Reg. No. : | | | | | | | | | | |

Question Paper Code: 33303

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

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 magnetic vector potential.
7. Write down the point form of Maxwell's equation using Faraday's law.
8. Distinguish between transformer emf and motional emf.
9. Define skin depth and determine the intrinsic impedance of free space.
10. What is meant by poynting vector?

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) (i) Derive the expression for electric field intensity due to charged circular ring. (8)

(ii) A parallel plate Capacitor is chosen with d = 1m, plate area $0.8m^2$ and a dielectric relative permittivity of 2.8. A dc volt of 500V is applied between the plates. Find the capacitance and energy stored. (8)

Or

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

13. (a) (i) Derive the boundary conditions to explain the behaviour of magnetic field at the interface of two magnetic media. (8)

(ii) Derive an expression for B and H due to finite long straight conductor. (8)

Or

(b) (i) Derive the boundary conditions of magnetic field at dielectric and conductor. (8)

(ii) What is magnetization? Explain the classification of magnetic materials with examples. (8)

14. (a) (i) Write short notes on Faraday's laws of electromagnetic induction. (6)

(ii) What are the different ways of emf generation? Explain with the governing equations and suitable practical examples. (10)

Or

(b) Derive the time-harmonics of Maxwell's equations in integral form and point form. (16)

15. (a) (i) Derive the expressions for input impedance and standing wave ratio of transmission lines. (12)

(ii) Find the skin depth of δ at a frequency of $1.6MHz$ in aluminum $\sigma = 38.2Ms/m$ and $\mu_r = 1$. (4)

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)

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

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