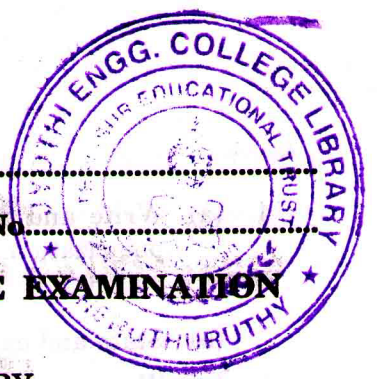


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Name.....

Reg. No.....



**FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
DECEMBER 2011**

EC 04 504—ELECTROMAGNETIC FIELD THEORY

(2004 admissions)

Time : Three Hours

Maximum : 100 Marks

Answer all questions.

1. (a) Given the vectors $\vec{A} = 3r \cos \phi \hat{r} + r^2 z \hat{\phi} - 3r \sin \phi \hat{z}$ and $\vec{B} = r^2 z \hat{r} + \sin^2 \phi \hat{\phi} - 2r^2 z \hat{z}$ (cylindrical), find $\vec{A} \times \vec{B}$.
- (b) Express the electric field intensity due to line charge, surface charge, and volume charge distributions.
- (c) Obtain the equation of current continuity.
- (d) Express the boundary conditions between two magnetic materials.
- (e) Explain the Maxwell's equation for static magnetic field.
- (f) State Poynting theorem.
- (g) How is the VSWR defined in transmission line ?
- (h) Write notes on impedance matching.

(8 × 5 = 40 marks)

2. (a) In Fig. 1, calculate the total force acting on $3\mu\text{C}$ charge.

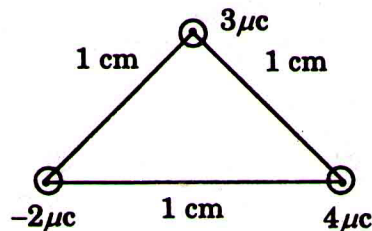


Fig. 1

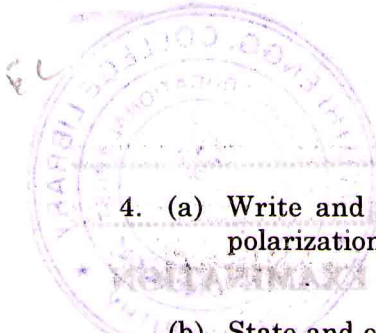
Or

- (b) Derive an expression for the capacitance between transmission lines.
3. (a) Derive an expression for the magnetic field at a point located at a height 'h' along the axis of a circular wire of radius 'a' carrying current 'I'.

Or

- (b) Derive an expression for the torque experienced by a closed loop rectangular current carrying coil in a uniform magnetic field.

Turn over



4. (a) Write and describe the wave equation when a uniform plane wave experiences elliptic polarization.

Or

(b) State and explain Maxwell's equations.

5. (a) Write notes on impedance matching and transients in transmission lines.

Or

(b) Write notes on skin effect and cavity resonators.

Time : Three Hours

(4 × 15 = 60 marks)

- (a) Given the vectors $A = 3r \cos \phi + r \hat{z}$, $B = 3r \sin \phi + r \hat{z}$, $C = 3r \hat{\phi} - 3r \hat{z}$ (cylindrical) and $A \times B$.
- (b) Express the electric field intensity due to line charge, surface charge, and volume charge distributions.
- (c) Obtain the equation of current continuity.
- (d) Express the boundary conditions between two magnetic materials.
- (e) Explain the Maxwell's equation for static magnetic field.
- (f) State Poynting theorem.
- (g) How is the VSWR defined in transmission line?
- (h) Write notes on impedance matching.

(8 × 5 = 40 marks)

3. (a) In Fig. 1, calculate the total force acting on 3µc charge.

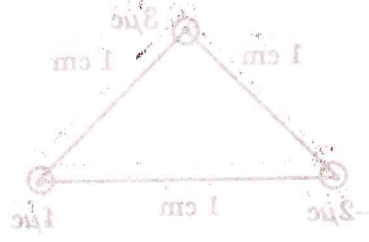


Fig. 1

- (a) Derive an expression for the magnetic field at a point located at a height 'h' along the axis of a circular wire of radius 'a' carrying current 'I'.
 - (b) Derive an expression for the capacitance between transmission lines.
- Or
- (a) Derive an expression for the torque experienced by a closed loop rectangular current carrying coil in a uniform magnetic field.
 - (b) Derive an expression for the torque experienced by a closed loop rectangular current carrying coil in a uniform magnetic field.