SHIKSHA CLASSES

BOARD QUESTION PAPER

Subject : Physics   **Topic: 11. Magnetic Materials**   **Total Marks : 20**
Class   : XII   **Time : 1 Hr.**

Section (A)

Q. 1. :   **Select and write the most appropriate answer from given alternatives in each sub-question.**   **5**

i)   Two small magnets each of magnetic moment 10 Am^2 are placed in end on position 0.1 m apart from their centres, the force acting between them is ------.

   a) 0.6×10^{-7}N   b) 0.06×10^7N   c) 0.6N   d) 0.06N

ii).   Susceptibility is positive and large for a ....

   a) Ferromagnetic substance   b) Paramagnetic substance

   c) Non magnetic substance   d) Diamagnetic substance

iii)   Relative permeability of iron is 5500, then the magnetic susceptibility will be

   a) 5500×10^7 b) 5500×10^{-7}

   c) 5501   d) 5499

iv)   The unit of intensity of magnetisation is ------.

   a) A/m   b) Am^2 c) Am   d) W/m

v)   A magnetic wire of dipole moment 4π Am^2 is bent in the form of semi-circle, the new magnetic moment is ------.

   a) 4π Am^2 b) 8π Am^2 c) 4 Am^2 d) Zero

Q. 2. :   **Very short answer type Question**   **2**

i)   How will the magnetic field intensity at the centre of a circular wire carrying current change, if the current through the wire is doubled and radius of the coil is halved?

ii)   Calculate the gyromagnetic ratio of electron(given e =1.6 x 10^{-19} C, m_e=9.1 x10^{-31} kg).

Section (B)

:   **Attempt any three question.**   **6**

Q. 3 :.   The magnetic moment of magnet of dimensions 10 cm × 5 cm × 1.25 cm is 12 Am^2. Calculate the intensity of magnetisation.

Q. 4 :.   Define magnetisation and explain magnetic intensity.

Q. 5 :   The maximum value of permeability of A-metal (77% Ni, 16% Fe, 5% Cu, 2% Cr) is 0.126 TmA^{-1}. Find the maximum relative permeability and susceptibility.

Q. 6 :   Find the magnetisation of a bar magnet of length 10 cm and cross sectional area 1 cm^2, if the magnetic moment is 5 Am^2.

Section (C)

:   **Attempt any one question.**   **3**

Q. 7 :.   Derive an expression for the magnetic dipole moment of a revolving electron.

Q. 8 :.   The susceptiblity of calcium at 500 K is 1.2×10^{-5}. At what temperature will the susceptibility increase to 1.8×10^{-5}?

Section (D)

:   **Attempt any one question.**   **4**

Q. 9 :   i) Derive an expression of magnetic permeability of the material by using the term relative magnetic permeability of the substance.

ii) The susceptibility of a metal at saturation is 5000. Find its permeability at saturation.

Q. 10 :   i)   Derive an expression for torque acting on a magnetic dipole in a uniform magnetic field.

ii)   In a hydrogen atom, an electron is making 6.6×10^{15} r.p.s around the nucleus in an orbit of radius 0.523 A.U. calculate the equivalent magnetic moment.

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