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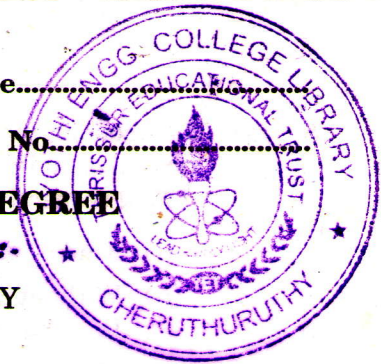
Name.....

Reg. No.....

**FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE
EXAMINATION, DECEMBER 2006**

EC 04 504—ELECTROMAGNETIC FIELD THEORY

(2004 admissions)



Time : Three Hours

Maximum : 100 Marks

Answer all questions.

1. (a) State and prove Stokes' theorem.
(b) A cylindrical capacitor consists of an inner conductor of radius a and outer conductor whose inner radius is b . The space between the conductors is filled with a dielectric of permittivity ϵ , and the length of the capacitor is L . Determine the capacitance.
(c) Derive the continuity equation.
(d) Give the fundamental postulate for electromagnetic induction.
(e) Give Maxwell's equations in differential form.
(f) State Poynting theorem.
(g) Write the significance of half-wave line.
(h) Write short note on cavity resonators.

(8 × 5 = 40 marks)

2. (a) (i) Discuss the electric field due to continuous charge distributions. (7 marks)
(ii) Determine the electric field intensity of an infinitely long, straight, line charge of a uniform density λ in air.

(8 marks)

Or

- (b) Determine the E-field both inside and outside a spherical cloud of electrons with a uniform volume charge density $\rho - \rho_0$ (where ρ_0 is a positive quantity) for $0 \leq R \leq b$ and $\rho = 0$ for $R > b$ by solving Poisson's and Laplace's equations for scalar potential V .

(15 marks)

3. (a) Discuss the magnetic materials and their properties.

Or

- (b) Discuss the magnetostatic boundary conditions.

(15 marks)

4. (a) Derive the wave equations in conductors.

Or

- (b) Discuss the oblique incidence of uniform plane waves at dielectric boundaries.

(15 marks)

Turn over

5. (a) The open circuit and short-circuit impedances measured at the input terminals of a lossless transmission line of length 1.5 m., which is less than a quarter wavelength, are $-j 54.6 \Omega$ and $j 103 \Omega$ respectively :

(i) Find z_0 of the line.

(ii) Without changing the operating frequency, find the input impedance of a short-circuited line that is twice the given length.

(iii) How long should the short-circuited line be in order for it to appear as an open circuit at the input terminals ?

(15 marks)

Or

(b) (i) Discuss the properties and applications of Smith chart.

(10 marks)

(ii) Write short notes on TE modes.

(5 marks)

[4 × 15 = 60 marks]