2055
B.E. (Electronics and Communication Engineering)
Fourth Semester
EC-408: Electromagnetic Theory

Time allowed: 3 Hours   Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit. Use of scientific calculator is allowed.*

x-x-x

I.   Attempt the following:-

   a) Mention the properties of electric flux lines.

   b) What is the total force acting on a moving charge, Q in the presence of both electric and magnetic fields?

   c) Name few applications of Gauss law in electrostatics.

   d) Define Reluctance and Permeability.

   e) Distinguish between conduction and displacement currents.   (5x2)

UNIT - I

II.   a) With neat diagrams, explain the spherical system with co-ordinates (R, θ, ϕ).

   b) Two point charges - 4 μC and 5 pC are located at $(2, -1, 3)$ and $(0, 4, -2)$ respectively. Find the potential at $(1, 0, 1)$ assuming zero potential at infinity.   (2x5)

III.   a) Derive Laplace's and Poisson's equations from Gauss's law for a linear material medium. State the importance of these equations.

   b) State and prove stokes theorem.   (2x5)

IV.   a) Derive the expression for a potential at a point due to a point charge.

   b) Derive the equation of continuity.   (2x5)

UNIT - II

V.   a) State and explain uniqueness theorem.

   b) What is a waveguide? What is its importance and applications?   (2x5)

P.T.O.

VI. a) Using Maxwell's equations derive an expression for uniform plane wave in free space.

b) Derive the expression for attenuation "factor for TEM waves between parallel conducting planes.   (2x5)

VII. Derive suitable relations for integral and point forms of poynting theorem.   (10)

x-x-x