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

Question Paper Code: 43043

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Third Semester

Electrical and Electronics Engineering

14UEE303 – FIELD THEORY

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

(Smith chart may be permitted)

PART A - (10 x 1 = 10 Marks)

1. In cylindrical coordinate system ϕ varies from

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

2. 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

3. The region where the force acts is called

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

4. The space surrounding an electric charge, over which the electric force of attraction (or) repulsion exists, is called its

(a) Coulombs Law (b) Charge (c) Electric Field (d) Gauss Law

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

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

6. $\overline{H}$ at the center of a circular current carrying coil

(a) $\frac{N}{2R}\ AT/_M$ (b) $\frac{NI}{R}\ AT/_M$ (c) $\frac{NI}{2R}\ AT/_M$ (d) $\frac{2NI}{R}\ AT/_M$

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. Reluctance of magnetic circuit

(a) $\frac{A}{l\mu}$ (b) $\frac{l}{A\mu}$ (c) $\frac{l}{\mu}$ (d) $\frac{A}{\mu}$

9. The value of standing wave ratio lies between

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

10. Velocity of propagation of electro-magnetic wave through free space

(a) $V = \frac{1}{\sqrt{\mu_0 \varepsilon_0}}\ m/sec$ (b) $V = \sqrt{\mu_0 \varepsilon_0}\ \ m/sec$

(c)) $V = \frac{1}{\sqrt{\mu_0 \varepsilon_0}}\ m^2/\text{sec}$ (d) $V = \sqrt{\mu_0 \varepsilon_0}\ m^2/\text{sec}$

PART - B (5 x 2 = 10 Marks)

11. Define Curl.

12. Express the Poisson's and Laplace equation.

13. Define Lorentz law of force.

14. Distinguish between scalar and vector potentials.

15. State Poynting theorem.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) State and prove Divergence theorem. (8)

(ii) Obtain the Spherical coordinate of $10a_x$ at the point *P (X* = -3, *Y* = 2, *Z* = 4*)*. (8)

Or

(b) Derive the expression interms of Cartesian, cylindrical and spherical co-ordinate system. (16)

17.(a) (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)

Or

(b) State and derive electric boundary condition for a dielectric to dielectric medium and a conductor to dielectric medium. (16)

18. (a) (i) A solenoid with N_1 = 1000, l_1 = 50 *cm*, r_1 = 1.0*cm* is concentric within a second coil of N_2 = 2000, l_2 = 50*cm*, r_2 = 2.0*cm*. Find the Mutual Inductance assuming free space condition. (8)

(ii) Derive the expression for the energy density in the Magneto static fields. (8)

Or

(b) Develop an expression for magnetic field intensity on the axis of a circular loop current carrying a current I and also find at the center of the coil, where h = 0. (16)

19. (a) Derive the Maxwell's equation and obtain them in point and integral form. (16)

Or

(b) State and derive the Maxwell's equations for free space in integral form and point form for time varying field. (16)

20. (a) Explain the virtual memory address translation and TLB with necessary diagram. (16)

Or

(b) Define Brewster angle and derive its expression. (16)