Question Paper Code: 33303

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Third Semester

Electrical and Electronics Engineering

01UEE303 - FIELD THEORY

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - $(10 \times 2 = 20 \text{ Marks})$

- 1. State divergence theorem.
- 2. Write the condition for a vector \overline{A} to be (a) solenoidal and (b) irrotational.
- 3. State Coulomb's law.
- 4. A parallel plate capacitor has a charge of 10^{-3} C on each plate, while the potential difference between the plates is 1000 Volts. Calculate the value of capacitance.
- 5. What is Lorentz law of force?
- 6. Define magnetic vector potential.
- 7. What is the significance of displacement current?
- 8. What is the significance of displacement current?
- 9. Calculate the characteristic impedance of free space.
- 10. Define loss tangent.

11. (a) Derive electric field intensity at the given point due to the line charge of infinite length. (16)

Or

	(b)	(i)	Convert the point P (3,4,5) from Cartesian to Spherical coordinates.	6)
		(ii)	Use Spherical coordinates and integrate to find the area of the region $0 \le \Phi \le \alpha$ of the Spherical shell of radius 'a'. What is the area if $\alpha = 2\pi$?)n 6)
		(iii)	State the Gradient in three coordinate systems. (4)	4)
12.	(a)	(i)	State and prove Gauss's law. (8)	8)
		(ii)	State Laplace and Poisson's equations and explain their significance in the field theory.	ld 8)
Or				
	(b)	Ob	tain the boundary conditions between a conductor and free space of electric field (16	d. 5)
13.	(a)	(i)	Derive Biot – Savart's law and Ampere's law using the concept of magnet vector potential.	ic 8)
		(ii)	Obtain the expression for energy stored in magnetic field and also derive a expression for magnetic energy density.	ın 8)
Or				
	(b) Derive the boundary conditions to explain the behaviour of magnetic field interface of two magnetic media.		rive the boundary conditions to explain the behaviour of magnetic field at the erface of two magnetic media. (16	5)
14.	(a)	(i)	Derive the expressions for displacement current and conduction current densities	s. 8)
		(ii)	State and derive the Maxwell's equation for free space in integral and point form for time varying fields.	15 8)

Or

(b) What are the different ways of emf generation? Explain with the governing equations and suitable practical examples. (16)

- 15. (a) Briefly explain about the wave incident
 - (i) Normally on perfect conductor. (8)
 - (ii) Obliquely to the surface of perfect conductor.

Or

(b) (i) A uniform plane wave in a medium having $\sigma = 10^{-3}$ s/m, $\varepsilon = 80\varepsilon_0$ and $\mu = \mu_0$ is having a frequency of 10kHZ. Calculate the different parameters of the wave.

(8)

(8)

(ii) Derive the expression for wave propagation in lossless medium. (8)

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