

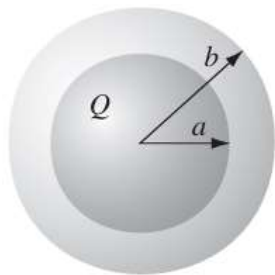
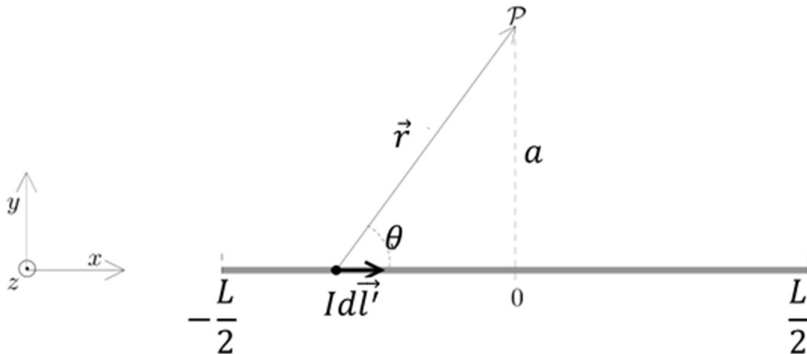


ELECTRONICS ENGINEERING
CONTINUOUS ASSESSMENT TEST - 2
FALL SEMESTER 2025-2026

Programme Name & Branch : B. Tech. VLSI Design
Course Code and Course Name : BEVD202L Electromagnetic Field Theory
Faculty Name(s) : Dr. Rajan Kumar Pandey
Class Number(s) : VL2025260103515
Date of Examination : October 06, 2025
Exam Duration : 90 minutes **Maximum Marks: 50**

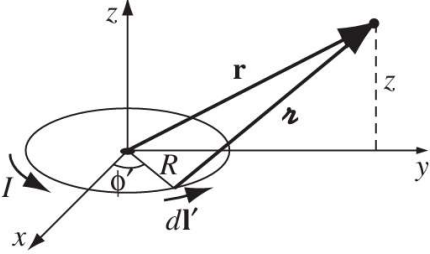
General instruction(s):

- 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.	A spherical conductor, of radius a, carries a charge Q. It is surrounded by linear dielectric material of susceptibility χ_e, out to radius b. Find the energy of this configuration. 	10	1	3
2.	A point charge q is imbedded at the center of a sphere of linear dielectric material (with susceptibility χ_e and radius R). Find the electric field, the polarization, and the bound charge densities, ρ_b and σ_b. What is the total bound charge on the surface? Where is the compensating negative bound charge located?	10	1	3
3.	A thin straight wire of length L carries current I. A point, P, lies at distance a along a perpendicular bisector of the wire, as illustrated in Figure below. Find the magnetic field along the bisector of a straight segment of wire at point P. Find out the magnetic field in the limit when L goes to infinity. 	10	2	3



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4.	Suppose you wanted to find the magnetic field of a circular loop at a point r that is not directly above the center. You might as well choose your axes so that r lies in the yz plane at $(0, y, z)$. The source point is $(R \cos\phi, R \sin\phi, 0)$, and ϕ runs from 0 to 2π. Set up the integrals from which you could calculate B_x, B_y, and B_z, and evaluate B_x explicitly. 	10	2	3
5.	A current I flows down a long straight wire of radius a. If the wire is made of linear material (copper, say, or aluminum) with susceptibility χ_m, and the current is distributed uniformly, what is the magnetic field a distance s from the axis, inside and outside of the wire? Find all the bound currents. What is the net bound current flowing down the wire?	10	2	3