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(2 pages)



FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
DECEMBER 2004

EC-2K-502 – ELECTROMAGNETIC FIELD THEORY

(New Scheme)

Time : Three Hours

Maximum : 100 Marks

- I. (a) State and prove divergence theorem.
(b) Prove that electrostatic energy does not obey superposition principle.
(c) What is meant by 'bound charge' ?
(d) State Biot-Savart's law.
(e) How Maxwell fixed Ampere's law.
(f) Write Wave equations for E and B in Vacuum.
(g) What is meant by skin depth ?
(h) Write the applications of Smith chart.
- (8 × 5 = 40 marks)
- II. A. (i) Find the potential inside and outside a spherical shell of radius R, which carries a uniform surface charge. (8 marks)
(ii) Derive Poisson's and Laplace's equations. (7 marks)
- Or
- B. (i) The entire region below the plane $Z = 0$ is filled with uniform linear dielectric material of susceptibility χ_e . Calculate the force on a point charge of situated a distance d above the origin. (8 marks)
(ii) A sphere of linear dielectric material is placed in an originally uniform electric field E_0 . Find the new field inside the sphere. (7 marks)
- III. A. (i) State and prove 'Flux rule'. (8 marks)
(ii) Derive 'Neumann formula.' (7 marks)
- Or
- B. Discuss multipole expansion of the vector potential. (15 marks)
- IV. A. Derive Poynting Theorem. (15 marks)
- Or
- B. (i) Write Maxwell's equations in integral and differential forms. (10 marks)
(ii) How uniform plane wave is expressed ? (5 marks)

Turn over

V. A. Discuss the oblique incidence of wave on a perfect conductor. (15 marks)

Or

B. Write short notes on the following :-

(i) Group velocity. (5 marks)

(ii) Characteristic impedance. (5 marks)

(iii) Standing wave ratio. (5 marks)

(4 × 15 = 60 marks)