E - E

**D 1953**                    (2 pages)                    Na...

## FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION,

### DECEMBER 2004

EE-2K-503/PTEE-2K-304 – ELECTROMAGNETIC FIELD THEORY

(New Scheme)

Time : **Three Hours**                                        Maximum : 100 Marks

I.  (a)  State the fundamental theorem for divergence. Give example.

(b)  Find the electric field a distance Z above the midpoint of a straight line segment of length 2L, which carries a uniform line charge $\lambda$.

(c)  Derive the curl of magnetic field B.

(d)  Derive Newmann Formula.

(e)  Derive the wave equation for E in vacuum.

(f)  Define the terms : Polalization angle, and polarization vector.

(g)  Define : Phase velocity and Group velocity.

(h)  Write short notes on stub matching.

(8 × 5 = 40 marks)

II.  A.  (i)  An infinite plane carries a uniform surface charge $\sigma$. Find its electric field.

(7 marks)

(ii)  Derive the electrostatic boundary conditions.

(8 marks)

*Or*

B.  (i)  Write the principle of method of images.                    (8 marks)

(ii)  Express Gauss's law in presence of dielectrics.                    (7 marks)

III.  A.  (i)  Find the magnetic field a distance Z above the center of a circular loop of radius R. Which carries a steady current I.                    (8 marks)

(ii)  Find the self-inductance of a toroidal coil with rectangular cross section (inner radius a, outer radius b, height h), which carries a total of N turns.                    (7 marks)

*Or*

B.  (i)  Write Faraday's law of Electromagnetic induction.                    (5 marks)

(ii)  Derive the multipole expansion of the vector potential.                    (10 marks)

Turn over

IV.  A.  (i)  Write Maxwell's equation in integral form.    (5 marks)

   (ii)  State and prove Flux rule.    (10 marks)

Or

   B.  State and prove Poynting theorem.    (15 marks)

V.   A.  Derive Brewster's angle.    (15 marks)

Or

   B.  Discuss wave equations on Co-axial and two wire transmission lines.    (15 marks)