

D 8480

(Pages : 2)

Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE
EXAMINATION, DECEMBER 2010

EC 04-504—ELECTROMAGNETIC FIELD THEORY

Time : Three Hours

Maximum : 100 Marks

Answer all questions.

1. (a) Calculate the potential due to a point charge of magnitude $20 \mu\text{C}$ at a distance of 2 m. Also express the potential due to line charge and surface distributions.
- (b) State the Poisson and Laplace equations by explaining their significance.
- (c) Obtain the relationship between Magnetic field and Vector potential.
- (d) When does the current carrying coil experience a torque ? Explain.
- (e) A plane TEM wave has a power density of 1.2 W/m^2 in a medium with $\epsilon_r = 3$, $\mu_r = 1$. Find E and H.
- (f) State Poynting theorem with expression.
- (g) Obtain an expression for propagation constant for a wave through a conducting medium.
- (h) List the characteristics of TE and TM waves.

(8 × 5 = 40 marks)

2. (a) (i) Derive an expression for the potential between two conducting spherical shells.
- (ii) Sketch the equipotential contour in uniform and non-uniform electric fields.

Or

(b)

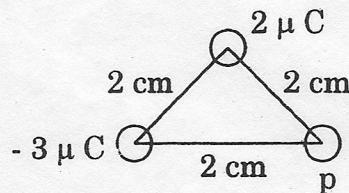


Fig 1

In Fig. 1, calculate the electric field at point p .

3. (a) Derive an expression for the force between two long filaments carrying equal and opposite currents. The filaments are separated by a distance of 'D' m.

Or

- (b) (i) Derive an expression for the energy stored in a magnetic field.
- (ii) Write the expression for motional e.m.f. by explaining the parameters involved in it.

Turn over

4. (a) Derive the expression for wave equation when a uniform plane wave undergoes circular polarization.
- Or
- (b) How are the boundary conditions derived in a time-varying field ? Explain.

5. (a) Obtain the expression for field vectors for TM wave in rectangular waveguide.
- Or
- (b) Derive the expression for TE waves between parallel lines.

(4 × 15 = 60 marks)

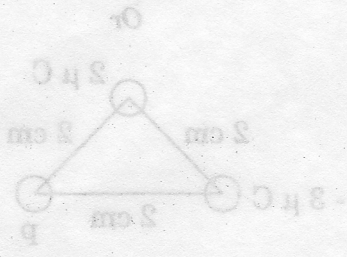


Fig 1

3. (a) Derive an expression for the force between two long filaments carrying equal and opposite currents. The filaments are separated by a distance of 'D' m.
- Or
- (b) (i) Derive an expression for the energy stored in a magnetic field.
(ii) Write the expression for motional e.m.f. by explaining the parameters involved in it.