M. Sc. (ECI) (Sem. VII) (CBCS) (W.E.F.-2016) Examination

October - 2019

Electromagnetics : Paper - 28

(New Course)

Faculty Code : 003
Subject Code : 1277004

Time : **2:30** Hours]   [Total Marks : **70**

Instructions : (1) All questions carry equal marks.
                   (2) Figures on right hand side indicate marks.

1 Answer the following : (any **seven**)   **14**

   (1) Draw and define unit vector.

   (2) What are fixed vector and free vector?

   (3) Write the properties of vector addition.

   (4) What are the point charges and functions of charges?

   (5) Write the limitation of Coulomb's law.

   (6) Define potential.

   (7) What is magnetic flux density?

   (8) Write the statement of Ampere's law for current element.

   (9) Write the Maxwell's equations for static fields.

   (10) Write about retarded potential.

2 Answer the following : (any **two**)   **14**

   (1) Explain the law of parallelogram for addition of two vectors with special cases of parallelogram.   **7**

   (2) Explain electric field strength due to point charge and also explain electric field strength due to infinite line charge with suitable derivations of equations.   **7**

   (3) Derive the formula for potential due to electric dipole   **7**

   $$V = \frac{p \cos\theta}{4\pi \in_0 r^2} \text{ volts.}$$

3 Answer the following : 14

   (1) Explain Faraday's experiment to define flux. 7
       Write a note on Coulomb's law.

   (2) Explain Gauss's Law on arbitrary surface and 7

       prove $\oint_S D.dS = Q$

<div align="center">OR</div>

3 Answer the following : 14

   (1) Explain boundary conditions on E and D with proof. 7

   (2) Define dielectric materials and write the properties 7
       of it. Explain dielectrics in electric field and types of
       dielectric materials.

4 Answer the following : 14

   (1) Explain Ampere's work law and derive the equation 7

       $\oint H.dL = I_{enc}$. Explain Faraday's law of induction.

   (2) Write a note on Ampere's force law with suitable 7
       diagram.

5 Answer the following : (any **two**) 14

   (1) Write a note on magnetization in materials and 7
       magnetic dipole moment.

   (2) Explain energy density in a magnetic field and 7
       derive equation

       $W_H = \frac{1}{2}\mu H^2$ and $W_H = \frac{1}{2}B.H.$

   (3) Write the Maxwell's equations in Phasor form. 7

   (4) Explain time varying potentials, Lorentz gauge 7
       condition and Helmholtz theorem.