

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER– IV EXAMINATION – SUMMER 2026****Subject Code:3141009****Date:30-05-2026****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
Q.1	(a) 'The divergence of curl of a vector is zero'-Justify the statement.	03
	(b) For given point A (x=2, y=3, z=-1) find the spherical coordinates.	04
	(c) Three charges of 0.5 μC are located at the vertices of an equilateral triangle of 0.1m side. Find the magnitude and direction of the force on one charge due to other two charges.	07
Q.2	(a) Write the equations of differential length, differential surfaces and differential volume of spherical coordinate system.	03
	(b) What will be the field strength at inside the inner core, in between inner and outer core and outside the co axial cable?	04
	(c) Three infinite uniform sheets of charges are located in the free space as follows: 2 nC/m ² at z = -4, 5 nC/m ² at z = 1 and -4 nC/m ² at z =4. Determine the Field E at the point P (4,2,-3) and Q (-1,-5,2).	07
	OR	
	(c) A continuous spherical symmetric distribution of electric flux density is given by $D = (5r^2)/4 \text{ a}_r$, $r \leq 2$ and $D = 20/r^2 \text{ a}_r$, $r > 2$ Find the charge density in each region.	07
Q.3	(a) Define dot product and state its application.	03
	(b) Explain divergence.	04
	(c) What is Gradient? With help of gradient prove that $E = - \text{Del } V$	07
	OR	
Q.3	(a) Obtain Maxwell's first equation.	03
	(b) What are applications of Gauss's Law? Explain any one application.	04
	(c) Define work done and obtain the line integral to calculate the work done in moving a point charge Q in an electric field E.	07

Q.4	(a) Explain curl.	03
	(b) State and explain Ampere's circuital law.	04
	(c) Find current I through square area 2M on a side with edges coinciding with +x and +y axis and one corner at the origin if (i) $H = 2y^2 a_x$ A/m (ii) $H = 3x^2y a_z$ A/m	07
OR		
Q.4	(a) Compare spherical and Cylindrical coordinate systems.	03
	(b) Explain Stoke's theorem.	04
	(c) A current filament of $2a_x$ A lies along x axis. Find H components at P (-1,3,2).	07
Q.5	(a) What is transmission line? Explain its parameters.	03
	(b) Explain wave polarization.	04
	(c) Write short note on plane wave at boundaries.	07
OR		
Q.5	(a) Explain double stub impedance matching of transmission line.	03
	(b) Define and explain the following terms: (i) VSWR (ii) Skin Effect	04
	(c) Write short note on wave propagation in dielectric.	07
