D 2389-A (Pages : 2) Name............................

Reg. No............................

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION DECEMBER 2009

EE 04 502—ELECTROMAGNETIC FIELD THEORY

(2004 Admissions)

Time : Three Hours Maximum : 100 Marks

I. (a) State Coulomb's law of force between any two point charges and state the units of force.

   (b) State and prove Gauss's law.

   (c) State the point form of Ampere's circuital law and explain it.

   (d) Derive the Laplace's equations for magnetic fields.

   (e) Write short note on :

      (i) Equation of continuity.

      (ii) Displacement current.

   (f) State Poynting theorem and explain its significance.

   (g) State Snell's Law of refraction.

   (h) Explain Brewster Angle.

$(8 \times 5 = 40 \text{ marks})$

II. (a) Define divergence, gradient, curl in spherical co-ordinate system with mathematical expression.

Or

   (b) Find the force on a point charge Q located at $(0, 0, h)$ m due to charge of surface charge density PSC/m² uniformly distributed over the circular disc $r \leq a, Z = 0, m.$

III. (a) Given $A = 2r \cos\phi\, \hat{I}_r + r\hat{I}_\phi$ in cylindrical co-ordinates. For the contour shown in figure, verify Stoke's theorem.
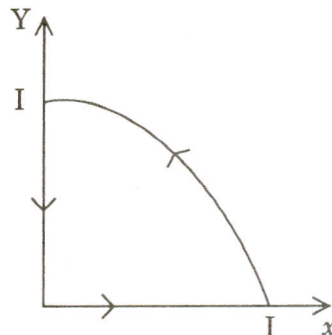
Or

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(b) (i) Distinguish scalar and vector potential as applied to electric field.

    (ii) Explain Faraday's law and Biot Savorts Law.

IV. (a) Derive Maxwell's equations from Faraday's law in integral and point forms.

Or

(b) (i) Write a short note on displacement current and displacement current density.

    (ii) Write a short note on linear and elliptic polarization.

V. (a) Discuss about the propagation of plane waves in free space and in a homogeneous material.

Or

(b) Describe about reflection of plane waves by a perfect dielectric.

(4 × 15 = 60 marks)