

SRI SAIRAM ENGINEERING COLLEGE
DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING

SAMPLE QUESTIONS FOR TEACHING LEARNING PROCESS

Domain: **CONTROL SYSTEMS ENGINEERING**

- 1) Which among the following units of PLC is adopted to convey the control plan to CPU?
 - a. Memory
 - b. Power supply unit
 - c. I/O interface
 - d. Programming software

- 2) Which architectural unit/block of PLC decides the sequence of different operations to be executed by means of instructions written in memory?
 - a. Memory
 - b. Programming software
 - c. I/O interface
 - d. CPU

- 3) Which among the following is a unique model of a system?
 - a. Transfer function
 - b. State variable
 - c. Both a and b
 - d. None of the above

- 4) Which among the following is a disadvantage of modern control theory?
 - a. Implementation of optimal design
 - b. Transfer function can also be defined for different initial conditions
 - c. Analysis of all systems take place
 - d. Necessity of computational work

- 5) According to the property of state transition method, e^0 is equal to _____
- a. I
 - b. A
 - c. e^{-At}
 - d. $-e^{At}$
- 6) Which mechanism in control engineering implies an ability to measure the state by taking measurements at output?
- a. Controllability
 - b. Observability
 - c. Differentiability
 - d. Adaptability
- 7) State model representation is possible using _____
- a. Physical variables
 - b. Phase variables
 - c. Canonical state variables
 - d. All of the above
- 8) Which among the following constitute the state model of a system in addition to state equations?
- a. Input equations
 - b. Output equations
 - c. State trajectory
 - d. State vector
- 9) Which principle specifies the relationship between enclosure of poles & zeros by s-plane contour and the encirclement of origin by $q(s)$ plane contour?
- a. Argument
 - b. Agreement
 - c. Assessment

d. Assortment

10) If a Nyquist plot of $G(j\omega)H(j\omega)$ for a closed loop system passes through $(-2, j0)$ point in GH plane, what would be the value of gain margin of the system in dB?

- a. 0 dB
- b. 2.0201 dB
- c. 4 dB
- d. 6.0205 dB

11) For Nyquist contour, the size of radius is _____

- a. 25
- b. 0
- c. 1
- d. ∞

12) Consider a feedback system with gain margin of about 30. At what point does Nyquist plot crosses negative real axis?

- a. -3
- b. -0.3
- c. -30
- d. -0.03

13) According to Nyquist stability criterion, where should be the position of all zeros of $q(s)$ corresponding to s-plane?

- a. On left half
- b. At the center
- c. On right half
- d. Random

14) If the system is represented by $G(s)H(s) = k(s+7) / s(s+3)(s+2)$, what would be its magnitude at $\omega = \infty$?

- a. 0

- b. ∞
- c. 7/10
- d. 21

15) If the unity feedback system is given by the open loop transfer function $G(s) = ks^2 / [(1 + 0.3s)(1 + 0.05s)]$, what would be the initial slope of magnitude plot?

- a. 20 dB/decade
- b. 40 dB/decade
- c. 60 dB/decade
- d. Unpredictable

16) If the constant 'k' is positive, then what would be its contribution on the phase plot?

- a. 0°
- b. 45°
- c. 90°
- d. 180°

17) The system is said to be marginally stable, if gain margin is _____

- a. 0
- b. 1
- c. $+\infty$
- d. None of the above

18) If the phase angle at gain crossover frequency is estimated to be -105° , what will be the value of phase margin of the system?

- a. 23°
- b. 45°
- c. 60°
- d. 75°

- 19) At which frequency does the magnitude of the system becomes zero dB?
- Resonant frequency
 - Cut-off frequency
 - Gain crossover frequency
 - Phase crossover frequency
- 20) The frequency at which the phase of the system acquires _____ is known as 'Phase crossover frequency'.
- 90°
 - -90°
 - 180°
 - -180°
- 21) In frequency response, the resonance frequency is basically a measure of _____ of response.
- Speed
 - Distance
 - Angle
 - Curvature
- 22) 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)?
- 1.2456 rad/s
 - 1.7352 rad/s
 - 2.3421 rad/s
 - 3.66 rad/s
- 23) If the resonant peak is estimated to be '5', which among the following would be the correct value of damping?
- $\xi = 0.3$
 - $\xi = 1$
 - $\xi = 3.2$

d. $\xi = 5.55$

24) If the damping of the system becomes equal to zero, which condition of the resonant frequency is likely to occur?

a. $\omega_r = \omega_d$

b. $\omega_r > \omega_n$

c. $\omega_r < \omega_n$

d. $\omega_r = \omega_n$

25) At which condition of ' ξ ', resonant peak does not exist and its maximum value is considered to be unity along with zero resonant frequency?

a. $0 < \xi < 0.707$

b. $\xi > 0.707$

c. $\xi = 0$

d. $\xi = 1$

26) If ' ξ ' approaches to zero, the peak resonance would _____

a. Also be zero

b. Be unity

c. Tend to infinity

d. Become equal to peak overshoot

27) 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

28) 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

29) 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

30) 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

31) On which factor does the steady state error of the system depend?

- a. Order
- b. Type
- c. Size
- d. Prototype

2) 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

33) In signal flow graph, the product of all _____ gains while going through a forward path is known as 'Path gain'.

- a. Branch
- b. Path
- c. Node
- d. Loop

34) The value of variables at each node is _____ the algebraic sum of all signals arriving at that node.

- a. Less than
- b. Equal to
- c. Greater than
- d. None of the above

35) At summing point, more than one signal can be added or _____

- a. Subtracted
- b. Multiplied
- c. Both a and b
- d. None of the above

36) Match the following notations with their meanings:

- A. $G(s)$ ----- 1) Laplace of error signal
- B. $H(s)$ ----- 2) Laplace of output signal
- C. $C(s)$ ----- 3) Forward transfer function
- D. $E(s)$ ----- 4) Feedback transfer function

- a. A- 2, B- 3, C- 1, D- 4
- b. A- 3, B- 4, C- 2, D- 1
- c. A- 2, B- 3, C- 4, D- 1
- d. A- 1, B- 2, C- 3, D- 4

- 37) Which among the following are the elements of rotational motion?
- a. Mass, Spring, Friction
 - b. Inertia, Damper, Spring
 - c. Work, Energy, Power
 - d. Force, Pressure, Viscosity
- 38) If an impulse response of a system is e^{-5t} , what would be its transfer function?
- a. $1/s - 5$
 - b. $1/s + 5$
 - c. $(s+1)/(s+5)$
 - d. $(s^2 - 5s)/(s-5)$
- 39) What should be the nature of bandwidth for a good control system?
- a. Large
 - b. Small
 - c. Medium
 - d. All of the above
- 40) Which system exhibits the initiation of corrective action only after the output gets affected?
- a. Feed forward
 - b. Feedback
 - c. Both a and b
 - d. None of the above
- 41) How many digital inputs are present in PLCs?
- a. 4
 - b. 8
 - c. 16
 - d. 32

42) Which is the correct sequence of operational steps necessary for proper operation of an elevator (lift) control mechanism?

1. Up switch
 2. Stop switch
 3. Down switch
 4. Start switch
- a. 1-2-3-4
 - b. 2-1-4-3
 - c. 4-2-1-3
 - d. 3-1-2-4

43) In addition to storage instructions, PLC controls _____

- a. Logic sequence timing
- b. Counting
- c. Arithmetic operations
- d. All of the above

44) In P-D controller, the derivative action plays a significant role in increasing _____ of response.

- a. Time
- b. Distance
- c. Speed
- d. Volume

45) Which among the following plays a crucial role in determining the state of dynamic system?

- a. State variables
- b. State vector
- c. State space
- d. State scalar

46) Which among the following are the interconnected units of state diagram representation?

- a. Scalars
- b. Adders
- c. Integrators
- d. All of the above

47) Consider the system represented by the equation given below. What would be the total phase value at $\omega = 0$?

$$200 / [s^3 (s + 3) (s + 6) (s + 10)]$$

- a. -90°
- b. -180°
- c. -270°
- d. -360°

48) Due to an addition of pole at origin, the polar plot gets shifted by ____ at $\omega = 0$?

- a. -45°
- b. -60°
- c. -90°
- d. -180°

49) If a pole is located at origin, how does it get represented on the magnitude plot?

- a. $-10 \log (\omega)$ dB
- b. $-20 \log (\omega)$ dB
- c. $-40 \log (\omega)$ dB
- d. $-60 \log (\omega)$ dB

50) According to the principle of log-scales, if the ratio between two points is same, then the two points get _____ equally.

- a. United
- b. Separated

c. Multiplexed

d. Mixed