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EC402(MTU)

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 130402

Roll No.

B. Tech.

(SEM. IV) THEORY EXAMINATION, 2014-15

ELECTROMAGNETIC FIELD THEORY

Time : **3** Hours] [Total Marks : **100**

Note : Attempt all problems.

1 Answer **any four** parts of the following. **5×4=20**

(a) Convert $(x / y^2+z^2)\hat{j}$ into cylindrical system.

(b) Give the physical significances and symbol of curl, gradient and divergence.

(c) Calculate the electric field intensity at the distance of **h** produced by the circular sheet of radius **r** and charge density ρ_s.

(d) Discuss following theorems in detai l: -

(1) Stokes

(2) Greens

(3) Uniqueness

(e) Calculate the distance in between (5,6,7) and (50,60°,70°).

(f) State and prove Gauss theorem.

2 Answer **any two** parts of the following **10×2=20**

(A) Calculate the energy stored by a cube which is having E as (1, 2, 4) Deduce the result also.

(B) Using both the side of divergence theorem calculate the charged enclosed by a

$$\overline{D} = r\sin^2\theta \hat{a}_r + r\cos\theta \sin\phi \hat{a}_r .$$

(C) Discuss :

(1) Continuity equation (2) Poisson's equations

(3) Laplace equation (4) Ampears rule.

3 Answer **any two** parts of the following- **10×2=20**

(A) Calculate the capacitance formed by two back to back cones separated by infinitely small distance.

(B) Calculate the inductance of the toroid having circular cross sectional area.

(C) Calculate the $\overline{E}$ vector of an Eagle bird along-with angle w.r.t. Z interface which can kill the fish in river and having $\overline{E}$ = (2, 3, 4).

4 Answer **any two** parts of the following- **10×2=20**

(A) Draw the model of transmission line. Deduce the result of line impedance. Prove that it is repeated at every distance of $\lambda/2$.

(B) A plane wave whose $\overline{E}$ vector is parallel to incidence, is penetrating the ocean and then submarine at 1GHz. Discuss the phenomenon which is occurring on the interfaces. What will happen when $\overline{E}$ vector is normal to the interface?

(C) What is displacement current? Write down the Maxwell's equation for time varying fields. Using these equations deduce the results of poynting theorem.

5 Write short notes on **any four** of the following. **5×4=20**

(1) Smith chart

(2) Method of images

(3) Waveguides

(4) Phase and group velocity

(5) Skin depth

(6) Quarter wave transformer.