



M 22450

Reg. No. :

Name :

**V Semester B.Tech. (Including Part Time) Degree (Reg./Sup./Imp.)
Examination, November 2012
(2007 Admn. Onwards)
PT 2K6/2K6 EC 503 : APPLIED ELECTROMAGNETIC FIELD THEORY**

Time : 3 Hours

Max. Marks : 100

Instruction : Answer all questions.

PART – A

- I. a) State and explain Gauss's Law in electrostatics.
- b) Transform the given vector $A = P(z^2 + 1) a_p - Pz \cos \phi$ to cartesian co-ordinates.
- c) Explain magnetic vector potential.
- d) Explain self and mutual inductance.
- e) Derive the current continuity equation.
- f) Explain the concept of elliptical polarization.
- g) Write a note on standing wave ratio.
- h) Explain with necessary theory the construction of Smith chart. (8×5=40)

PART – B

- II. a) State and explain Divergence theorem. 6
 - b) Derive the expression for electric field intensity due to infinite sheet charge with inform charge density ρ_s c/m². 9
- OR
- c) Derive the expression for potential at any point due to dipole. 8
 - d) A circular flat ring of inner radius 1 m and outer radius 2 m has surface charge density $\rho_s = 100/r$ μ c/m². Determine the resulting 'E' on the axis of the ring 10 m away from the centre. 7

P.T.O.



- III. a) State and explain Biot-Savart's law. 6
- b) A solenoid of length ' l ' and radius ' a ' consists of ' N ' turns of wire carrying current ' I '. Find ' H ' at a point ' P ' along its axis. 9
- OR
- c) Derive the magnetic boundary conditions at the boundary between two composite magnetic materials. 8
- d) Explain magnetic moment. Derive the expression for torque on a closed circuit. 7
- IV. a) Derive the Maxwell's equation in the differential and integral form for a time varying field from Ampere's law. 8
- b) Explain dielectric hysteresis. 7
- OR
- c) The electric field associated with a plane wave travelling in a perfect dielectric medium is given by $E_x(z, t) = 10 \cos(2\pi \times 10^7 t - 0. \pi z)$ V/m. 8
- a) Determine the velocity of propagation
- b) Find the expression for H if $\mu = \mu_0$.
- d) Derive the relation between E and H . 7
- V. a) Explain : 9
- 1) Phase velocity and Group velocity
- 2) Characteristic impedance.
- b) Explain P-polarized wave. 6
- OR
- c) Explain the process of impedance matching by stub lines. 8
- d) Discuss briefly the results of reflection and refraction of plane wave incident normally to the surface of perfect dielectric. 7
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