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

Question Paper Code: 43303

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

Third Semester

Electrical and Electronics Engineering

14UEE303 – FIELD THEORY

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Vector algebra includes

   (a) Addition (b) Subtraction (c) Multiplication (d) All the above

2. Cross product of two vectors, $\bar{A} \times \bar{B} =$

   (a) $|A|\,|B| \sin\theta\ \overline{a_n}$ (b) $|A|\,|B| \cos\theta\ \overline{a_n}$
   (c) $|A|\,|B| \tan\theta\ \overline{a_n}$ (d) $|A|\,|B| \sec\theta\ \overline{a_n}$

3. 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

4. ε_0 is

   (a) $8.854*10^{-12}$ F/M (b) $6.854*10^{-12}$ F/M
   (c) $6.854*10^{-12}$ H/M (d) $8.854*10^{-12}$ F/M

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. Reluctance of magnetic circuit

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

9. 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/sec (d) $V = \sqrt{\mu_0 \varepsilon_0}\, m^2$/sec

10. A point form of faraday's law is

(a) $\nabla . \bar{D} = -\rho_v$ (b) $\nabla . \bar{D} = \rho_l$
(c) $\nabla \times \bar{E} = -\frac{\partial \bar{B}}{\partial t}$ (d) $\nabla \times \bar{E} = \frac{\partial \bar{B}}{\partial t}$

PART - B (5 x 2 = 10 Marks)

11. What is curl of vector function and their physical interpretation.

12. Compare electric circuit and magnetic circuits.

13. Formulate the Laplace equation.

14. Distinguish between scalar and vector potentials.

15. State Poynting theorem.

PART - C (5 x 16 = 80 Marks)

16. (a) Explain briefly the spherical and cylinderical coordinate systems. (16)

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) Explain the capacitance of a parallel plate capacitor and calculate the equivalent capacitance value using the following details.

Plate area A = 100 cm^2

Dielectric-1 $\varepsilon r_1 = 4$, $d_1 = 2$ *mm*

Dielectric-2 $\varepsilon r_2 = 3$, $d_2 = 3$ *mm*

If 200*V* is applied across the plates, what will be the voltage, gradient across each dielectric? (16)

18. (a) 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)

Or

(b) Derive the energy stored and hence energy density in a magnetic field. (16)

19. (a) (i) State and explain Faraday's electromagnetic induction law. (6)

(ii) Explain the relation between field theory and circuit theory. (10)

Or

(b) Derive the Maxwell's equation and obtain them in point and integral form. (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) Define Brewster angle and derive its expression. (16)

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