

Medium

Deputy Executive Engineer (Electric)

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ports Authority of Gujarat / Assistant Engineer (E

Consider the following statements regarding Non-linear Control Systems: 1. Superposition principle does not apply. 2. Linearization is used for analysis near operating

A**1, 2 and 4 only****Correct****B****1 and 3 only****C****2 and 3 only****D****All of the above**

Correct Answer: A

Full Detailed Explanation

Correct Answer: A - 1, 2 and 4 only Quick Concept Explanation Nonlinear systems do not obey superposition, but they can still be stable or unstable. Linearization around an operating point uses a local first-order approximation and is useful for small-signal analysis. Key relation: Local linearization uses the Jacobian evaluated at the operating point. Exam focus: Nonlinear does not mean unstable; stability depends on the dynamics and operating point. Common trap: Do not apply global conclusions from a local linear model without checking validity range. Statement-wise Verification Statement 1 - Correct. Superposition principle does not apply. Nonlinear systems do not obey superposition Statement 2 - Correct. Linearization is used for analysis near operating point. Linearization around an operating point uses a local first-order approximation and is useful for small-signal analysis. Statement 3 - Incorrect. Non-linear systems are always unstable. Nonlinear systems may be stable or unstable; nonlinearity alone does not determine stability Statement 4 - Correct. Phase plane analysis is used for non-linear systems. Phase-plane methods visualize trajectories and equilibria, especially for low-order nonlinear systems. Core Concept Nonlinear systems do not obey superposition, but they can still be stable or unstable. Linearization around an operating point