



CBSE Sample Paper

Class 12th Physics

(Based on the new pattern for 2015)

Magnetism and Magnetic effect of current

Time Allowed: 3 Hours

Maximum Marks: 70

General Instructions

1. All questions are compulsory. There are 26 questions in all.
2. This question paper has five sections: Section A, Section B, Section C, Section D and Section E.
3. Section A contains five questions of one mark each, Section B contains five questions of two marks each, Section C contains twelve questions of three marks each, Section D contains one value based question of four marks and Section E contains three questions of five marks each.

Q.1> Find the magnetic moment of a bar magnet of pole strength 20Am and length 5cm.

Q.2> Find the magnetic moment of a coil having 10 turns of area 2m^2 and carrying a current of 5A.

Q.3> What is direction b/w magnetic moment of a magnet and magnetic field at equatorial point?

Q.4> What is the basic difference b/w magnetic and electric field lines?

Q.5> Define magnetic field and mention its unit.

Q.6> A solenoid of length 2m and area $2 \times 10^{-2} \text{m}^2$ has 2000 turns and carries a current of 10A. Find the magnetic field at its centre.

- Q.7>** A bar magnet of moment 2Am^2 is cut along perpendicular to its length from the center. Explain how the dipole moment will change.
- Q.8>** At a certain location, the Vertical component of earth's magnetic field is found to be 100G while the net magnetic field is double this value. Find the horizontal component and dip.
- Q.9>** Name the 3 elements of earth's magnetism
- Q.10>** Explain why no work is done by the magnetic field on a moving charge particle.
- Q.11>** An infinite wire carries a current of 4A in the South to North direction. Find the magnetic field at a point 5m to the east of this wire. Give the direction of the field.
- Q.12>** A bar magnet of moment 10Am^2 has a moment of inertia 5kgm^2 . It performs 10 oscillations in one minute. Find the magnetic induction in the region.
- Q.13>** What are magnetic field lines? Give 2 properties.
- Q.14>** Mention 2 uses of the cyclotron.
- Q.15>** An electron and a proton with equal momentum enter a magnetic field perpendicular to the field lines. What is the ratio of the radii of curvature of their trajectories?
- Q.16>** Write the expression for the force b/w 2 current carrying wires. Hence define an Ampere
- Q.17>** A galvanometer has a coil resistance of 5ohm and it shows a full scale deflection for 100mA current. Explain how it can be converted into ammeter of range 2A ? What is total resistance now?
- Q.18>** State and Derive Curie's law in magnetism.
- Q.19>** The radius of the Dees of a cyclotron is R and the magnetic induction is B . Find the maximum velocity and maximum kinetic energy that can be given to a proton using this cyclotron.
- Q.20>** A circular coil of radius 10cm has 100 turns and carries a current of 5A in the clockwise direction. The coil is placed in a uniform magnetic field of 10T . Find the torque that will act on the coil when the direction of magnetic field is
(a) Parallel to the plane of the coil (b) Perpendicular to the plane of the coil.
Also find the net force acting on the coil in both cases.

Q.21> What is Biot-Savart law? Using it derive the magnetic field intensity at the centre of a coil.

Q.22> Mention 3 difference b/w paramagnetic and diamagnetic substances giving 2 examples each.

Q.23> While watching Discovery Channel, Shyama was impressed that certain organisms have the ability to sense the field lines of earth's magnetic field. They use this ability to travel from one location to another. Shyama wanted to find the angle of dip at her place. She got a magnetic compass, using which she found the magnetic meridian. She mounted the compass on a cardboard and placed it vertically along the magnetic meridian. She was able to measure the angle of dip.

(a) What values did Shyama have?

(b) Define the three magnetic elements of the earth and depict them in a figure

Q.24> Derive an expression for the magnetic induction on the axis of a current carrying loop.

Q.25> What is Hysterisis? Draw the hysterisis loops for soft iron and steel. Explain Retentivity and Coercivity. Hence *explain* which material you would prefer for making

(a) Permanent magnet (b) Core of a transformer (c) Electromagnet



Q.26> Explain the construction and working of a moving coil galvanometer. A moving coil galvanometer is made of a coil of radius 10cm and has 1000 turns. The strong horse shoe magnets create a magnetic field of 0.2T and the spring has a spring constant of 0.5 N/m . Find
(a) Galvanometer constant G (b) Current sensitivity I_s (c) Voltage Sensitivity V_s
Explain how a galvanometer can be made more sensitive

For Solutions, please write to

Abhishek Gupta
Engineering Physics
IIT – Delhi
physics_css@yahoo.com