Hard | Assistant Engineer (Electrical), Clas | 2025 | Building Department

The unit step response of a second order system is = 1 e^(5t) 5t e^(5t). Consider the following statements: 1. The under damped natural frequency

A. Only 1 and 2

B. **Only 2 and 3** — Correct

C. Only 1 and 3

D. 1, 2 and 3

Correct Answer: B

Full Detailed Explanation

Concept & ReasoningFor a critically damped system G(s)= _n /(s+ _n) with =1. Its unit-step response is 1 e^{- _n t}(1+ _n t). Comparing with the given expression gives _n=5 rad/s and =1. The damped oscillation frequency _d= _n (1)=0, so calling 5 rad/s an 'underdamped natural frequency' is incorrect. The impulse response is the derivative of the unit-step response.How to Solve It in the ExamSpot (1+ _nt)e^{- _nt} critically damped repeated pole.Important Exam PointImpulse response = derivative of unit-step response for an LTI system.Editorial / Answer-Key NoteThe official GPSC final answer key revised the provisional outcome for this question from D to B.Related Revision PathThis question sits in the revision path Control Systems Second-Order Systems Time Response .

Open live question on website:

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