

Easy

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Gujarat Public Service Commission / Assistant Engineer (Electrical)

Installation of capacitors at suitable locations and of optimum size in a distribution system results in 1. improved voltage regulation 2. reduction in distribution

A

1 only

B

1, 2 and 3

Correct

C

1 and 2 only

D

3 only

Correct Answer: B

Full Detailed Explanation

Correct Answer: B - 1, 2 and 3 Quick Concept Explanation For a fixed real-power load and supply voltage, poor power factor requires higher current. Raising power factor with shunt capacitors or an over-excited synchronous machine reduces kVA demand, line current and I^2R losses and generally improves voltage regulation. Key relation: Single phase: $I = P / (V \cdot \text{PF})$. Three phase: $I = P / (\sqrt{3} V_L \cdot \text{PF})$. Exam focus: For the same kW, current is inversely proportional to power factor. Common trap: Capacitors supply leading reactive power; they do not supply lagging VARs. Statement-wise Verification Statement 1 - Correct.improved voltage regulation Raising power factor with shunt capacitors or an over-excited synchronous machine reduces kVA demand, line current and I^2R losses and generally improves voltage regulation. Statement 2 - Correct.reduction in distribution power losses Raising power factor with shunt capacitors or an over-excited synchronous machine reduces kVA demand, line current and I^2R losses and generally improves voltage regulation. Statement 3 - Correct.reduction of kVA rating of distribution transformers Raising power factor with shunt capacitors or an over-excited synchronous machine reduces kVA demand, line current and I^2R losses and generally improves voltage regulation. Core Concept For a fixed real-power load and supply voltage, poor power factor requires higher