

Medium

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2026

Gujarat Public Service Commission / Assistant Engineer (Electrical)

Regarding the effect of source inductance (L_s) in a single-phase rectifier: 1. It causes a "commutation overlap" denoted by angle μ . 2. It reduces the average output voltage.

A

1 and 2 only

B

1, 2 and 3 only

Correct

C

2 and 3 only

D

1 and 3 only

Correct Answer: B

Full Detailed Explanation

Correct Answer: B - 1, 2 and 3 only
Quick Concept Explanation Source inductance prevents current from transferring instantaneously between rectifier devices. During the overlap angle μ , outgoing and incoming devices conduct simultaneously, reducing average DC output voltage. Key relation: Overlap introduces a commutation reactance drop; $V_{dc_actual} < \text{ideal } V_{dc}$. Exam focus: More source inductance/current $\rightarrow$ more overlap. Common trap: Ignoring source inductance overestimates rectifier DC output. Statement-wise Verification Statement 1 - Correct. It causes a "commutation overlap" denoted by angle μ . Overlap introduces a commutation reactance drop; $V_{dc_actual} < \text{ideal } V_{dc}$. Statement 2 - Correct. It reduces the average output voltage. During the overlap angle μ , outgoing and incoming devices conduct simultaneously, reducing average DC output voltage. Statement 3 - Correct. During overlap, the output voltage follows the average of the two commutating phases. During the overlap angle μ , outgoing and incoming devices conduct simultaneously, reducing average DC output voltage. Core Concept Source inductance prevents current from transferring instantaneously between rectifier devices. During the overlap angle μ , outgoing and incoming devices conduct simultaneously, reducing average DC output voltage. The exact overlap voltage waveform depends on converter topology and the