7229

SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

ROLL No: | | | | | | | | | | | | | Total number of pages:[2]

Total number of questions:06

B.Tech. || ECE || 3rd Sem

Electromagnetic Field Theory (RP)

Subject Code:BTEC-305A/~~320~~

Paper ID: M/18 (2015 batch onwards)

Time allowed: 3 Hrs Max Marks: 60

Important Instructions:

- All questions are compulsory
- Assume any missing data

PART A (2×10)

Q. 1. Short-Answer Questions: All COs

(a) Write about Ampere's circuital law.

(b) Define electric field intensity and electric flux density.

(c) What is Skin depth?

(d) How the electromagnetic waves propagate through the wave guide.

(e) Differentiate between conduction current and displacement current.

(f) What is Brewster angle?

(g) What is the continuity equation?

(h) A vector A is drawn from the point (0, -1, -3) to (5, 1, -5). Find a unit vector in the direction of A.

(i) What do you mean by equipotential surfaces?

(j) What are the conditions for field to be irrotational ?

PART B (8×5)

Q. 2. What is poynting vector? What is the significance of poynting vector? Deduce an expression for instantaneous, average and complex poynting vector. CO4

OR

a) Write about Reflection by a perfect dielectric at Normal incidence. CO4

b) Differentiate between linear, elliptical and circular polarization.

Q. 3. Derive the expression for the reflection and transmission coefficients for an uniform plane wave incidence normally on the planer interface between two unbounded medium. CO4

OR

Derive the relation between E and H in uniform plane wave propagation. Also Define intrinsic impedance. CO4

Q. 4. a) State and prove the Gauss's Law. CO1&

b) Express $2x\vec{i} - 3y^2\vec{j} + xz\,\vec{k}$ in cylindrical co-ordinate. CO2

OR

a) Derive an expression for electric field intensity due to a charge CO1&

uniformly distributed over an infinite plane with charge density ρ_s. CO2

b) Given three vectors

$$A = 21_x + 1_y$$
$$B = 21_x + 2\,1_y - 21_z$$
$$C = 2\,1_y + 2\,1_z$$

Find i) A+B ii) B-C iii) unit vector normal to A and B
iv) A.(B x C)

Q. 5. Write Maxwell's equation in free space for the time varying fields both in differential and integral form. Give the physical interpretation of Maxwell's equations. CO3

OR

a) Starting with Maxwell's equations derive the wave eqn for E and H in free space. CO3

b) Starting with Ampere's law, derive Maxwell's equation in integral form. Obtain the corresponding relation by applying the Stoke's theorem.

Q. 6. a) State and explain Coulomb's law. CO2

b) Assume Four like charges of 30 μC each are located at the four comers of a square, the diagonal measures 8m. Find the force on a 100 μC located 3m above the center of the square.

OR

a) Derive Poisson's and Laplace's equations. CO2

b) State divergence theorem and derive the equation for divergence theorem.