2PUC Physics Annual Examination Checklist

Based on Model Paper Blueprint 2023–24

II PUC PHYSICS(33) BLUEPRINT FOR THE MODEL QUESTION PAPER - 2023-24

QP Part	Question type	Number of questions to be set	Marks alloted	Number of questions to be answered	Marks alloted
A	MCQ	15	15	15	15
	Fill in the blank(FIB)	05	05	05	05
B	SA (2 Marks)	09	18	05	10
C	SA (3 Marks)	09	27	05	15
D	LA (5 Marks)	06	30	03	15
	Numerical Problem(NP) (5 Marks)	04	20	02	10
	Total	**48**	**115**	**30**	**70**

Unit	Sr. No	Chapter/ Content domain/ Unit/ Theme	No. of periods	Marks	Remember(41 marks)					Understand(33 marks)				Apply(23 marks)				HOTS(18 marks)		
					MCQ 1 mark	FIB 1 Mark	SA 2 Marks	SA 3 Marks	LA	SA 2 Marks	NP 2 Marks	SA 3 Marks	LA 5 mark	SA 2 Marks	NP 3 Marks	LA 5 mark	NP 5 mark	MCQ 1 mark	SA	NP 5 mark
I	1	Electric charges & Fields	12	11	1		1					1								1
II	2	Electrostatic potential and Capacitance	12	11				1			1					1		1		
III	3	Current electricity	15	14	1			1								1				1
IV	4	Moving Charges and Magnetism	13	12	1	1	1					1				1				
V	5	Magnetism and Matter	6	6				1		1								1		
	6	Electromagnetic Induction	8	8	2	1	1					1								
VI	7	Alternating Current	8	8	1					1							1			
	8	Electromagnetic Waves	3	3	1		1													
VII	9	Ray Optics and Optical Instruments	11	11	1		1	1												1
VIII	10	Wave Optics	8	7	1	1							1(ST)							
IX	11	Dual nature of Radiation and Matter	6	6									1(ST)					1		
	12	Atoms	4	4	1							1								
X	13	Nuclei	5	5	1	1									1					
	14	Semiconductor Electronics	9	9	1	1	1						1							
		Total	**120**	**115**	**12**	**5**	**12**	**12**	**-**	**4**	**2**	**12**	**15**	**-**	**3**	**15**	**5**	**3**	**-**	**15**

ST => SPLIT TYPE QUESTION (1+2+2) OR (2+3) OR (1+4) OR (1+1+3)

Weightage to objectives:

Objectives	Weightage	Marks
Knowledge	35%	41
Understanding	29%	33
Application	20%	23
HOTS	16%	18

Weightage to level of difficulty:

Level	Weightage	Marks
Easy	40%	46
Average	40%	46
Difficult	20%	23

GENERAL GUIDELINES FOR SETTING THE QUESTION PAPER

1. Variation of 1 mark in each chapter or unit weightage is permitted while preparing the blue print and the total marks should not exceed 115.
2. The question paper should be prepared on the basis of blueprint following the weightage of marks fixed for each chapter. The questions must be framed to check the specific cognitive level as mentioned in the blueprint.
3. Questions should be clear, unambiguous, understandable and free from grammatical errors.
4. Questions which are based on same concept, law, fact etc. and which generate the same answer should not be repeated under different forms (MCQ, FIB, VSA, LA and NP).
5. The answers for the questions should be available in the prescribed text book or can be derived from the concepts of text book for application/reasoning/analytical/HOTS questions.
6. When a question carrying 3 or 5 marks is split, the sub questions should be derived from the same concept or different concepts of same chapter.
7. Only one 5 mark numerical problem has to be set from chapters corresponding to a pair of consecutive units like I & II, III & IV, V & VI, VII & VIII, IX & X.
8. In part A (I main) 3 MCQ and in part D (VI main) 3 numerical problems of same difficulty level must be framed to check Higher Order Thinking Skills.
9. Only one simple numerical problem can be included in each of the part B (2 mark) and part C (3 mark).

Part – A (MCQ – 1 mark each)

{To be treated as MCQs}

Question No: 01 (Electric Charges & Fields)

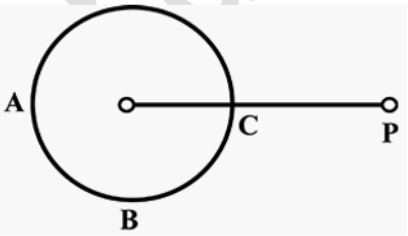
1. The instrument which is used to detect the presence of charge on a body is ____ (Electroscope)
2. Physical quantity measured in terms of coulomb is _____ (electric charge)
3. Charge on a body may be _____ (+10/2e) {It can never be in fraction}
4. An isolated solid metallic sphere is given $+Q$ charge. The charge will be distributed on the sphere___ (Uniformly but only on the surface)
5. There are two metallic spheres of same radii but one is solid and the other is hollow, then _____ (They can be charged equally)
6. The value of electric permittivity of free space is __(8.85×10^{-12} C^2/Nm^2)
7. Number of electrons in one coulomb of will be ___ (6.25×10^{18})
8. When 10^{13} electrons are removed from a neutral metal sphere, then the electric charge on it will be _____ ($+1.6 \times 10^{-6}$C)
9. One metallic sphere A is given positive charge whereas another identical metallic sphere B of exactly same mass as of A is given equal amount of negative charge. Then _____ (Mass of B increases)
10. If the distance between two charged particles is double then the force between them ___ (F/4)
11. Two charged spheres separated at a distance d exert a force F on each other. If they are immersed in a liquid of dielectric constant 2, then what is the force (if all conditions are same) ___ (F/2)
12. When 10^{19} electrons are removed from a neutral metal plate, the electric charge on it is _____ (+1.6C)
13. The dielectric constant of metal is ____ (infinite)
14. **A glass rod is rubbed with silk cloth. The charge acquired by glass rod is _____ (positive charge or acquires positive charges)**
15. If E is the electric field intensity of an electrostatic field, then the electrostatic energy density is proportional to ____ (E^2)
16. Conduction electrons are almost uniformly distributed within a conducting plate. When placed in an electrostatic field E, the electric field within the plate ____ (is zero)
17. The electric field near a sheet having a uniform surface charge density σ is given by _____ ($\sigma/2\varepsilon_0$ and is normal to the surface)
18. The unit of intensity of electric field is ____ (newton/coulomb)
19. _____ is deflected by electric field (alpha particles)
20. An electron is moving towards x-axis. An electric field is along y-direction then path of electron is _____ (parabola)

21. A proton enters in an electric field with its velocity in the direction of the electric lines of force. Then _____ (The path of the proton will be a straight line)
22. An electric dipole when placed in a uniform electric field E will have minimum potential energy, if the direction of dipole moment makes the following angle with E ___ (zero)
23. An electric dipole is kept in uniform electric field. It experiences ____ (torque but not force)
24. An electric dipole is kept in non-uniform electric field. It experiences ___ (force and a torque)
25. The angle between the electric dipole moment and the electric field strength due to it on the equatorial line is ____ (180^0 or π)
26. The electric field due to a dipole at a distance r on its axis is _____ (Inversely proportional to r^3)
27. The torque acting on a dipole of moment p in an electric field E is _____(pEsinθ)
28. The electric field at a point on axial line of a dipole and direction of the dipole moment _____ (will be parallel)
29. The electric field at a point on equatorial line of a dipole and direction of the dipole moment _____ (will be in opposite direction)
30. If E_a be the electric field strength of a short dipole at a point on its axial line and E_e that on the equatorial line at the same distance, then _____ ($E_a = 2E_e$)
31. A region surrounding stationary electric dipoles has _____ (Electric field only)
32. Electric field at a point varies as r^0 for _____(A plane infinite sheet of charge)
33. For a given surface the Gauss' law is stated as $\oint E \cdot ds$=0. From this we can conclude that _____ (the total flux through the surface is zero)
34. According to Gauss' Theorem, electric field of an infinitely long straight wire is proportional to ___ (1/r)
35. The S.I. unit of electric flux is _____ (volt-meter)
36. Gauss's law in electrostatics should be invalid if _____ (the inverse square law were not exactly true)
37. A spherical conductor has the charge on it. Then total flux emitted through the Gaussian surface drawn around conductor will be ____ ($1/\epsilon_0 Q_{encl}$)
38. Gauss's law is true only if force due to a charge varies as _____ (r^{-2})
39. 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 ___ ($1/x^2$)
40. A body can be charged by the method of _____ (Induction)
41. _____ apparatus with which the presence of electric charge on a body is detected (Electroscope)
42. SI unit linear charge density/surface charge density/volume charge density is _____(coulomb per meter/ coulomb per meter^2/ coulomb per meter^3)
43. The direction of electric field is _____ from the positive charge (away)
44. The direction of electric field is _____ the negative charge (towards)
45. Electric field lines do not exist inside a _____ (conductor)

46. If ($Q_1Q_2 < 0$) then nature of force between charges is _____ (attractive)
47. SI unit of dipole moment is _____ (coulomb-meter)

Question No: 02 (Electrostatic Potential & Capacitance) {HOTS}

1. Electric potential at a point due to a point charge q depends on distance as _____ (1/distance)
2. SI unit of electric potential is _____ (volt)
3. Work done in moving a unit positive charge from infinity to a point against the electric field is said to be the electric _____ at that point (potential)
4. The correct formula for electric potential is _____ (potential = work done/charge)
5. Electric potential at a point due to short dipole varies with distance as _____ ($1/(\text{distance})^2$)
6. Electric potential at a point due to a short dipole with orientation as _____ ($\cos\theta$)
7. **A spherical conductor of radius R is carrying a charge of +Q. The ratio of the electric potentials corresponding to a point on the surface of the conductor and a point at a distance R/2 from the centre of the conductor are in the ratio _____ (1:1)**



8. A hollow conducting sphere is placed in an electric field produced by a point charge placed at P as shown in figure. Let V_A, V_B and V_C be the potentials at points A, B and C on the sphere respectively. Then: ($V_A = V_B = V_C$)
9. The radius of two metallic sphere A and B are r_1 and r_2 respectively ($r_1 > r_2$) They are connected by a thin wire and the system is given a certain charge. The charge will be greater _____ (on the surface of sphere A)
10. The angle between electric field and equipotential surface is ___ (90^0)
11. If we carry a charge once around an equipotential surface, then work done by it is ____ (zero)
12. Equipotential surface is a surface _____ (on which each and every point has same potential)
13. Electric field due to a point charge is in the direction in which _____ (potential decreases the steepest)
14. In the relation A = BC where A is Electric Potential energy, B is Electric charge, which physical quantity does C represent? (Electric potential)
15. When dipole moment is aligned in the direction of uniform electric field then _____ (the dipole is in stable equilibrium)
16. When dipole moment is aligned 180^0 with respect to the uniform electric field _____ (the dipole is in unstable equilibrium)
17. At the surface of a charged conductor, electric field must be always _____ (perpendicular to the surface)
18. In bringing an electron towards another electron, the electrostatic potential energy of the system _____ (increases)

19. Statement – I: Electrostatic potential is constant throughout the volume
    Statement – II: Electric field inside a charged conductor is zero has no tangential component on the surface. (Both statements are correct)
20. Which of the following is TRUE for equipotential surface for uniform electric field?
    (A) Equipotential surface is cylindrical
    (B) Electric field lines are perpendicular to equipotential surface
    (C) Electric field lines are parallel to equipotential surface
    (D) Equipotential surface is spherical
21. Electric potential at any point inside a conductor is _____ (constant & is equal to the potential on the surface)
22. The electric field inside a cavity of a charged conductor is zero. This is known as _____ (Electrostatic Shielding)
23. Effect of introducing a dielectric in a region of electric field is _____ (electric field decreases but doesn't becomes zero)
24. The maximum electric field that a dielectric medium can withstand without break down its insulating property is called its _____ (dielectric strength)
25. '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, _____ (A is a non-polar molecule & B is a polar molecule)
26. An example for polar molecule is _____ (Water Molecule)
27. In case of dielectric, which of the following options is true with regard to the induced dipole moment (p) and the applied external electric field (E_{ext})? (E_{ext} and p are in the same direction and proportional to each other)
28. Capacitors are used to _____ (Store electric charges)
29. Capacitance of a capacitor is defined as:_____ (Ratio of charge on the capacitor to its potential difference)
30. Capacitance of a parallel plate capacitor does not depend on: _____ (Charge on the plates)
31. In a parallel plate capacitor, the capacitance increases if_____ (distance between the plates decreases)
32. In a parallel plate capacitor, if the area of the plates is decreased by n times, then the capacitance _____ (Decreases by n times)
33. Ratio of capacitance of a capacitor with a dielectric substance to the capacitance of the same capacitor without the dielectric substance is called: _____ (dielectric constant)
34. When a number of capacitances are connected in parallel, which quantity remains same every time for all the capacitors? (Potential differences)
35. Electrical energy stored in a capacitor per unit volume of the space is called as _____ (Energy density)

36. A parallel plate capacitor with air between its plates has capacitance of C. Its new capacitance when the separation between the plates is doubled is _____. (C/2)
37. Two capacitors of capacity 2μF and 3μF are connected in series the effective capacitance of the capacitors is ____. (6/5μF)
38. Three capacitors of capacitance 3μF are connected in a circuit. Then their maximum and minimum capacitances will be _____ (9μF & 1μF)

Question No: 03 (Current Electricity)

1. Kirchoff's junction rule signifies the law of conservation of _____ (Charge)
2. Kirchoff's loop rule is a consequence of the law of conservation of ____ (Energy)
3. Drift velocity per unit electric field is called _____ (Mobility)
4. Drift velocity of electrons does not depend on _____ (length of the wire)
5. Current per unit area is called _____ (Current density)
6. The resistance offered by a 1m long conductor having a cross sectional area 1sqm is called _____ (Electrical resistivity of the conductor)
7. Average time between two successive collisions is called _____ (Relaxation time)
8. The average velocity with which free electrons move in a conductor opposite to the applied electric field is called _____ (Drift velocity)
9. Average time between any two successive collisions is called _____ (relaxation time)
10. Constantin and Manganin wires are used in making standard resistance boxes because they have ____ (Low temperature coefficient of resistance and high resistivity)
11. Principle of working of a meter bridge is ___ (balanced Wheatstone bridge)
12. Resistance of a conducting wire depends on _____ (length, area of cross section & temperature)
13. Resistivity of a conducting wire depends on _____ (temperature)
14. Resistance of a conducting wire increases when _____ (length increases)
15. Resistors in the higher range are mostly made from _____ (carbon)
16. Drift velocity v_d varies with the intensity of electric field as per the relation _____ ($v_d \alpha E$)
17. When the length and area of cross-section of a wire both are doubled, then its resistance _____ (will remain the same)
18. The resistance of a wire is _____ (decreases with the length and increases with the cross-section of wire)
19. **The resistivity of a metallic conductor _____ with decrease in temperature. (decreases)**
20. Ohm's law is true ____ (for metallic conductors at low temperature)
21. The example for non-ohmic resistance or device is ___ (diode)
22. The reciprocal of resistance is _____ (conductance)
23. The reciprocal of resistivity is _____ (conductivity)
24. Which of the following is vector quantity? (current density)
25. The resistance of a conductor increases with _____ (increase in length, increase in temperature & decrease in cross-sectional area)

26. When a current flows through a conductor its temperature _____ (increases)

27. The direction of current density is __ (along the direction of electric field)
28. The alloys constantan and manganin are used to make standard resistance because they have _____ (high resistivity & low temperature co-efficient of resistance)
29. The correct expression for drift velocity of electrons in a conductor is _____ ($v_d = -\frac{eE\tau}{m}$)
30. The correct expression for conductivity of a conductor is _____ ($\sigma = \frac{ne^2\tau}{m}$)
31. The correct expression for current density is _____ ($J = nev_d$ or $J = I/A$)
32. The electron drift speed is small and the charge of the electron is also small but still, we obtain large current in a conductor. This is due to _____ (the electron number density of the conductor is enormous)
33. Current in a circuit containing a cell and a resistor (simple circuit) is given by ____ ($I = E/(R + r)$)
34. On increasing the temperature of a conductor, its resistance increases because _____ (Relaxation time decreases)
35. The electric field, current density and conductivity of a conductor are related as ____ ($\sigma = J/E$)
36. Which among the following devices is used to measure unknown resistance? (Meter bridge)

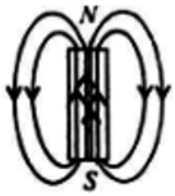
Question No: 04 (Moving Charges & Magnetism)

1. A charge q is moving in a magnetic field then the magnetic force does not depend upon ____ (mass)
2. If a charge q is going in the direction of magnetic field B with the velocity of v then the force on electron is _____ (zero)
3. When a charged particle enters perpendicular to the external uniform magnetic field, it follows _____ (circular path)
4. The magnetic force on neutral particle moving in external uniform magnetic field is ____ (zero)
5. The correct expression for Lorentz force is _____ ($Q(\vec{E} + \overrightarrow{(v} \times \vec{B})$)
6. When the charged particle move in combined electric and magnetic field, the force acting on it is ____ (Lorentz force)
7. **The Lorentz force is the force on a charged particle moving in a region containing _____ (Electric field & Magnetic field)**
8. A charged particle enters a uniform magnetic field perpendicular to it. The magnetic field _____ (changes the direction of motion of the particle)
9. The force F on a current carrying conductor of length l in an external magnetic field B is _____ (I(l x B))
10. If the direction of the initial velocity of the charged particle is neither along nor perpendicular to that of the magnetic field, then the orbit will be _____ (a helix)
11. A magnetic field can be produced by ____ (a moving charge)
12. A charged particle moving in a magnetic field increases its velocity, then its radius of the circle _____ (Increases)

13. Magnetic field at the center of circular current loop is _____ ($\frac{\mu_0 I}{2R}$)
14. In a circular coil of radius r, the magnetic field at the centre is proportional to ____ (1/r)
15. SI unit of magnetic field is ____ (tesla)
16. An electron having mass m, charge q and kinetic energy E enters a uniform magnetic field B perpendicularly. Then its frequency of rotation will be _____ ($\frac{qB}{2\pi m}$)
17. Unit of magnetic permeability is _____ (H/m)
18. The magnetic force on a current carrying conductor of length l in an external magnetic field B is given by ____ (BILsinθ)
19. Vector form of Biot-Savart's law is ____ ($\overrightarrow{dB} = \frac{\mu_0}{4\pi} I \left(\frac{\vec{dl} \times \vec{r}}{r^3}\right)$)
20. The magnetic induction at the center of a current carrying circular of coil radius r, is _____ (Inversely proportional to r)
21. Ampere's circuital law is given by _____ ($\oint \vec{B}.\overrightarrow{dl} = \mu_0 I_{net}$)
22. The magnetic induction at any point due to a long straight wire carrying a current is _____ (Inversely proportional to the distance from wire)
23. The magnetic field B with in the solenoid having n turns per metre length and carrying a current of I ampere is given by _____ ($\mu_0 nI$)
24. Two long parallel wires carrying currents in opposite direction _____ (repel each other)
25. A current carrying loop is placed in a uniform magnetic field. The torque acting on it does not depend upon _____ (Shape of the loop)
26. In a moving coil galvanometer, the deflection of the coil θ is related to the electrical current I by the relation _____ (I α θ)
27. The sensitiveness of a moving coil galvanometer can be increased by decreasing ____ (the couple per unit twist of the suspension)
28. To convert a galvanometer into a voltmeter one should connect a _____ (high resistance in series with galvanometer)
29. To convert a galvanometer into an ammeter one should connect a _____ (low resistance in parallel with galvanometer)

Question No: 05 (Magnetism & Matter) {HOTS}

1. The S.I unit of magnetic pole strength is _____ (A-m)
2. The magnetic field lines due to a bar magnet are correctly shown in _____



3. If m is magnetic moment and B is the magnetic field, then the torque is given by ____ ($\vec{m} \times \vec{B}$)
4. Torque acting on a magnet held at angle Θ with magnet field is maximum when Θ = ____ (0^0)
5. Potential energy of a magnetic dipole of magnetic moment placed in uniform magnetic field is _____ ($U = -\vec{M}.\vec{B}$)

6. Potential energy of a magnetic dipole is zero when Θ = _____ (90^0)
7. Which is true regarding a bar magnet? (Magnetic field lines are directed from north to south outside the magnet)
8. Which is not true regarding magnetic field lines? (normal to the magnetic field lines gives the direction of magnetic field)
9. **Below are the two statements related to magnetic field lines:**
   Statement – I: The magnetic field lines do not intersect
   Statement – II: The direction of magnetic field at a point is unique
   (Both the statements I and II are correct and II is the correct explanation for I)
10. Product of area and current through a current loop is called _____ (magnetic moment)
11. Magnetic field at a distance r on the axial line of a magnetic dipole is _____ (inversely proportional to r^3)
12. Product of pole strength and length of a magnetic dipole is called _____ (magnetic induction)
13. Ratio of magnetic moment to the length of magnetic dipole is called _____ (pole strength)
14. SI unit of magnetic dipole moment is ____ (Am^2)
15. The relation between relative permeability and magnetic susceptibility is given by __ ($\mu_r = 1 + \chi$)
16. Torque acting on a magnetic needle placed in a magnetic field is maximum _____ (when the magnetic moment and magnetic fields are perpendicular or angle between magnetic moment and magnetic field is 90^0)
17. Magnetic needle placed in a magnetic field will be in stable equilibrium if _____ (when the magnetic moment and magnetic fields are parallel or angle between magnetic moment and magnetic field is 0^0)
18. Magnetic needle placed in a magnetic field will be in unstable equilibrium if _____ (when the magnetic moment and magnetic fields are anti parallel or angle between magnetic moment and magnetic field or angle between magnetic moment and magnetic field is 180^0)
19. Potential energy stored in a magnetic dipole placed with its magnetic moment (m) inclined at an angle θ to the external magnetic field (B) is given by _____ ($U = B.m = -Bm\cos\theta$)
20. The net magnetic flux through any closed surface is _____ (A-area of closed surface) (zero)
21. Gauss' law in magnetism is _____ (The net magnetic flux through any closed surface is zero)
22. Net magnetic moment per unit volume of a magnetic material is called _____ (magnetization)
23. Magnetic permeability is defined as ___ (ratio of magnetic induction to magnetic intensity)
24. SI unit of magnetic permeability is _____ ($TA^{-1}m$)
25. The ratio of magnetisation to magnetic intensity is called _____ (magnetic susceptibility)
26. Identify the property exhibited by diamagnetic substances: _____ (They are repelled by a magnet)
27. Magnetic materials whose susceptibility is very low and positive are _____ (paramagnetic)

28. Magnetic materials whose susceptibility is high and positive are _____ (ferromagnetic)
29. The property exhibited by diamagnetic substances is _____(Meisner effect)
30. For paramagnetic substances relative permeability will be _____ (greater than 1)
31. The magnetic susceptibility of an ideal diamagnetic/paramagnetic/ferro substance is _____ (-1, +1, large)
32. Meissner effect is the phenomenon of _____ (perfect diamagnetism in superconductors)
33. Which is the diamagnetic material among the following?
    (A) Iron (B) cobalt (C) nickel *(D) copper*
34. Which is the paramagnetic material among the following?
    (A) Iron (B) cobalt (C) nickel *(D) Aluminium*
35. Which is the ferromagnetic material among the following?
    (A) Iron (B) copper (C) Bismuth (D) Aluminium
36. Super conductors are _____ (diamagnetic materials)
37. Soft magnetic materials are those _____ (ferromagnetic materials which lose magnetisation on the removal of external magnetic field)
38. Hard magnetic materials are those _____ (ferromagnetic materials which retain magnetisation on the removal of external magnetic field)
39. Intrinsic magnetic dipole moment of atoms of diamagnetic materials is _____ (zero)
40. Intrinsic magnetic dipole moment of atoms of paramagnetic materials is _____ (small)
41. Intrinsic magnetic dipole moment of atoms of ferromagnetic materials is _____ (large)
42. At high enough temperature, a ferromagnetic material becomes _____ (paramagnet)
43. Core of electromagnets and solenoid are made of ____ (Soft iron)

Question No: 06 & 07 (Electromagnetic Induction)

1. The correct statement of EMI is _____ (Electric current is generated by varying magnetic field)
2. In the coil magnet experiment, the deflection in the galvanometer is larger when, _____ (A Coil moves faster towards or away from the magnet & Magnet moves faster towards or away from the coil)
3. In a coil-coil experiment when an iron is inserted into their axis, the deflection in the galvanometer _____ (increases)
4. **The S.I unit of magnetic flux is _____ (weber)**
5. The law which gives the polarity of induced emf in electromagnetic induction is _____ (Lenz's law)
6. A small piece of metal wire is dragged across a gap between the pole pieces of a magnet in 0.5seconds. The magnetic flux between the pole pieces is 8×10^{-4}Wb. The emf induced in the wire is _____ (1.6×10^{-3}V)
7. The significance of Lenz's law is ____ (Law of conservation of energy.)

8. **A straight conductor of length l is moving with a velocity v in the direction of uniform magnetic field of strength B. The magnitude of emf induced between the ends of the conductor is _____ (Blv)**
9. Self-inductance plays the role of _____ (Inertia)
10. The principle of AC generator is _____ (Electromagnetic induction)
11. The possible maximum instantaneous value of the emf is _____ ($E_0 = NBA\omega$)
12. Relation between Induced Charge & Magnetic flux is _____ ($dQ = d\phi/R$)
13. To induce an e.m.f. in a coil, the linking magnetic flux ____ (can either increase or decrease)
14. Self-induction of a solenoid is _____ (Directly proportional to its length)
15. Average energy stored in a pure inductor of inductance L when a current I flow through it is _____ ($LI^2/2$)
16. Mutual inductance of two coils can be increased by ____ (Increasing the number of turns in the coils)
17. Dynamo is a device for converting _____ (Mechanical energy into electrical energy)
18. Electromagnetic induction is _____ (induction of emf in a coil when the magnetic flux through it varies with time)
19. A magnet and a coil are moved in the same direction with the same speed. Now, ____ (emf is not induced in the coil)
20. Magnetic flux per unit area is called _____ (magnetic induction)
21. The law which gives polarity of induced emf in a circuit due to rate of change of magnetic flux is _____ (Lenz's law)
22. Lenz's law is based on _____ (the law of conservation of energy)
23. In a closed circuit, electric currents are induced when there is a change in magnetic flux linked with it. This is to ____ (oppose the change in magnetic flux)
24. North pole of a magnet is moved along the axis towards a circular coil. Direction of current flowing in the side of the coil phasing the magnet is _____ (anticlockwise)
25. North pole of a magnet is moved away from a circular coil along the axis of the coil. Direction of current flowing in the side of the coil phasing the magnet is _____ (clock wise)
26. South pole of a magnet is moved away from the circular coil along the axis of the coil. Direction of current flowing in the side of the coil phasing the magnet is _____ (anti clock wise)
27. South pole of a magnet is moved towards a circular coil along the axis of the coil. Direction of current flowing in the side of the coil phasing the magnet is _____ (clockwise)
28. South pole of a magnet is moved towards a circular coil along the axis of the coil. The side of the coil phasing the magnet ___ (would act like south pole)
29. South pole of a magnet is moved away from a South pole of a magnet is moved away from a circular coil along the axis of the coil. The side of the coil phasing the magnet _____ (would act like north pole)
30. SI unit of mutual -inductance is ____ (henry (H))

30. Two solenoids of different radii are kept inside one another coaxially. Mutual inductance of inner coil with respect to outer coil is M_{12} and mutual inductance of outer coil with respect to inner coil is M_{21}. Now, ($M_{12} = M_{21}$)
31. Mutual inductance between a pair of coils is _____ (directly proportional to the product of number of turns in each coil)
31. Mutual induction principle is used in _____ (Transformer)
32. If N is the number of turns in a coil the value of self-inductance varies as _____ (N^2)
33. An iron rod is introduced into to a solenoid. Now its self-inductance (increases)
32. Self induced emf is also called ____ (back emf)
33. Energy stored in an inductor of self-inductance L when current increases from zero to I is _____ ($U = ½ LI^2$)
34. AC generator works on the principle of _____ (electromagnetic induction)
35. Ac generator converts _____ (mechanical energy to electrical energy)
36. Number of cycles of ac generated per second is called ___ (frequency of ac)
37. Equation for instantaneous value of emf induced in a generator coil is given by _____ ($E=E_0\sin(\omega t)$)
38. Maximum emf generated in an ac generator is independent of _____ (resistance of the coil).

Question No: 08 (Alternating Current)

1. Relation between peak value of emf (V_0) and rms value of emf (V_{rms}) is _____($V_0 = \sqrt{2}V_{rms}$)
2. The relation between current amplitude (I_0) and average value of current (I_m) is _____ ($I_m = (2/\pi)I_0$)
3. An alternating voltage, $V=V_0 \sin\omega t$ is applied across a resistor. Current through the resistor is _____ ($I=I_0 \sin\omega t$)
4. In the case of alternating voltage applied to a resistor ____ (the current and the voltage are in phase)
5. Average power dissipated in a purely resistive ac circuit is _____ ($P = V_{rms}I_{rms}$)
6. **The average power dissipated in an ac circuit is maximum if the source is connected _____ (only to pure resistor)**
7. Power factor in a purely resistive ac circuit is ____ (1)
8. As the frequency of ac increases, resistance of resistor ____ (does not change)
9. An ac of rms value 10A is passed through a resistor for a certain time. Then a direct current of 10A is passed through the same resistor for the same time. Now, ____ (power developed in both the cases are same)
10. The equivalent dc value for an ac which produces the same heat loss in a resistor in a given time is called _____ (rms value of ac)
11. Average value of an ac for one full cycle is _____ (zero)
12. An alternating voltage, $V=V_0 \sin\omega t$ is applied across a capacitor. Current through the capacitor is _____ ($I = I_0\sin(\omega t + \pi/2)$)

13. Average power dissipated in a purely inductive/capacitive ac circuit is _____ (zero)
14. Power factor in a purely inductive/capacitive ac circuit is ____ (zero)
15. As the frequency of ac increases, capacitive reactance _____ (decreases)
16. Capacitive reactance is _____ (inversely proportional to the frequency of ac source)
17. Capacitor offers infinite reactance to _____ (direct current)
18. An alternating voltage, $V=V_0 \sin\omega t$ is applied across an inductor. Current through the inductor is ____ ($I=I_0 \sin(\omega t - \pi/2)$)
19. In the case of alternating voltage applied to an inductor: ___(the current lags behind the voltage by a phase angle of $\pi/2$)
20. As the frequency of ac increases, inductive reactance ___(increases)
21. Inductive reactance is _____ (directly proportional to the self-inductance of the inductor)
22. An Inductor offers very large reactance to ____ (very high frequency ac)
23. Reactance offered by an inductor to direct current is __(almost zero)
24. An inductor stores energy in _____ (magnetic field)
25. A capacitor stores energy in _____ (electric field)
26. In a series RLC circuit at resonance _____ (net reactance/impendance is equal to resistance)
27. In a series RLC circuit, at resonance _____ (Potential difference across inductor is equal to potential difference across capacitor)
28. In a series RLC circuit, at resonance (power factor is unity, current and voltages are in phase, impedance of the circuit is equal to resistance)
29. In a series resonance circuit, below the resonance frequency
(Capacitive reactance is greater than the inductive reactance)
30. In a series resonance circuit, above the resonance frequency
(Inductive reactance is greater than capacitive reactance)
31. In a series RLC circuit, current and power dissipated is found to be maximum, then angular frequency is equal to _____ ($\frac{1}{\sqrt{LC}}$)
32. If R is resistance, X_C is capacitive reactance, X_L is inductive reactance then impedance Z is ($\sqrt{R^2 + (X_L - X_C)^2}$)
33. When the frequency of alternating current is doubled, the impedance of an LCR circuit is _____ (decreases)
34. Current will be wattless in an ac circuit containing ____ (Inductor and capacitor)
35. If R is resistance, X_C is capacitive reactance, X_L is inductive reactance and Z is impedance of series resonance circuit, then power factor, $\cos\theta$ is _____ ($\cos\theta = R/Z$)
36. As the frequency of ac in a series RLC circuit is increased, the total impedance of the circuit, ____ (decreases up to resonance and then increases)
37. The circuit used for tuning mechanism in radio and TV sets is _____ (Series RLC resonance circuit)

38. Principle of working of a transformer is _____ (Mutual induction)
39. Transformer is a device _____ (which increases or decreases the amplitude of ac)
40. In a step-up transformer _____ (secondary voltage is more than primary and secondary current is less than primary)
41. In a step-down transformer _____ (secondary voltage is less than primary and secondary current is more than primary)
42. In a step-up transformer _____ (number of turns in the secondary are more than the number turns at the primary)
43. In a step-down transformer _____ (number of turns in the secondary are less than the number turns at the primary)
44. A DC battery is applied to the primary of a step-up transformer _____ (Voltage at the secondary will be zero)
45. In a transformer, primary and secondary are wound over a iron core. This is to _____ (reduce flux leakage loss)
46. In a transformer, eddy currents losses are minimised by ____ (laminated core)
47. In a transformer, heat loss due to resistance of wires are minimised by _____ (using thick copper wires)
48. Heat loss due to repeated magnetisation and demagnetisation of the core of a _____ (hysteresis loss)
49. Heat loss due to hysteresis in the core of a transformer can be reduced by _____ (using a material as a core for which area of hysteresis curve is least)
50. In order to reduce I^2R power loss during transmission, power is transmitted through cables _____ (at high voltage and low current)

Question No: 09 (Electromagnetic Waves)

1. A velocity of electromagnetic waves in free space is _____ ($3x10^8 ms^{-1}$)
2. One of the inconsistencies of ampere's circuital law _____ (Fails to determine magnetic field due to displacement current)
3. Which of the following rays is not an electromagnetic wave? (β- rays)
4. The part of the spectrum of the electromagnetic radiation used to cook food is ___ (microwaves)
5. The wave used by artificial satellites for communication is _____ (microwaves)
6. Which of the electromagnetic waves has smallest wavelength? (γ-rays)
7. The ultra-high frequency band of radio waves in electromagnetic wave is used as in _____ (cellular phone communication)
8. The quantity $\sqrt{\mu_0 \epsilon_0}$ represents _____ (Inverse of speed of light in vacuum)
9. Which radiation is used in the treatment of muscle pains? (Infrared rays)
10. Which of the following electromagnetic wave used in the treatment of cancer? (Gamma rays)
11. **The electromagnetic waves with lowest frequency among is _____ (radio waves)**

12. Which of the em waves has the maximum energy? (Gamma rays)
13. Which of the em waves has the minimum energy? (radio waves)
14. Which of the following laws was modified by Maxwell by introducing the displacement current? (Ampere's law)
15. What is the nature of electromagnetic waves? (Transverse wave)
16. What is the angle between electric field vector & magnetic field of electromagnetic waves? (90^0)
17. Displacement current is _____ (is the current due to time varying both magnetic field and electric field)
18. Which ray is used in photosynthesis? (UV –rays)
19. For dehydrated fruits the ray used ____ (IR –rays)
20. Fundamental source of electromagnetic wave is _____ (oscillating charged particles)
21. If the total energy of electromagnetic wave falling on the surface U. Then the total momentum delivered for complete absorption is ____ (U/c)
22. The electromagnetic theory of light failed to explain _____ (photoelectric effect)

Question No: 10 (Ray Optics & Optical Instruments)

1. The speed of light in vacuum is _____ (3×10^5 km/s)
2. The relation between focal length (f) and radius of curvature (R) of a mirror is ____ (f = R/2)
3. Mirror equation is given by _____ (f = uv/u+v & 1/f = 1/u + 1/v)
4. The position of the object to get virtual image in the case of concave mirror is _____ (Between F and P)
5. At which position of the object a concave mirror produces a magnification equal to -1 is _____ (At C)
6. The mirror which produces only a virtual and diminished image is _____ (Convex mirror)
7. The bouncing back of light after hitting any surface is called _____ (Reflection)
8. For what angle of incidence Snell's law is not valid ____ (0^0)
9. The colour of the light which has highest refractive index is _____ (Violet)
10. The colour of the light which has least refractive index is _____ (Red)
11. Due to atmospheric refraction of sunlight, the length of the day increases by about ____ (4 minute)
12. The colour which has least critical angle of incidence is ____ (Violet)
13. The colour which has highest critical angle of incidence is ____ (Red)
14. The critical angle for diamond – water interface is nearly ____ (24^0)
15. Convex mirrors are used as side view mirrors in cars because _____ (they form diminished, virtual images)
16. Virtual images are formed _____ (Behind the mirrors)
17. Refractive index is the _____ (Ratio of speeds of light & Ratio of wavelengths of light)

18. For given pair of media, if angle of incidence is increased then refractive index _____ (remains same)
19. The one which has lowest refractive index is ____ (Vacuum)
20. When light travel from air to glass, frequency ____ (remains same)
21. For critical angle of incidence, Angle of refraction is ____ (90^0)
22. Total internal reflection of a ray of light is possible when the _____ (ray of light goes from denser medium to rarer medium and angle of incidence is greater than critical angle)
23. Principle of optical fibre is ____ (Total internal reflection)
24. dioptre is equivalent to ____ ($meter^{-1}$)
25. The power of lens is –4D. It is a _____ (concave)
26. Deviation produced by a thin prism is _____ ((n-1) A)
27. **A ray of light coming from an object which is incident parallel to the principal axis of a convex lens placed in air after refraction _____ (converges at principal focus)**
28. The nature of the image produced by concave lens is _____ (Virtual and diminished)
29. At which position of the object, a convex lens produces a magnification of – 1? (At 2F)
30. At which position of the object, a convex lens produces an enlarged real image? (Between F & 2F)
31. The SI unit of power of a lens is ____ (diopter)
32. Magnification produced by simple microscope is given by ____ (1 + D/f)
33. Magnification produced by a compound microscope is ____ $((L/f_0)(D/f_e)$
34. Magnification produced by a telescope is ___ (f_0/f_e)
35. The length of a telescope in normal adjustment is ____ $(f_o + f_e)$
36. The final image formed by compound microscope is _____ (Inverted and Enlarged)
37. Angle of a prism is ____ $(r_1 + r_2)$
38. A convex lens is will act like a simple microscope _____ (when the object is within the focus)
39. Image formed by a simple microscope is _____ (enlarged, virtual and erect)
40. To increase the magnifying power of telescope _____ (focal length of eyepiece must be decreased)
41. When the length of microscope tube increases, its magnifying power _____ (increases)
42. Advantages reflecting telescopes over refracting telescopes are_____ (Reflecting telescopes use concave mirrors which are lighter compared to lenses, reflecting telescopes use concave mirrors which are free from chromatic aberration, It is easy to mount concave mirrors as compared to lenses in refracting telescopes)
43. Cassegrain telescope is a ___ (reflecting telescope)

Question No: 11 (Wave Optics)

1. Corpuscular model of light was first given by _____ (Descartes)
2. According to Huygens constructions, the speed of the secondary wavelets is _____ (Same as the wave)
3. The source of the plane wave is _____ (Source at large distance)

4. Two sources of waves are called coherent if____ (same frequency & constant phase difference)
5. The nature of the refracted wave front from a prism when the incident wave front is plane is _____ (Plane wave making angle with the incident wave)
6. The nature of the refracted wavefront from a convex lens when the incident wavefront is plane is _____ (spherical wave)
7. Coherent waves refers to wave of _____ (Constant phase difference)
8. Two coherent sources of light can be obtained by _____ (Two slits illuminated by a same source)
9. Path difference b/w coherent waves for constructive interference must be ____ ($n\lambda$)
10. The expression for the fringe width is _____ ($\beta = \lambda D/d$)
11. The distance at which an nth bright fringe formed is _____ ($X_n = n\lambda D/d$)
12. The distance at which an nth dark fringe formed is ____ ($X_n = (2n+1)\lambda D/2d$)
13. If the distance between the slit and the screen is increased, what happens to fringe width _____ (Increases in proportion to the distance)
14. If the monochromatic source is replaced by another source of shorter wave length, the fringe width _____ (decreases)
15. If the monochromatic source is replaced by white light the central fringe will be ____ (white)
16. The colours seen when CD is viewed is due to _____ (diffraction)
17. If D is the distance between slit and screen, 'a' width of the slit illuminated by a monochromatic source, the width of the central diffraction maxima is given by _____ ($2\lambda D/a$)
18. Interference and diffraction fringes are consistent with _____ (conservation of energy)
19. If the monochromatic source is replaced by white light the central fringe in diffraction will be ____ (white)
20. Polarization is the phenomenon of light based on _____ (transverse electromagnetic nature)
21. Polaroids are used to produce _____ (polarised light)
22. The relation $I = I_0 \cos^2\theta$ (Where the symbols have their usual meaning) is _____ (Malus' law)
23. The intensity of the emergent beam will be zero if the pass axis of two polaroids are ____ (only when perpendicular to each other)
24. If the intensity varies b/w maximum and minimum but not completely dark when viewed through analyser Polaroid is called _____ (partially polarized light)
25. A point source of light produce _____ (spherical wavefront & plane wavefront)
26. Path difference for second minima in diffraction pattern a single slit _____ (2λ)
27. **If unpolarised light of intensity I_0 is passed through a polaroid, the intensity of emergent light is _____ ($I = I_0\cos^2\theta$)**

Question No: 12 (Dual Nature of Radiation & Matter) {HOTS}

1. Work function is the energy required _____ (to eject an electron just out of the surface)
2. Photoelectric effect is based upon _____ (energy)
3. The photoelectric effect occurs only when the incident light has more than certain minimum _____ (frequency)

4. The maximum number of photo electrons released in a photocell is independent _____ (frequency of the incident ray)
5. Intensity of light incident on photo sensitive surface is doubled then _____ (the number of emitted electrons is doubled)
6. If the frequency of light in photoelectric experiment is doubled, the stopping potential will _____ (become more than doubled)
7. The best metal to be used for photo emission is _____ (cesium)
8. de Brogile wavelength depends on the mass and energy according to the relation ____ (mass x energy)$^{-1/2}$
9. The incident photon involved in the photoelectric effect experiment _____ (completely disappears)
10. The kinetic energy of Photoelectron is directly proportional to _____ (the difference between the frequency of the incident light and the threshold frequency)
11. If wavelength of an electron and a photon is same then they will have same _____ (momentum)
12. A proton and an electron move with a same velocity. The associated wavelength for proton is ____ (shorter than that of the electron)
13. Which of the following has the largest de Brogile wavelength if they are moving with the same velocity? (beta particle)
14. For a given metal, the maximum kinetic energy of emitted electrons in a photoelectric effect does not depend upon _____ (intensity)
15. If an electron and a proton have the same de Broglie wavelength, then the kinetic energy of the electron is _____ (more than that of the proton)
16. In photoelectric effect, the number electrons ejected per second is directly _____ (proportional to the intensity of the light)
17. For a given photosensitive material (above threshold frequency) the photoelectric current is directly proportional to the _____ (frequency of incident light)
18. **The following are the statements related to photo emission;**
    - **(i) Photoelectric current is independent of intensity of incident radiation**
    - **(ii) Stopping potential is different for different photosensitive metal surfaces for a radiation of particular frequency ($f > f_0$)**
    - **(iii) Maximum speed of photoelectrons is independent of frequency of incident radiation**
    - **(iv) Saturation current is different for radiations for different intensities having same frequency**

    (Only (ii) & (iv) are correct)
19. Light of certain frequency and intensity incident on photosensitive material causes photoelectric effect. If both the frequency and intensity are doubled the photoelectric current becomes ____ (doubled)

20. When green light is made incident on a metal, Photo electrons are emitted by it but no photo electrons are obtained by yellow light. If red light is made to incident on that metal then _____ (no electron will be emitted)
21. When yellow light is incident on a surface, no electrons are emitted while green light can emit. If red light is incident on the surface then, _____ (no electrons are emitted)
22. The value of e/m was found to be independent of _____ (nature of the metal used as the cathode & gas introduced in the discharge tube)
23. The waves associated with material particles in motion are called _____ (matter waves)
24. λ_e, λ_p, λ_α are the de-brogile wavelengths of electron, proton & α – particle. If all are accelerated by the same potential then, _____ ($\lambda_e > \lambda_p > \lambda_\alpha$)
25. When a metallic surface is illuminated with radiation of wavelength λ, the stopping potential is V. If the same surface is illuminated with radiation of wavelength 2λ, the stopping potential is V/4. The threshold wavelength for the metallic surface is _____ (3λ)
26. Photons are electrically _____ (neutral)
27. The minimum negative potential applied to the anode to just stop the photo emission from cathode is called _____ (stopping potential)
28. The maximum wavelength of the incident radiation above which there is no photo emission is called as _____ (threshold wavelength)
29. The wavelength of matter waves is known as ____ (de Brogile wavelength)
30. The photoelectric effect is based on the law of conservation of ____ (energy)
31. The phenomenon of photoelectric emission was discovered by _____ (Heinrich Hertz)
32. Which of the followings is the type of electron emission? (Thermionic emission, field emission & Photoelectric emission)
33. The work function depends on the _____ (properties of the metal & the nature of metal surface)
34. _____metal has highest work function of 5.65eV (platinum)
35. Dual nature of matter is proposed by _____ (louis de Brogile)
36. Photoelectric current is directly proportional to _____ (intensity of incident radiation)
37. Photoelectric current depends on _____ (Intensity & Potential of the collector plate)

Question No: 13 (Atoms)

1. Who proposed plum pudding model of an atom? (J.J Thomson)
2. Planetary model of the atom was proposed by ___ (Rutherford)
3. Thomson's plum pudding model of atom was discarded because _____ (the model failed explain the results of Rutherford's alpha-particle scattering experiment)
4. In alpha-particle scattering experiment, it is found that ____ (Most of the alpha-particles are scattered at small angles and very few deflected backwards)
5. In Rutherford's alpha-particle scattering experiment, alpha particles were bombarded towards gold foil because _____ (gold nucleus is much heavier than alpha-particle, Gold is highly malleable and can be drawn into very thin sheet)

6. In Rutherford's alpha-particle scattering experiment, distance of closest approach is ____ (10^{-14}m)
7. Inside the nucleus of an atom, _____ (Almost all the mass of an atom is concentrated, Entire positive charge is distributed & Nuclear force exists)
8. Perpendicular distance between the initial velocity direction of alpha particle and center of the nucleus is called _____ (impact parameter)
9. In Rutherford's alpha-particle scattering experiment, when impact parameter is zero _____ (Angle of scattering is 180^0)
10. According to classical electromagnetic theory, path of an electron orbit around the nucleus will be _____ (spiral)
11. According to Rutherford's model, nucleus of an atom is _____ (positively charged)
12. According to Rutherford's model, centripetal force for the electron moving round the nucleus is provided by _____ (electrostatic force of attraction between positively charged nucleus and negatively charged electron)
13. When an electron revolves round the nucleus, _____ (Its electrostatic potential energy is negative and kinetic energy is positive)
14. Rutherford's nuclear atom model failed to explain _____ (Stability of the atom)
15. According to Bohr's postulates, angular momentum of an electron in its orbit around a nucleus is equal to _____ (equal to an integral multiple of $h/2\pi$)
16. According to Bohr's hydrogen atom model, the radius of the n^{th} stationary orbit of electron is proportional to _____ (n^2)
17. According to Bohr's hydrogen atom model, the radius of first, second and third electron orbits are in the ratio _____ (1:4:9)
18. According to Bohr's hydrogen atom model, as long as electron moves in a stationary orbit, _____ (Electron does not lose energy)
23. According to Bohr's hydrogen atom model, as the electrons move to outer orbits _____ (speed of electrons decreases)
24. Orbital velocity of electron in a stationary n^{th} orbit is given by _____ ($v = e^2/2\epsilon_0 nh$)
19. Radius of the first orbit of hydrogen atom is (in angstroms) ___(0.529)
20. Total energy of an electron revolving round in a stationary orbit around hydrogen nucleus is ____ (always negative)
21. Energy of an electron in the ground state of hydrogen atom is ___(-13.6eV)
22. **The minimum energy required to free the electron from the ground state of a hydrogen atom is _____ (ionization energy = 13.6eV)**
23. The ionization potential of hydrogen atom is _____ (13.6V)
24. According to Bohr's hydrogen atom model, as the electrons move to outer orbits, its total energy _____ (increases)

25. According to Bohr's hydrogen atom model, the total energy of electron in n^{th} stationary orbit is proportional to _____ ($1/n^2$)
26. Energy required to excite an electron from lower energy state to higher energy state is called _____ (Excitation energy)
27. Bohr's hydrogen atom model fails in explaining _____ (intensity of different spectral lines of hydrogen atom)
28. Bohr's hydrogen atom model successfully explained _____ (wavelength of different series of hydrogen spectrum)
29. The series of hydrogen spectrum is _____ in the visible region. (Balmer series) {Similarly remember for regions of all other spectral series}

Question No: 14 (Nuclei)

1. Strongest force in nature is _____ (strong nuclear force)
2. Atomic number of a nucleus represents _____ (number of protons)
3. Mass number of a nucleus represents _____ (number of nucleons)
4. Difference between mass number and atomic number of a nucleus represents _____ (number of neutrons)
5. If Z represents atomic number and A represents mass number of a nucleus, then charge of the nucleus is _____ here e=magnitude of charge of electron (+Ze)
6. Volume of a nucleus is directly proportional to _____ (atomic mass)
7. If A is the mass number, radius of a nucleus is _____ (directly proportional to $A^{1/3}$)
8. Radius of a nucleus of mass number A is given by (Ro is a constant) _____ ($R=R_oA^{1/3}$)
9. If R_1 and R_2 are radii of the atomic nuclei of mass numbers 64 and 125 respectively, then the ratio R_1/R_2 is ____ (4/5)
10. If Z is atomic number, A is mass number, m_p is mass of proton, m_n is mass of a neutron, then mass defect (Δm) is ____ ($\Delta m= Zm_p + (A-Z)m_n$)
11. Density of a nucleus is _____ (independent of mass number)
12. Mass defect is ____ (The difference in actual mass of a nucleus and its sum of mass of constituents nucleons)
13. Density of a nucleus is about _____ ($2.29x10^{17}kgm^{-3}$)
14. Among the following atoms, select the isotopes _____ ($^{35}Cl_{17}$; $^{37}Cl_{17}$)
15. Among the following atoms, select the isotones _____ ($^{39}K_{19}$; $^{37}Cl_{17}$)
16. Among the following atoms, select the mirror nuclei ___ ($^{7}Be_{4}$; $^{7}Li_{3}$)
17. Among the following atoms, select the isobars ___ ($^{14}C_{6}$; $^{14}N_{7}$)
18. Charge of a nucleus _____ (is positive)
19. Deuterium and tritium are example for _____ (isotopes)
25. 1 atomic mass unit is equal to ____ ($1.66x10^{-27}kg$)
26. 1 atomic mass unit is equal to _____ (1/12 mass of the one C-12 atom)

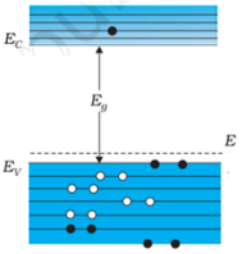
27. Nuclear binding energy is the ____ (energy equivalent of mass defect, energy required to form a nucleus starting from individual nucleons, energy required to break a nucleus into constituent nucleons)
28. Energy equivalent of 1 atomic mass unit is _____ (931.5 MeV)
29. Atomic mass can be determined using _____ (Mass spectrograph)
30. Neutron was discovered by _____ (James Chadwick)
31. Select the wrong statement regarding to neutrons
    (a) neutrons are electrically neutral
    (b) two neutrons inside the nucleus experience nuclear force.
    (c) two neutrons inside the nucleus experience electrostatic force of repulsion
    (d) Neutron is stable inside the nucleus and a free neutron outside the nucleus is unstable.
32. According to Einstein, energy equivalent of mass m is _____ here c is speed of light in vacuum ($E = mc^2$)
33. Energy equivalent of 1kg mass is _____(9×10^{16}J)
34. The energy equivalent of mass defect of a nucleus is ____ (binding energy)
35. According to binding energy curve, which one of the following elements is less stable? (elements with less mass number)
36. Binding energy per nucleon is the _____ (the ratio of the binding energy of a nucleus to the number of the nucleons)
37. Select the true statement
    (a) Nuclei having highest binding energy are most stable
    (b) Nuclei having least binding energy are most stable
    (c) Nuclei having highest binding energy per nucleon are most stable
    (d) Nuclei having least binding energy per nucleon are most stable.
38. Which of the pair of particles cannot experience nuclear force between them? (proton & electron)
39. Select the statement which is not true.
    (a) nuclear force is short range and saturated.
    (b) nuclear force can exist between electrically neutral neutrons.
    (c) nuclear force is charge independent, strongest force.
    (d) nuclear force varies as the square of the distance between nucleons.
40. The force that acts like centripetal force for the electron revolving round the nucleus is _____ (Electrostatic force)
41. Radioactivity was discovered by _____ (Henry Becquerel)
42. Which is not found during radioactive decay? (emission of X – ray)
43. **The radioactive decay in which a helium nucleus is emitted is called _____ (α decay)**
44. Alpha-particles found during radioactive decay process _____ (are positively charged)
45. Alpha-particles found during radioactive decay process ____ (contain 2 protons and 2 neutrons)

46. β^--particles found during radioactive decay process _____ (are negatively charged)
47. β^+ particles found during radioactive decay process _____ (are positively charged)
48. Gamma-decay of radioactivity involves _____ (electromagnetic radiations)
49. The process in which two lighter nuclei combine together to form a heavier nucleus is called _____ (nuclear fusion)
50. During nuclear fission process _____ (mass is converted into energy)
51. In nuclear bomb ____ (uncontrolled fission chain reaction is carried out)
52. Nuclear reaction occurring stars is _____ (fusion reaction)
53. Which among the following is not a nuclear phenomenon?
    (a) Radioactivity (b) fission chain reaction
    (c) emission of light during electron transition
    (d) fusion
54. Which one of the following is also called thermonuclear reaction?
    (a) Fission reaction (b) fusion reaction
    (c) Radioactivity (d) β^- decay

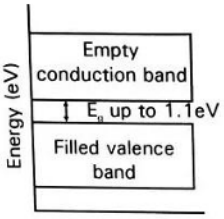
Question No: 15 (Semiconductor Electronics)

1. In semiconductors at room temperature (The valence band is partially empty and the conduction band is partially filled)
2. In the insulators _____ (The conduction band is empty and the valence band is filled with electrons)
3. Example for elemental semiconductor is ___ (silicon)
4. The resistivity range of metals is ____ ($10^{-2} - 10^{-8}$ Ωm)
5. In n-type semiconductor the electron concentration is equal to ___ (number of donor atoms)
6. In a n- type semiconductor, the Fermi energy level lies ___ (In the forbidden energy gap nearer to the conduction band)
7. An n- type and p-type silicon can be obtained by doping pure silicon respectively with __ (Phosphorous and indium)
8. The element that can be used as acceptor impurity to dope silicon is ____ (boron)
9. Among the following, the wrong statement in the case of semiconductor is ____ (At absolute zero temperature it behaves like a conductor)
10. Band gap in insulator is of the order ____ (6 eV)
11. In p- type semiconductor conduction is due to _____ (Greater number of holes and less number of electrons)
12. In n- type semiconductor conduction is due to _____ (Greater number of electrons and less number holes)
13. With increase in temperature in an intrinsic semiconductor the ratio of conduction electrons and holes is ____ (1 : 1)

14. To obtain n- type extrinsic semiconductor, the impurity element to be added to germanium should be of valence ____ (5)
15. To obtain p- type extrinsic semiconductor, the impurity element to be added to germanium should be of valence ____ (3)
16. The majority carriers in a p-type semiconductor are ____ (holes)
17. On increasing reverse voltage in a p-n junction diode the value of reverse current will ____ (first remains constant and then suddenly increase)
18. p-n junction in forward bias behaves like ____ (an on switch)
19. When p-n junction is forward biased, the current across the junction is mainly due to ____ (diffusion of charges)
20. **According to band theory of solids, this energy diagram corresponds to _____ (indium)**



21. The thickness of depletion layer is approximately _____ (1 μm)
22. The diffusion current in a p-n junction is greater than the drift current when the junction is ___ (forward biased)
23. When a junction diode is reverse biased, the current called drift current is due to _____ (minority charge carriers of both n and p sides)
24. Among the following one statement is not correct when a junction diode is in forward bias _____ (electron on n-side and holes on p-side will move away from junction)
25. When p-n junction is reverse biased, as bias voltage increases, the thickness of the depletion layer (increases)
26. According to band theory of solids, this energy diagram corresponds to, _____ (silicon)



Part – A (Fill in the blanks – 1 mark each)

Question No: 16 (Moving Charges & Magnetism)

1. The magnitude of _____ field at a point due to current element is directly proportional to the current in the current elements (magnetic)
2. The resistance of ideal voltmeter is _____ (infinity)
3. Magnetic field can be produced by _____ (moving charge)
4. The product of current produced in a loop and area of the loop gives _____ (magnetic moment)
5. There is a force of _____ between two straight parallel conductors carrying current in the same direction (attractive)
6. The radius of curvature of the circular path of charged particle in a uniform magnetic field is directly proportional to _____ (mass & velocity)

7. Resistance of an ideal voltmeter is _____ (infinite)
8. Resistance of an ideal ammeter is _____ (zero)
9. To convert galvanometer into voltmeter one should connect _____ (high resistance in series with galvanometer)
10. A galvanometer is converted into ammeter by connecting a _____ (low resistance in parallel with galvanometer)
11. Force on a charged particle moving in s magnetic field is maximum when the angle between the velocity of the charge and the magnetic field is _____ (90^0)
12. A neutron moves with a uniform velocity at an angle of 90^0 to a uniform magnetic field. Its path will be _____ (straight line)
13. A charged particle moves perpendicular to a magnetic field. Its path is _____ (circle)
14. Magnetic field due to an infinitely long solenoid is _____ (uniform along the axis of the solenoid)
15. Magnetic field due to an infinitely long straight current carrying wire at a distance r from its axis within the wire is _____ proportional to r (directly)
16. Magnetic field due to an infinitely long straight current carrying wire at a distance r outside is _____ proportional to r (inversely)
17. **A convenient way to increase Sensitivity of a galvanometer is to _____ number of turns in the coil (increase)**
18. Range of an ammeter can be increased by _____ the value of shunt resistance (decreasing)

Question No: 17 (Electromagnetic Induction)

1. The current element which opposes the change in the current flowing through it is _____ (inductor)
2. Magnetic flux is _____ quantity (Scalar)
3. SI unit of magnetic flux is _____ (weber)
4. Magnetic flux linking conductor can be change by _____ changing (magnetic field, area, orientation)
5. If N is number of turns in a solenoid then self-inductance varies as ____ (N^2)
6. _____ states that "The polarity of induced emf is such that it tends to produce a current which opposes the change in magnetic flux (Lenz's law)
7. According to Lenz/s law the direction of induced emf is _____ to the cause (opposite)
8. Self-inductance of the coil depends on ____ of the medium (permeability)
9. **The device used to convert mechanical energy into electrical energy is called a _____ (generator)**
10. To make the field _____ the magnetic pole pieces are made curved in an ac generator (radial)

Question No: 18 (Wave Optics)

1. A wavefront is the locus of all points vibrating in ____ phase (same)
2. A point source at finite distance is the source of _____ waves (spherical)
3. According to Huygens construction the amplitude of the secondary wavelet is _____ in backward direction (zero)
4. The physical quantity which remains same when a wave gets refracted from one medium to another of different optical density is _____ (frequency)
5. The nature of the reflected plane wavefront from a concave mirror is a _____ wavefront (spherical)
6. When a point source of light is placed at the principal focus of a convex lens, the shape of the emergent wavefront is _____ (plane)
7. The superposition of two coherent wave resulting in zero intensity is called _____ (destructive interference)
8. The path difference between two coherent waves resulting in destructive interference is ___multiple of λ/2 (odd)
9. The alternate dark and bright bands of equal width and intensities resulting due to superposition are called _____ (interference fringes)
10. The distance between two consecutive bright or dark fringe is called ____ (fringe width)
11. The fringe width in Young's double slit experiment is directly proportional to _____ (distance between the slits)`
12. **If two waves coming from two coherent sources superpose at a point in phase, then the intensity of light at that point is _____ (maximum)**
13. Central fringe in the interference pattern is a ____ fringe (bright)
14. Fringes of unequal intensities and width are referred as _____ pattern (diffraction)
19. Polaroids can be used for _____ (3D movie camera)
20. _____ is a device used to produce and analyze plane-polarised light (Poloroid)

Question No: 19 (Nuclei)

1. The difference between the sum of the masses of the nucleons forming the nucleus and the rest mass of the nucleus is called _____ (mass defect)
2. Atoms of nuclei having same number of protons but different mass number are called _____ (isotopes)
3. Atoms of two nuclei having same number of neutrons are called _____ (isotones)
4. Atoms of two nuclei having same atomic mass but proton and neutron number interchanged are called _____ (mirror nuclei)
5. Atoms of two nuclei having same atomic mass but different atomic number are called _____ (isobars)
6. A nuclear process is represented as $^{238}U = {}^{234}Th_{92} + X_{90}$ unkown element X is _____ (Helium)

7. All nuclei have same _____ (nuclear density)
8. Antiparticle of electron is _____ (positron)
9. Emission of β^- particle results in _____ of atomic number by one (
10. Function of moderator in a nuclear reactor is to _____ fast neutrons (slowdown)
11. Nuclear force does not depend on upon _____ (charge on nucleons)
12. Nuclear forces are charge _____ (independent)
13. **The source of energy output in the interior of stars is _____ (fusion)**
14. The energy released per fission reaction of nuclei like uranium is of the order of _____ (200MeV)
15. The process of combing the two light nuclei in to single nucleus is _____ (fusion)
16. The average energy required to release a nucleon from the nucleus is called _____ (binding energy)

    {Read & understand "Properties of Nuclear forces}

Question No: 20 (Semiconductor Electronics)

1. The gap between the top of the valence band and bottom of the conduction band is called _____ (energy band gap)
2. Extrinsic semiconductors are _____ form of semiconductors (impure)
3. The energy band gap in the case of insulators is greater than _____ (3eV)
4. The level formed due to impurity atom, in the forbidden energy gap, very near to the valence band in p – type semiconductor is called ____ level (acceptor)
5. The atoms in a semiconductor are bonded by _____ bond (covalent)
6. n – type semiconductor is obtained by doping a pure form of semiconductor with _____ impurity (pentavalent)
7. Process of adding impurity to pure semiconductor is called _____ (doping)
8. The band energy gap between valence and conduction band in conductors is _____ (zero)
9. Conductivity of pure semiconductor is increased, the number of charge carriers will _____ (increase)
10. When electric field across a semiconductor is increased, the number of charge carriers will ____ (increase)
11. In intrinsic semiconductor, at room temperature, the number of electrons and holes will be _____ (equal)
12. Majority charge carriers in n – type semiconductor is _____ (electron)
13. Rectification is a process of converting alternating current into _____ current (direct)
14. The output of a rectifier is pulsating but _____ (unidirectional)
15. **The width of depletion region of a pn junction diode will _____ on increasing the forward bias voltage (decrease)**
16. pn junction under _____ bias acts as an open switch (reverse)
17. The region of immobile positive and negative ions in a semiconductor is called ____ region (depletion)

18. The potential in the depletion region is due to _____ (ions)
19. The diode is said to be biased, when an _____ potential difference is applied (external)

Part – B (SA – 2 marks each)

Question No: 21 (Electric Charges & Fields)

(1) **Mention any two properties of electric charge.**
(2) Name the methods of electrifications
(3) Define electric field. Mention its SI unit.
(4) Draw the electric field lines for (a) a single point charge (positive & negative) (b) dipole or two equal & opposite charges (d) two equal positive charges
(5) What is the direction of electric field due to a point (a) positive charge and (b) negative charge?
(6) Write Coulomb's law in vector notation and explain it.
(7) Explain the principle of superposition to calculate the force between multiple charges
(8) Define electric flux and write the SI unit.
(9) When a dipole placed in a uniform electric field does is said to be in (a) stable & (b) unstable equilibrium?

Question No: 22 (Electrostatic Potential & Capacitance)

(1) Define electric potential at a point due to a point charge. Write the expression for the same.
(2) **The amount of work done in bringing a point charge of 3mC from infinity to a point P is 0.06J. Find the electric potential at the point P.**
(3) A point charge +4nC is placed in free space. Determine the electric potential at a distance of 9m from the point charge.
(4) What is an equipotential surface? Give an example. (Mention the shape of equipotential surface due to a single isolated charge)
(5) Can two equipotential surfaces intersect each other? Justify your answer.
(6) Draw equipotential surfaces for: (i) a positive point charge. and (ii) an electric dipole.
(7) Write any two properties of equipotential surfaces.
(8) Write the relation between electric field and electric potential. What does negative sign indicate in the equation?
(9) Write any two properties of electrostatics of conductors.
(10) Calculate the potential energy of a system of two charges 2μC and 3μC separated by a distance of 0.2m.
(11) What are polar dielectrics? Give an example.
(12) What are non-polar dielectrics? Give an example.
(13) Distinguish between polar and non-polar molecules.
(14) Calculate the capacitance of parallel plate capacitor having cross section area of 6×10^{-3} m^2 separated by distance of 3mm filled in air.

(15) A parallel plate capacitor has a capacity C. The separation between the plates is doubled and a dielectric medium is introduced between the plates. If the capacity now becomes 2C, find the dielectric constant of the medium

Question No: 23 (Moving Charges & Magnetism)

(1) Mention an expression for force on charge moving in uniform magnetic field and explain the terms?

(2) When is the force acting on a charged particle moving in magnetic field (a) maximum & (b) minimum?

(3) Write the expression for force acting on a current carrying conductor placed in magnetic field & explain the terms.

(4) **Write the expression for magnetic force per unit length between two long straight parallel conductors carrying current. Give the nature of force between two parallel conductors carrying current in the same direction.**

(5) Write the expression for torque experienced by a current loop placed in a magnetic field and explain the terms.

(6) What is the trajectory of a charge particle when it enters the magnetic field at an angle $\theta = 0^0$ and $\theta = 90^0$?

(7) Mention the nature of trajectory of a charged particle moving (a) parallel & perpendicular to the direction of uniform magnetic field.

(8) Write the expression for Lorentz force and explain the terms.

(9) Express Biot-Savart's law in vector form and explain the term.

(10) State and explain Ampere's circuital law.

(11) What is Solenoid? Write the expression for magnetic field at a point well inside a solenoid.

(12) A solenoid made of 1000 turns per unit length carries a current of 5A. What is the magnitude of the magnetic field inside the solenoid?

(13) How does the magnetic field at a point inside an air cored solenoid change with the (i) number of turns per unit length and (ii) strength of the current in the solenoid?

(14) Mention the factors on which current sensitivity of a galvanometer depends on.

(15) Distinguish between ammeter and voltmeter.

Question No: 24 (Magnetism & Matter)

(1) Define magnetization of a sample mention its SI unit.

(2) Define: (a) Magnetic intensity (b) Magnetic permeability.

(3) **State and explain Gauss's law in magnetism.**

(4) Define magnetic susceptibility of a magnetic material. Mention its expression.

(5) What is Magnetic permeability? For which material magnetic susceptibility is low and positive.

(6) What are diamagnetic substances? Give an example.

(7) What are paramagnetic substances? Give an example.

(8) What are ferromagnetic substances? Give an example.

(9) Draw the filed lines due to an external magnetic field near a (a) diamagnetic material & (b) paramagnetic material.

(10) What is Meissner effect?

Question No: 25 (Electromagnetic Induction)

(1) Define magnetic flux. Mention its SI unit.

(2) Write the expression for magnetic flux through a surface. When it is maximum?

(3) State and explain Faraday's law of Electromagnetic Induction.

(4) Define coefficient of self-induction. Mention its SI unit.

(5) On what factors does self-inductance of a coil depends?

(6) **Mention any two factors on which self-inductance of a long solenoid depends.**

(7) Define coefficient of mutual induction. Mention its SI unit.

(8) On what factors does mutual inductance of a coil depends?

(9) Write an expression for mutual inductance of two long solenoids of same length and explain the terms.

(10) Write the expression for self-inductance in terms of geometry of the coil and explain the terms.

(11) The current in a coil falls from 25mA in 2ms and induces an emf of 10V in it. Find the self-inductance of a coil?

(12) Draw a neat labeled diagram of ac generator.

(13) What is AC generator? Mention its principle.

Question No: 26 (Alternating Current)

(1) What is an alternating current? Represent alternating current graphically.

(2) Define: (i) phase and (ii) frequency of AC.

(3) Give the relation between mean value and rms value of AC.

(4) Write the expression for average power dissipated per cycle of an AC in resistor and explain the terms.

(5) Define inductive reactance and mention its SI unit.

(6) Define capacitive reactance and mention its SI unit.

(7) Distinguish between inductive reactance and capacitive reactance.

(8) Define impedance of an AC circuit. Mention its SI unit.

(9) Write the expression for resonant frequency and explain the terms.

(10) Mention the expression for quality factor and explain the terms.

(11) On what factors does the power factor of an AC circuit depends?

(12) Mention the salient features of series LCR circuit at resonance.

(13) What is wattles current? Give an example.

(14) Mention the expression for the frequency of LC oscillations and explain the terms.

(15) What is transformer? Mention its principle.

(16) **Briefly explain the construction of transformer.**

(17) Mention the sources of energy loss in a transformer.

(18) Mention any two applications of transformer.

Question No: 27 (Electromagnetic Waves)

(1) What is an electromagnetic wave? Write an expression for the speed of em – waves/What is an electromagnetic wave? Write an expression for the speed of em – waves in term of permeability.

(2) Write any four properties of electromagnetic waves.

(3) Mention the source of an electromagnetic wave?

(4) Give two uses of all electromagnetic waves.

(5) What is displacement current? Mention the need for displacement current.

(6) **What is displacement current? Give the expression for the same.**

(7) Write Maxwell's equation for the speed of electromagnetic waves and explain the terms.

Question No: 28 (Ray Optics)

(1) State laws of reflection of light.

(2) State laws of refraction of light.

(3) Mention Lens Maker's formula and explain the terms.

(4) Draw ray diagram of a simple microscope for image formation at least distance of distinct vision.

(5) Draw ray diagram showing the image formation in a compound microscope and label the parts.

(6) Draw the ray diagram of a reflecting/refracting telescope and label the parts.

(7) **Write the conditions for total internal reflection**

(8) Define the terms magnification and magnifying power of an optical instrument.

(9) Draw the diagram of total reflecting prisms which bends the image (a) through 90^0 (b) through 180^0

{Practice ray diagrams of mirrors & lens}

Question No: 29 (Semiconductor Electronics)

(1) **On the basis of energy band diagram, distinguish between conductors, insulators and semiconductors.**

(2) Give an example each for an elemental semiconductor and a compound semiconductor.

(3) Distinguish between extrinsic and intrinsic semiconductors.

(4) Discuss the formation of n-type semiconductors.

(5) Discuss the formation of p-type semiconductors.

(6) Give any two/three differences between n-type and p-type semiconductors.

(7) Distinguish between forward bias and reverse bias.

(8) Draw current-voltage characteristics curve for forward bias & reverse bias

(9) Define the terms: (a) cut in voltage (b) breakdown voltage and (c) reverse saturation current.

PART – C (SA – 3 marks each)

Question No: 30 (Electric Charges & Fields)

(1) Mention any three properties of electric charges.
(2) **State and explain Coulomb's law. Define '1 coulomb'.**
(3) Using superposition principle, find the resultant force on a charge due to multiple charges.
(4) Write any three properties of electric field lines.
(5) Derive an expression for torque on an electric dipole.
(6) State and explain Gauss's law in electrostatics.
(7) Using Gauss's law, obtain an expression for the electric field due to an infinitely long straight uniformly charged conductor.

Question No: 31 (Electrostatic Potential & Capacitance)

(1) What is electrostatic shielding? Mention one application of electrostatic shielding.
(2) **Obtain the expression for potential energy of an electric dipole placed in a uniform electric field**
(3) Derive the relation between electric field and electric potential due to a point charge
(4) Mention the factors on which the capacitance of a parallel plate capacitor depends.

Question No: 32 (Current Electricity)

(1) State & explain Ohm's Laws
(2) **Mention any three limitations of Ohm's Law**
(3) Draw graphs showing variation of resistivity with temperature for (a) copper, (b) nichrome and (c) a semiconductor.
(4) Derive an expression for drift velocity of free electrons in a conductor.
(5) Obtain an expression for current in terms of drift velocity.

Question No: 33 (Moving Charges & Magnetism)

(1) Write the expression for the force acting on a charge moving in a uniform magnetic field and explain the terms.
(2) Mention the nature of a trajectory of the charged particle which is moving (i) parallel and (ii) perpendicular to the magnetic field.
(3) **Obtain the expression for radius of circular path of charged particle in a magnetic field.**
(4) Using Ampere's circuital law, derive the expression magnetic field at point to a long current carrying conductor.
(5) Derive an expression for torque acting on a rectangular current loop in a uniform magnetic field.
(6) Explain with circuit diagram how to convert galvanometer into an ammeter.
(7) Explain with the circuit diagram how to covert galvanometer into voltmeter.
(8) Differentiate between voltmeter & ammeter.

Question No: 34 (Magnetism & Matter)

(1) Mention any three properties of magnetic field lines.
(2) Write the expression for torque experienced by a magnetic dipole when placed in an external magnetic field & write the conditions for maximum & minimum torque.
(3) Derive an expression for potential energy of a bar magnet when placed in an external magnetic field.
(4) What are diamagnetic, paramagnetic & ferromagnetic materials?
(5) **Write any three differences between diamagnetic & ferromagnetic materials and paramagnetic & diamagnetic materials.**
(6) Write any three properties of diamagnetic materials.
(7) Write any three properties of paramagnetic materials.
(8) Write any three properties of ferromagnetic materials.

Question No: 35 (Electromagnetic Induction)

(1) **Explain briefly an experiment with a coil and magnet to demonstrate the phenomenon of electromagnetic induction.**
(2) Explain briefly an experiment with a coil and coil to demonstrate the phenomenon of electromagnetic induction.
(3) State and explain Lenz's law for induced emf of Electromagnetic Induction.
(4) Derive an expression for motional emf, induced across the end of a conducting rod moving in a uniform perpendicular magnetic field.
(5) Derive an expression for self-inductance of a solenoid.
(6) Obtain the expression for energy stored in an inductor.

Question No: 36 (Ray Optics)

(1) **Write the Cartesian sign conventions used in analyzing reflection of light by spherical mirrors.**
(2) What is refraction of light? State the laws of refraction of light.
(3) Obtain the relation between radius of curvature and focal length.
(4) Mention three applications of total internal reflection of light.
(5) Derive the expression for the effective focal length of two thin lenses kept in contact.
(6) What is reflecting telescope? Name any two advantages of reflecting telescope over refracting telescope.

Question No: 37 (Atoms)

(1) Explain briefly the observations of Geiger Marsden's experiment on scattering of alpha particle experiment on scattering of alpha particles by a nucleus.
(2) Write a note on emission spectra.
(3) Write a note on absorption spectra.
(4) State Bohr's postulates of hydrogen atom.
(5) **Give the de-Broglie's explanation of Bohr's second postulate**

(6) Sketch the energy level diagram for hydrogen atom.

(7) Name the region of em-spectrum of Lyman, Balmer & Paschen series.

(8) Derive an expression for the radius of electron orbit using Rutherford's atomic model.

(9) Derive an expression for the frequency of radiation emitted by assuming the expression for energy of an electron of hydrogen atom in a stationary orbit.

(10) Mention the limitations of Bohr's atom model.

Question No: 38 (Nuclei) {Numerical}

(1) Calculate the nuclear density of iron nucleus given mass of iron nucleus is 55.85u and atomic mass of iron is 56. Take $R_0 = 1.2 \times 10^{-15}$m and
$1u = 1.66 \times 10^{-27}$kg

(2) Calculate the nuclear density of iron nucleus? (Given mass of iron nucleus = 55.85u and A = 56 and $1u = 1.66 \times 10^{-27}$kg

(3) Calculate the binding energy of an oxygen nucleus $^{8}O_{16}$ using the following data. Mass of proton = 1.007825 u Mass of neutron = 1.008665 u Mass of oxygen nucleus = 15.995 u.

(4) Obtain the binding energy of $^{56}Fe_{26}$ in units of MeV from the following data. Rest mass of $^{56}Fe_{26}$ = 55.934939U, Rest mass of $^{1}n_0$ = 1.099U, Rest mass of $^{1}p_1$ = 1.00783U

(5) Calculate the energy equivalent to 1 atomic mass unit in MeV. Given speed of light is 2.9979×10^{8}m/s and charge of the electron is 1.602×10^{-19}C.

(6) Calculate the binding energy of an alpha particle in MeV from the following data. Mass of Helium nucleus = 4.00260 u, Mass of neutron 1.008662 u, Mass of proton 1.007825 u.

(7) Obtain the binding energy of nucleus $^{238}U_{92}$. Mass of $^{238}U_{92}$ = 238.05079u & Mass of neutron 1.008662 u, Mass of proton 1.007825 u.

(8) A copper coin has a mass of 63.0 g. Calculate the nuclear energy that would be required to separate all the neutrons and protons from each other. The coin is entirely made of $^{29}Cu_{63}$ atoms. Mass of $^{29}Cu_{63}$ atom = 62.92960 u, mass of proton = 1.00727 u, mass of neutron = 1.00866 u. Given Avogadro's number is = 6.023×10^{23} atoms.

(9) **Calculate the mass defect and binding energy of $_{7}N^{14}$, given that the rest mass of nitrogen nucleus is 14.00307u, rest mass of proton is 1.00783u and rest mass of neutron is 1.00867u.**

(10) Calculate the binding energy of an alpha (α) particle in MeV from the following data: Mass of α particle = 4.00260u, Mass of neutron = 1.008662u, Mass of proton = 1.007825u.

PART – D (LA – 5 marks each)

Question No: 39 (Electrostatic Potential & Capacitance)

(1) Derive the expression for electric potential at a point due to a point charge.

(2) **Derive the expression for capacitance of a parallel plate capacitor with air as dielectric. Write the expression for capacitance of a parallel plate capacitor with some dielectric medium introduced between the plates.**

(3) Obtain the expression for the effective capacitance of two capacitors connected in series & parallel.

Question No: 39 (Electric Charges & Fields) – *Additional questions for practice*

(1) Obtain an expression for the electric field at a point along axis of an electric dipole.

(2) Obtain an expression for the electric field at a point on the equatorial plane of an electric dipole.

(3) Using Gauss's law, obtain an expression for the electric field due to uniformly charged infinite plane sheet.

(4) Using Gauss's law, obtain an expression for the electric field due to a uniformly charged thin spherical shell.

Question No: 40 (Current Electricity)

(1) Assuming the expression for drift velocity, derive the expression for conductivity of material $\sigma = ne^2\tau/m$, where symbols have usual meanings or derive the expression for electrical conductivity of the material in terms of number density and relaxation time.

(2) Derive the relation: $J = \sigma E$ with terms having usual meanings.

(3) Obtain an expression for equivalent emf and equivalent internal resistance when two different cells are connected in series.

(4) Obtain an expression for equivalent emf and equivalent internal resistance when two different cells are connected in parallel.

(5) **Deduce the condition for balance of a Wheatstone's bridge using Kirchhoff's rules.**

Question No: 41 (Moving Charges & Magnetism)

(1) **Derive the expression for magnetic field at a point on the axis of a circular current loop.**

(2) Derive an expression for the magnetic field at a point inside the air cored long current carrying solenoid using Ampere's circuital law.

(3) Derive the expression for force per unit length between two infinitely long straight parallel current carrying conductors and hence define ampere.

(4) With the help of a neat diagram, explain the working of a moving coil galvanometer.

Question No: 42 (Wave Optics)

{Split type: 1+2+2 or 2+3 or 1+4 or 1+1+3}

(1) (a) What is wave front of light waves? 1

(b) Explain Malus' law for polaroids. 2

(2) (a) State Huygens principle. 2

(b) Using Huygens principle arrive at Snell's law of refraction for a plane wave. 3

(3) (a) What is wavefront? 1

(b) Mention the expression for fringe width in Young's experiment and explain the terms 2

(c) Write any two uses of polaroids 2

(4) (a) Draw a diagram showing refraction of plane wave by a thin prism 2

(b) Using Huygens principle arrive at Snell's law of refraction for a plane wave. 3

(5) (a) Write any two differences between interference and diffraction of light 2

(b) Using Huygen's principle show that angle of incidence is equal to angle of reflection 3

(6) (a) Explain Young's double slit experiment. 3

(b) Write the formula for Malus' law & write the expression. 2

(7) (a) Mention two applications of Polaroids. 2

(b) Write the relation between the path difference in wavelength of light wave used for constructive and destructive interference of light. 2

(c) For which angle of incidence reflected ray is completely polarized? 1

(8) (a) What is interference of light? 1

(b) Describe Young's double slit experiment for producing interference fringes. 4

Question No: 43 (Dual Nature of Radiation & Matter)

{Split type: 1+2+2 or 2+3 or 1+4 or 1+1+3}

(1) (a) What is meant by electron emission? 1

(b) Mention three types of electron emission. 3

(c) Define electron volt. 1

(2) (a) Mention the factors on which the work function of a metal depends. 2

(b) Explain briefly the Hallwach's experimental observations on photoelectric effect. 3

(3) (a) Explain briefly the Lenard's experimental observations on photoelectric effect. 3

(b) Define the terms: (1) Threshold frequency (2) Stopping potential 1+1

(4) (a) What is photoelectric effect? 1

(b) Write any three experimental observation of Photoelectric Effect. 3

(c) What is meant by saturation current? 1

(5) (a) Write the Einstein's equation of Photoelectric effect and explain the terms. 1+1

(b) Explain any three experimental observations on the basis of Einstein's equation of photoelectric equation. 3

(6) **(a) Define work function of a photosensitive material.** **1**

(b) What is photoelectric effect? Give Einstein's explanation of photoelectric effect. **4**

(7) (a) Give Einstein's explanation for photoelectric effect. 3

(b) Mention any two properties of photons 2

(8) (a) Define work function and stopping potential 2

(b) Represent in graphs the effect of

- Intensity of light on photocurrent 1
- Potential on photoelectric current 1
- Frequency of incident radiation on stopping potential 1

(9) (a) Write any three characteristics of photon. 3

(b) What are matter waves? 1

(c) Mention the expression for de-Broglie wavelength of matter wave. 1

Question No: 44 (Semiconductor Electronics)

(1) On the basics of energy band diagram, distinguish between conductors, insulators and semiconductors.

(2) Give the differences between n-type and p-type semiconductors.

(3) Explain the working of pn junction diode when it is (a) forward bias & (b) reverse bias with neat circuit diagram and its characteristics.

(4) Distinguish between forward bias and reverse bias.

(5) What is rectification? Explain the working of a half wave rectifier using the circuit diagram. Also draw input-output waveforms.

(6) **What is rectifier/rectification? Explain the working of a full wave rectifier using the circuit diagram. Also draw input-output waveforms.**

Part – D (Numerical Problems – 5 marks each)

Question No: 45 (Electric Charges & Fields) {HOTS}

(1) Two charges 10nC & 20nC are placed at 5m apart. Calculate (a) force between the charges, (b) force between the charges if a medium of relative permittivity 5 is introduced, (c) change in force between the charges and (d) force between the charges when they are brought in contact and then replaced in their initial positions.

(2) Two charges 10nC & 20nC are laced at the corners of hypotenuse BC of a right angled triangle ABC of side AB = 3m & AC = 4m. Find (a) magnitude of force acting on corner A of right angled triangle ABC if a charge +2nC is placed at corner A (b) direction of resultant force at corner A

(3) Four point charges Q_A = 2μC, Q_B = -5μC, Q_C = 2μC & Q_D = -5μC are located at the corners of a square ABCD of side 10cm. What is the force on a charge of 1μC placed at the centre of the square?

(4) Two point charges Q_A = 3μC and Q_B = -3μC are located 20cm apart in vacuum. What is the magnitude of electric field at the midpoint O of the line joining of the line joining the two charges?

If a negative test charge of magnitude 1.5 x 10^{-9}C is placed at this point, what is the magnitude of force experienced by the test charge?

(5) Two charges 10nC and 20nC are placed at the corners of hypotenuse BC of a right angled triangle ABC of side AB = 3m and AC = 4m. Find the direction of resultant electric intensity at corner A

(6) Two point charges 4 x 10^{-6}C and 2 x 10^{-6}C are placed at the vertices A and B of a right angled triangle ABC respectively. B is the right angle. AB = √3 x 10^{-2}m, AC = 2 x 10^{-2}m and BC = 1 x 10^{-2}m. Find the magnitude and direction of the resultant electric field at C.

(7) Two point charges each of +2μC are placed at the two corners A and B of an equilateral triangle ABC of side 0.2 m. Find the magnitude and direction of the resultant electric field at C

(8) Two charges +6nC and –6nC are placed at 0.2m apart. Calculate (a) dipole moment (b) Axial field at a distance of 0.2m from the centre of dipole (c) Equatorial field at distance of 0.2m from the centre of dipole (d) Force experienced by the test charge of magnitude 1nC when it is placed at midpoint on the line joining two charges

(9) Two point charges 2mC and 4mC are placed at A and C respectively of right angled triangle ABC. AB = 3cm, BC = 2cm & angle B = 90^0. Calculate the magnitude of the resultant electric field at B.

(10) Two charges +3μC and –3μC are located 20cm apart in vacuum. What is the electric field at the midpoint of the line joining these two point charges? Also find the force experienced by a negative test charge of magnitude 1.5nC placed at midpoint of the line joining two charges.

(11) Three charges each equal to +4nC are placed at the three corners of a square of side 2cm. Find electric field at the fourth corner.

(12) A uniformly charged conducting sphere of radius 1.2m has surface charge density of 80 x 10^{-6}C/m^2. Find (a) Charge on the sphere, (b) Electric field at a distance of 2m from the centre of the sphere surface, (c) Electric field at a distance of 1m from the center of the sphere surface and (d) Total flux leaving the surface.

(13) An electric dipole consists of two opposite charges each of 1μC separated by 2cm. The dipole is placed in an external uniform field of 10^5N/C. Find (a) the maximum torque exerted by the field on the dipole and (b) the work done in maximum torque exerted by the field on the dipole through 180^0 from the position θ = 0^0.

(14) A uniformly charged conducting sphere of 1.8m diameter has a surface charge density of 60μCm^{-2} (a) find the charge on the sphere (b) what is the total flux leaving the surface of the sphere

(15) A charged spherical conductor has a surface charge density of 0.7Cm^{-2}. When its charge is increased by 0.44C, the charge density increases by 0.14Cm^{-2}. Find the initial charge on the spherical conductor and also radius of the sphere?

Question No: 45 (Electrostatic Potential & Capacitance) {HOTS} – *Additional numerical for practice*

(1) Two charges 3×10^{-9}C and -2×10^{-9}C are located 15cm apart. At what point(s) on the line joining the two charges is the electric potential zero? Take the potential at infinity to be zero.

(2) ABCD is a square of side 2m. Charges of 5nC, +10nC and -5nC are placed at corners A, B & C respectively. What is the work done in transferring a charge of 5μC from D to the point of intersection of the diagonals?

(3) Charges 2μC, 4μC & 6μC are laced at the three corners A, B & C respectively of a square ABCD of side x meter. Find, what charge must be placed at the fourth corner so that the total potential at the centre of the square is zero.

(4) Four point charges 1nC, 2nCm 3nC & 4nC are placed respectively at the corners of a square ABCD of side 2m. Find the magnitude and direction of resultant electric field at the intersection of diagonals.

(5) A charge of 8mC is located at the origin. Calculate the work done in taking a small charge of -2×10^{-8}C from a point A(3cm, 0, 0) to appoint B(0, 4cm, 0) via point C(3m, 4cm, 0)

(6) In a parallel plate capacitor with air between the plates, each plate has an area of $6 \times 10^{-3}m^2$ and the distance between the plates is 3mm. Calculate the capacitance of the capacitor. If this capacitor is connected to a 100V supply, what is the charge on each plate of capacitor?

(7) Three capacitors of capacitances 2pF, 3pF & 4pF are connected in parallel. (a) What is the total capacitance of the combination? (b) Determine the charge on each capacitor, if the combination is connected to 100V supply.

(8) The plates of parallel plate capacitor have an area of $100cm^2$ each and are separated by 3mm. the capacitor is charged by connecting it to 400V supply. (a) Calculate the electrostatic energy stored in the capacitor (b) If a dielectric constant 2.5 is introduced between the plates of the capacitor, then find the electrostatic energy stored and also change in the energy stored.

(9) Two capacitors 3μF and 5μF are connected in series. Calculate the equivalent capacitance. If a battery of emf 10V is connected across them, Calculate, (a) the charge on each capacitor and (b) the potential difference across each other.

(10) Two capacitors of 30μF and 40μF are charged to 100V and 800V respectively. If they are connected in parallel, calculate the energy stored and loss of energy due to connection.

(11) A 900pF capacitor is charged by 100V battery. How much electrostatic energy is stored by the capacitor? If the capacitor is disconnected from the battery and connected to another 900pF capacitor. What is the electrostatic energy stored by the system?

(12) The effective capacitance of two capacitors is 7μF when in parallel and 6/7μF when in series. Find the individual capacitance

Question No: 46 (Current Electricity) {HOTS}

(1) A uniform copper wire of length 2 m and cross-sectional area 5 x $10^{-7}m^2$ carries a current of 2 A. Assuming that there are 8 x 10^{28} free electrons per m^3 of copper, calculate the drift velocity of free electrons. How much time will an electron to take drift from one end to another end of the wire? Given: e = 1.6 x $10^{-19}C$.

(2) 100 mg mass of nichrome metal is drawn in to a wire of area of cross-section 0.05 mm^2. Calculate the resistance of the wire. Given density of nichrome 8.4 x $10^3 kgm^{-3}$ and resistivity of the material as 1.2 x 10^{-6} Ω m.

(3) A wire of length 2m, area of cross-section 0.5 mm^2 and resistivity 1.5× 10^{-6} Ω m is connected in series with a cell of emf 4 V. If the current through the wire is 0.5 A, calculate: (a) the internal resistance of the cell and (b) the rate of energy dissipated by the wire.

(4) A wire having length 2.0 m, diameter 1.0 mm and resistivity 1.963 x $10^{-8}\Omega m$ is connected in series with a battery of emf 3 V and internal resistance 1Ω. Calculate the resistance of the wire and current in the circuit.

(5) Six lead-acid type of secondary cells each of emf 2.0 V and internal resistance 0.015 Ω are joined in series to provide a supply to a resistance of 8.5 Ω. What are the current drawn from the supply and its terminal voltage?

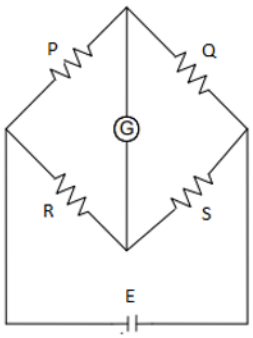
(6) Three resistors 1 Ω, 2 Ω and 3 Ω are connected in series what is the total resistance of the combination? If the combination is connected to a battery of emf 12 V & negligible internal resistance then obtain the potential drop across each resistor.

(7) A battery of internal resistance 3Ω is connected to 20Ω resistor and potential difference across the resistor is 10V. If another resistor of 30Ω is connected in series with the first resistor and battery is again connected to the combination, calculate the emf and terminal potential difference across the combination.

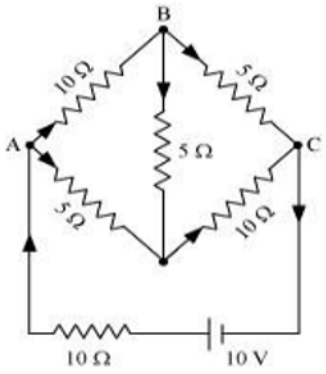
(8) A battery of emf 12V and internal resistance 2 Ω is connected to a resistor. If the current in the circuit is 2A, what is the resistance of the resistor? What is the terminal voltage of the battery when the circuit is closed?

(9) Two resistors are connected in series with 5V battery of negligible internal resistance. A current of 2A flows through each resistor. If these are connected in parallel with the same battery a current of 25/3A flows through combination. Calculate the value of each resistance.

(10) In the following Wheatstone network if P = 2 Ω, Q = 3 Ω, R = 4 Ω, S = 5 Ω and emf of battery E = 2V. Find the current through the galvanometer



(11) In a Wheatstone network four resistor 1Ω, 2Ω, 3Ω and 4Ω are connected in cyclic order of square ABCD. A battery of 3V, 1Ω is connected between A and C. A galvanometer of resistance 5Ω is connected across B and D. Calculate the current through the galvanometer.



(12) Determine the current in each branch of the network shown in the figure

(13) Two identical cells both in series and parallel combination, give the same current of 0.5A through an external resistance of 4Ω. Find the emf and internal resistance of each cell.

(14) A heating element using nichrome confected to a 230V supply draws an initial current of 3.2A which settles after few seconds to a steady value of 2.8A. What is the steady temperature of the heating element if the room temperature is 27.0^0C? Temperature co-efficient of resistance of nichrome averaged over the temperature range involved is $1.7 \times 10^{-4}\ ^0C^{-1}$

(15) Two identical cells either in series or parallel gives the same current of 0.5A through external resistance of 4ohm, find the emf and internal resistance

(16) Two cells A and B are connected in series, each having emf of 1.5V. The internal resistances of A and B are 0.5ohm and 0.5ohm respectively. The combination is connected across a resistance of 2.25ohm. Calculate (a) current in the circuit (b) the pd across thh terminals of cell.

(17) **The number density of free electrons in copper is estimated to be $8.5 \times 10^{28} m^{-3}$. A copper wire of length 3.0 m and area of cross-section 2.0 mm^2 is carrying a current of 3.0 A. Calculate the drift velocity of electrons. How long does an electron take to drift from one end of the wire to its other end?**

Question No: 47 (Alternating Current)

(1) A sinusoidal voltage of peak value 283 V and frequency 50 Hz is applied to a series LCR circuit in which R = 3 Ω, L = 25.48 mH, and C = 796 μF. Find (a) the impedance of the circuit, (b) the phase difference between the voltage across the source and the current. Does the current lead or lag the voltage?

(2) A resistor, an inductor and a capacitor are in series with a 120 V 100 Hz AC source. Voltage leads the current by 35° in the circuit. If the resistance of the resistor is 10 Ω and the sum of the inductive and capacitive reactance is 17Ω. Calculate the self-inductance of the inductor.

(3) A resistor of 100 Ω, a pure inductance coil of L=0.5 H and a capacitor are in series in a circuit containing an A C source of 200 V, 50 Hz. In the circuit, current is ahead of voltage by 30°. Find the value of capacitance.

(4) A 20 Ω resistor, 1.5 H inductor and 35 μF capacitor are connected in series with a 220 V, 50 Hz AC supply. Calculate the impedance in the circuit and also find current through the circuit.

(5) A sinusoidal voltage of rms value 200 V and frequency 50 Hz is applied to a series RC circuit in which R = 5 Ω and C = 800 μF. Calculate: a) impedance of the circuit and b) the current through the circuit.

(6) An alternating current source of 220V, 50Hz is applied to a circuit having resistance 200 Ω, inductance 4H and capacitance of 2 μF in series. Calculate (a) impedance of the circuit (b) maximum current in the circuit

(7) A resistance of 200Ω and a capacitor of 15μF are connected in series to a 220V, 50Hz ac source. (a) Calculate the current in the circuit & (b) Calculate the rms voltage across the resistor and capacitor.

(8) A resistor of 100ohm, pure inductance of coil of L = 0.5henry and capacitor are in series in a circuit containing an AC source of 200V, 50Hz. In the circuit, current is ahead of the voltage by 30^0. Find the value of capacitance.

(9) A sinusoidal voltage of peak value 285 V is applied to a series LCR circuit in which a resister of resistance 5 Ω, pure inductor of inductance 28.5 mH and a capacitor of capacitance 800 μF are connected. Find the impedance, resonant frequency, current, and power dissipated at the resonance.

(10) A 60 V, 10 W, lamp is to be run on 100 V, 60 Hz A C mains. Calculate the inductance of the coil required to be connected in series with it to work the bulb.

(11) A 25mH inductor is connected to a 200V, 50Hz ac supply. Determine the rms value and the peak value of the current in the circuit.

(12) An inductance of 200mH, capacitance of 20μF and resistance of 80Ω are connected in series across an AC source of 220V, 50Hz. Find the average value of current

(13) Calculate the resonant frequency of a series LCR circuit containing a pure inductor of inductance 4H, capacitor of capacitance 27μF and resistor of resistance 6.3Ω

(14) Calculate the resonant frequency of a series LCR circuit with L= 2.0 H, C= 32 μF and R = 10 Ω. What is the Q-value of this circuit?

(15) A series LCR ac circuit has a pure inductor of inductance 5.0H, a capacitor of capacitance 20μF and a resistor of resistance 40 Ω. Find (a) the frequency of the alternating voltage that drives the circuit into resonance. (b) Sharpness of resonance and (c) Bandwidth of resonance.

Question No: 48 (Ray Optics) {HOTS}

(1) An object is placed in front of a concave mirror of radius of curvature 40cm at a distance of 10cm. Find the position, nature and magnification of the image.

(2) A square of side 4cm is placed 20cm away from the concave mirror of radius of curvature of 30cm. calculate the area enclosed by the image of the square.

(3) An air bubble in a cube of glass side 21cm appears to be at a depth of 10cm from one face and 4cm from other face. Find (a) the actual depth of the bubble from the first face (b) refractive index of glass.

(4) A glass sphere of radius 0.15m contains a small air bubble at a distance 0.06m from its centre. When viewed along its diameter from its nearest side the bubble appears to be at 0.075m. Calculate the RI of glass and apparent distance of the bubble from the farthest side.

(5) A small bulb is placed at the bottom of a tank containing water to a depth of 1m. Find the critical angle for water air interface and also calculate the diameter of the circular bright patch of light formed on the surface of water. (RI of water = 4/3)

(6) A point object is placed at 50cm from the surface of a glass sphere of radius 10cm along a diameter. Where will the final image be formed after refraction at both the surfaces? (n = 1.5)

(7) The radii of curvature of two surfaces of a convex lens are 0.2m and 0.22m. Find the focal length of the lens if refractive index of the material of lenses 1.5. Also find the change in focal length if it is immersed in water of refractive index 1.33.

(8) Two lenses of focal lengths 0.2m and 0.3m are kept in contact. Find the focal length of the combination. Calculate the powers of two lenses and combination

(9) An object of size 2cm is placed at 20cm in front of convex lens of focal length 0.15m. Find the image distance and also size of image.

(10) Calculate the angle of minimum deviation produced by an equilateral prism of refractive index 1.65

(11) The radii of curvature of the faces of double convex glass lens are 10cm and 15cm. Its focal length is 12cm. Calculate the refractive index and power of glass lens.

(12) A parallel beam of light is incident on one face of an equilateral prism. By rotating the prism, the angle of minimum deviation is measured to be 40^0. Determine the refractive index of the material of the prism. If the prism is immersed completely in water (refractive index = 1.33), calculate the new angle of minimum deviation.

(13) A prism is made of glass of unknown refractive index. A parallel beam of light is incident on a face of the prism. The angle of minimum deviation measured to be 40^0. What is the refractive index of the prism? The refracting angle of prism is 60^0. If prism is placed in water (refractive index 1.33) predict new angle of minimum deviation of a parallel beam of light.

(14) At what angle should ray of light be incident on the face of equilateral prism, so that it just suffers total internal reflection at the other face? The RI of material of the prism is 1.5.

(15) The refractive index of an equilateral prism is 1.532. Calculate the angle of minimum deviation.

(16) A ray of light is incident on one face of an equilateral prism of RI 1.5 at an angle of 30^0. Find the angle of deviation produced by the prism. Find what other angle of incidence deviation is same.

(17) A small fish, 0.4m below the surface of a lake, is viewed through a simple converging lens of focal length 3m. The lens is kept at 0.2m above the water surface such that the fish lies on the optical axis of the lens. Find the image of the fish seen by observer. RI of water is 4/3.


ಡೌಟ್ Sir


FOR SOLUTIONS
QR SCAN


PHYSICS
WITH GARUD