

Code: R7210205

B.Tech II Year I Semester (R07) Supplementary Examinations December 2015

ELECTROMAGNETIC FIELDS

(Common to EEE & E.Con.E)

(For 2008 Regular admitted batch only)

Time: 3 hours

Max. Marks: 80

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Obtain an expression for electrical field intensity at a point due to infinite number of point charges.
(b) Define electric potential and explain how the potential of a group of charges can be determined.
- 2 (a) Derive Poisson's and Laplace's equations.
(b) Obtain the solution of Laplace equation in spherical co-ordinates.
- 3 (a) Derive the expression for capacitance of a parallel plate capacitor.
(b) Determine the capacitance of a capacitor consisting of two parallel metal plates 30 cm x 30 cm surface area, separated by 5 mm in air. What is the total energy stored by the capacitor if the capacitor is charged to a P.D. of 500 V? What is the energy density?
- 4 (a) Derive the expression for Maxwell's second equation.
(b) Find the magnetic field intensity at the origin due to a current element $(8\pi a_z) \mu A - m$ at the point (4, -5, 1) in free space.
- 5 (a) State & prove amperes circuit law.
(b) A 'z' direct current distribution is given by, $\vec{J} = (r^2 + ur)$, for $r \leq a$. Find $\vec{B}$ at any point $r \leq a$ using Ampere's circuital law.
- 6 (a) Write short note on magnetic dipole and dipole moment.
(b) A distribution line consists of two straight parallel conductors supported on the cross arms of wooden poles spaced 100 m apart. The normal spacing between the conductors is 20 cm, suppose a current of 10,000 A, flows down one conductor and back the other during a fault. Determine the force on each 100 m section of conductor.
- 7 (a) What are permanent magnets? Explain their characteristics and applications.
(b) A toroidal coil of 1200 turns has a mean radius of 30 cm and a radius for the winding of 2 cm. What is the average self-inductance?
(i) With air core. (ii) With an iron core of relative permeability, $\mu_r = 900$.
- 8 (a) Explain Faraday's law of electromagnetic induction and derive the expression for induced emf.
(b) Write a short note on displacement current.
