GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–IV (NEW) EXAMINATION – SUMMER 2022

Subject Code:3141009   **Date:04-07-2022**

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 vector magnetic potential is zero'-Justify the statement.	**03**
	(b)	Find the rectangular coordinates of the point A (ρ = 4.4, φ = -115^0 z=2).	**04**
	(c)	What is divergence? Explain the physical significance of divergence with two examples.	**07**
Q.2	**(a)**	Find the a_x dot a_ϕ and a_z dot a_θ	**03**
	(b)	What is electric field intensity? Derive mathematical equation of electric field intensity due to a continuous volume charge distribution.	**04**
	(c)	A uniform line charge density of 5 nC /m is at y = 0, z = 2 m in free space, while -5 nC/m is located at y = 0, z = - 2 m. A uniform surface charge density of 0.3 nC/m^2 is at y = 0.2 m and -0.3 nc /m^2 is at y = -0.2m. Find E at the origin.	**07**

OR

	(c)	Given the flux density D = $(\cos\theta/r^3)$ a_r + $(5\sin\theta/r^3)$ a_θ c/m^2, evaluate both sides of the divergence theorem for the region defined by 1< r < 2 , 0 < θ < π/2 , 0< ϕ< π	**07**
Q.3	**(a)**	What is the use of coordinate system? Explain the Cartesian coordinate system in brief.	**03**
	(b)	State and explain Gauss's Law.	**04**
	(c)	Write Maxwell's equations in integral form and explain physical significance of equations.	**07**

OR

Q.3	**(a)**	State and explain Ampere's circuital Law in brief.	**03**
	(b)	Derived the desired distance field for the dipole.	**04**
	(c)	Write Maxwell's equations in point form and explain their physical significance.	**07**
Q.4	**(a)**	Explain Skin effect.	**03**
	(b)	Explain the reflection of uniform plane wave at normal incidence.	**04**
	(c)	Current filaments of 2 a_x A lies along x axis. Find H components at B (-1, 3, 2).	**07**

OR

Q.4	**(a)**	Compare spherical and Cylindrical coordinate systems.	**03**
	(b)	State and explain Stoke's theorem.	**04**
	(c)	For magnetic vector potential A = - r^2/2 a_z Wb/m calculate the total flux crossing the surface φ = π/2 , 2$\leq$ r $\leq$ 4 m, 0$\leq$ z $\leq$ 4 m.	**07**

Q.5	**(a)**	What is smith chart? What are its uses?	**03**
	(b)	Explain one of the impedance matching methods of transmission line.	**04**
	(c)	Write short note on plane wave reflection at oblique incidences angles.	**07**

OR

Q.5	**(a)**	Define and explain voltage standing wave ratio.	**03**
	(b)	Define and explain hall effect.	**04**
	(c)	What are the applications of transmission line? Write the equations of transmission lines and their solutions in phasor form.	**07**

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