## BACHELOR OF SCIENCE (CBCS-2018 COURSE)
## F. Y. B. Sc. Sem-II : WINTER- 2022
## SUBJECT : PHYSICS : ELECTRICITY & MAGNETISM

Day : Friday
Time : 02:00 PM-05:00 PM

Date : 9/12/2022
**W-18320-2022**
Max. Marks : 60

**N.B.**
1) All questions are **COMPULSORY**.
2) Figures to the **RIGHT** indicate **FULL** marks.
3) Draw a neat and labeled diagram wherever necessary.

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Q 1.  Attempt any **Two** of the following. **(12)**
    (a) Give a detailed explanation on polar and non-polar molecules with examples. Also explain how they behave under the effect of electric field.
    (b) State principle of superposition in electrostatics and obtain an expression for force on any one charge due to all other charges.
    (c) Using Biot-Savart's law, obtain an expression for magnetic field due to circular loop.

Q 2.  Attempt any **Two** of the following. **(12)**
    (a) State Gauss's law in dielectrics.
    (b) What is electric dipole and dipole moment? Obtain an expression for electric intensity at any point due to an electric dipole.
    (c) State and prove Ampere's circuital law.

Q 3.  Attempt any **Two** of the following. **(12)**
    (a) State and explain Coulomb's law in electrostatics. Discuss its vector form.
    (b) A charge of 12 nano-coulombs is situated inside a cube. Calculate the electric flux through one of the faces of the cube. (Given: $\varepsilon_0 = 8.85 \times 10^{-12}$ $C^2/Nm^2$).
    (c) Obtain an expression for Torque on a dipole placed in a uniform electric field.

Q 4.  Attempt any **Three** of the following. **(12)**
    (a) Obtain the relation between $\bar{D}, \bar{E}$ and $\bar{P}$.
    (b) Discuss electric polarization vector.
    (c) An aluminium wire of diameter 0.4 cm carries a current of 25 ampere. Find the magnetic induction at the surface of the wire.
    (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) Write a note on Bohr Magneton.
    (c) An electric dipole consisting of two opposite charges each of magnitude 2 $\mu$C is separated by a distance of 2 cm. The dipole is placed in an external field of intensity $1.0 \times 10^5$ N/C. Calculate torque on the dipole.
    (d) Explain Paramagnetic, Diamagnetic and Ferromagnetic materials with example.
    (e) What are magnetic susceptibility and permeability?
    (f) State the limitations of Coulomb's law and Gauss's law.

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