(3 Hours)   [Total Marks : 80

N.B.: (1)   Questions No. **1** is compulsory.
(2)   From remaining **five** questions solve any **three**.
(3)   Use suitable data, whenever **required**.

1.   (a)   Give significance of boundary conditions for electric field.   20
(b)   Can you use CRO to measure the ratio of charge & mass of electron?
(c)   Give behaviour of wave for normal incidence in dielectric media.
(d)   Why do we need numerical techinques to solve field problems.

2.   (a)   Explain plane earth reflection on horizontally polarized & vertically polarized   10
wave.

(b)   Derive relation between MUF & Skip distance.   10

3.   (a)   In non-magnetic medium   10

$$\overline{E} = 4\sin\left[2\pi \times 10^7 t - 0.8x\right]\overline{a}_z \text{ V/meter. Find}$$

(i) ε_r ; η
(ii)   The time average power carried by the wave.
(iii) The total power crossing 100 cm² of plane $2x + y = 5$

(b)   Determine potential at 2.8cm from the center of co axial cable as shown in   10
figure 1 by using FEM. There is no free charge between inner & outer
sheaths of coaxial cable.
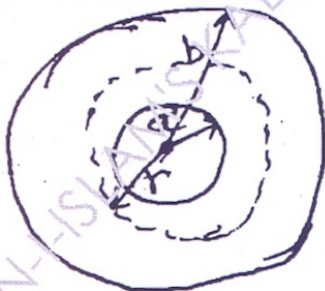
a = 1.5 cm.
b = 4.4 cm
r = 2.8 cm

Figure 1

4.   (a)   Explain parallel & perpendicular polarization of wave.   8

(b)   A uniform plane wave in air with $\overline{E} = 8\cos\left[\omega t - 4x.3z\right]\overline{a}_y$ volt / meter is   6
incident on dielectric slab $[z \geq 0]$ with $\mu r = 1$, $\varepsilon_r = 2.5$, $\sigma = 0$
Find
(i)   Polarization of wave.
(ii)   The Angle of incidence

(c)   Explain Ray path & critical frequency.   6

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5. (a) What is the advantage of using a traingular mesh in the FEM   5

   (b) Give the solution of wave equation for free space.   5

   (c) Solve Laplace's equation $\overline{\nabla}^2 V = 0$ 10
   $0 \leq x \leq 1;\ 0 \leq y \leq 1$ with
   $V(x, 1) = 45\ x\ (1 - x)$;
   $V(x, 0) = V(0, y) = V(1, y) = 0$
   Assume mesh size as 0.5

6. (a) Write maxwell's equation in a) point form b) integral form   10
   Explain the significance of each equation.

   (b) State poynting theorem. What is poynting vector?   5

   (c) What is a magnetic dipole? How does a magnetic dipole differ from electric   5
   dipole.

Course: S.E. (SEM. IV)(CBSGS) (E & T.)(prog-791 TO 805)

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Correction:

Question 4B

1) It is printed as $E = 8 \cos(\omega t - 4x.3z)a_y$

   It should be $E = 8 \cos(\omega t - 4x - 3z)a_y$

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Correction:

Question : 5C

1)It should be symbol 'del" i.e.' ∇" instead of $\triangledown$.

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