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Reg. No. : .....

Name : .....

Fourth Semester B.Tech. Degree Examination, February 2015
(2008 Scheme)
Branch : Electrical and Electronics
08.403 : ENGINEERING ELECTRO MAGNETICS (E)
(Special Supplementary)

Time : 3 Hours Max. Marks : 100

***Instruction** : Answer **all** questions from Part **A** and **any one** full question from **each** Module of Part **B**.*

PART – A

1. Give the spherical co-ordinates of the point whose Cartesian co-ordinates are

   X= 3, y = 4, z = 5.

2. Derive the relationship between electrostatic field and electric potential.

3. State and explain Coulomb's law.

4. A scalar potential is given by

   $V = x^2 + 3y^2 + 9z$ volt. Find F at P(1, –2, 3).

5. State and explain Biot-Savart law.

6. Derive the expression for the inductance of a torroidal coil.

7. In a field $H = [y \cos (\alpha\ x)]\ a_x + (y + e^x)a_z$. Find the current density J over the y z plane

8. Define propagation constant and attenuation constant.

P.T.O.

9. Explain standing wave ratio and its significance.

10. A lossless transmission line with a characteristic impedance of 75 Ω is terminated by a load impedance of 120 Ω. If the magnitude of the incident wave is 10 volt. Calculate the minimum and maximum values of voltage on the line.

(10×4= 40 Marks)

PART – B **(20×3= 60 Marks)**

Module – I

11. a) Obtain the spherical co-ordinates of 10 $\vec{ax}$ at the point

P(x = – 3, y = 2, z = 4). 10

b) Four point charges are located at the corners of a square on x – y plane. Side of square = a m and four charges are q, 2q ,3q and 4q. Find E at the centre of the square. 10

OR

12. a) Explain cylindrical co-ordinate system and differential elements in cylindrical co-ordinate system. 10

b) Derive an expression for Electric field intensity as a point due to an Electric Dipole. 10

Module – II

13. a) Derive Poisson's and Laplace's Equations. 10

b) Define curl. Give its physical significance. Also explain Stokes theorem element. 10

OR

14. a) Derive an expression for magnetic field intensity H on the axis of a circular current loop of radius a m and carrying a current of I amperes. Specialize the result to the centre of the loop. 10

b) Find the force on a straight conductor of length 0.5 m carrying a current of 10.0 A in the $-\overline{a_y}$ direction, where the field is $B = 4.5 \times 10^{-3} \left(\overline{a_x} + \overline{a_y} - \overline{a_z}\right)$ Tesla. 10

Module – III

15. a) Calculate the attenuation constant and phase constant of a uniform plane wave with frequency 5 Ghz in polythelac for which $\mu = \mu_0$, $\epsilon_r = 2.3$ and $\sigma = 256 \times 10^{-4}$ ℧ / m. **10**

    b) Derive transmission line equations. **10**

OR

16. a) Distinguish between conduction and displacement currents. **10**

    b) Derive the wave equations for a conducting medium from Maxwell's equations. **10**