25/4/13

Roll No.								

B.E./B.Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2013

ELECTRONICS AND COMMUNICATION ENGINEERING BRANCH

THIRD SEMESTER

8

EC 271 – ELECTROMAGNETIC FIELDS AND WAVES

(REGULATIONS 2004)

Duration: 3 Hours **Max.marks: 100**

Answer ALL questions

PART-A **(10x2=20 Marks)**

1.State Coulomb's law.
2.Define gradient.
3.What is displacement current density?.
4.State Gauss law for magnetic field.
5.Write the relation between dielectric constant and free space permittivity.
6.Write the Laplace equation in all three co-ordinate systems.
7.Define time varying field.
8.State Faraday's law.
9.Define circular polarization.
10.What do you mean by surface impedance?

PART-B **(5x16=80 Marks)**

11. (i) Explain Gauss law and apply it to find charge enclosed in hollow sphere whose surface is uniformly charged. **(10)**
(ii) Derive the equation for the potential due to a system of point charges. **(6)**

12.(a) (i) Find the magnetic field on the axis of a ring carrying a constant current. **(9)**
(ii) State and prove Ampere law. **(7)**

OR

12.(b)(i)Derive an expression for Biot-Savart law. **(8)**
(ii)How does a bar magnet experience torque tending to align it with magnetic field? **(8)**

13.(a)(i)Derive the equation for energy stored in an inductor. **(10)**
(ii)Derive any two boundary conditions for H-field. **(6)**

OR

13.(b)(i)Derive the boundary conditions for E-field. **(7)**
(ii)Derive the three expressions for electric energy density. **(9)**

14.(a) (i)Derive the integral form of four Maxwell's equations. **(8)**
(ii)Compare circuit theory and EM theory. **(8)**

OR

14.(b)(i) Is it possible to construct a generator of EMF which is constant and does not vary with time by using the principle of electromagnetic induction? Justify. **(8)**
(ii)Write the mathematical substantiation of Poynting vector. **(8)**

15. (a) (i) Derive the wave equations from Maxwell's equations. **(8)**
(ii) Explain the elliptical polarization with equations. **(8)**

OR

15.(b) (i)Derive the equation for uniform plane waves in perfect dielectric. **(8)**
(ii)Derive the equations for reflection and refraction of plane waves from metallic surface. **(8)**
