

Medium

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Gujarat Public Service Commission / Assistant Engineer (Electrical)

Consider the following statements: Surge impedance loading of a transmission line can be increased by

1. increasing its voltage level
2. addition of lumped inductance
3. addition of lumped capacitance
4. reducing the length of the line

A**1 and 3 only****Correct****B****2 and 4 only****C****1 and 4 only****D****3 and 4 only**

Correct Answer: A

Full Detailed Explanation

Correct Answer: A - 1 and 3 only

Quick Concept Explanation Surge impedance loading is the power at which a transmission line's reactive generation by capacitance approximately balances reactive absorption by inductance. Series capacitive compensation reduces effective series reactance/surge impedance and therefore can increase SIL. Key relation: $SIL = \frac{V_{LL}^2}{Z_c}$. Exam focus: Higher voltage has a squared effect on SIL. Common trap: Line length itself is not the defining variable in the basic SIL formula.

Statement-wise Verification

Statement 1 - Correct. increasing its voltage level Higher voltage has a squared effect on SIL.

Statement 2 - Incorrect. addition of lumped inductance in parallel The correct principle is: Surge impedance loading is the power at which a transmission line's reactive generation by capacitance approximately balances reactive absorption by inductance.

Statement 3 - Correct. addition of lumped capacitance in series Surge impedance loading is the power at which a transmission line's reactive generation by capacitance approximately balances reactive absorption by inductance.

Statement 4 - Incorrect. reducing the length of the line The correct principle is: $SIL = \frac{V_{LL}^2}{Z_c}$.

Core Concept Surge impedance loading is the power at which a transmission line's reactive generation by capacitance approximately balances reactive absorption by