Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– IV(NEW) EXAMINATION – SUMMER 2023

Subject Code:3140912 Date:11-07-2023

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.**

			Marks
Q.1	**(a)**	List the Applications of Cross Product.	**03**
	(b)	Calculate the divergence of G at P(1,-2,3) if G = yz ax + 4xy ay+ y az	**04**
	(c)	Explain Cartesian co-ordinate system along with the equations of differential length, differential surfaces and differential volume elements.	**07**
Q.2	**(a)**	Explain magnetic dipole moment.	**03**
	(b)	Analyze the expression for electric field due to infinite surface charge distribution in free space.	**04**
	(c)	Point charges 1 mC and -2 mC are located at (3,2,-1) and (-1,-1,4) respectively. Calculate the electric force on a 10 nC charge loacated at (0,3,1) and the electric field intensity at that point.	**07**
		OR	
	(c)	Explain Physical meaning of divergence and state it's properties.	**07**
Q.3	**(a)**	Explain phenomenon of polarization	**03**
	(b)	Explain boundary condition for a dielectric material.	**04**
	(c)	Derive the boundary condition for a dielectric- dielectric interface.	**07**
		OR	
Q.3	**(a)**	State and explain Ampere's circuital law.	**03**
	(b)	Write Poisson's and Laplace equation. also state use of this equation and uniqueness theorem	**04**
	(c)	State and prove uniqueness theorem.	**07**
Q.4	**(a)**	State and explain Biot Savart's law	**03**
	(b)	State and explain Ampere circuital law.	**04**

	(c)	Derive maxwell's Equation in integral and point form.	**07**

OR

Q.4	**(a)**	What is the difference between steady magnetic field and time varying fields?	**03**
	(b)	Define the physical significance of the term: Curl of a vector.	**04**
	(c)	Derive stroke's theorem with its mathematical expression.	**07**
Q.5	**(a)**	What is inductance? Explain self inductance and mutual inductances.	**03**
	(b)	Classify magnetic materials.	**04**
	(c)	Explain force between two differential current elements.	**07**

OR

Q.5	**(a)**	What are the applications of Lorentz Force Equation?	**03**
	(b)	Define displacement current and current density.	**04**
	(c)	Analyze Maxwell's equations for Static fields. Explain how they are modified for time varying electric and magnetic fields. Derive the time varying Maxwell's equation for curl of H and also mention its physical significance.	**07**