CLASS: B.TECH   SEMESTER : MO/2022
BRANCH: EEE   SESSION : 2022-23

SUBJECT: EE253 ENGINEERING ELECTROMAGNETICS

TIME: 03 Hours   FULL MARKS: 50

INSTRUCTIONS:
1. **The question paper contains 5 questions each of 10 marks and total 50 marks.**
2. **Attempt all questions.**
3. **The missing data, if any, may be assumed suitably.**
4. **Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

Q.1(a)   Derive the expressions for electrostatic forces and torques in terms of stored electrostatic energy.   [5]
Q.1(b)   A constant voltage V_o is applied to a partially filled parallel-plate capacitor as shown in figure below.   [5]
         The permittivity of the dielectric is ε, and the area of the plates is S. Find the force on the upper
         plate.
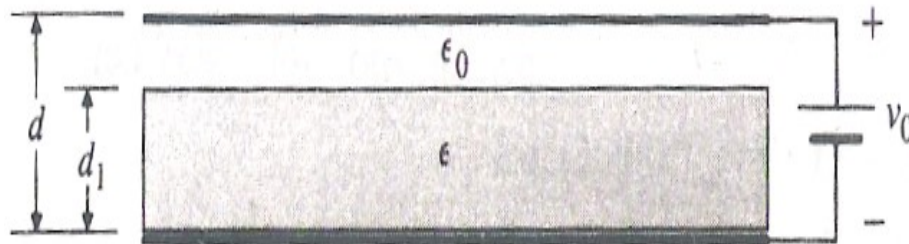
Q.2(a)   For source-free lossless and lossy simple medium, obtain the wave equations governing electric time-   [5]
         varying fields.
Q.2(b)   In spherical coordinates, V = -25 V on a conductor at r = 2 cm and V = 150 V at r = 35 cm. The space   [5]
         between the conductors is a dielectric for which ε_r = 3.12. Find the surface charge densities on the
         conductors.

Q.3(a)   Explain with the help of a diagram, the space-time behaviour of the total field in the medium if the   [5]
         incidence of an electro-magnetic wave on a plane dielectric boundary is normal. Write down the
         expressions of electric and magnetic fields for incident, reflected and transmitted wave.
Q.3(b)   If a wave with a frequency of 100 MHz propagates in free space, find the propagation constant.   [5]

Q.4(a)   What do you mean by polarization? Describe linear, circular, and elliptical polarization.   [5]
Q.4(b)   How would you define reflection and transmission coefficient in terms of intrinsic impedances in   [5]
         electrostatic and magnetostatic fields?

Q.5(a)   What is meant by skin depth of a conductor? How is it related to attenuation constant? Mention the SI   [5]
         unit of phase constant and attenuation constant.
Q.5(b)   What is Hertzian Dipole? Explain the radiation pattern of a Hertzian dipole. What do you mean by   [5]
         radiation resistance?

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