

GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER-VI • EXAMINATION – SUMMER- 2015

Subject Code:160906**Date: 18/05/2015****Subject Name: Theory of Electromagnetics****Time: 10.30am-01.00pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain the physical significance of Curl of a vector field. Find the nature of field $F=30I_x+2xyI_y+5xz^2I_z$ by determining divergence and curl. **07**
 (b) Derive the expression of divergence of electric flux density D. **07**
- Q.2** (a) Given the potential field, $V=2x^2y-5z$, and a point P(-4, 3, 6), find following at point P: (1) the potential V, (2) the electric field intensity E, (3) the direction of E, (4) the electric flux density D, and (5) the volume charge density ρ_v **07**
 (b) Transform the vector $4I_x-2I_y-4I_z$ in to spherical coordinates at a point P (-2, -3, 4). **07**
- OR**
- (b) Transform the vector $B= y a_x - x a_y + z a_z$ in to cylindrical coordinates. **07**
- Q.3** (a) Derive Poisson's and Laplace's equation. **07**
 (b) Explain boundary condition for dielectric material. **07**
- OR**
- Q.3** (a) State and explain Ampere's circuital law. **07**
 (b) Derive the relation between I and J and explain the continuity equation of steady electric current in integral form and point form. **07**
- Q.4** (a) State Lorentz force equation. Give the classification of magnetic materials. **07**
 (b) Explain the construction and working principle of Magneto Hydrodynamic (MHD) Generator. **07**
- OR**
- Q.4** (a) Derive the expression curl $H= J$. **07**
 (b) Write Maxwell's equation in point form and in integral form. **07**
- Q.5** (a) State and prove uniqueness theorem. **07**
 (b) Describe briefly finite difference method (FDM). **07**
- OR**
- Q.5** (a) Explain briefly finite element method. Also state the advantages and disadvantages of finite element method. **07**
 (b) State and explain Stoke's theorem. **07**
