Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – SUMMER 2019

Subject Code: 2151002 **Date: 06/06/2019**

Subject Name: Engineering Electromagnetics

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.**

Q.1	**(a)**	Define and explain DOT and CROSS products.	**03**
	(b)	Compare Cylindrical and spherical co-ordinate systems.	**04**
	(c)	The three vertices of a triangle are located at A(6, -1, 2), B(-2, 3, -4) and C(-3, 1, 5). Find: (a) $\mathbf{R_{AB}}$; (b) $\mathbf{R_{AC}}$; (c) the angle θ_{BAC} at vertex A; (d) the (vector) projection of $\mathbf{R_{AB}}$ on $\mathbf{R_{AC}}$.	**07**
Q.2	**(a)**	Briefly explain streamlines and sketches of fields.	**03**
	(b)	State and prove Divergence theorem.	**04**
	(c)	Derive Maxwell's first equation using Gauss's law.	**07**
		OR	
	(c)	State and prove Gauss's law.	**07**
Q.3	**(a)**	State Coulombs Law. Also derive vector form of coulombs law.	**03**
	(b)	A charge of –0.3 μC is located at A(25, -30, 15) (in cm), and a second charge of 0.5 μC is located at B(-10, 8, 12) (in cm). Find **E** at: (a) Origin, (b) P(15, 20, 50) (in cm).	**04**
	(c)	Derive equation of electric field intensity due to line charge.	**07**
		OR	
Q.3	**(a)**	Define potential and potential difference.	**03**
	(b)	Infinite uniform line charges of 5 nC/m lie along the (positive and negative) x and y axes in free space. Find **E** at: (a) A(0, 0, 4); (b) (0, 3, 4).	**04**
	(c)	State and explain Faraday's law.	**07**
Q.4	**(a)**	Explain measurement of curl using curl meter.	**03**
	(b)	Define and explain current and current density.	**04**
	(c)	Write short note on boundary conditions for metallic conductors.	**07**
		OR	
Q.4	**(a)**	Write Poisson's and Laplace's equations.	**03**
	(b)	Briefly explain Hall effect.	**04**
	(c)	Write short note on magnetic boundary conditions.	**07**
Q.5	**(a)**	Write Maxwell's equations in point and integral form.	**03**
	(b)	Briefly explain skin effect.	**04**
	(c)	State and explain Amperes circuital law.	**07**
		OR	
Q.5	**(a)**	For TEM waves, prove that **E.H = 0.**	**03**
	(b)	Briefly explain stokes theorem.	**04**
	(c)	State and explain Biot-Savart law.	**07**

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