

Hard

Assistant Engineer (Electrical), Class 2025

Building Department

A transmission line $Z = (2 + j8)$ has 10% of the voltage regulation with the lagging load of 0.8. If the load is 0.707 leading, then the V.R. is _____ (Assume the

A

6.63%

Correct

B

5.77%

C

10%

D

8.63%

Correct Answer: A

Full Detailed Explanation

Concept & Reasoning: With $R=2$ and $X=8$, the lagging 0.8 power factor has $\sin \phi = 0.6$. The proportional drop factor is $2(0.8) + 8(0.6) = 6.4$. For 0.707 leading, $\cos \phi = 0.707$ and the factor is $2(0.707) - 8(0.707) = -4.242$. Holding current and receiving voltage constant, regulation scales by $-4.242/6.4$, so 10% becomes about 6.63%.
How to Solve It in the Exam: Leading pf flips the sign of the $X \sin \phi$ term.
Important Exam Point: Use the given 10% case as a ratio; no absolute line voltage is required.
Related Revision Path: This question sits in the revision path Power System → Transmission Lines → Voltage Regulation.

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