BOARD-PATTERN PRACTICE PAPER · CBSE CLASS 12

Moving Charges and Magnetism

Physics · Chapter 4 · Matches current CBSE blueprint · Each question PYQ-sourced where indicated

DATE	TOTAL MARKS	DURATION	MARKING	TARGET
_____	30	60 min	As per board	⩾ 24/30

GENERAL INSTRUCTIONS

1. All questions are compulsory.
2. Section A has 1-mark very-short-answers; Section B has 2-mark short answers; Section C has 3-mark short-long; Section D has a 5-mark long-answer including numerical.
3. Use a non-programmable calculator only if required.
4. Draw neat, labelled diagrams where asked.
5. Internal choice is given in Section D.
6. Take mu_0 = 4*pi x 10^-7 T m/A where needed.

Section A — Very Short Answer (1 mark each)

5 MARKS · 8 MIN

Q1. Why does a magnetic force do no work on a moving charge? [PYQ 2019 Delhi] **[1 mark]**

Q2. Write the expression for the magnetic field at the centre of a circular loop of radius R carrying current I. [PYQ 2021 Delhi] **[1 mark]**

Q3. On what factors does the cyclotron frequency depend? [PYQ 2020 Outside Delhi] **[1 mark]**

Q4. Do two parallel wires carrying currents in opposite directions attract or repel? [PYQ 2022 Delhi] **[1 mark]**

Q5. Write the expression for the magnetic moment of a coil of N turns, area A, carrying current I. [PYQ 2023 Delhi] **[1 mark]**

Section B — Short Answer (2 marks each)

6 MARKS · 12 MIN

Q6. A charge of 1 mC moves at 4 x 10^4 m/s perpendicular to a uniform field of 0.5 T. Find the magnetic force on it. [PYQ 2021 Delhi] **[2 marks]**

Q7. A long straight wire carries a current of 8 A. Find the magnetic field at a perpendicular distance of 4 cm from it. [PYQ 2020 Outside Delhi] **[2 marks]**

Q8. Distinguish between the magnetic field of a long solenoid and that of a toroid. [PYQ 2019 Delhi] **[2 marks]**

Section C — Short-Long Answer (3 marks each)

9 MARKS · 18 MIN

Q9. Using the Biot-Savart law, derive the expression for the magnetic field on the axis of a circular current loop of radius R at an axial distance x. Hence write the field at the centre. [PYQ 2023 Delhi] **[3 marks]**

Q10. Derive an expression for the force per unit length between two long parallel straight conductors carrying currents I1 and I2 separated by a distance d. Hence define the ampere. [PYQ 2024 Outside Delhi] **[3 marks]**

Q11. Derive the expression for the torque on a rectangular current loop placed in a uniform magnetic field, and define the magnetic moment of the loop. [PYQ 2020 Delhi] **[3 marks]**

Section D — Long Answer (5 marks; internal choice)

10 MARKS · 22 MIN

Q12. (a) With a labelled diagram, explain the working of a cyclotron and show that the cyclotron frequency is f = qB/(2*pi*m). (b) A proton (q = 1.6 x 10^-19 C, m = 1.67 x 10^-27 kg) moves in a cyclotron with B = 0.5 T. Calculate the cyclotron frequency. State one limitation of the cyclotron. [PYQ 2024 Delhi] **[5 marks]**

Q13. OR (a) Explain how a moving-coil galvanometer works and why its field is made radial. (b) A galvanometer of resistance 50 Ohm shows full-scale deflection at 1 mA. Convert it into (i) an ammeter of range 1 A and (ii) a voltmeter of range 5 V. [PYQ 2024 Outside Delhi] **[5 marks]**

Marking scheme & model answers — see companion Answer Key PDF · all PYQs traceable to actual CBSE papers · readyforboards.com · +91 70330 05444