

Medium

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The capacitance of an overhead transmission line increases with 1. increase in mutual geometrical mean distance. 2. increase in height of conductors

A

Both 1 and 2 are true

B

Both 1 and 2 are false

Correct

C

Only 1 is true

D

Only 2 is true

Correct Answer: B

Full Detailed Explanation

Correct Answer: B - Both 1 and 2 are false

Quick Concept Explanation Capacitance is larger when conductors/electrodes are effectively closer. In overhead lines, larger phase spacing weakens electric coupling between phases. Key relation: Simple line: $C \propto 1/\ln(D/r)$. Single conductor to ground (image model): $C \propto 1/\ln(2h/r)$. Therefore $dC/dD < 0$ and $dC/dh < 0$.

Exam focus: Inductance generally increases with spacing; capacitance generally decreases with spacing. Common trap: Mixing up the spacing trends of line inductance and capacitance. Statement-wise Verification Statement 1 - Incorrect.increase in mutual geometrical mean distance.For a simple overhead line, capacitance varies inversely with $\ln(D/r)$; increasing separation D increases the logarithmic denominator and reduces capacitance. Statement 2 - Incorrect.increase in height of conductors above ground.A conductor farther from ground has a larger electrostatic path/logarithmic denominator to its image, so its capacitance to ground decreases rather than increases. Core Concept Capacitance is larger when conductors/electrodes are effectively closer. In overhead lines, larger phase spacing weakens electric coupling between phases. Earth can be handled by the method of images; increasing height reduces the earth's capacitive influence. Formula / Key Relationship Simple line: $C \propto 1/\ln(D/r)$ Single conductor to ground (image