

D 42089

(Pages : 2)

Name.....

Reg. No.....



**FIFTH SEMESTER B.TECH. (ENGINEERING)  
DEGREE EXAMINATION, DECEMBER 2007**

Electronics and Communication Engineering

EC 2K 502 – ELECTROMAGNETIC FIELD THEORY

Maximum : 100 Marks

Time : Three hours

- I. (a) In an xy plane charge  $Q_2$  is  $= 150 \mu\text{C}$  at (5.0) m, experiences a repulse force. of 6 N because of  $Q_1$  at (7, 8) m find Q.
- (b) Write Laplace's and Poisson's equation's. Write their significances.
- (c) Explain the applications of magnetic boundary conditions.
- (d) What are motional and transformer e.m.f. ? Explain.
- (e) Define and explain conduction current and displacement current. Write their expression.
- (f) State Helmholtz theorem. Write Lorentz Gauge condition.
- (g) Explain the characteristics of wave passing through a conductor.
- (h) Explain the significance of impedance matching in detail. (8 × 5 = 40 marks)

- II. (a) (i) Obtain the expressions for resultant potential and electric field for an electric dipole.
- (ii) Explain the principle of method of images with neat sketches and its applications.

Or

- (b) (i) State and derive electrostatics uniqueness of theorem
- (ii) Verify that the expression for the potential due to an electric dipole satisfies the Laplace equation.

- III. (a) (i) Give an account on 'magnetisation in materials'. (8 marks)
- (ii) Derive expressions for Inductance of solenoids and toroids. (7 marks)

Or

- (b) (i) State and derive Lenz's law of electromagnetic induction. (8 marks)
- (ii) Derive expressions for energy stored in a magnetic field and in an electric field. (7 marks)

Turn over

IV. (a) (i) Obtain Maxwell's equations in time varying form.

(8 marks)

(ii) Derive Maxwell's equations in integral and differential forms.

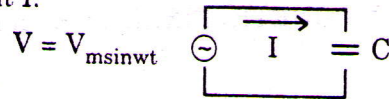
(7 marks)

Or

(b) (i) Define and derive pointing theorem.

(8 marks)

(ii) Show that the displacement current through the capacitor is equal to the conduction current  $I$ .



(7 marks)

V. (a) (i) Derive wave equations for a conducting medium.

(8 marks)

(ii) Explain the significant of Brewster angle. Obtain an expression for it.

(7 marks)

Or

(b) (i) Derive Smith chart equations.

(8 marks)

(ii) Draw a neat sketch of a single stub inner and explain its principle of operation.

(7 marks)

(4 × 15 = 60 marks)