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

Question Paper Code: 41333

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

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. The number of magnetic flux crossing unit area perpendicularly is called

   (a) Magnetic intensity (b) Magnetic flux density
   (c) Magnetic Force (d) Magnetic field lines

6. $\bar{H}$ 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. Magnetic material which has iron as one of its constituents is known as

(a) Ferro magnetic material (b) Diamagnetic material
(c) Paramagnetic material (d) Conducting magnetic material

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. Define wave propagation.

PART - C (5 x 16 = 80 Marks)

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

Or

(b) Explain briefly the following

(i) Curl of a vector (6)

(ii) Divergence theorem (5)

(iii) Stoke's theorem (5)

17. (a) (i) State and explain Gauss's law. (8)

(ii) Derive the expression for Poisson's and Laplace's equations. (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) What is the significance of Poynting vector and also explain it. (16)

Or

(b) (i) What is the different conditions of uniform plane wave? (8)

(ii) Derive a physical phenomenon of electro-magnetic wave equation. (8)
