GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–IV (NEW) EXAMINATION – WINTER 2023

Subject Code:3140912   **Date:17-01-2024**

Subject Name: Electromagnetic Fields

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.**

Q.1	**(a)**	Explain cylindrical coordinate system in brief.	03
	(b)	Explain Electrical dipole.	04
	(c)	Explain spherical coordinate system and give the relationship between Cartesian and spherical coordinate system.	07
Q. 2	**(a)**	State and explain Coulomb's law.	03
	(b)	State and explain the Gauss's law.	04
	(c)	Obtain equation for flux density due to infinite line charge using Gauss's law.	07

OR

	(c)	Give the potential field, $V = 2x^2y - 5z$, and a point P $(-4, 3, 6)$. Find out the several numerical value at P (1) the potential V, (2) the Electric field Intensity E, (3) the direction of E, (4) the electric flux density D and the volume charge density ρ_v.	07
Q.3	**(a)**	Define displacement current and current density.	03
	(b)	Derive the point form of the continuity equation.	04
	(c)	Obtain the Expression for field intensity **H** at the center of a circular carrying current **I**, using Biot-Savart law.	07

OR

Q.3	**(a)**	Explain concept of dot product and cross product.	03
	(b)	Explain phenomenon of polarization.	04
	(c)	Discuss Poisson's and Laplace equation.	07
Q.4	**(a)**	Classify magnetic materials.	03
	(b)	Explain the physical significance of the term: Curl of a vector.	04
	(c)	Derive Maxwell's equation in integral and Point form.	07

OR

Q.4	**(a)**	Explain difference between steady magnetic field and time varying magnetic field.	03
	(b)	Define divergence.	04
	(c)	Explain Stoke's theorem with its mathematical expression.	07
Q.5	**(a)**	Explain concept of electric potential difference.	03
	(b)	State and explain Ohm's law in point form.	04
	(c)	Eplain boundary conditions between two perfect dielectric materials.	07

OR

Q.5	**(a)**	Explain concept of scalar magnetic potential and magnetic vector potential.	03
	(b)	Explain Electrical field as the Gradient of the electrical potential.	04
	(c)	State and explain ampere's circuit law, both in integral differential form as used in magnetic field.	07