Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2018

Subject Code:2151002 **Date:27/11/2018**

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.**

			MARKS
Q.1	**(a)**	If three vertices of a triangle are p (6, -1, 2), q (-2, 3, -4) and r (-3, 1, 5) then determine : (a) Rpq.Rpr, (b) Rpq × Rpr , (c) area of the triangle	**03**
	(b)	Explain Cylindrical co-ordinate system with unit vectors, differential lengths, areas and volume.	**04**
	(c)	Two infinite uniform line charges of 5 nC/m, lie along the positive and negative x and y axes in free space respectively. Find E at point P(0,0,4).	**07**
Q.2	**(a)**	State and explain Coulomb's law and get its vector notation.	**03**
	(b)	Calculate the total charge enclosed within the volume defined by the universe with $\rho_V = e^{-2r}/r^2$.	**04**
	(c)	Define electric field intensity (E) and write the equation of E due to a point charge and explain system of super position of charges.	**07**
		OR	
	(c)	Explain boundary conditions at conductor-free space interface.	**07**
Q.3	**(a)**	Briefly discuss stream lines.	**03**
	(b)	Which are the different types of charge distributions? Hence define ρ_L , ρ_S & ρ_V .	**04**
	(c)	Derive expression of Electric field due to infinite uniform sheet charge lying along Y-Z plane.	**07**
		OR	
Q.3	**(a)**	Calculate electric flux density at point P(2,-3,6) produced by a point charge Q_A=55 mille Coulombs located at Q(-2,3,-6).	**03**
	(b)	State and prove divergence theorem as, $\int_s D.\, dS = \int_v (\nabla \cdot D)\, dv$	**04**
	(c)	State and explain Gauss's law and its applications for symmetrical charge distributions.	**07**
Q.4	**(a)**	Define potential difference and potential of a point.	**03**
	(b)	Derive Poisson's and Laplace's equations.	**04**

	(c)	Derive the incremental work done in moving a point charge in an electric field and briefly explain line integral.	**07**

OR

Q.4	**(a)**	Define : magnetic flux density, scalar magnetic potential, vector magnetic potential,	**03**
	(b)	Describe boundary conditions for perfect dielectric-dielectric interface.	**04**
	(c)	Define and discuss Curl with necessary equations & derive point form of Amperes' law as $\nabla \times H = J$.	**07**
Q.5	**(a)**	Explain displacement current and retarded potential.	**03**
	(b)	State and explain Biot-Savart's law.	**04**
	(c)	Write down the Maxwell equation in integral and differential form and explain its physical significance.	**07**

OR

Q.5	**(a)**	Define: polarization, magnetization, poynting vector.	**03**
	(b)	Discuss boundary conditions for magnetic materials	**04**
	(c)	Magnetic field intensity $H = 6xy\ a_x - 3y^2\ a_y$. Verify stokes theorem for region $2 <= x <= 5$, $-1 <= y <= 1$ and $z = 0$. Let the positive direction of dS be a_z.	**07**

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