Medium | Deputy Executive Engineer (Electric | 2026 | orts Authority of Gujarat / Assistant Engineer (El

Consider the following statements regarding Stability in State-Space Analysis: 1. Eigenvalues of the system matrix A define the characteristic roots that

A 1, 2 and 3 only

B 1 and 3 only

C 2, 3 and 4 only

D **All of the above** Correct

Correct Answer: D

Full Detailed Explanation

Correct Answer: D - All of the above Quick Concept Explanation A state-space model represents internal dynamics using a minimal set of state variables. Stability of a continuous-time LTI model is tied to eigenvalues of A: strictly negative real parts imply asymptotic stability. Key relation: x =Ax+Bu; y=Cx+Du.Exam focus: Eigenvalues of A are the state-model characteristic roots. Common trap: Output is not generally independent of state variables. Statement-wise Verification Statement 1 - Correct.Eigenvalues of the system matrix A define the characteristic roots that determine the system's stability.Eigenvalues of A are the state-model characteristic roots. Statement 2 - Correct.A system is asymptotically stable if and only if, all eigenvalues of the system matrix A have strictly negative real parts (located in the Left-Half Plane).Stability of a continuous-time LTI model is tied to eigenvalues of A: strictly negative real parts imply asymptotic stability. Statement 3 - Correct.The presence of at least one eigenvalue with a positive real part (located in the Right-Half Plane) implies that the system is unstable.Stability of a continuous-time LTI model is tied to eigenvalues of A: strictly negative real parts imply asymptotic stability. Statement 4 - Correct.Stability is a property of the system itself and is determined by the internal system parameters and the A