Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–IV EXAMINATION – WINTER 2025

Subject Code:3141009 Date:24-11-2025

Subject Name:Electromagnetic Theory

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)**	Define 1) Divergence, 2) Gradient and 3) Curl	**03**
	(b)	Prove that the divergence of curl of any vector field is zero.	**04**
	(c)	Derive an equation of electric field due to surface charge distribution.	**07**
Q.2	**(a)**	Given vectors $A = 3a_x + 4a_y + a_z$ and $B = 2a_y - 5a_z$, find angle between vector A and B**.**	**03**
	(b)	State and explain Gauss's Law.	**04**
	(c)	What is the application of Poynting's Theorem? Derive its equation for total power leaving the volume.	**07**
		OR	
	(c)	Derive and sketch the standing wave pattern when the intrinsic impedance of medium 1 is less than medium 2 ($\eta_1 < \eta_2$).	**07**
Q.3	**(a)**	Explain Electric Field Intensity.	**03**
	(b)	Briefly describe magnetic boundary condition between two different media.	**04**
	(c)	Draw the equivalent circuit of the transmission line and derive its voltage and current equations.	**07**
		OR	
Q.3	**(a)**	Write Maxwell's equation in differential form and integral form for static electric and magnetic fields.	**03**
	(b)	State and prove Stokes's Theorem.	**04**
	(c)	Write short note on wave propagation in good conductor.	**07**
Q.4	**(a)**	Compare Cartesian and Cylindrical coordinate systems.	**03**
	(b)	Obtain the expression of impedance for a lossless transmission line terminated in short circuit.	**04**
	(c)	Explain the boundary condition between two dielectric material having permittivity ε_1 and ε_2.	**07**
		OR	
Q.4	**(a)**	Define following terms: 1. Standing wave ratio 2. Reflection coefficient 3. Characteristic impedance	**03**
	(b)	State and explain Faraday's Law.	**04**
	(c)	Explain Pulse Broadening in Dispersive Media.	**07**
Q.5	**(a)**	Explain Lorentz Force equation.	**03**
	(b)	How electric dipole is formed? Derived an equation of electric field due to electric dipole.	**04**

	(c)	Write short note on loss less and distortion less transmission line.	**07**

OR

Q.5	**(a)**	Derive an equation for variation in flux by moving loop in static magnetic field.	**03**
	(b)	State and derived the Biot-Savart Law.	**04**
	(c)	Write a short note on Smith Chart	**07**

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