

Moderate

Assistant Engineer (Electrical), Class 2025

Building Department

Three charged cylindrical sheets are present in three spaces with $\rho = 5$ at $R = 2\text{m}$, $\rho = 2$ at $R = 4\text{m}$ and $\rho = 3$ at $R = 5\text{m}$. Find the flux density at $R = 3\text{m}$.

A

3

B

10/3

Correct

C

11/3

D

4

Correct Answer: B

Full Detailed Explanation

Concept & Reasoning Choose a coaxial Gaussian cylinder of radius $r=3\text{ m}$ and length L . The enclosed charge is (2 aL) from the sheet at $a=2\text{ m}$. The outer charged sheets do not contribute to enclosed charge at this Gaussian radius. By symmetry D is radial and constant on the cylindrical Gaussian surface, so $D(2\text{ rL})= (2\text{ aL})$, yielding $D= a/r=10/3$. This is a direct application of Gauss' law for an infinite cylindrical sheet. How to Solve It in the Exam For concentric sheets, include only charges with radius less than the observation radius. Important Exam Point List enclosed sheets before writing Gauss' law. Related Revision Path This question sits in the revision path Electromagnetic Fields Gauss Law Cylindrical Charge Distribution .

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