CBSE 12th Physics

FINAL 50

Most Probable Questions for Boards 2026

section features questions meticulously compiled by expert teachers with extensive experience, based on ination trends over the past five years. These questions are likely to appear in the 2026 examination. However, rongly recommend that you prepare the entire syllabus to ensure comprehensive readiness.

apter 1 Electric Charges and Fields

1 (i) Find the expressions for the force and torque on an electric dipole kept in uniform electric field. What happens, if the field is non-uniform?

(ii) Depict the orientation of the dipole in (a) stable (b) unstable equilibrium in a uniform electric field.

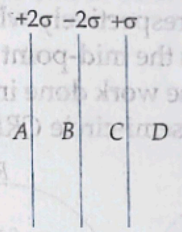
(iii) What would happen, if the external field E is increasing (a) parallel to p and (b) anti-parallel to p

2 Find the expression for the electric field strength at a distant point situated (i) on the axis and (ii) along the equatorial line of an electric dipole. Draw graph for electric field *versus* distance.

3 (i) Define electric flux. Mention its two SI units.

(ii) Use Gauss' law to obtain the expression for the electric field due to uniformly charged infinite plane sheet.

(iii) In the figure, there are three infinite long thin sheets having surface charge densities $+2\sigma$, -2σ and $+\sigma$, respectively. Give the magnitude and direction of electric field at a point to the left of sheet of surface charge density $+2\sigma$ and to the right of sheet of charge density $+\sigma$.



Q.4 (i) Using Gauss' law, obtain an expression for electric field due to infinitely long thin straight charged wire with uniform linear charge density λ.

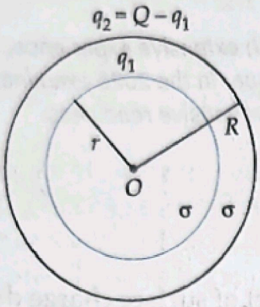
(ii) An infinite line charge produces a field of $9\times10^4\ NC^{-1}$ at a distance of 2 cm. Calculate the linear charge density.

Q.5 Using Gauss' law, obtain the expression for the electric field due to uniformly charged spherical shell at a point

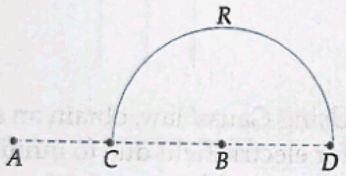
(i) outside the shell and

(ii) inside the shell. Plot the graph of electric field with distance r from the centre of shell

Q.6 A charge Q is distributed over the surfaces of the two concentric hollow spheres of radii r and $R (R >> r)$, such that their surface charge densities are equal. Derive the expression for the potential at the common centre.

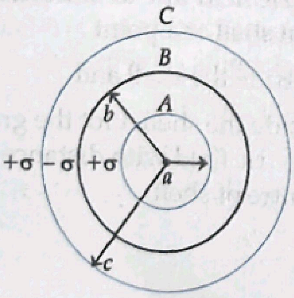


Q.7 Charges $(+q)$ and $(-q)$ are placed at the points A and B, respectively which are a distance $2L$ apart. C is the mid-point between A and B. What is the work done in moving a charge $+Q$ along the semi-circle CRD?



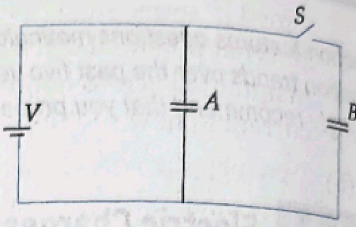
Q.8 Three concentric metallic shells A, B and C of radii a, b and $c (a < b < c)$ have surface charge densities $+\sigma$, $-\sigma$ and $+\sigma$ respectively as shown in the figure.

If shells A and C are at the same potential, then obtain the relation between the radii a, b and c.



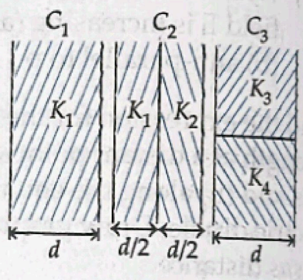
Q.9 (i) Two identical parallel plate capacitors A and B are connected to a battery of V volts with switch S closed. The switch is now opened and free space between the plates of capacitors is filled with dielectric constant K.

Find the ratio of total electrostatic energy in both capacitors before and after the introduction of dielectric.



(ii) Three identical parallel plate (air) capacitors C_1, C_2 and C_3 have capacitance C each. The space between their plates is now filled with dielectrics as shown.

If all the three capacitors still have same capacitances, obtain the relation between dielectric constants K_1, K_2, K_3 and K_4.



Q.10 In a parallel plate capacitor with air between the plates, each plate has an area of $6 \times 10^{-3}\ m^2$ and the separation between the plates is 3 mm.

(i) Calculate the capacitance of the capacitor.

(ii) If this capacitor is connected to 100 V supply, what would be the charge on each plate?

(iii) How would charge on the plates be affected, if a 3 mm thick mica sheet of $K = 6$ is inserted between the plates while the voltage supply remains connected?

Chapter 3 Current Electricity

(i) A metal rod of square cross-sectional area A having length l has current I flowing through it, when a potential difference of V volt is applied across its ends. Now, the rod is cut parallel to its length into two identical pieces and joined in series such that length of rod is $2l$. What potential difference is maintained across length $2l$, so that current in new rod remains the same?

(ii) Two metallic wires P_1 and P_2 of the same material and same length but different cross-sectional areas A_1 and A_2 are joined together and connected to a source of emf. Find the ratio of the drift velocities of free electrons in two wires when they are connected

(a) in series and (b) in parallel

Q.12 Define electromotive force and terminal potential difference of a cell. Derive a relation between the internal resistance, emf and terminal potential difference of a cell. Draw the graph for

(i) E *versus* R (ii) V *versus* R and

(iii) V *versus* I

Q.13 When 14 cells in sries are connected to the ends of a resistance of 82.6 Ω, then the current is found to be 0.25A. When same cells after being connected in parallel are joined to the ends of a resistance of 0.053 Ω, then the current is 25A. Calculate the internal resistance and the emf of each cell.

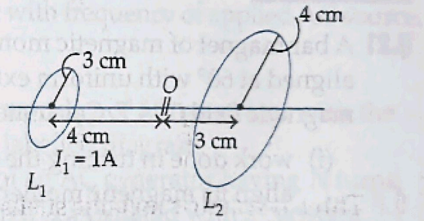
Chapter 4 Moving Charges and Magnetism

Q.14 (i) A uniform magnetic field **B** is setup along positive X-axis. A particle of charge q and mass m moving with velocity v enters the field at the origin in XY-plane such that it has velocity components both along and perpendicular to magnetic field **B**. Trace giving reason, the trajectory followed by the particle. Find out the expression for the distance moved by the particle along the magnetic field in one rotation.

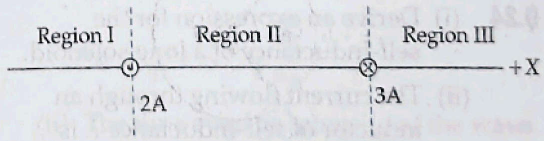
(ii) A particle of mass m, charge q accelerated by potential V enters magnetic field perpendicularly. Derive the expression for radius of trajectory traced by charge particle.

Q.15 (i) Using Biot-Savart's law, derive an expression for magnetic field at any point on axial line of a current-carrying circular loop. Hence, find magnitude of magnetic field intensity at the centre of circular coil.

(ii) Two co-axial circular loops L_1 and L_2 of radii 3 cm and 4 cm are placed as shown. What should be the magnitude and direction of the current in the loop L_2, so that the net magnetic field at the point O be zero?



16. Two straight infinitely long wires are fixed in space, so that the current in the left wire is 2 A and directed out of the plane of the page and the current in the right wire is 3 A and directed into the plane of the page. In which region(s) is/are there a point on the X-axis, at which the magnetic field is equal to zero due to these currents carrying wires? Justify your answer.

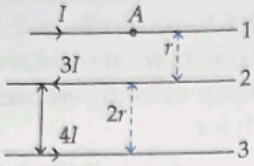


Q.17 (i) Derive an expression for the force per unit length between two long straight parallel current-carrying conductors. Hence, define SI unit of current.

(ii) The figure shows three infinitely long straight parallel I current-carrying conductors. Find the

(a) magnitude and direction of net magnetic field at point A lying on conductor 1

(b) magnetic force on conductor 2.



Q.18 Explain using a labelled diagram, the principle and working of a moving coil galvanometer. What is the function of

(i) uniform radial magnetic field

(ii) phosphore-bronze wire?

Define the terms current sensitivity and voltage sensitivity of a galvanometer. Why does increasing the current sensitivity not necessarily increase voltage sensitivity?

Q.19 (i) Explain how a galvanometer is converted into an ammeter. What is the ideal resistance of ammeter?

(ii) A galvanometer coil has a resistance of 15 Ω and it shows full scale deflection for a current of 4 mA. Convert it into an ammeter of range 0 to 6 A.

Q.20 (i) Explain how a galvanometer is converted into a voltmeter. What is the ideal resistance of voltmeter?

(ii) To convert a given galvanometer into a voltmeter of ranges $2V$, V, $\frac{V}{2}$ and resistances R_1, R_2 and R_3 ohms respectively, are required to be connected in series with the galvanometer. Obtain the relationship between R_1, R_2 and R_3.

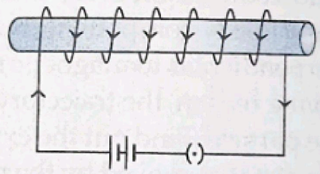
Chapter 5 Magnetism and Matter

Q.21 A bar magnet of magnetic moment 6 J/T is aligned at 60° with uniform external magnetic field 0.44 T. Calculate

(i) work done in turning the magnet to align its magnetic moment (a) normal to the magnetic field (b) opposite to magnetic field and

(ii) the torque on the magnet in the final orientation in case (b).

Q.22 Draw the magnetic field lines for a current carrying solenoid when a rod of (i) copper, (ii) aluminium and (iii) iron is inserted within solenoid as shown.



Q.23 Write three points of differences between para-dia and ferromagnetic materials, giving one example for each

Chapter 6 Electromagnetic Induction

Q.24 (i) Derive an expression for the self-inductance of a long solenoid.

(ii) The current flowing through an inductor of self-inductance L is continuously increasing. Plot a graph showing the variation of

(a) magnetic flux *versus* current

(b) induced emf *versus* $\frac{dI}{dt}$

(c) magnetic potential energy stored *versus* the current.

Q.25 (i) Define mutual inductance and write its SI unit. Derive expression for the mutual inductance of two long co-axial solenoids of same length wound one over the other.

(ii) A long solenoid of radius r consists of n turns per unit length. A current $I = I_0 \sin \omega t$ flows in solenoid. A coil of N turns is wound tightly around it near its centre. What is

(a) the induced emf in the coil,

(b) mutual inductance between the solenoid and the coil?

(i) State Faraday's law of electromagnetic induction.

(ii) A conducting rod of length l with one end pivoted is rotated with uniform angular speed ω in a vertical plane normal to a uniform magnetic field B. Deduce an expression for the emf induced in the rod. If R is the resistance of rod, what is the current induced in it?

Chapter 7 Alternating Current

Q.27 An AC voltage $V = V_0 \sin \omega t$ is applied across pure inductor of inductance L.
Find the expression for the current flowing in circuit and show mathematically that current lags behind voltage by a phase angle of $\frac{\pi}{2}$.
Explain term inductive reactance. Draw the graph showing variation of inductive reactance with frequency of applied AC source.

Q.28 A voltage $V = V_0 \sin \omega t$ is applied to a series L-C-R circuit. Derive the expression for the average power dissipated over a cycle. Under what condition is (i) no power dissipated even though the current flows through the circuit, (ii) maximum power dissipated in the circuit?

Q.29 (i) An AC source of voltage $V = V_0 \sin \omega t$ is connected to a series combination of L, C and R. Use the phasor diagram to obtain expressions for impedance of the circuit and phase angle between voltage and current. Find the condition when current will be in phase with the voltage. What is the circuit in this condition called?

(ii) In a series LR circuit $X_L = R$ and power factor of the circuit is P_1. When capacitor with capacitance C such that $X_L = X_C$ is put in series, the power factor becomes P_2. Calculate $\frac{P_1}{P_2}$.

Q.30 AC voltage $E = E_0 \sin \omega t$ is applied across capacitor of capacitance C. Find the expression for the current flowing in circuit and show mathematically that current leads voltage by a phase angle of $\frac{\pi}{2}$.
Explain the term capacitive reactance. Draw the graph showing variation of capacitive reactance with frequency of applied AC source.

Q.31 State the working of AC generator with the help of a labelled diagram.
The coil of an AC generator having N turns, each of area A, is rotated with a constant angular velocity ω. Deduce the expression for the alternating emf generated in the coil.
What is the source of energy generation in this device?

Chapter 8 Electromagnetic Waves

Q.32 A plane EM wave travelling along z-direction is described by $E = E_0 \sin(kz - \omega t)\hat{i}$ and $B = B_0 \sin(kz - \omega t)\hat{j}$. Show that,

(i) The average energy density of the wave is given by

$$u_{av} = \frac{1}{4}\varepsilon_0 E_0^2 + \frac{1}{4}\frac{B_0^2}{\mu_0}$$

(ii) The time average intensity of the wave is given by $I_{av} = \frac{1}{2} c\varepsilon_0 E_0^2$.

Chapter 9 Ray Optics and Optical Instruments

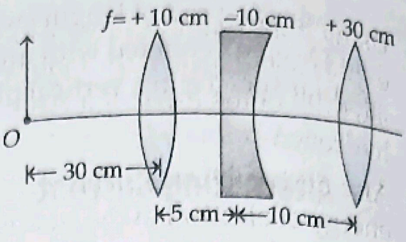
Q.33 Draw the labelled ray diagram for the formation of image by compound microscope.

Write its magnifying power when image is formed at near point.
The total magnification produced by compound microscope is 20. The magnification produced by eyepiece is 5.

The microscope is focussed on certain object. The distance between the objective and eyepiece is 14 cm. If least distance of distinct vision is 20 cm, calculate the focal length of the objective and the eyepiece.

Q.34 (i) Draw a neat labelled diagram of a astronomical telescope for the formation of image at near point. Write its magnifying power.

(ii) Find the position of the image formed of an object 'O' by the lens combination given in the figure.



Q.35 (i) State two main considerations taken into account while choosing the objective of astronomical telescope.

(ii) Draw a ray diagram of reflecting type telescope. State its magnifying power.

(iii) State the advantages of reflecting type telescope over the refracting type.

Q.36 Draw a graph to show the angle of deviation δ with the variation of angle of incidence i for a monochromatic ray of light passing through prism of refracting angle A. Deduce the relation, $n = \frac{\sin\left(\frac{A+\delta_m}{2}\right)}{\sin\frac{A}{2}}$.

Chapter 10 Wave Optics

Q.37 (i) Draw the intensity pattern for a single slit diffraction and double slit interference for the fringes produced in interference.

(ii) State the difference between interference and diffraction.

Q.38 Define the term wavefront. Using Huygens' wave theory, verify the laws of reflection.

Q.39 Use Huygens' principle to show how a plane wavefront propagates from a denser to rarer medium. Hence, verify Snell's law of refraction.

Chapter 11 Dual Nature of Radiation and Matter

Q.40 Find the ratio of the de-Broglie wavelengths associated with an alpha particle and a proton, if both

(i) have the same speeds,

(ii) have the same kinetic energy,

(iii) are accelerated through the same potential difference.

Q.41 Write Einstein's photoelectric equation. State clearly the three salient features observed in photoelectric effect which can be explained on the basis of this equation.

The maximum kinetic energy of the photoelectrons gets doubled when the wavelength of light incident on the surface changes from λ_1 to λ_2.
Derive the expression for the threshold wavelength λ_0 and work function for the metal surface.

Q.42 Determine the value of the de-Broglie wavelength associated with the electron orbiting in the ground state of hydrogen atom (Given, $E_n = -\left(\frac{13.6}{n^2}\right)$ eV and Bohr radius $r_0 = 0.53$ Å).
How will the de-Broglie wavelength change when it is in the first excited state?

Chapter 12 Atoms

Q.43 (i) Using Bohr's atomic model, derive an expression for the radius and velocity of nth orbit of the revolving electron in a hydrogen atom.

(ii) Also derive the expression for total energy of electron in the stationary state of the hydrogen atom.

(iii) Using Bohr's model, obtain the expression for the frequency of radiation emitted when atom makes transition from the higher energy state with quantum number n_i to the lower energy state with quantum number n_f. $(n_f < n_i)$

Chapter 13 Nuclei

Q.44 Draw a diagram to show the variation of binding energy per nucleon with mass number for different nuclei and mention its two features. Why do lighter nuclei usually undergo nuclear fusion?

Q.45 (i) Show that the density of nucleus over a wide range of nuclei is constant and independent of mass number.

(ii) Draw a graph showing the variation of potential energy between a pair of nucleons as a function of their separation. Indicate the regions in which nuclear force is () attractive (b) repulsive. Write two important conclusions which you can draw regarding the nature of nuclear force.

Chapter 14 Semiconductor Electronics : Materials, Devices and Simple Circuits

Q.46 (i) Distinguish between intrinsic and extrinsic semiconductors.

(ii) Explain how the heavy doping of both p and n sides of a p-n junction diode results in the electric field of the junction being extremely high even with a reverse bias voltage of few volts.

Q.47 Describe briefly with the help of a diagram, the role of the two important processes involved in the formation of a p-n junction.

Q.48 Draw the circuit diagram for studying V-I characteristics of p-n junction diode (i) in forward bias and (ii) in reverse bias. Draw typical V-I characteristics of a silicon diode. Explain the term "breakdown voltage in reverse bias"

Q.49 According to Bohr's atomic model and the concept of electronic configuration of an isolated atom, the electrons have well defined energy levels in isolated atom. But, due to interatomic interaction in a crystal, the electrons of the outer shells are forced to have energies different from those in isolated atoms. Each energy level splits into a number of energy levels forming a continuous band.

The gap between top of valence band and bottom of conduction band in which electrons are not found is called energy gap (E_g).

(i) What is the order of energy band gap of an insulator?

(ii) A radiation of wavelength 300 nm is used to shift the electron from valence band to conduction band. What is the energy band gap of the material?

(iii) The separation between valence band and conduction band is 10 eV. Find the wavelength of the radiation used to transfer electron from valence band to conduction band.

(iv) Which band is responsible for current flow in a semiconductor in presence of external field?

Q.50 If each diode in figure has a forward bias resistance of 25 Ω and infinite resistance in reverse bias, what will be the values of the currents I_1, I_2, I_3 and I_4?