GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–IV EXAMINATION – SUMMER 2025

Subject Code:3141009   **Date:19-05-2025**
Subject Name: Electromagnetic Theory
Time: 10:30 AM TO 01:00 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)	Explain Lorentz Force Equation.	03
	(b)	Compare Cartesian and Cylindrical coordinate system	04
	(c)	Derive the expression for the electric flux density due to infinite line charge placed on the z-axis.	07
Q.2	(a)	Explain the concept of retarded potential.	03
	(b)	Explain properties of Smith Chart.	04
	(c)	Draw the equivalent circuit of the transmission line and derive its voltage and current equations.	07

OR

	(c)	State and prove Ampere's Circuital Law.	07
Q.3	(a)	State Stoke's theorem and Divergence theorem.	03
	(b)	Derive continuity equation.	04
	(c)	Write short note on wave propagation in good conductor.	07

OR

Q.3	(a)	Write Maxwell's equation in integral form for static electric and magnetic fields	03
	(b)	Explain VSWR and Reflection coefficient.	04
	(c)	Given three charge distributions in free space: 0.25nC/m on the line x=3,y=2; -0.2nC/m on the line z=1,y=3 and a point charge of 0.5nC at origin. Find electric field intensity at point (2,3,4).	07
Q.4	(a)	State and explain Biot-Savart's law.	03
	(b)	Explain spherical coordinate system.	04
	(c)	Using Biot-Savart law, find the vector magnetic field intensity in Cartesian coordinate at P(1.5,2,3) caused by a current filament of 24A in the a_z direction on z-axis and extending from z=0 to z=6.	07

OR

Q.4	(a)	Explain concept of conduction and convection current.	03
	(b)	Prove that curl of gradient of any scalar is zero.	04
	(c)	Obtain the expression of impedance for a loseless transmission line terminated in short circuit.	07
Q.5	(a)	Define and explain characteristic impedance.	03
	(b)	State Gauss's law and give its mathematical expression	04
	(c)	Write a note on Wave Reflection from Multiple Interfaces.	07

OR

Q.5	(a)	Write Maxwell's equation in differential form for static electric	03

and magnetic fields

(b) Prove that divergence of curl of any vector is zero. **04**

(c) Write a short note on Plane Wave Reflection at Oblique Incidence Angle. **07**

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