Day : Wednesday

Date : 6/7/2022 **S-18320-2022**

Time : 11:00 AM-02:00 PM

Max. Marks : 60

N.B.

1) All questions are **COMPULSORY**.
2) Figures to the **RIGHT** indicate **FULL** marks.
3) Draw diagrams **WHEREVER** necessary.

Q 1. Attempt any **Two** of the following. (12)
- **(a)** State principle of superposition in electrostatics and obtain an expression for force on any one charge due to all other charges.
- **(b)** Explain polar and non-polar molecules with examples and effect of electric field on them.
- **(c)** Using Biot-Savert's law, obtain expression for magnetic field produced in long straight conductor.

Q 2. Attempt any **Two** of the following. (12)
- **(a)** Obtain the relation between $\bar{B}, \bar{M}$ and $\bar{H}$. Discuss qualitatively.
- **(b)** What is electric dipole and dipole moment? Obtain an expression for electric potential at any point due to an electric dipole.
- **(c)** State Gauss's law and obtain the expression for the electric intensity near the surface of metallic conductor using Gauss's law.

Q 3. Attempt any **Two** of the following. (12)
- **(a)** State and explain Coulomb's law in electrostatics. Discuss its vector form.
- **(b)** State and prove Ampere's circuital law.
- **(c)** Calculate the electric intensity and potential due to a point charge 6×10^{-8} C at a point 20 cm away from it.

Q 4. Attempt any **Three** of the following. (12)
- **(a)** A charge of 12 nano-coulombs is situated inside a cube. Calculate the electric flux through one of the faces of the cube. (Given: $\varepsilon_0 = 8.85 \times 10^{-12}$ C^2/Nm^2).
- **(b)** Using Gauss's law, obtain an expression for electric intensity at any point due to a line charge.
- **(c)** Obtain an expression for Torque on a dipole placed in an uniform electric field.
- **(d)** Obtain an expression of magnetic field on the axis of solenoid.

Q 5. Attempt any **Four** of the following. (12)
- **(a)** Define (i) magnetization, (ii) magnetic intensity, (iii) Magnetic induction.
- **(b)** Define magnetic field and hence explain its properties.
- **(c)** An electric dipole consisting of two opposite charges each of magnitude 4 µC is separated by a distance of 2 cm. The dipole is placed in an external field of intensity 2×10^5 N/C. Calculate torque on the dipole.
- **(d)** Explain Paramagnetic, Diamagnetic and Ferromagnetic materials with example.
- **(e)** What do you mean by Polarization of dielectric material?
- **(f)** Give the limitations of Coulomb's law and Gauss's law.

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