



Attempt questions first; check the separate key afterward. Show all working. Draw accurate figures where required.

A. Very short answers - 1 mark each

1. State the direction of field lines outside a bar magnet.
2. Why do magnetic field lines not intersect?
3. What determines the direction of field around a straight current-carrying wire?
4. Draw the field for current directed out of the page.
5. What happens to the field if current in a wire reverses?
6. What happens to field strength if current increases?
7. Name the shape of the field inside a long current-carrying solenoid.
8. Explain how a solenoid resembles a bar magnet.

B. Short answers / practice - 2 marks each

9. Which core material is commonly used for an electromagnet?
10. State three ways to strengthen an electromagnet.
11. Which rule gives the force direction on a current-carrying conductor in a magnetic field?
12. State the meanings of its three fingers.
13. When is magnetic force on a current-carrying wire zero?
14. When is it maximum for fixed current, length and field?
15. What energy conversion occurs in an electric motor?
16. Describe the principle of an electric motor with a labelled diagram.
17. What is the function of a split-ring commutator in a simple DC motor?
18. Explain why this maintains rotation in one direction.
19. Does a stationary magnet beside a stationary coil induce a continuous current?

20. Describe how moving a magnet can induce current in a coil.

C. Application / reasoning - 3 marks each

21. What energy conversion occurs in a generator?
22. Compare a generator and a motor in principle and function.
23. What is the frequency of mains AC in India?
24. How many direction reversals occur in 1 s for 50 Hz AC?
25. Which domestic wire is connected to a metal appliance body for safety?
26. Explain how earthing reduces electric-shock risk.
27. What happens to magnetic force on a wire if both current and field directions reverse?
28. Explain why fuse-wire selection must consider the intended current.
29. A 660 W appliance operates at 220 V. Find current.
30. Draw the magnetic field around a circular current loop and mark its direction consistently.
31. Compare a short circuit with normal operation of a low-resistance heating element.
32. Should a fuse be connected in series with the live wire?
33. Distinguish overloading and short circuit.
34. A 2200 W appliance operates at 220 V. Find current.
35. Explain the roles of live, neutral, earth and protective devices in a labelled domestic circuit.

ANSWER KEY - Numerical / closed questions

- 1) North to south. 3) Right-hand thumb rule. 4) Anticlockwise circles. 5) Field direction reverses. 6) It increases at fixed distance. 7) Approximately uniform, parallel lines. 9) Soft iron. 11) Fleming's left-hand rule. 13) Wire parallel to field. 14) Wire perpendicular to field. 15) Electrical to mechanical. 17) Reverses coil current every half-turn. 19) No. 21) Mechanical to electrical. 23) 50 Hz. 24) 100. 25) Earth wire. 27) Force direction is unchanged. 29) 3 A. 32) Yes. 34) 10 A.