1}{\omega c}$ b) ω c c) $\frac{\omega}{c}$ d) $\frac{C}{\omega}$

15. Instaneous value of alternating through an inductor

a) $\mathbf{I = I_0 \sin\left(wt - \frac{\pi}{2}\right)}$ b) $I = I_0 \sin\left(wt + \frac{\pi}{2}\right)$

c) $I = \sin\left(wt - \frac{\pi}{2}\right)$ d) $I = \sin\left(wt + \frac{\pi}{2}\right)$

16. The voltage across condenser is lagging behind the current by a phase angle of

a) $\frac{\pi}{2}$ b) π c) $\frac{\pi}{4}$ d) $\frac{\pi}{3}$

17. The current is lagging behind the resultant voltage by a phase angle of

a) $\frac{\pi}{2}$ b) π c) $\frac{\pi}{4}$ d) $\frac{\pi}{3}$

18. Current is in phase with voltage when

a) $\boldsymbol{\omega_L = \frac{1}{\omega_c}}$ b) $\omega_L = \omega_c$ c) $\omega = \frac{1}{c}$ d) $\omega_c = \omega_R$

19. Which of the following material is used as core of a transformer

a) Soft iron b) Copper c) Molybdenum d) Bismuth

20. Frequency of DC source is

a) ∞ **b) 0** c) 340 Hz d 220 Hz

ELECTROMAGNETIC WAVES

1. Identify the wrong statement among the following options about properties of electromagnetic waves
   a) They are produced by accelerated charges.
   b) They are transverse in nature
   c) They can be polarized.
   d) They required material medium for their propagation
2. Displacement current arise due to
   a) constant electric flux b) time varying electric flux
   c)change of magnetic flux d) constant magnetic flux
3. Micro waves are used
   a) in nuclear reactions b) to keep earth warm
   c) to kill germs in water purifiers
   d) to cook food micro ovens
4. Existence of electromagnetic waves experimentally confirmed by the scientist
   a) James clerk maxwell b) Newton
   c) Heinrich hertz d) Einstein
5. The wavelength is maximum for
   a) Radio waves b) gamma rays
   c) UV rays d) micro waves
6. The frequency is maximum for
   a) Radio waves **b) gamma rays**
   c) UV rays d) micro waves
7. The transverse nature of electromagnetic waves is confirmed By
   a) reflection b) interference
   c) polarization d) diffraction
8. The nature of electromagnetic waves is
   a) longitudinal **b) transverse**
   c) mechanical d) stationary
9. The range of wavelength for visible region is
   a) 700nm to1mm **b) 400nm to 700nm**
   c) 1nm to 400nm d) 1nm to 1pm
10. The cause of greenhouse effect is due to
    a) X-rays b) UV-rays c) radio waves **d) infra-red rays**
11. Electromagnetic waves do not transport
    a) energy **b) charge**
    c) momentum d) information
12. Which of the following rays are used in LASIK eye surgery
    a) X-rays **b) UV-rays** c) radio waves d) infra-red rays

Ray optics

1. Air bubble in water behave as
   a) Concave, sometimes convex lens
   b) Concave lens c) Convex lens
   d) Always refracting surface
2. In the formation of a rainbow the light from the sun on water droplets
   Undergoes
   a) dispersion **b) TIR**
   c) Dispersion and TIR d) Scattering
3. When a ray of light enters from one medium to another medium then which of the following does not change?
   a) Frequency b) Wavelength
   c) Speed d) Amplitude
4. Mirage is a phenomenon of
   a) Refraction of light b) Reflection of light
   c) Total internal reflection of light d) Diffraction of light

1. Refractive index $= \frac{\text{velocity of light in vacuum}}{\text{velocity of light in medium}}$
2. The distance between the focus and the pole of the mirror
   a) Focal length b) Radius of curvature
   c) Pole d) Optical centre
3. Relation between real depth and apparent depth
   a) $\mu = \frac{\textbf{Real depth}}{\textbf{Apparent depth}}$ b) $\mu = \frac{\text{Apparent depth}}{\text{Real depth}}$
   c) μ= Real depth x apparent depth
   d) μ = real depth + apparent depth
4. Relation between critical angle and retractive index
   a) $\mu = \frac{1}{\sin \theta_c}$ b) $\mu = \sin \theta_c$ c) $\mu = \sin \theta_c$ x sini d) $-\frac{1}{\mu} = \frac{1}{\sin \theta c}$
5. The distance between the principal focus and the optical centre of the lens is
   a) Focal length b) Radius of curvature
   c) Principal axis d) Centre of curvature
6. Linear magnification produced by a lens
   a) Magnification $= \frac{\text{size of image}}{\text{size of object}}$ b) Magnification $= \frac{\text{size of object}}{\text{size of image}}$
   c) Magnification = size of object x size of image
   d) size of image $= \frac{\text{magnification}}{\text{size of object}}$

1. Virtual image formed by convex mirror has magnification negative
2. Optical denseness of a medium is measured in terms of refractive index
3. Minimum angle of incidence in the dense medium for which angle of refraction becomes 90^0 is called critical angle
4. Blue colour of sky is due to phenomenon of scattering of light
5. Optical fibre works on the principle of total internal reflection
6. The splitting of white light into it's constituent colours when it passes through a glass prism is called dispersion
7. Snell's law of refraction of light $N = \frac{\sin i}{\sin r}$
8. SI unit of power of lens dioptre
9. Deviation produced by a prism of small angle $\delta = \mu - 1) A$
10. The near point of a normal eye is at a distance 25cm
11. The reciprocal of focal length expressed in terms $P = \frac{1}{f}m$
12. Relation between critical angle and refractive index $\mu = \frac{1}{\sin c}$
13. Relation between focal length and radius of curvature is
    focal length $= 1/2 \times$ radius of curvature

1. The direction of light ray and its wave front is
   a) parallel **b) perpendicular** c) opposite d) same direction
2. Which of the following has maximum refractive index
   a) water **b) diamond** c) glass d) air
3. The bottom of a tank appears to be concave due to
   a) reflection **b) refraction** c) diffraction d) scattering
4. Duration of day time is greater than night time due to this property of light
   a) refraction b) reflection c) diffraction d) scattering
5. Mirage and looming are due to
   a) reflection b) refraction c) diffraction d) total internal reflection
6. Glittering of diamond is due to
   a) total internal reflection b) reflection
   c) refraction d) interference
7. The lens maker's formula is applicable to only
   a) marginal rays **b) paraxial rays** c) for all rays d) non paraxial rays
8. The focal length of convex lens is maximum for
   a) blue b) green c) yellow **d) red**
9. A prism is placed in water the angle of minimum deviation
   a) increases **b) decrease**
   c) remains same d) increases and decreases

10. The colour of light is a characteristics of
    a) amplification b) wavelength c) velocity **d) frequency**
11. Why a ray of light enters into air from a glass slab
    a) It's wavelength increases **b) It's wavelength decreases**
    c) It's frequency increases d) It's frequency decreases
12. Wave nature of light was proposed by
    a) Huygen b) young c) Fresnel d) Maxwell

Wave optics

1. Interference of light was first demonstrated by
   a) Thomas young b) Malus
   c) Max planck d) Newton
2. In Huygen's wave theory the locus of all points in the same state of vibration is called
   a) half period zone **b) wave front**
   c) point source d) reflection
3. Young's double slit experiment the band width is maximum for the colour
   a) Red b) Yellow c) Green d) Blue
4. Young's double slit. Experiment the central spot of the fringes is
   a) Bright b) Dark
   c) Partially dark d) Partially bright
5. In plane polarized light plane containing electric vector is called plane of
   a) Circulation **b) vibration**
   c) Polarisation d) Diffraction
6. The substance which can rotate the plane of polarization is Called
   a) Optically active substance b) Inactive substance
   c) Polarizing substance d) analyzing substance
7. Ordinary light is
   a) Plane polarized b) Partially polarized
   c) Circularly polarized **d) Un polarized**
8. Double refraction of light was discovered by
   a) Brewster b) Snell **c) Barthrolinus** d) Stoke
9. Substance from the following which gives double refraction
   a) glass b) water **c) calcite** d) flint
10. The relation between refractive index of the medium and angle of polarization is called
    a) Brewster law b) malus law
    c) stoke's law d) newton law
11. Waves are said to undergo constructive interference if phase difference between them
    a) $\frac{\pi}{4}$ b) π c) $\frac{\pi}{2}$ **d) 0**
12. Waves are said to undergo destructive interface if phase difference between them
    a) π b) $\frac{\pi}{2}$ c) $\frac{\pi}{4}$ d) $\frac{\pi}{6}$

13. Interference proves
a) transverse nature of light b) longitudinal nature of light
c) wave nature of light d) If young's double slit experiment

14. If young's double slit experiment is immersed in water then the fringe width
a) Increase **b) decrease**
c) remains unchanged d) become infinite

15. Light appears to travel in a straight line because
a) It velocity is very large
b) it is not absorbed by the surroundings
c) Its wavelength is very small
d) It is reflected by the surrounding

16. The contrast in the fringe in any inference pattern depends on
a) fringe width b) wavelength
c) intensity ratio of sources d) distance between the sources

17. For constructive interference to take place between two monochromatic light waves of wavelength λ the path difference should be
a) $(2n-1)\frac{\lambda}{4}$ b) $(2n-1)\frac{\lambda}{2}$
3) n λ d) $(2n+1)\frac{\lambda}{2}$

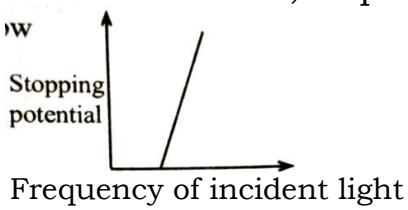
18. Diffraction can be explained by
a) Newton's corpuscular theory **b) Huygen's Fresnel principle**
c) E.M theory d) Plank quantum theory

19. The phenomenon which does not take place sound wave is
a) scattering b) diffraction
c) interference **d) polarization**

20. In propagation of electromagnetic wave the angle between the direction of propagation and plane polarisation is
a) 0^0 b) 45^0 c) 90^0 d) 180^0

DUAL NATURE OF RADIATION & MATTER

1. Radiations of frequency υ are incident on a photo sensitive metal. The maximum K.E of photo electrons is E. when the frequency of the incident radiations is doubled, what is the maximum. K.E of photo electrons?
   a) E + hv b) 4E c) 2E d) E – hv
2. In photoelectric effect, slope of the graph given below gives



   a) Charge on the electron b) Planck's constant
   c) Work function of emitter **d) h/e**
3. The least energy required to eject an electron from an atom is called
   a) K.E b) Electrical energy
   c) Work – function energy d) Chemical energy
4. Work function is the energy required
   a) To produce X-rays b) to excite an atom
   c) To explore an atom
   d) To eject an electron just out of the surface
5. Photo electric effect is based upon
   a) Energy b) Momentum c) Charge d) Mass
6. Photoelectric effect supports
   a) Huygen's wave theory of the light
   b) Maxwell's electromagnetic theory of light
   c) Planck's quantum theory of light
   d) Newton's corpuscular theory of the light
7. The best metal to be used for photoemission is
   a) Potassium b) Sodium
   c) Cesium d) Lithium
8. The photo electric effect occurs only when the incident light has more than a certain minimum
   a) Wavelength b) Speed
   c) Charge **d) Frequency**
9. The photo electric threshold wavelength of certain metal is 3000 Å. If the radiation of 2000 Å is incident on a metal, then
   a) Electrons will be emitted b) Protons will be emitted
   c) Positrons will be emitted d) Electrons will not be emitted

10. The maximum number of photoelectrons released in a photocell is independent of
    a) Nature of the cathode surface
    b) Frequency of incident ray
    c) Intensity of radiations incident on cathode surface
    d) None of the above
11. Intensity of light incident on a photo sensitive surface is doubled. Then
    a) The no of emitted electrons is trebled
    b) The no of emitted electrons is doubled
    c) K.E is doubled
    d) Momentum is doubled
12. If the frequency of light in a photoelectric experiment is doubled, the stopping potential will:
    a) Be doubled b) Be halved
    c) Become more than double d) Become less than double
13. The K.E of photo electrons depends on
    a) Intensity of incident light
    b) The difference between the frequency of the incident light and the threshold frequency
    c) The sum of frequency of incident light and threshold frequency
    d) The ratio of frequency of light used and threshold frequency
14. If the distance of 100 watt lamp is increased from a photo cell, saturation current I. In the photo cell, I varies with distance d as
    a) $I \propto d$ b) $I \propto d^2$ **c) $I \propto \frac{1}{d^2}$** d) $I \propto \frac{1}{d}$
15. The rest mass of photon is
    a) Zero b) 1kg
    c) 1.6×10^{-19}kg d) 3.1×10^{-30}kg
16. A proton and an electron move with the 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 as that of the electron
    d) Zero
17. The wavelength of De-Broglie wave associated with a thermal neutron of mass 'm' at absolute temperature T is given by
    a) $\frac{h}{\sqrt{mkT}}$ b) $\frac{h}{\sqrt{2mkT}}$ **c) $\frac{h}{\sqrt{3mkT}}$** d) $\frac{h}{\sqrt{4mkT}}$

NUCLEI (13)

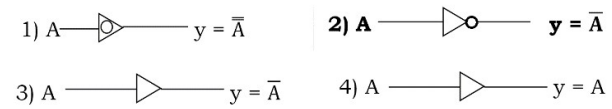
1. The binding energy of an alpha particle
   a) Is released when be particle splits
   b) Must be added to turn the particle
   c) Is released when the particle turns its constituents
   d) Adds to the mass of the alpha particle.
2. In the process of fusion
   a) B.E/ nucleons increases
   b) B.E / nucleons decreases
   c) B.E / nucleons remains constant
   d) Energy is absorbed
3. For stable (neutral) atom
   a) $N < Z$ **b) $N = Z$** c) $N > Z$ d) $N \geq Z$
4. The value of 1 atomic mass unit – in kilogram
   a) $1u = 1.66 \times 10^{-72}$ kg b) $1\ u = 1.56 \times 10^{-27}$ kg
   c) $1\ u = 1.66 \times 10^{-27}$ kg d) $1\ u = 1.66 \times 10^{27}$ kg
5. How is the radius of the nucleus of an atom related to its mass number.
   a) $R \alpha A^{1/3}$ b) $R \alpha 1/A^{1/3}$
   c) $R \alpha A^{3/1}$ d) $R \alpha A^{2/3}$
6. What is the energy equivalent to 1 amu?
   a) 932.5 Mev **b) 931.5 Mev**
   c) 931.5 eV d) 932.5 eV
7. What happens when an electron and a positron collide?
   a) Photon is produced b) Electron is produced
   c) Positron is produced d) None of the above
8. Which property of nuclear forces is responsible for constancy of binding energy per nucleon.
   a) Long range force b) Medium range force
   c) Short range force d) Long or short range force
9. Who discovered the phenomenon of radio activity?
   a) Mary cuire b) Chadvic
   c) Einstein **d) Becquerel**
10. Which particle emitted along with electron when a neutron is converted into proton in a nucleus.
    a) Anti – proton b) proton – proton
    c) electron – proton **d) anti – neutrino**
11. How does the number of radioactive atoms vary with time?
    a) Decreases b) Increases
    c) Constantly increases d) No change
12. How does the half – life of a radioactive sample depend on its decay constant?

a) T α λ b) T α 2/λ **c) T α1/λ** d) T α λ^{-2}

13. In which type of B-decay antineutrino is emitted?
    a) positive β-decay **b) negative β-decay**
    c) In both positive – negative β-decay
    d) none of the above
14. Einsteins mass – energy relation is
    a) $E = \upsilon c^2$ b) E = mc
    c) $E = mc^2$ d) $E = m^2c$
15. Nuclear forces are
    a) Strongly attractive forces b) Weak attractive forces
    c) Long range – forces d) Central forces.
16. The parameter used to measure the stability of the nucleus is
    a) Average binding energy b) Number of protons
    c) Number of neutrons d) Number of electrons
17. The radius of a nucleus mainly depends on
    a) Proton number b) Electron number
    c) Mass number d) Neutron number
18. The nuclear size is measured in units of
    a) Angstrom **b) Fermi** c) Bar d) light – year
19. Nuclides which have the same mass number are called
    a) Isotopes **b) Isobars** c) Isotones d) Isomers
20. Among the following one is not emitted by a radioactive substance.
    a) Electrons b) β-rays
    c) Positron **d) Protons**

SEMICONDUCTOR DEVICES

1. A semiconductor at OK behaves as
   a) Conductor **b) Insulator**
   c) Super conductor d) Extrinsic semiconductor
2. On increasing temperature the conductivity of pure Semiconductors
   a) Decreases **b) Increases**
   c) Remains unchanged d) Becomes zero.
3. The other name of P-n junction is
   a) Insulator b) Diode resistor
   c) Transistor **d) Semiconductor diode**
4. The circuit symbol of NOT gate is



5. The value of energy gap in semiconductor is
   a) Energy gap < 3 eV b) Energy gap = 3 e V
   c) Energy gap > 3 e V d) Energy gap $\geq$ 3 e V
6. The width of the depletion region when the diode is forward biased.
   a) Increases **b) Decreases**
   c) Constant d) Increases rapidly
7. The valence of impurity element for making p-type semiconductor is
   a) 5 b) 4 **3) 3** d) 7
8. In intrinsic semiconductor at room temperature the number of electrons and holes are
   a) Equal b) Zero c) Unequal d) Infinite
9. Band gap in insulator is of the order
   a) 6eV b) 0.60eV c) -6eV d) 0 eV
10. The majority carriers in a P-type semiconductor are
    a) Electrons **b) Holes**
    c) Both (1) & (2) d) Impurities
11. In intrinsic semiconductor conductivity is
    a) Low b) Average c) High d) Very low
12. In intrinsic semiconductor conductivity is due to
    a) Doping b) Holes
    c) Breaking of covalent bonds d) Free electrons
13. P-n junction diode acts as
    a) ohmic resistance **b) Non-ohmic resistance**
    c) Both (1) & (2) d) Amplifier

14. In forward bias the depletion layer behaves like
    a) An insulator b) Capacitor
    c) A semiconductor **d) A conductor**
15. P-n junction in reverse bias behaves like
    a) A condenser b) An inductor
    c) Amplifier **d) An off switch**
16. The main cause of avalanche breakdown is
    a) Collision by ionization b) High doping
    c) Recombination of electrons & holes
    d) Low doping
17. The thickness of depletion layer is approximately
    a) 1 μm b) 1 mm c) 1 cm d) 1m
18. The potential in the depletion layer due to
    a) Electrons b) Holes
    c) Ions d) Forbidden band
19. P-n Junction diode can be used as.
    a) Amplifier **b) Detector**
    c) Oscillator d) Capacitor
20. In the boolean algebra, the following one is wrong
    a) 1 + 0 = 1 b) 0 + 1 = 1
    c) 1 + 1 = 1 **d) 0 + 0 = 1**