GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (OLD) - EXAMINATION – SUMMER 2018

Subject Code:151002   **Date:30/04/2018**

Subject Name:Engineering Electromagnetics

Time:02:30 PM to 05:00 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 divergence, gradient &curl with the help of mathematical expressions.	**07**
	(b)	With the help of necessary formulas, explain conversion among various co-ordinate systems.	**07**
Q.2	**(a)**	Derive the expression for the electric field **E** due to infinitely long line charge distribution.	**07**
	(b)	State Gauss's law. Also derive mathematical formulation for the same.	**07**
		OR	
	(b)	State & derive mathematical formulas for the following: (1) Maxwell's first equation for electrostatics (2) Divergence theorem.	**07**
Q.3	**(a)**	Define potential. Write a detailed note on potential gradient.	**07**
	(b)	What is an electric dipole? Derive the expression for the potential and electric field intensity due to a dipole at distances very large from the origin compared to the spacing between the charges of the dipole.	**07**
		OR	
Q.3	**(a)**	Derive the boundary conditions at the interface between two dielectric materials with permittivitiesε_1 and ε_2.	**07**
	(b)	Derive the relationship between **J** &**E** for a metallic conductor.	**07**
Q.4	**(a)**	Write down & discuss point and integral forms of Maxwell's equations for steady electric and magnetic fields.	**07**
	(b)	Using necessary diagrams, discuss magnetic boundary conditions.	**07**
		OR	
Q.4	**(a)**	State & discuss Biot-Savart law& Ampere's circuital law using necessary diagrams.	**07**
	(b)	Derive the expression of capacitance for following capacitors: (a) Parallel plate capacitor, (b) Coaxial capacitor, (c) Spherical capacitor.	**07**
Q.5	**(a)**	Write a short note on skin effect & skin depth.	**07**
	(b)	Using faraday's law, derive first Maxwell's equation for time-varying fields.	**07**
		OR	
Q.5	**(a)**	With the help of necessary expressions, explain uniform plane wave propagation/motion in free space.	**07**
	(b)	Derive and explain the Poisson's and Laplace Equations.	**07**

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