

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V EXAMINATION – SUMMER 2025****Subject Code:2151002****Date:13-05-2025****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.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) What is the result of divergence of curl of a vector? Why?	03
	(b) Covert Point P (10, 30°, 60°) in cylindrical coordinate.	04
	(c) What is a unit vector? With help of neat sketches, briefly explain the cylindrical coordinate system.	07
Q.2	(a) Describe the experimental law of coulomb. Define electric field intensity and derive the expression for electric field intensity E due to infinite and uniform line charge ρ_L .	07
	(b) Three infinite uniform sheets of charges are located in the free space as follows: 3 nC/m ² at z = -4, 6 nC/m ² at z = 1, -8 nC/m ² at z = 4. Determine the E at the point P (4,2,-3) and Q (-1,-5,2).	07
	OR	
	(b) A charge configuration is given by $\rho_v = 5r^2 e^{-2r}$ C/m ³ . Find D using Gauss's Law.	07
Q.3	(a) What do you mean by equipotential surface? Derive the expression of potential gradient.	07
	(b) Given the potential field, $V = 8x + 6y^2 - 3z^{1/2}$ V. Calculate the value at P (3,4,9) in air of (i) E (ii) D and (iii) ρ_v	07
	OR	
Q.3	(a) State and explain divergence theorem and its application.	07
	(b) Given $D = 10\sin\theta a_r + 2\cos\theta a_\theta$ C/m ² . Prove that the charge density $\rho_v = (\sin\theta / r) [18 + 2\cot^2\theta]$ C/m ³	07
Q.4	(a) Derive the Maxwell's four equations in point form.	07
	(b) Explain the boundary conditions for conductor- free space of boundary in electrostatics.	07
	OR	
Q.4	(a) State and explain the Biot-Savart Law in detail.	07
	(b) Explain the magnetic boundary conditions.	07
Q.5	(a) Write short note on Stoke's Theorem	07
	(b) Explain plane waves in free space.	07
	OR	
Q.5	(a) What do you mean by electromagnetic wave? Where, when and why it is require? Explain in detail with help of Maxwell's equations.	07
	(b) Write short note on wave propagation in good conductor.	07
