

2014
B.E. (Electronics and Communication Engineering)
Fourth Semester
EC-408: Electromagnetic Theory

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section. Use of scientific calculator is allowed.

x-x-x

1. Attempt the following:-

- (a) What are the source of electric field and magnetic fields? (2)
- (b) Derive the expression for energy density in a static electric field. (2)
- (c) What is a magnetic dipole? How it is differ from electric dipole? (2)
- (d) State Faraday's law of induction. (2)
- (e) Define Elliptical polarization. (2)

Section- A

- 2 (a) Using Gauss law, derive the expression for electric field intensity due to an infinite length of line charge. (5)
- (b) Find the total charge Q with in the sphere of radius $r=4$ m if its volume charge density is $\rho_v = 10/(r \sin\Theta)C/m^3$. (5)
- 3 (a) Find the magnetic field intensity at centre of a square of sides equal to 5m and carrying a Current equal to 10 A. (5)
- (b) Apply Biot-Savart's law to derive the expression for Magnetic Field Intensity due to circular loop placed on xy plane with radius 'r'. (5)
- 4 (a) Derive the Maxwell's four equations for time varying fields. (5)
- (b) Explain the concept of displacement current and obtain an expression for the Displacement current density. (5)

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(2)

Section-B

- 5 (a) Discuss about lossless and distortion less transmission lines. (5)
- (b) What is a waveguide? What is its importance and applications? (5)
- 6 (a) A transmission line operating at 800 MHz has $Z_0 = 80 \Omega$, $\alpha = 0.06 \text{ Np/m}$ and $\beta = 1.5 \text{ rad/m}$.
determine the line parameters R, L, G and C. (5)
- (b) Define and explain the design procedure of a single stub matching? (5)
7. Explain the wave behavior in guiding structure. (10)

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