

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2023****Subject Code:2151002****Date:05-12-2023****Subject Name: Engineering Electromagnetics****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 and Explain Faraday's Law.	03
	(b) Explain cartesian coordinate system.	04
	(c) Derive the expression for the electric field intensity due to infinite line charge placed on the z-axis.	07
Q.2	(a) What do you mean by Electric Flux Density?	03
	(b) Briefly explain skin effect.	04
	(c) Write a brief note on boundary conditions for perfect dielectric materials.	07
OR		
	(c) Explain Uniqueness Theorem.	07
Q.3	(a) Explain briefly Hall effect.	03
	(b) Write a short note on Stoke's theorem.	04
	(c) State and prove Ampere's Circuital Law.	07
OR		
Q.3	(a) Write short note on Lorentz force equation.	03
	(b) Write a short note on Divergence Theorem.	04
	(c) Given three charge distributions in free space: 0.25nC/m on the line $x=3, y=2$; -0.2nC/m on the line $z=1, y=3$ and a point charge of 0.5nC at origin. Find electric field intensity at point $(2,3,4)$.	07
Q.4	(a) State and explain Biot-Savart's law.	03
	(b) Explain spherical coordinate system.	04
	(c) Using Biot-Savart law, find the vector magnetic field intensity in Cartesian coordinate at $P(1.5,2,3)$ caused by a current filament of 24A in the a_z direction on z-axis and extending from $z=0$ to $z=6$.	07
OR		
Q.4	(a) Explain concept of conduction and convection current.	03
	(b) Explain cylindrical coordinate system.	04
	(c) What is Gradient? Derive the relation between electric field intensity and potential.	07
Q.5	(a) Prove that divergence of curl of any vector is zero.	03
	(b) State Gauss's law and give its mathematical expression	04
	(c) State and prove Poynting's Theorem.	07
OR		
Q.5	(a) Prove that curl of gradient of any scalar is zero.	03
	(b) Define and explain Magnetization and Permeability.	04
	(c) What is the importance of Maxwell's equations? Explain all equations in integral form.	07
