

## Control Systems Questions and Answers – Routh-Hurwitz Stability Criterion

This set of Control Systems Multiple Choice Questions & Answers (MCQs) focuses on “Routh-Hurwitz Stability Criterion”.

1. Routh Hurwitz criterion gives:
- Number of roots in the right half of the s-plane
  - Value of the roots
  - Number of roots in the left half of the s-plane
  - Number of roots in the top half of the s-plane

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Answer: a

Explanation: Routh Hurwitz criterion gives number of roots in the right half of the s-plane.

2. Routh Hurwitz criterion cannot be applied when the characteristic equation of the system containing coefficient's which is/are

- Exponential function of s
- Sinusoidal function of s
- Complex
- Exponential and sinusoidal function of s and complex

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Answer: d

Explanation: Routh Hurwitz criterion cannot be applied when the characteristic equation of the system containing coefficient/s which is/are exponential, sinusoidal and complex function of s.

3. Consider the following statement regarding Routh Hurwitz criterion:
- It gives absolute stability
  - It gives gain and phase margin
  - It gives the number of roots lying in RHS of the s-plane
  - It gives gain, phase margin and number of roots lying in RHS of the s-plane

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Answer: d

Explanation: Routh Hurwitz gives the absolute stability and roots on the right of the s plane.

4. The order of the auxiliary polynomial is always:
- Even
  - Odd
  - May be even or odd
  - None of the mentioned

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Answer: a

Explanation: Auxiliary polynomial denotes the derivative of the odd equation which is always even.

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5. Which of the test signals are best utilized by the stability analysis.
- Impulse
  - Step
  - Ramp
  - Parabolic

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Answer: a

Explanation: Computational task is reduced to much extent.

6. The characteristic equation of a system is given as  $3s^4+10s^3+5s^2+2=0$ . This system is :
- Stable
  - Marginally stable
  - Unstable
  - Linear

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Answer: c

Explanation: There is a missing coefficient so the system is unstable.

7. The characteristic equation of a system is given as  $s^3+25s^2+10s+50=0$ . What is the number of the roots in the right half s-plane and the imaginary axis respectively?
- 1,1
  - 0,0
  - 2,1
  - 1,2

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Answer: b

Explanation: The characteristic equation has no sign changes so number of roots on the right half of s plane is zero.

8. Consider the following statement:
- A system is said to be stable if its output is bounded for any input
  - A system is said to be stable if all the roots of the characteristic equation lie on the left half of the s plane.
  - A system is said to be stable if all the roots of the characteristic equation have negative real parts.
  - A second order system is always stable for finite values of open loop gain

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Answer: a

Explanation: A system is stable if its output is bounded for bounded input.

9. The necessary condition for the stability of the linear system is that all the coefficients of characteristic equation  $1+G(s)H(s)=0$ , be real and have the :
- Positive sign
  - Negative sign
  - Same sign
  - Both positive and negative

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Answer: c

Explanation: The necessary condition for the stability of the linear system is that all the coefficients of characteristic equation  $1+G(s)H(s)=0$ , is they must have same sign.

10. For making an unstable system stable:
- Gain of the system should be increased
  - Gain of the system should be decreased
  - The number of zeroes to the loop transfer function should be increased
  - The number of poles to the loop transfer function should be increased

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Answer: b

Explanation: For making an unstable system stable gain of the system should be decreased.

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