Code: 15A02403 **R15**

B.Tech II Year II Semester (R15) Supplementary Examinations December 2018

ELECTROMAGNETIC FIELDS

(Electrical & Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Find the force in Newton on charge $Q_1 = 20\ \mu C$ situated at (0, 1, 2) m due to charge $Q_2 = -300\ \mu C$ situated at (2, 0, 0) m.

(b) State Gauss law.

(c) Define dielectric strength of a material mention the same for air.

(d) Define electric field intensity

(e) Plane y = 0 carries a uniform current of 30 $\bar{a}_z\ ma/m$. Calculate the magnetic field intensity at $(1, 10, -2)$ m in rectangular co-ordinate system.

(f) State Ampere's circuital law.

(g) Define self and mutual inductance.

(h) State Laplace equation for scalar magnetic potential.

(i) State Poynting theorem.

(j) Write the wave equation in lossy dielectric.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 A circular disc of radius 'a' meter is charged uniformly with a charge density of $P_s\ c/m^2$. Find the electric field at a point 'h' m from the disc along its axis.

OR

3 Derive the expression of Poisson's equation of electrostatics.

UNIT – II

4 Derive the electrostatic boundary conditions at the interface of two dielectrics.

OR

5 Derive the expression for the capacitance between: (i) Two parallel plates. (ii) Two coaxial cylinders.

UNIT – III

6 Find an expression for magnetic field intensity around infinitely long straight conductor using Biot Savart's law.

OR

7 Explain magnetic dipole, magnetic vector potential, magnetic dipole moment and torque, deriving necessary expressions.

UNIT – IV

8 Derive the expression for the inductance of: (i) Solenoid. (ii) Toroid.

OR

9 Obtain the expression for energy stored in magnetic field of a coil possessing an inductance L when the current in the coil is 1 amp.

UNIT – V

10 Derive wave equations in phasor form and also derive for $\alpha, \beta, \gamma\ and\ \eta$.

OR

11 Derive the Maxwell's equations for field varying harmonically with time.

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