

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV(NEW) EXAMINATION – WINTER 2022****Subject Code:3141009****Date:17-12-2022****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) State Gauss's law and give its mathematical expression.	03
	(b) Explain the phenomena of skin depth.	04
	(c) State and prove Ampere's Circuital Law.	07
Q.2	(a) State Biot-Savart's law and give its mathematical expression.	03
	(b) Explain properties of Smith Chart.	04
	(c) Find total Electric field intensity at origin if the following charge distributions are present in free space. Point charge 12nC at (2,0,6), line charge 3nC/m at x=-2,y=3 and surface charge density 0.2nC/m ² at x=2.	07
	OR	
	(c) State Electric field intensity and obtain the derivation of it due to infinite line charge.	07
Q.3	(a) State and explain Faraday's law.	03
	(b) Write Maxwell's equation in differential form and integral form for static electric and magnetic fields.	04
	(c) Give statement & mathematical expression of Poynting Theorem.	07
	OR	
Q.3	(a) Define VSWR and reflection coefficient.	03
	(b) Derive continuity equation.	04
	(c) Draw the equivalent circuit of the transmission line and derive its voltage and current equations.	07
Q.4	(a) State Stoke's theorem and Divergence theorem	03
	(b) Prove that curl of gradient of any scalar is zero.	04
	(c) Explain the concept of potential gradient and obtain the relation between electric field (E) and potential (V)	07
	OR	
Q.4	(a) State Lorentz Force Equation.	03
	(b) Prove that divergence of curl of any vector is zero.	04
	(c) Write a short note on wave propagation in good conductor.	07
Q.5	(a) Explain spherical co-ordinate system.	03
	(b) Explain Retarded Vector Potential.	04
	(c) Write a short note on Wave Reflection from Multiple Interfaces.	07
	OR	
Q.5	(a) Explain cylindrical co-ordinate system.	03
	(b) Transform the given vector $\mathbf{A}=10\mathbf{a}_z$ into spherical co-ordinates at the point P(4,110°,120°)	04

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