UNIT - II

1. The response of a control system to standard inputs is called:

A) Frequency response
B) Time response
C) Stability response
D) State response
Answer: B

2. Which of the following is a standard test signal?

A) Step input
B) Random input
C) Noise signal
D) Disturbance signal
Answer: A

3. The standard test inputs used in control systems are:

A) Step, Ramp, Parabolic, Impulse
B) Sine, Cosine, Tangent
C) Pulse, Triangle, Square
D) DC and AC only
Answer: A

4. The transfer function of a first-order system is:

A) $K/(Ts + 1)$
B) $K/(s^2 + 2\zeta\omega_n s + \omega_n^2)$
C) K/s
D) $K(s+1)$
Answer: A

5. The time constant of a first-order system is represented by:

A) K
B) ζ
C) T
D) ω_n
Answer: C

6. For a first-order system, the output reaches 63.2% of its final value after:

A) T/2
B) T
C) 2T
D) 4T
Answer: B

7. The final value theorem is used to determine:

A) Initial value of response
B) Final steady-state value
C) Frequency response
D) Stability margin
Answer: B

8. The initial value theorem gives the value of response at:

A) $t = 0$
B) $t = \infty$
C) $t = 1$
D) $t = T$
Answer: A

9. The damping ratio of a critically damped system is:

A) 0
B) 0.5
C) 1
D) >1
Answer: C

10. A second-order system is underdamped when:

A) $\zeta > 1$
B) $\zeta = 1$
C) $0 < \zeta < 1$
D) $\zeta = 0$
Answer: C

11. Peak overshoot is associated with:

A) Overdamped systems
B) Underdamped systems
C) Critically damped systems

D) Stable systems only
Answer: B

12. Rise time is the time required for the response to:

A) Reach peak value
B) Reach final value exactly
C) Rise from 0% to 100% (approximately) of final value
D) Become unstable
Answer: C

13. Settling time is the time required for the response to:

A) Reach zero
B) Remain within a specified tolerance band
C) Reach peak value
D) Cross the steady-state value
Answer: B

14. A system is said to be stable if:

A) Output grows infinitely
B) Output oscillates continuously
C) Output remains bounded for a bounded input
D) Gain is zero
Answer: C

15. Routh-Hurwitz criterion is used to determine:

A) Frequency response
B) Stability of a system
C) Gain margin
D) Time constant
Answer: B

16. For stability, all elements of the first column of the Routh array must be:

A) Negative
B) Positive and non-zero
C) Zero
D) Imaginary
Answer: B

17. Relative stability indicates:

A) Whether a system is stable or unstable only
B) Degree of stability
C) Number of poles
D) Number of zeros
Answer: B

18. Root locus represents the movement of:

A) Zeros only
B) Poles only
C) Both poles and zeros
D) Gain only
Answer: B

19. Root locus branches start from:

A) Zeros
B) Poles
C) Origin
D) Infinity
Answer: B

20. Root locus branches terminate at:

A) Poles
B) Gain points
C) Zeros or infinity
D) Origin only
Answer: C

Fill in the Blanks

1. The response of a system as a function of time is called **time response**.
2. Step, ramp, impulse, and parabolic signals are called **standard test inputs**.
3. The transfer function of a first-order system contains only one **pole**.
4. The parameter **T** represents the time constant of a first-order system.
5. The initial value theorem determines the response at **t = 0**.
6. The final value theorem determines the response at **steady state**.
7. The damping ratio is represented by the symbol **ζ (zeta)**.
8. The natural frequency of a second-order system is denoted by **ω_n**.
9. An underdamped system has a damping ratio between **0 and 1**.

10. Peak overshoot occurs in **underdamped** systems.
11. The time taken to reach the first peak value is called **peak time**.
12. Settling time is usually specified within **2% or 5%** error band.
13. A stable system produces a **bounded** output for a bounded input.
14. The Routh-Hurwitz criterion determines stability without calculating the **roots**.
15. The number of sign changes in the first column of the Routh array gives the number of **right-half-plane poles**.
16. Relative stability indicates how **stable** a system is.
17. Root locus is a graphical method for studying system **stability**.
18. Root locus branches begin at open-loop **poles**.
19. Root locus branches end at open-loop **zeros** or infinity.
20. The root locus technique shows pole locations as the system **gain** varies.