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

Question Paper Code: 41333

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Third Semester

Electrical and ElectronicsEngineering

14UEE303 – FIELD THEORY

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The cylindrical system coordinates are represented in terms of

   (a) (x, y, z) (b) (ρ, φ, z) (c) (r, θ, φ) (d) all the above

2. In cylindrical coordinate system ϕ varies from

   (a) 0 to 90° (b) 0 to 180° (c) 0 to 270° (d) 0 to 360°

3. Electric field intensity is a quantity of

   (a) scalar (b) vector
   (c) both a & b (d) none of these

4. The region where the force acts is called

   (a) Electric flux (b) Electric field (c) Field Intensity (d) Flux density

5. Which of the following is the unit of magnetic flux density

   (a) Weber (b) Lumens
   (c) Tesla (d) None of these

6. The relationship between Magnetic flux density and Magnetic field Intensity is given by

   (a) $\mathcal{E}$ (b) μ (c) α (d) β

7. Substance which have the permeability less than the permeability of free space are known as

(a) ferromagnetic (b) paramagnetic
(c) diamagnetic (d) bipolar

8. A current through a capacitive element is called

(a) displacement current (b) conduction current
(c) current density (d) energy density

9. Electromagnetic waves can travel through space, they do not need this to travel through

(a) electric energy (b) charge
(c) medium (d) magnetic field

10. The value of standing wave ratio lies between

(a) 1 and ∞ (b) 0 and ∞ (c) $-\infty$ and $+\infty$ (d) -1 and +1

PART - B (5 x 2 = 10 Marks)

11. Shows that the two vectors $\overline{A} = 6\overline{a}_x + \overline{a}_y - 5\overline{a}_z$ and $\overline{B} = 3\left(\overline{a}_x - \overline{a}_y + \overline{a}_z\right)$ are perpendicular to each other

12. Express the Poisson's and Laplace equation.

13. What is the relation between magnetic flux density and field intensity?

14. What is the significance of displacement current density?

15. State Poynting theorem.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Explain the different coordinate system used to represent field vector. (12)

(ii) What are the source of electromagnetic fields? (4)

Or

(b) State and prove

(i) Divergence theorem (8)

(ii) Stokes theorem (8)

17. (a) (i) Develop an expression for E and D due to the infinity sheet of charge placed in $Z = 0$ plane, using Gauss's Law. (8)

(ii) Develop an expression for electric field intensity due to an uniformly charged infinite long straight line with constant charge density in *c/m*. (8)

Or

(b) (i) Deduce an expression for the capacitance of a pair of co-axial cylinders of radii r_1 and r_2 and length. The dielectric being air. The outside cylinder is earthed. (8)

(ii) Deduce the polarization in dielectric material with $\mathcal{E}_R = 2.8$, if $D = 3$ X 10-7c/m^2. (8)

18. (a) State Bio-Savart law. Obtain the magnetic field intensity H due to an infinite long straight filament carrying a direct current I. (16)

Or

(b) Obtain the expression for energy in magnetic field and also derive an expression for magnetic energy density. (16)

19. (a) Derive the Maxwell's equations in integral and point terms. (16)

Or

(b) State Faraday's laws. What are the different ways of emf generation? Explain each one of them with governing equation and suitable example. (16)

20. (a) (i) Derive the expression for wave propagation in conducting medium. (8)

(ii) Define wave. Derive the expression for electromagnetic wave equations. (8)

Or

(b) (i) State Poynting theorem and derive an expression for Poynting vector. (8)

(ii) A certain transmission line, working at radio frequencies, has following constants, $L = 9$ $\mu H/m$, $C = 16$ pF/m. The line is terminated in a resistive load of 1000 Ω. Find the reflection coefficient and standing wave ratio. (8)

———————

41333