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Control Systems Questions and Answers – Transfer Functions

This set of Control Systems Multiple Choice Questions & Answers (MCQs) focuses on “Transfer Functions”.

1. Which of the following is not the feature of modern control system?
a) Quick response
b) Accuracy
c) Correct power level
d) No oscillation

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Answer: d
Explanation: For a good control system the speed of response and stability must be high and for the slow and sluggish response is not used and undesirable.

2. The output of the feedback control system must be a function of:
a) Reference input
b) Reference output
c) Output and feedback signal
d) Input and feedback signal

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Answer: a
Explanation: Feedback control system has the property of reducing the error and that is by differencing the output with the desired output and as the equation of the output of the system is $C=GR/1+GH$.

3. The principle of homogeneity and superposition are applied to:
a) Linear time invariant systems
b) Nonlinear time invariant systems
c) Linear time variant systems
d) Nonlinear time invariant systems

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Answer: c
Explanation: Superposition theorem states that for two signals additivity and homogeneity property must be satisfied and that is applicable for the LTI systems.

4. In continuous data systems:
a) Data may be continuous function of time at all points in the system
b) Data is necessarily a continuous function of time at all points in the system
c) Data is continuous at the inputs and output parts of the system but not necessarily during intermediate processing of the data
d) Only the reference signal is continuous function of time

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Answer: b
Explanation: Continuous signals are the signals having values for the continuous time and if impulse response decays to zero as time approaches infinity, the system is stable.

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5. A linear system at rest is subject to an input signal $r(t)=1-e^{-t}$. The response of the system for $t>0$ is given by $c(t)=1-e^{-2t}$. The transfer function of the system is:
a) $(s+2)/(s+1)$
b) $(s+1)/(s+2)$
c) $2(s+1)/(s+2)$
d) $(s+1)/2/(s+2)$

View Answer

Answer: c
Explanation: $c(t)=1-e^{-2t}$
 $R(s)=1/s-1/s+1$
 $C(s)=1/s-1/s+2$
 $Tf=2(s+1)/(s+2)$.

6. In regenerating the feedback, the transfer function is given by
a) $C(s)/R(s)=G(s)/1+G(s)H(s)$
b) $C(s)/R(s)=G(s)H(s)/1-G(s)H(s)$
c) $C(s)/R(s)=G(s)/1+G(s)H(s)$
d) $C(s)/R(s)=G(s)/1-G(s)H(s)$

View Answer

Answer: d
Explanation: Regenerating feedback is positive feedback and it increases the infinitely and hence the speed of response of the system reduces.

7. A control system whose step response is $-0.5(1+e^{-2t})$ is cascaded to another control block whose impulse response is e^{-t} . What is the transfer function of the cascaded combination?
a) $1/(s+2)(s+1)$
b) $1/(s+1)s$
c) $1/(s+3)$
d) $0.5/(s+1)(s+2)$

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Answer: a
Solution: Laplace transform is the transformation that transforms the time domain into frequency domain and of both the cascaded systems are $1/(s+1)(s+2)$.

8. A transfer function has two zeroes at infinity. Then the relation between the numerator(N) and the denominator degree(M) of the transfer function is:
a) $N=M+2$
b) $N=M-2$
c) $N=M+1$
d) $N=M-1$

View Answer

Answer: b
Explanation: Zeroes at infinity implies two poles at origin hence the type of the system is two and degree of denominator is $M=N+2$.

9. When deriving the transfer function of a linear element
a) Both initial conditions and loading are taken into account
b) Initial conditions are taken into account but the element is assumed to be not loaded
c) Initial conditions are assumed to be zero but loading is taken into account
d) Initial conditions are assumed to be zero and the element is assumed to be not loaded

View Answer

Answer: c
Explanation: When deriving the transfer function of a linear element only initial conditions are assumed to be zero, loading cannot be assumed to be zero.

10. If the initial conditions for a system are inherently zero, what does it physically mean?
a) The system is at rest but stores energy
b) The system is working but does not store energy
c) The system is at rest or no energy is stored in any of its part
d) The system is working with zero reference input

View Answer

Answer: c
Explanation: A system with zero initial condition is said to be at rest since there is no stored energy.

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