Paper ID [EE303]

(Please fill this Paper ID in OMR Sheet)

B. Tech. (Sem. - 5th)

ELECTROMAGNETIC FIELD THEORY (EE-303)

Time : 03 Hours   Maximum Marks : 60

Instruction to Candidates:

1) Section - A is **Compulsory**.

2) Attempt any **Four** questions from Section - B.

3) Attempt any **Two** questions from Section - C.

Section - A

Q1) $(10 \times 2 = 20)$

a) Determine the divergence of a vector field

$$\vec{A} = r\sin\phi\, \vec{a_r} + 2r\cos\phi\, \vec{a_\phi} + 2z^2\, \vec{a_z}$$

b) Find the curl of a vector, V

$$V = \vec{i}\,(x + 2y + az) + \vec{j}\,(bx - 3y - z) + \vec{k}\,(4x + cy + 2z)$$

c) Define the terms 'Electric intensity' and Electrical displacement density.

d) State Gauss's law for electrostatic.

e) Write down maxwell's equation in free space.

f) Find the capacitance of a parallel capacitor with two different dielectrics between the plates.

g) Write about Ampere's circuital law.

h) What is difference between scalar magnetic potential and vector magnetic potential.

i) State stokes theorem.

j) Write about the magnetic vector potential.

Section - B

$(4 \times 5 = 20)$

Q2) State divergence theorem and derive the equation for divergence theorem.

Q3) Derive Poisson's and Laplace's equations.

Q4) Express $2x\vec{i} - 3y^2\vec{j} + xz\vec{k}$ in cylindrical co-ordinate.

Q5) Write about the equation of continuity and inconsistency of Ampere's Law.

Q6) Discuss the reflection by perfect insulator at oblique incidence.

Section - C

(2 × 10 = 20)

Q7) (a) Derive the equation of continuity for time varying fields.

(b) Derive the Maxwell's curl equation for time varying electric fields?

Q8) (a) State and prove the Gauss's Law.

$$\nabla \cdot \vec{D} = P$$

(b) The concentrated charges of 0.25 μC are placed at the vertices of an equilateral triangle whose side is 100 mm. Determine the magnitude and direction of the resultant force on one charge due to others.

Q9) (a) Write about Reflection by a perfect dielectric at Normal incidence.

(b) Write about Conductors and Dielectrics in detail.

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