

Physics (Class XII)

- Question 1:** Sketch the electric field lines for two point charges q_1 and q_2 for $q_1=q_2$ and $q_1>q_2$ separated by a distance d .
- Question 2:** Why do the electrostatic field lines not form closed loops?
- Question 3:** An electric dipole is held in a uniform electric field. a) Show that the net force acting on it is zero.
b) The dipole is aligned parallel to the field. Find the work done in rotating it through the angle of 180°
- Question 4:** Find expressions for the force and torque on an electric dipole kept in a uniform electric field.
- Question 5:** Find an expression for the electric field strength at a distant point situated (1) on the axis and (2) along the equatorial line on an electric dipole.
- Question 6:** Derive an expression for the capacitance of a parallel plate capacitor when a dielectric slab of dielectric constant k and thickness $t=d/2$ but of same area as that of the plates is inserted between the capacitor plates. (d = separation between the plates).
- Question 7:** Derive an expression for the energy stored in a parallel plate capacitor C , charged to a potential difference V . Hence derive an expression for the energy density of a capacitor.
- Question 8:** An electric dipole of dipole moment p is placed in a uniform electric field E . Write the expression for the torque experienced by the dipole. Identify two pairs of perpendicular vectors in the expression. Show diagrammatically the orientation of the dipole in the field for which the torque is (1) Maximum (2) Half the maximum value (3) Zero.
- Question 9:** Using Gauss theorem show mathematically that for any point outside the shell is same as the entire charge on the shell is concentrated at the centre.
- Question 10:** Plot a graph showing the variation of a resistance of a conducting wire as a function of its radius, keeping the length of the wire and its temperature as constant.
- Question 11:** A resistance R is connected across a cell of emf and internal resistance r . A potentiometer now measures the potential difference between the terminals of the cell as V . Write the expression in terms of r , V and R .
- Question 12:** Two cells of emfs \mathcal{E}_1 and \mathcal{E}_2 and internal resistance r_1 and r_2 respectively are connected in parallel as shown in the figure.
Deduce the expression for
(a) The equivalent e.m.f of the combination,
(b) The equivalent resistance of the combination and
(c) The potential difference the points A and B.
- Question 13:** Derive ohm's law using the concept of drift velocity.
- Question 14:** Derive condition of balance of wheatstone bridge.
- Question 15:** Using the principle of wheatstone bridge, describe the method to determine the specific resistance of wire in the laboratory. Draw the circuit diagram and write the formula used. Write any two important precautions you would observe while performing the experiment.
- Question 16:** State the principle of working a potentiometer.
- Question 17:** Draw the circuit diagram of a potentiometer which can be used to determine the internal resistance (r) of a given cell of emf (E). Describe a method to find the internal resistance of a primary cell. Why is potentiometer considered to be superior or better than a voltmeter to measure the emf of a cell?
- Question 18:** What is the angle of dip at a place where the horizontal and vertical components of the earth's magnetic field are equal?
- Question 19:** Write the expression for the force on a charge moving in a field. Use this expression to define the SI unit of magnetic field.
- Question 20:** A particle mass ' m ', with charge ' q ' moving with a uniform speed ' v ' normal to magnetic field ' B ', describes a circular path of radius ' r '. Derive the expression for the (a) time period of revolution and (b) kinetic energy of the particle.
- Question 21:** Distinguish between diamagnetic and ferromagnetic materials in respect of their (a) intensity of magnetisation (b) behaviour in non-uniform magnetic field and (c) susceptibility.
- Question 22:** Draw the labelled diagram of a moving coil galvanometer. Prove that in a radial magnetic field, the deflection of the coil is directly proportional to the current flowing in a cell.
- Question 23:** Deduce an expression for magnetic dipole moment of an electron revolving around a nucleus in a circular orbit. Indicate the direction of magnetic dipole moment? Use the expression in derive the relation between the magnetic moment of an electron moving in a circle and its related angular momentum?
- Question 24:** State Bio-Savart Law. Using this law, find an expression for the magnetic field at the centre of a circular coil of N -turns, radius r , carrying current I .
- Question 25:** Using Ampere's circuital law find an expression for the magnetic field at a point on the axis of a long solenoid with a closely wound turns.
- Question 26:** Using Ampere's circuital law, derive an expression for the magnetic field along the axis of a toroidal solenoid.
- Question 27:** In a certain region of a space, electric field E and a magnetic field B are perpendicular to each other. An electron enters in the region perpendicular to the directions of both B and E and moves undeflected. Find the velocity of the electron.

- Question 28:** A parallel plate capacitor is being charged by a time varying current. Explain briefly how Ampere's circuital law is generalized to incorporate the effect due to displacement current.
- Question 29:** The motion of copper plate is damped when it is allowed to oscillate between the two poles of a magnet. What is the cause of this damping?
- Question 30:** Define the term self-inductance of a coil. Give its SI unit.
- Question 31:** The coils in certain galvanometers have fixed core made of a non-magnetic material. Why does the oscillating coil come to rest so quickly in such a core?
- Question 32:** What is wattless current?
- Question 33:** In an experimental arrangement of two coils C1 and C2 placed coaxially parallel to each other, find out the expression for the emf induced in the coil C1 (of N_1 turns) corresponding to the change of current I_2 in the coil C2 (of N_2 turns).
- Question 34:** How does the mutual inductance of a pair of coils change when
Distance between the coil is increased and
Number of turns in the coils is increased?
- Question 35:** What is induced emf? Write Faraday's law of electromagnetic induction. Express it mathematically.
- Question 36:** Derive expression for self inductance of a long air-cored solenoid of length L , cross sectional area A and having number of turns N .
- Question 37:** What is impedance?
- Question 38:** State the condition for resonance to occur in series LCR a.c. circuit and derive an expression for resonant frequency.
- Question 39:** Explain with the help of labelled diagram, the principle and working of an ac generator? Write the expression for the emf generated in the coils in the terms of speed of rotation. Can the current produced by an ac generator be measured with a moving coil galvanometer?
- Question 40:** Describe briefly, with the help of a labelled diagram, the working step up of a transformer.
- Question 41:** What are eddy currents? How are they produced? In what sense eddy currents are considered undesirable in a transformer? How can they be minimized? Give two applications of eddy currents.
- Question 42:** What is meant by the transverse nature of electromagnetic waves? Draw a diagram showing the propagation of an electromagnetic wave along X-direction, indicating clearly the directions of oscillating electric and magnetic fields associated with it.
- Question 43:** Name the constituent radiation of electromagnetic spectrum which
Is used in satellite communication
Is used for crystal structure.
Is similar to the radiations emitted during the decay of radioactive nuclei.
Has its wavelength range between 390 nm and 700 nm.
Is absorbed from sunlight by ozone layer.
Produces intense heating effect.
- Question 44:** A biconvex lens made up of transparent material of refractive index 1.25 is immersed in water of refractive index 1.33. Will the lens behave as a converging lens? Give reasons.
- Question 45:** A concave mirror and a converging lens have the same focal length in air. Which one of the two will have greater focal length both are immersed in water?
- Question 46:** Out of blue and red which light is deviated more by a prism? Give reasons.
- Question 46:** Draw a schematic labelled diagram of a reflecting type telescope (cassegrain).
- Question 47:** Define resolving power of a compound microscope, how does the resolving power of a compound microscope change when
Refractive index of a medium between the object and objective lens increases.
Wavelength of radiation used is increased?
- Question 48:** Draw a ray diagram for formation of image of a point object by thin double convex lens having radii of curvature R_1 and R_2 . Hence, derive lens maker's formula for a double convex lens. State the assumptions made and sign conventions used.
- Question 49:** Draw the labelled diagram for the formation of image by a compound microscope. Derive an expression for its magnification (or magnifying power), when the final image is formed at the near point.
- Question 50:** Explain with help of labelled diagram, how is image formed in astronomical telescope. Derive an expression for its magnifying power.