1129
**B.E. (Electrical and Electronics Engineering)**
**Fifth Semester**
**EE-508: Electromagnetic Fields Theory**

Time allowed: 3 Hours                                                 Max. Marks: 50

*NOTE:* *Attempt* <u>*five*</u> *questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.*

x-x-x

I.   Attempt the following:-

a)  State Gauss's law for electric field.

b)  Write down the equation for Ampere's law in the differential vector form.

c)  What is the complex Poynting vector?

d)  State the magnetic boundary conditions.

e)  Write the point form of continuity equation.                                    (5x2)

## UNIT – I

II.   a) Prove that divergence of a curl of a vector is zero, using Stoke's theorem.

b) Determine the curl of the following vector field:
$$A = yza_x + 4xya_y + ya_z$$
                                                                                      (2x5)

III.   a) Derive continuity equation for current.

b) Obtain the expression for energy stored in magnetic field and also derive an expression for magnetic energy density.                                    (2x5)

IV.   a) Define Biot-Savart law and Ampere's law.

b) State Poisson's equation and explain their significance in field theory.     (2x5)

## UNIT – II

V.   a) From the fundamental laws, obtain the Maxwell's equations in integral form and differential form.

b) Define conduction and displacement current.                                    (6,4)

VI.   State and explain Faraday's law of electromagnetic induction. Hence derive the expressions for statically and dynamically induced emfs.                         (10)

VII.    a) What do you mean by inductance and mutual inductance?

b) Derive the Laplace and Poisson's equations.

c) Compare electric and magnetic circuits.                              (3,4,3)


*x-x-x*