

**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
<b>Q.1</b> (a) State Gauss's law and give its mathematical expression.	<b>03</b>
(b) Explain the phenomena of skin depth.	<b>04</b>
(c) State and prove Ampere's Circuital Law.	<b>07</b>
<b>Q.2</b> (a) State Biot-Savart's law and give its mathematical expression.	<b>03</b>
(b) Explain properties of Smith Chart.	<b>04</b>
(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 <sup>2</sup> at x=2.	<b>07</b>
<b>OR</b>	
(c) State Electric field intensity and obtain the derivation of it due to infinite line charge.	<b>07</b>
<b>Q.3</b> (a) State and explain Faraday's law.	<b>03</b>
(b) Write Maxwell's equation in differential form and integral form for static electric and magnetic fields.	<b>04</b>
(c) Give statement & mathematical expression of Poynting Theorem.	<b>07</b>
<b>OR</b>	
<b>Q.3</b> (a) Define VSWR and reflection coefficient.	<b>03</b>
(b) Derive continuity equation.	<b>04</b>
(c) Draw the equivalent circuit of the transmission line and derive its voltage and current equations.	<b>07</b>
<b>Q.4</b> (a) State Stoke's theorem and Divergence theorem	<b>03</b>
(b) Prove that curl of gradient of any scalar is zero.	<b>04</b>
(c) Explain the concept of potential gradient and obtain the relation between electric field (E) and potential (V)	<b>07</b>
<b>OR</b>	
<b>Q.4</b> (a) State Lorentz Force Equation.	<b>03</b>
(b) Prove that divergence of curl of any vector is zero.	<b>04</b>
(c) Write a short note on wave propagation in good conductor.	<b>07</b>
<b>Q.5</b> (a) Explain spherical co-ordinate system.	<b>03</b>
(b) Explain Retarded Vector Potential.	<b>04</b>
(c) Write a short note on Wave Reflection from Multiple Interfaces.	<b>07</b>
<b>OR</b>	
<b>Q.5</b> (a) Explain cylindrical co-ordinate system.	<b>03</b>
(b) Transform the given vector $\mathbf{A}=10\mathbf{a}_z$ into spherical co-ordinates at the point P(4,110°,120°)	<b>04</b>

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

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