

SAMPLE PAPER FOR BOARD EXAM 2015

Class 12th Physics (Magnetism)

Time allowed: 1 hour

Maximum marks: 50

General Instructions

1. All questions are compulsory. There are 18 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 two questions of three marks each, Section D contains one value based question of four marks and Section E contains five questions of five marks each.

SECTION A

Q.1> A compass needle free to rotate in the vertical plane, orients itself totally vertical at a certain location. Find out the angle of dip and the horizontal component at that place.

Q.2> Mention difference b/w paramagnetic and diamagnetic substances in terms of susceptibility.

Q.3> 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.4> What is the basic difference b/w magnetic and electric field lines?

Q.5> Under what condition is the cyclotron able to accelerate charged particles efficiently?

SECTION B

Q.6> An element $\Delta z \hat{i}$ is placed at the origin and carries a large current $I = 10$ A along the positive Z axis. What is the magnetic field (magnitude and direction) on the y-axis at a distance of 0.5 m. Given that the length of the element is $\Delta z = 2$ cm.

Q.7> Explain why the magnetic field can not accelerate a charged particle.

Q.8> An electron and an alpha particle with equal momentum enter a magnetic field perpendicular to the field. What is the ratio of the radii of curvature? Draw figure to show their path.

Q.9> A toroid of radius 2m has 20000 turns and carries a current of 10A. Find the magnetic field at its centre and inside the core.

Q.10> An infinite wire carries a current of 4A in the South to North direction. Find the magnetic field at a point 5m on top of this wire. Also give the direction of the field.

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SECTION C

Q.11> A galvanometer has a coil resistance of 5 ohm 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.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.

SECTION D

Q.13> 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) Mention one real life use/application of magnetic field.
- (c) Define the three magnetic elements of the earth.

SECTION E

Q.14> Derive an expression for the torque acting on a current carrying coil in a magnetic field.

Q.15> 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 when 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 and its magnetic flux in both cases.

Q.16> What is Hysterisis? Draw the hysteresis loops for soft iron and steel. Explain Retentivity and Coercivity. Hence *explain* with reason which material you would prefer for making (a) Permanent magnet

Q.17> A circular coil of radius 2m has 1000 turns and carries a current I. The magnetic field induction at its centre is measured as a function of current. Check the data as given below and explain using suitable formula which reading is not correct. What should be the correct value?

Current (Ampere)	Magnetic field at its centre (Tesla)
1	3.14×10^{-4}

2	6.28×10^{-4}
4	9.42×10^{-4}
7	21.98×10^{-4}
10	31.40×10^{-4}

Now keeping the current to be 10A, a soft iron core is placed at its centre. The new magnetic field is found to be 0.314 Tesla. What is the susceptibility and relative permeability of soft iron?

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Q.18> State Ampere's law. Using it derive the magnetic field at the centre of a solenoid.

If you have any doubt in Physics, write to

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