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Question Paper Code: 43303

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

- The cylindrical system coordinates are represented in terms of
(a) (x, y, z) (b) (ρ, φ, z) (c) (r, θ, φ) (d) all of these
- What is the perpendicular conditions for two vector \bar{A} and \bar{B} to be
(a) $\bar{A} + \bar{B}$ (b) $\bar{A} \times \bar{B}$ (c) $\bar{A} \cdot \bar{B}$ (d) none of the above
- Electric field intensity is a quantity of
(a) scalar (b) vector (c) both a & b (d) none of the above
- 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
- Which of the following is the unit of magnetic flux density
(a) Weber (b) Lumens (c) Tesla (d) None of the above
- The Biot-Savart's law is a general modification of
(a) Kirchoff's law (b) Lenz's law (c) Ampere's law (d) Faraday's law

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. Conductivity of perfect dielectric is
 (a) unity (b) zero (c) 0.5 (d) $1/\sqrt{12}$
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 $\bar{A} = 6\bar{a}_x + \bar{a}_y - 5\bar{a}_z$ and $\bar{B} = 3(\bar{a}_x - \bar{a}_y + \bar{a}_z)$ are perpendicular to each other
12. Define electric field intensity or electric field.
13. What is the relation between magnetic flux density and field intensity?
14. Compare the energy stored in inductor and capacitor.
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) Apply Gauss law to an
 (i) infinite line (8)
 (ii) infinite sheet of charge (8)

Or

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

$$\text{Plate area } A = 100 \text{ cm}^2$$

$$\text{Dielectric-1 } \epsilon_{r1} = 4, d_1 = 2 \text{ mm}$$

$$\text{Dielectric-2 } \epsilon_{r2} = 3, d_2 = 3 \text{ mm}$$

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

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

19. (a) (i) Deduce Transformer and Motional emf with necessary equations. (8)
(ii) State and explain the Faraday's law of electromagnetic induction. (8)

Or

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

20. (a) Explain the electromagnetic wave propagation in

- (i) lossless dielectrics (4)
(ii) good dielectric (4)
(iii) good conductors. (8)

Or

- (b) (i) What is the different conditions of uniform plane wave? (8)
(ii) Derive a physical phenomenon of electro-magnetic wave equation. (8)

