

Medium

Deputy Executive Engineer (Electric)

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Ports Authority of Gujarat / Assistant Engineer (EL

Consider the following statements regarding Voltage Source Converters (VSC):

1. They use self-commutating devices like IGBT. 2. They can independently control active

A

2 and 3 only

B

1 and 2 only

Correct

C

1 only

D

1, 2 and 3

Correct Answer: B

Full Detailed Explanation

Correct Answer: B - 1 and 2 only

Quick Concept Explanation The key distinction is commutation. LCC relies on the AC system for commutation and consumes reactive power; VSC uses self-commutating devices and synthesized AC voltage, giving flexible P/Q control and better weak-grid capability. Key relation: Conceptually, active power is strongly related to converter voltage-angle difference, while reactive power is strongly related to voltage-magnitude difference (subject to network/converter limits). Exam focus: VSC keyword pair: self-commutated + independent/flexible P-Q control. Common trap: Transferring the strong AC system required limitation from LCC to VSC. Statement-wise Verification Statement 1 - Correct. They use self-commutating devices like IGBT. Modern VSC-HVDC uses turn-on/turn-off controllable semiconductor valves (classically IGBT-based; modern MMC implementations use IGBT submodules or equivalent self-commutating devices). Statement 2 - Correct. They can independently control active and reactive power. By controlling converter voltage magnitude and phase, VSC can regulate active and reactive power substantially independently within converter limits. Statement 3 - Incorrect. They require strong AC system for operation. Requiring a strong AC system is a major limitation of LCC-HVDC, not VSC; VSC is well suited to weak grids, offshore networks and