Chettinad College of Engineering & Technology
Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai.

Department of Electrical and Electronics Engineering

Subject & Subject Code: Control Systems & IC8451

UNIT II-MCQ bank

TIME RESPONSE

1. Time taken for the response to rise from zero to 100 % for very first time is called…….

   a. **Rise time.**
   b. Settling time.
   c. Delay time.
   d. Peak time.

   Answer: a

2. Time taken by the response to reach and stay within a specified error is called

   a. Rise time.
   b. **Settling time.**
   c. Peak overshoot
   d. Peak time.

   Answer: b

3. An open loop control system, represented by the transfer function G (s) = (s - 1) / (s + 2)(s + 3), is

   a. stable and of the non-minimum phase type.
   b. stable and of the minimum phase type.
   c. unstable and of the minimum phase type.
   d. unstable and of the non minimum phase type .

   Answer: a

4. A function y (t) satisfies the following differential equation : Where, δ (t) is the delta function. Assuming zero initial condition and denoting the unit step function by u(t), y(t) can be formed as
   a. e^{t}.
   b. $e^{-t}u(t)$.
   c. e^{-t}.
   d. $e^{t}u(t)$.

Answer: b

5. Lead network is used to
   a. improve transient response.
   b. both A and C.
   c. increase bandwidth.
   d. improve steady state response.

Answer: b

6. Type and order of transfer function G (s) = K / {s(s + 2)}
   a. 1,2
   b. 2,1
   c. 0,1
   d. 1,1

Answer: a

7. Name test signals used in time response analysis?
   a. All of B, C, D.
   b. Unit step.
   c. Unit ramp.
   d. Impulse.

Answer: a

8. The identical first order system have been cascaded non-interactively. The unit step response of the systems will be:
   a) Overdamped
   b) Underdamped

c) Undamped

d) Critically damped

Answer: d

9. A system has a single pole at origin. Its impulse response will be:

a) Constant

b) Ramp

c) Decaying exponential

d) Oscillatory

Answer: a

10. Given a unity feedback system with G (s) =K/ s (s+4). What is the value of K for a damping ratio of 0.5?

a) 1

b) 16

c) 4

d) 2

Answer: b

11. How can the steady state error can be reduced?

a) By decreasing the type of the system

b) By increasing system gain

c) By decreasing the static error constant

d) By increasing the input

Answer: d

12. Maximum peak overshoot in time domain corresponds to :

a) Resonance peak

b) Resonant frequency

c) Bandwidth

d) Cut-off rate

Answer: a

13.Frequency of oscillation in time domain correspond to :

a) Resonance peak

b) Resonant frequency

c) Bandwidth

d) Cut-off rate

Answer: b

14. Steady state error is usually specified in terms of :

a) Error constants

b) Damping factor

c) Speed of response

d) Bandwidth

Answer: a

15. Transient response measure is usually specified in terms of :

a) Error constants

b) Damping factor

c) Speed of response

d) Both b and c

Answer: d

16. In time domain the measure of relative stability is:

a) Damping factor

b) Maximum peak overshoot

c) Damping factor and Maximum peak overshoot

d) Speed of response

Answer: c

17. First order system is defined as :

a) Number of poles at origin

b) Order of the differential equation

c) Total number of poles of equation

d) Total number of poles and order of equation

Answer: d

Explanation: First order system is defined by total number of poles and also which is same as the order of differential equation.

18. A unit step is applied at t=0 to a first order system without time delay. The response has the value of 1.264 units at t=10 mins, and 2 units at steady state. The transfer function of the system is_____

a) 3/(1+600s)

b) 2/(1+500s)

c) 5/(1+220s)

d) 2/(1+600s)

Answer: d

Explanation: a(t)= k[1-e^-t/T] K=2

0.632= 1-e^-10/T

T=600 sec

G(s)=2/(1+600s).

19. The transfer function of the system is G(s) =100/(s+1) (s+100). For a unit step input to the system the approximate settling time for 2% criterion is:

a) 100 sec

b) 4 sec

c) 1 sec

d) 0.01 sec

Answer: b

Explanation: G(s) =100/(s+1) (s+100)

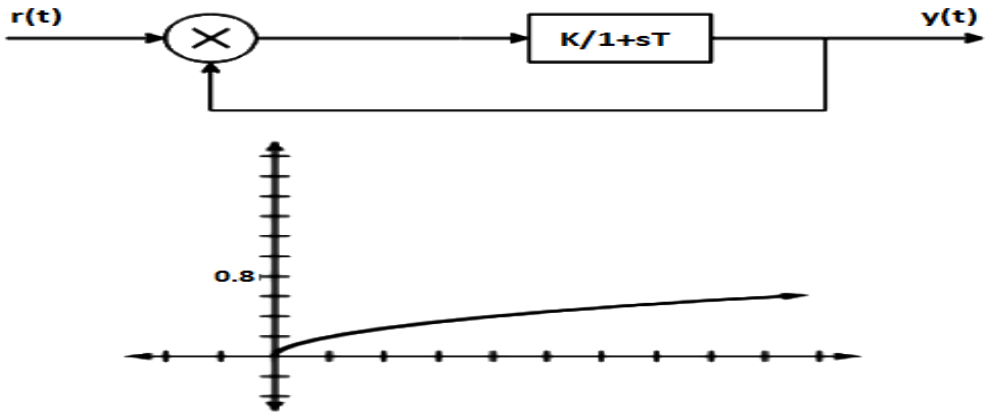
Taking the dominant pole consideration,

S=-100 pole is not taken.

G(s)= 100/s+1

Now it is first order system, ts=4T=4 sec.

20. If a first order system and its time response to a unit step are as shown below, the gain K is :



a) 0.25

b) 0.8

c) 1

d) 4

Answer: d

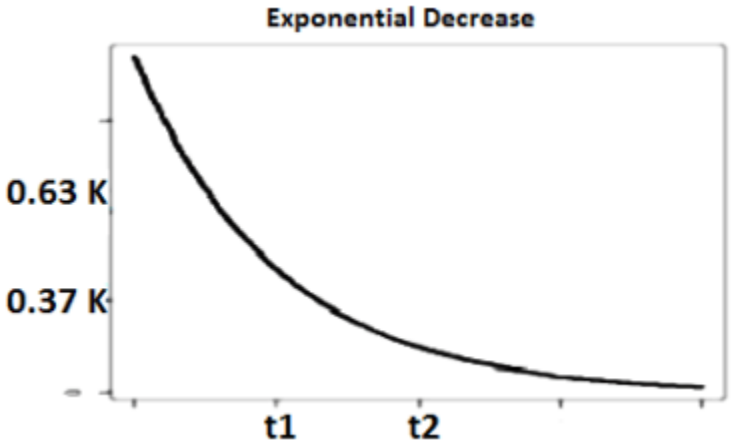
Explanation: Y(s)/R(s)=K/1+sT+K

By, use of partial fraction, K/T/s+(K+1/T)

Taking inverse Laplace transform on both the sides

Y(t)=K/K+1[1-e^(K+1/T)t] K=4

21.The unit impulse response of a system having transfer function K/(s+a) is shown below. The value of a is :



a) t1

b) t2

c) 1/t1

d) 1/t2

Answer: d

Explanation: G(s) = K/s+a

C(s) =K/(s+a) Since R(s) =1

C(t) =Ke^-at

T=1/a

C(t) =0.37K

T= t2=1/a.

22. A system with transfer function 1/Ts+1, subjected to a step input takes to seconds to reach 50% of step height. The value of t is :

a) 6.9s

b) 10s

c) 14.4s

d) 20s

Answer: c

Explanation: The response of a first order system is:

A(t)=a[1-e^-t/T] ½= 1-e^-10/t

T= 14.43 sec.

23. 7.A first order system and its response to a unit step input are shown in figure below. The system parameters are_____

a) a=5 and k=12

b) a=10 and k=5

c) a=5 and k=10

d) a=8 and k=9

Answer: c

Explanation: time constant=0.2 sec.

1/a=0.2

a=5

final value=$\lim_{s\to 0}$ sC(s) =K/a

K/a=2

K=10.

24. 9. Laplace transform of unit impulse signal is :

a) A/s

b) A

c) 1

d) 1/s

Answer: c

25. If a type 1 system is subjected to parabolic input, what will be the value of steady state error?

a. 0

b. 100

c. Constant k

d. Infinite

ANSWER: Infinite

26. On which factor does the steady state error of the system depend?

a. Order

b. Type

c. Size

d. Prototype

ANSWER: Type

27. If a type 0 system is subjected to step input, what is its effect on steady state error?

a. It increases continuously

b. It remains constant

c. It decreases monotonically

d. It gets subjected to another input

ANSWER: It remains constant

28.Which among the following is represented by a parabolic input signal?

a.Position

b. Force

c. Velocity

d. Acceleration

ANSWER: Acceleration

29. If a system is subjected to step input, which type of static error coefficient performs the function of controlling steady state error?

a. Position

b. Velocity

c. Acceleration

d. Retardation

ANSWER: Position

30**.** In a second order system, if the damping ratio is greater than equal to '1', then what would be the nature of roots?

a. Imaginary

b. Real and equal

c. Real but not equal

d. Complex conjugate

ANSWER: (c) Real but not equal

31. For drawing root locus, the angle of asymptote yields the direction along which _____branches approach to infinity.

a. p + z

b. p – z

c. p / z

d. p x z

ANSWER: (b) p – z

32. What should be the nature of root locus about the real axis?

a. Assymetric

b. Symmetric

c. Exponential

d. Decaying

ANSWER: (b) Symmetric

33. If the system is specified by open loop transfer function G(s)H(s) = k / s(s+3) (s + 2), how many root loci proceed to end at infinity?

a. 2

b. 3

c. 5

d. 6

ANSWER: (b) 3

34.Consider the equation $S^3 + 3s^2 + 5s + 2 = 0$. How many roots are located in left half of s-plane?

a. Zero

b. Two

c. Three

d. Four

ANSWER: (b)

35. If the system is represented by characteristic equation $s^6 + s^4 + s^3 + s^2 + s + 3 = 0$, then the system is_____

a. Stable

b. Unstable

c. Marginally stable

d. Unpredictable

ANSWER: (b) Unstable

36. If poles are added to the system, where will the system tend to shift the root locus?

a. To the left of an imaginary axis

b. To the right of an imaginary axis

c. At the center

d. No shifting takes place

ANSWER: (b) To the right of an imaginary axis

37. For a unity feedback system with $G(s) = 10 / s^2$, what would be the value of centroid?

a. 0

b. 2

c. 5

d. 10

ANSWER: (a) 0

38. If the resonant peak is estimated to be '5', which among the following would be the correct value of damping?

a. $\xi = 0.3$

b. $\xi = 1$

c. $\xi = 3.2$

d. $\xi = 5.55$

ANSWER: (a) $\xi = 0.3$

39. If a system is said to have a damping $\xi = 0.5532$ with the natural frequency $\omega_n = 2$ rad/sec, what will be the value of resonant frequency (ω_r)?

a. 1.2456 rad/s

b. 1.7352 rad/s

c. 2.3421 rad/s

d. 3.66 rad/s

ANSWER: (a) 1.2456 rad/s

40. If a pole is located at s = -5 in left-hand plane (LHP), how will it be represented in Laplace domain?

a. 1/ s + 5

b. 1/ s – 5

c. s/ s + 5

d. s/ s – 5

ANSWER: (a) 1/ s + 5