Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:2163203 **Date:14/05/2019**

Subject Name:Engineering Electromagnetics And Wave Propagation

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.**

Q.1	**(a)**	Explain cross product.	**03**
	(b)	Explain spherical coordinate systems.	**04**
	(c)	(i) Transform the vector **B** = *y***a***x* – *x***a***y* + *z***a***z* into cylindrical coordinates. (ii) Transform vector field **G** = (*xz*/*y*)**a***x* into spherical components and variables.	**07**
Q.2	**(a)**	State Coulomb's law.	**03**
	(b)	Find electric field intensity due to infinite line with uniform line charge density ρl which lies on the z-axis.	**04**
	(c)	Given the field D = 6 ρ sin (φ /2) aρ+ 1.5 ρ cos (φ /2) aφ C/m2. Evaluate both sides of the divergence theorem for the region bounded by ρ= 2, 0 < φ < 180°, 0 < z < 5.	**07**
		OR	
	(c)	Find the total charge inside each of the volumes indicated. (a) ρv = 10 **Z** ² $e^{-0.1x}$ sinπy, -1 < x < 2, 0 < y < 1,3 < z < 3.6. (b) ρv = 4xy **Z** ² , 0 < ρ < 2, 0 <φ < л /2, 0 < z < 3. (c) ρv = 3л cos ² θ cos² φ / [2r² (r^2 +1)]; Universe.	**07**
Q.3	**(a)**	What do you mean by equipotential surface? Derive the expression of potential gradient.	**03**
	(b)	Derive the expression of following capacitor: 1) coaxial 2) Spherical.	**04**
	(c)	Write short note on magnetic boundary conditions .	**07**
		OR	
Q.3	**(a)**	Explain electric dipole .	**03**
	(b)	Write short note on boundary condition for perfect dielectric.	**04**
	(c)	Prove that Δ .D =ρv	**07**
Q.4	**(a)**	What are the characteristics of good conductor?	**03**
	(b)	State and explain Stoke's theorem.	**04**
	(c)	An electric field is expressed in rectangular coordinates by **E** = 6x²**ax** + 6y **ay** + 4 **az** V/m for points M (2, 6, -1) & N (-3, -3, 2). Determine potential a) V_{MN} b) V_N if V = 2 at P(1, 2, -4)	**07**
		OR	
Q.4	**(a)**	Explain ampere's circuital law.	**03**
	(b)	Let $V = 2xy^2z^3 + 3\ln(x^2 + 2y^2 + 3z^2)$ V in free space. Evaluate each of the following quantities at *P*(3, 2,− 1): a) *V* b) |*V* | and c) E.	**04**
	(c)	Explain Point and integral form of Maxwell's Equations .	**07**
Q.5	**(a)**	Define skin effect.	**03**
	(b)	Derive Poission's and Laplace's equation.	**04**
	(c)	Verify Stoke's theorem for the field **H** = 6xy**ax** – 3y²**ay** and the rectangular path around the region 2 ≤ x ≤5, -1 ≤ y ≤1 and z = 0. Let the positive direction of **ds** be **az.**	**07**

OR

Q.5	**(a)**	Explain faraday's law of EM induction .	**03**
	(b)	Explain Wave motion in free space .	**04**
	(c)	State and prove Poynting theorem relating to the flow of energy at a point in space in an electromagnetic field.	**07**

****