



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

PAPER ID : 130402

Roll No.

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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 detail :-
 - (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

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

(C) Discuss :

- (1) Continuity equation (2) Poisson's equations
 (3) Laplace equation (4) Ampere's 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 \vec{E} vector of an Eagle bird along with angle w.r.t. Z interface which can kill the fish in river and having $\vec{E} = (2, 3, 4)$.

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 \vec{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 \vec{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.