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# FIFTH SEMESTER B.TECH. DEGREE EXAMINATION, DECEMBER 2010
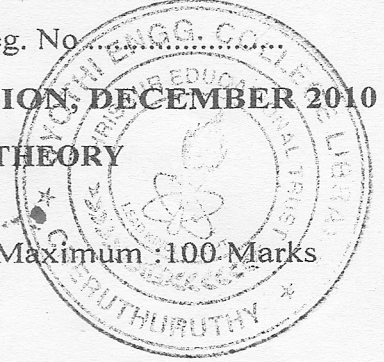
## EE 04.502-ELECTROMAGNETIC FIELD THEORY

### (2004 Admissions)

Time : Three Hours                                    Maximum : 100 Marks

*Answer* all *questions*.

I   (a)  Write Poisson's and Lap lace's equations.

(b)  A total charge Q is put on a thin spherical shell of radius b. Determine the electric field intensity at an arbitrary point. inside the shell.

(c)  What is Ampere's circuit law? Explain its application.

(d)  Derive the integral form of Faraday's law of electromagnetic induction.

(e)  With the concept of elliptic polarization.

(f)  Derive continuity equation.

(g)  Explain with necessary theory the construction of Smith chart.

(h)  Derive an expression for the characteristic impedance of a transmission line.

(8 X 5 = 40 marks)

II.  (a)  Discuss the electric field due to a continuous distribution of charges.

*Or*

(b)  Derive the energy required to assemble a uniform sphere of chare of radius b and volume charge density p.

III. (a)  Define vector magnetic potential and show that B = V x A where B is the magnetic flux density and A is the vector magnetic potential at any point.

(b)  Explain the terms self inductance and mutual inductance.

Or

(c)  Using Biot-Savart law, derive an expression for inductance unit length of a long waxial cable with radii of inner and outer conductors are a and b (b > a) respectively.

(d)  An iron ring 0.2 in in diameter and 10 sq.m area of the core, is uniformly wound with 250 turns of wire. If B is the core is to be 1 tesla and $\mu_r$. = 500. What is the exciting current required ? Also determine the stored energy.

IV. (a)  Derive Maxwell's equations in integral. form.

Or

(b)  State and discuss Poynting theorem.

V.  (a)  Compare open stub matching with short stub matching.

(b)  Derive boundary relations for static electric field in the general form across a common boundary separated by two different perfect dielectric media.

Or

(c)  Compare the advantages and disadvantages of co-axial cable with 2 wire transmission line.

(d)  Explain voltage reflection coefficient.

(4 X 15 = 60 marks)