

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-VI Examination-Nov/Dec-2011

Subject code: 160906

Date: 02/12/2011

Subject Name: Theory of Electromagnetics

Time: 10.30 am -1.00 pm

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 dot product and cross product of two vectors. Also explain unit vectors of Cartesian, cylindrical and spherical co-ordinate systems **07**
- (b) Given the points $A(x=2, y=3, z=-1)$ and $B(r=4, \theta=25^\circ, \Phi=120^\circ)$ **07**
Find
(a) The spherical co-ordinates of A
(b) The Cartesian co-ordinates of B
(c) The distance from A to B
- Q.2** (a) Describe coulomb's law also explain concept of electric potential difference **07**
- (b) Determine electric flux density $\vec{D}$ at (4,0,3) if there is a point charge $-5 \pi \text{ mc}$ at (4,0,0) and a line charge $3 \pi \text{ mc/m}$ along the y-axis **07**
- OR**
- (b) State explain gauss's law. Obtain electric field intensity of line charge using gauss's law **07**
- Q.3** (a) Discuss Poisson's and Laplace's equation **07**
- (b) Derive continuity equation of current also explain relaxation time **07**
- OR**
- Q.3** (a) Explain boundary condition for dielectric material **07**
- (b) State and Explain Biot-Savart's law for magnetic field. Using this law derive expression for magnetic field intensity at a point due to a finite length current element carrying current 'I' lying on z-axis in cylindrical co-ordinates **07**
- Q.4** (a) State and Explain Stoke's theorem **07**
- (b) Explain applications of numerical techniques in engineering **07**
- OR**
- Q.4** (a) State and Explain Ampere circuital law **07**
- (b) Write short-note on 'magnetic materials' **07**
- Q.5** (a) State and Explain Lorentz force equation on charge particle. Also Explain concept of magnetic torque **07**
- (b) Write Maxwell equation in point form and in integral form **07**
- OR**
- Q.5** (a) State and Explain Induction heating **07**
- (b) State and Explain Eddy current testing of materials **07**
