

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER-III EXAMINATION – WINTER 2015

Subject Code: X31102**Date: 21/12/2015****Subject Name: Engineering Electromagnetics****Time: 10:30pm to 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) What do you mean by Vector Components and Unit Vectors, explain with suitable example. **07**
 (b) Give brief about Spherical Coordinate System. Find out a transformation vector from $\mathbf{G} = \left(\frac{xz}{y}\right) \mathbf{a}_z$ in to spherical coordinate system. **07**
- Q.2** (a) Define Electric Field Intensity. Evaluate E for the field of a sheet of charge. **07**
 (b) Write short notes on gauss's law for the case of differential volume element. Also find out a charge enclosed in volume ΔV . **07**
- OR**
- (b) Evaluate Maxwell's first equation i.e. $\text{div } \mathbf{D} = \rho_v$, Also find a $\text{div } \mathbf{D}$ for the case where $\mathbf{D} = \frac{Q}{4\pi r^2} \mathbf{a}_r$ is considered. **07**
- Q.3** (a) Write short notes on line integral. **07**
 (b) Derive $\mathbf{E} = -\nabla V$; Potential gradient equation. **07**
- OR**
- Q.3** (a) Define current density. Evaluate point form of the continuity equation. **07**
 (b) What do you mean by boundary condition? Determine boundary conditions at a conductor-free space boundary. **07**
- Q.4** (a) Give brief information about following **07**
 (1) Ampere's circuital law, (2) CURL
 (b) What is the purpose of Poisson's and Laplace equation? Derive Poisson's equation. **07**
- OR**
- Q.4** (a) Explain uniqueness theorem. **07**
 (b) Let $\mathbf{E} = \left(\frac{-6y}{x^2}\right) \mathbf{a}_x + \left(\frac{6}{x}\right) \mathbf{a}_y + 5 \mathbf{a}_z$ V/m and calculate : (a) V_{PQ} given $P(-7,2,1)$ and $Q(4,1,2)$; (b) V_p if $V = 0$ at Q ; (c) V_p if $V = 0$ at $(2,0,-1)$. **07**
- Q.5** (a) State Point and integral forms of Maxwell's equations for steady electric and Magnetic fields and give a details on it **07**
 (b) What do you mean by Skin Effect? Evaluate a depth of penetration. **07**
- OR**
- Q.5** (a) Give details on Wave Motion in Perfect Dielectrics. **07**
 (b) What the information is available by Poynting vector? Write short notes on it. **07**
