JBF-003-1151003 Seat No. _____

M. Sc. (ELE) (Sem. I) (CBCS) (W.E.F.-2016) Examination

December – 2019

Paper - 03 : Electromagnetics

(New Syllabus)

Faculty Code : 003

Subject Code : 1151003

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

1 Answer the following questions in brief : (any seven) **14**

(1) Define Collinear vectors.

(2) Define Co-terminus vectors.

(3) What is displacement vector?

(4) What is electromagnetic radiation?

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

(6) Define electric field.

(7) What is potential?

(8) Define equipotential surface.

(9) Define steady magnetic field.

(10) Write the statement of Ampere's work law.

2 Attempt any two of the following questions : **14**

(1) Derive the equation $E = \frac{\rho_L}{2\Pi \in_0 \rho} a_\rho$ of electric field strength due to infinite line charge. **7**

(2) Explain cross product of two vectors, graphical representation for cross product of two vectors and cross product in component form. **7**

(3) Explain electric field strength due to point charge and also write salient features of electric intensity. **7**

3 Answer the following questions : **14**

(1) Derive the equation $E = \frac{\rho_S}{2 \in_0} a_n$ for field due to surface charge density. **7**

(2) Derive the equation $V = \frac{Qd \cos\theta}{2\Pi \in_0 r^2}$ for potential due to electric dipole. **7**

OR

3 Answer the following questions : **14**

(1) Write a note on Gauss's law and its applications. **7**

(2) Explain boundary conditions on E and D and also prove the boundary conditions. **7**

4 Answer the following questions : **14**

(1) Derive the equation $E = \frac{p}{4\Pi \in_0 r^2} \left(2\cos\theta\, a_r + \sin\theta\, a_\theta\right)$ of electric field due to dipole. **7**

(2) Write the procedure for Faraday's experiment to define flux. **7**

5 Answer any two of the following questions : **14**

(1) Explain capacitance of parallel plate capacitor and capacitance between two concentric spheres with derivation of relevant equations. **7**

(2) Derive the equation $H = \frac{I}{4\Pi R} \int_{\alpha_2}^{\alpha_1} \sin\alpha\, d\alpha\, a_\phi = \frac{1}{4\Pi R} \left[\cos\alpha_2 - \cos\alpha_1\right] a_\phi$ for field due to a finite current element. **7**

(3) Explain Ampere's circuit law and derive the equation $\oint H.dL = I_{enc}$. **7**

(4) Derive the equation $H = \frac{I}{2\Pi\rho} a_\phi$ for field due to infinity long current element. **7**