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Question Paper Code: 33303

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

Third Semester

Electrical and Electronics Engineering

01UEE303 - FIELD THEORY

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Define gradient.
2. Define divergence theorem.
3. Define 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. State Ampere's Circuital law.
6. Define self inductance.
7. What is the significance of displacement current?
8. Write down Maxwell's equation in integral form.
9. Define Poynting vector.
10. What is intrinsic impedance of free space? What is its value?

PART - B (5 x 16 = 80 Marks)

11. (a) Explain different type of Coordinate system with mathematical expressions. (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 $0 \leq \Phi \leq \alpha$ on the Spherical shell of radius 'a'. What is the area if $\alpha = 2\pi$? (6)

(iii) State the Gradient in three coordinate systems. (4)

12. (a) Derive the expression for electric field intensity due to charged circular ring. (16)

Or

(b) Obtain the boundary conditions between a conductor and free space of electric field. (16)

13. (a) Using Bio-Savart law find H due to finite and infinitely long straight conductor. (16)

Or

(b) Derive the boundary conditions to explain the behaviour of magnetic field at the interface of two magnetic media. (16)

14. (a) Obtain the expressions for the Maxwell's equation in the point form and integral form. (16)

Or

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

15. (a) State the Poynting vector and establish its usage in Electromagnetic wave analysis. (16)

Or

(b) (i) A uniform plane wave in a medium having $\sigma = 10^{-3}$ s/m, $\epsilon = 80\epsilon_0$ and $\mu = \mu_0$ is having a frequency of 10kHz. Calculate the different parameters of the wave. (8)

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