Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2163203 **Date: 01/05/2017**

Subject Name: Engineering Electromagnetics & wave Progogation

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		**Short Questions**	**14**
	1	State stokes theorem.	
	2	Give the relationship between potential gradient and electric field.	
	3	What is the physical significance of div D?	
	4	What are the sources of electric field and magnetic field?	
	5	State Gauss law.	
	6	Define electric field intensity.	
	7	State amperes circuital law.	
	8	Define electric dipole.	
	9	Write down the magnetic boundary conditions.	
	10	Define magnetic field strength.	
	11	What are equipotential surfaces?	
	12	Give the relation between electric field intensity (E) and electric flux density (D).	
	13	Define skin depth.	
	14	Mention the properties of uniform plane wave.	
Q.2	**(a)**	Explain cross product and dot product on detail.	**03**
	(b)	Explain spherical coordinate systems.	**04**
	(c)	Given point P (—2, 6, 3) and vector A = y a_X+ (x + z) a_Y, express P and A in cylindrical and spherical coordinates. Evaluate A at P in the Cartesian, cylindrical, and spherical systems.	**07**
		OR	
	(c)	Find the total charge inside each of the volumes indicated. (a) $\rho v = 10z^2 e^{-0.1X} \sin\pi y, -1 < x < 2, 0 < y < 1, 3 < z < 3.6$. (b) $\rho v = 4xyz^2$, $0 < \rho < 2, 0 < \varphi < л/2, 0 < z < 3$. (c) $\rho v = 3л \cos^2\theta \cos^2\varphi / [2r^2 (r^2+1)]$; Universe.	**07**
Q.3	**(a)**	Explain experimental law of coulomb and from that deduce expression for electric field intensity for point charges.	**03**
	(b)	Derive the electric field intensity and electric field density due to an infinite and uniform line charge density.	**04**
	(c)	Given the field D = 6ρsin (1/2) φ a_ρ+ 1.5ρcos (1/2)a_φ C/m2.Evaluate both sides of the divergence theorem for the region bounded by ρ= 2, 0 < φ < 180°, 0 < z < 5.	**07**

OR

Q.3	**(a)**	Explain electric dipole.	**03**
	(b)	An electric field is expressed in rectangular coordinates by **E** = $6x^2$ **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)	**04**
	(c)	Using Gauss's law for differential volume element prove that divD=ρv.	**07**
Q.4	**(a)**	What do you mean by equipotential surface? Derive the expression of potential gradient.	**03**
	(b)	Derive equation to find Energy stored in the field of a system of charges.	**04**
	(c)	Let $V = 2xy^2 z^3 + 3 \ln (x^2 + 2y^2 + 3z^2)$ V in free space. Evaluate each of the following quantities at $P(3, 2, -1)$: a) V b) $\|V\|$ and c) E	**07**

OR

Q.4	**(a)**	Derive continuity equation for current.	**03**
	(b)	Write short note on boundary condition for perfect dielectric.	**04**
	(c)	Write short note on magnetic boundary conditions.	**07**
Q.5	**(a)**	Derive the expression for curl of magnetic field intensity.	**03**
	(b)	State and explain Bio-Savart's law	**04**
	(c)	Explain Point and integral form of Maxwell's Equations.	**07**

OR

Q.5	**(a)**	Given power density P=200 Watt /m2 at 2 GHz. Find out permissible electric and magnetic field	**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**

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