Note:-
1. All Questions are compulsory.
2. Numbers on the right indicate full marks.

Section A
Multiple Choice Question

(4)

1. Biot-Savart's law is valid for

    A) symmetrical current distribution   B) unsymmetrical current distribution

    C) very small length conductor carrying current   D) both (a) and (b)

2. The unit of Magnetic Induction is

    A) Tesla   B) $\dfrac{\text{Wb}}{\text{m}^2}$

    C) $\dfrac{\text{N}}{\text{Am}}$ D) all of these

3. The mutual repulsion between two long and parallel similar wires in air is F, when they carry certain current. If the current is doubled and distance between them is trebled, the new force will be

    A) $\dfrac{2}{9}$ F   B) $\dfrac{4}{9}$ F

    C) $\dfrac{2}{3}$ F   D) $\dfrac{4}{3}$ F

4. A rectangular coil 6cm long and 2 cm wide is placed in a magnetic field of 0.02 T. If the loop contains 200 turns and carries a current of 50 mA, the torque on the coil (with loop face parallel to the field is ....

    A) $2.4 \times 10^{-4}\text{Nm}$ B) 2.4 Nm

    C) 0.24 Nm D) 0.024 Nm

Section B
Answer the any 3 question.

(6)

1. State an expression for Biot-Savart's law.

2. Explain helical motion of a charged particle in magnetic field B.

3. What do you mean figure of merit of galvanometer?

4. Why magnetic is weak outside solenoid?

Section C
Answer any 2 question.

(6)

1. What do you mean by Lorentz Force?

2. A piece of straight wire has mass 20 g and length 1m. It is to be levitated using a current of 1 A flowing through it and a perpendicular magnetic field B in a horizontal direction. What must be the magnetic of B?

3. A toroid of narrow radius of 10 cm has 1000 turns of wire. For a magnetic field of 5×10^{-2} T along its axis, how much current is required to be passed through the wire?

Section D
Answer any 1 question.

(4)

1. Using neat diagram, explain ampere's law.

2. Two wires shown in the figure are connected in a series circuit and the same amount of current of 10 A passes through both, but in opposite directions. Separation between the two wires is 8mm. The length AB is S = 22 cm. Obtain the direction and magnitude of the magnetic field due to current in wire 2 on the section AB of wire 1. Also obtain the magnitude and direction of the force on wire 1. $\left[\mu_o = 4\pi \times 10-7 \ T.m/A \right]$