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

A unity feedback system has open-loop transfer function such that it is a type-1 system and subjected to a unit step input, then 1. The steady-state error for step input

A **1, 2 and 3 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 3 only Quick Concept Explanation It determines the order of polynomial input that can be tracked with zero/finite/infinite steady-state error, provided the closed loop is stable. Static-error constants directly produce the truth set {1,2,3}. Key relation: Type 1: Kp=lim_{s 0}GH= ess,step=1/(1+Kp)=0; Kv=lim_{s 0}sGH finite ess,ramp=1/Kv.Exam focus: Type-1 mnemonic: step zero error; ramp finite error; parabolic infinite error. Common trap: Ignoring the closed-loop stability condition when applying steady-state error formulas. Statement-wise Verification Statement 1 - Correct.The steady-state error for step input is zero.One integrator makes the position constant Kp infinite, so unit-step steady-state error is zero (for a stable closed loop). Statement 2 - Correct.The steady-state error for ramp input is finite.The velocity constant Kv is finite for a type-1 system, so unit-ramp error is finite. Statement 3 - Correct.Increasing system gain reduces steady-state error for ramp input.Increasing system gain typically increases Kv and therefore reduces ess,ramp=1/Kv. Statement 4 - Incorrect.The steady-state error for step input increases with increase in gain.Step error remains zero for a stable type-1 system; it does not increase with gain. Core Concept System type is the number of pure integrators in the open-loop transfer