REG.NO.:

VIT®
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

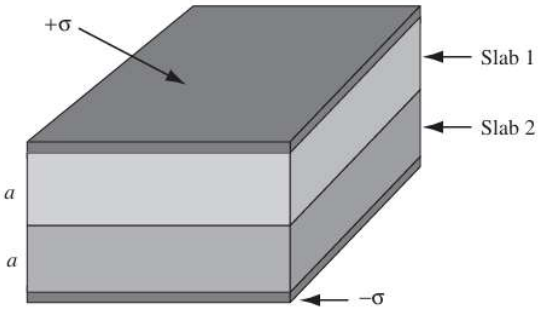
ELECTRONICS ENGINEERING
CONTINUOUS ASSESSMENT TEST - 2
FALL SEMESTER 2025-2026

SLOT: B1+TB1

Programme Name & Branch : **B. Tech. VLSI Design**
Course Code and Course Name : **BEVD202L Electromagnetic Field Theory**
Faculty Name(s) : **Dr. Rajan Kumar Pandey, Dr. Henridass A.**
Class Number(s) : **VL2025260102594, VL2025260102596**
Date of Examination : **October 6, 2025**
Exam Duration : **90 minutes** **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Q. No	Question	M	CO	BL
1.	The space between the plates of a parallel-plate capacitor is filled with two slabs of linear dielectric material. Each slab has thickness a, so the total distance between the plates is $2a$. Slab 1 has a relative dielectric constant of 2, and slab 2 has a relative dielectric constant of 1.5. The free charge density on the top plate is σ and on the bottom plate −σ.  (a) Find the electric displacement **D** in each slab. (b) Find the electric field **E** in each slab. (c) Find the polarization **P** in each slab. (d) Find the potential difference between the plates. (e) Find the location and amount of all bound charge.	10	1	3
2.	A sphere of linear dielectric material has embedded in it a uniform free volume charge density ρ. Find the potential at the center of the sphere (relative to infinity), if its radius is R and the dielectric constant is ε_r.	8	1	3
3.	Use the Biot-Savart law appropriate to surface currents to find the field inside and outside an infinitely long solenoid of radius R, with n turns per unit length, carrying a steady current I.	12	2	3

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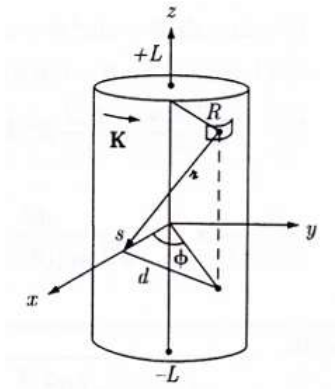
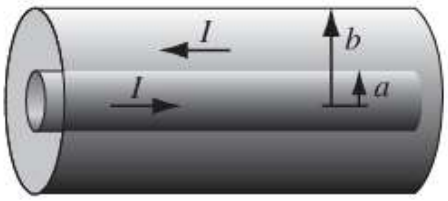
				
4.	Find the magnetic vector potential a distance s from an infinite straight wire carrying a current *I*. Check that $\nabla \cdot \mathbf{A} = 0$ and $\nabla \times \mathbf{A} = \mathbf{B}$. (b) Find the magnetic vector potential (**A**) inside the wire, if it has radius *R* and the current is uniformly distributed.	10	2	3
5.	A coaxial cable consists of two very long cylindrical tubes, separated by linear insulating material of magnetic susceptibility χ_m. A current *I* flows down the inner conductor and returns along the outer one; in each case, the current distributes itself uniformly over the surface. Find the magnetic field in the region between the tubes. As a check, calculate the magnetization and the bound currents, and confirm that (together, of course, with the free currents) they generate the correct field. 	10	2	3

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