D 42161

(Pages : 2)

Name.....

Reg. No.....

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

EC 04 504 : ELECTROMAGNETIC FIELD THEORY

(2004 admissions)

Time : Three Hours

Maximum : 100 Marks

I (a) State Coulomb's law and Gauss law.

(b) A spherical capacitor consists of an inner conducting sphere of radius R_i and an outer conductor with a spherical inner wall of radius R_0. The space in between is filled with a dielectric of permittivity ϵ. Determine the capacitance.

(c) State Biot-Savart's law. Also give the expression of magnetic force.

(d) What is meant by motional e.m.f.? Explain.

(e) Write notes on elliptic polarization.

(f) Derive wave equations in vacuum.

(g) What is meant by skin effect? Give the expression.

(h) Write the significance of quarter wave line.

(8 × 5 = 40 marks)

II. (a) (i) Consider a very long coaxial cable. The inner conductor hs a radius 'a' and is maintained at a potential v_0. The outer conductor has an inner radius 'b' and is grounded. Determine the potential distribution in the space between the conductors.

(8 marks)

(ii) Write the concept of method of images.

(7 marks)

Or

(b) (i) A point charge Q is at a distance d from the center of a grounded conducting sphere of radius a ($a < d$). Determine the charge distribution induced on the surface of the sphere, and the total charge induced on the sphere.

(8 marks)

(ii) Give electrostatic boundary conditions.

(7 marks)

III. (a) (i) Calculate the internal and external inductances per unit length of a transmission line consisting of two long parallel conducting wires of radius 'a' that carry currents in opposite directions.

The axes of the wires are separated by a distance d, which is much larger than d.

(8 marks)

Turn over

(ii) Give Ampere's law and its applications.

(7 marks)

Or

(b) (i) Find the magnetic flux density at a point on the axis of a circular loop of radius '*b*' that carries a direct current I.

(7 marks)

(ii) Write the boundary conditions for magnetic fields.

(8 marks)

IV. (a) State and derive pointing theorem.

(15 marks)

Or

(b) Discuss the normal incidence of uniform plane wave at conducting boundaries.

V. (a) Discuss the concept of cavity resonators.

(15 marks)

Or

(b) (i) Explain the concept of impedance matching.

(8 marks)

(ii) Write the applications of Smith chart.

(7 marks)

[4 × 15 = 60 marks]