Class Test No. 05 Thursday 29th August 2019 Duration: 10 Minutes Closed notes

Name: _____ Roll No. _____

Choose only one option which is the most appropriate for questions 1 - 5.

1. Transfer function of a general n^{th} order system is its

(a) unit impulse response
(b) unit step response
(c) unit harmonic response
(d) unit initial velocity response

2. System type is the highest degree of s in

(a) numerator polynomial
(b) denominator polynomial
(c) factored representation of numerator
(d) factored representation of denominator

3. In the partial fraction expansion of $1/(s + 1)^2$, the coefficient of $1/(s + 1)$ factor is

(a) 1
(b) 0
(c) -1
(d) 2

4. Output of a system to sinusoidal input is also sinusoidal with

(a) same magnitude and same phase as that of input
(b) same magnitude and different phase from that of input
(c) different magnitude and same phase as that of input
(d) different magnitude and different phase from that of input

5. If a transfer function is multiplied by -1, its bode plot will show

(a) no change in phase
(b) 180^o change in phase
(c) 90^o change in phase
(d) 360^o change in phase

Give short (1 - 2 lines) answer to the questions 6-10.

6. Give the definition of the transfer function.

Transfer function is the ratio of Laplace transform of output and the Laplace transform of input subject to zero initial conditions.

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7. What are the zeros of a transfer function?

Zeros of the transfer functions are the roots of the numerator polynomial of the transfer function.

8. Give the partial fraction expansion of the Y(s) for a unit step input for the following transfer function.

$$G(s) = \frac{1}{s+1}$$

$$Y(s) = \frac{1}{s(s+1)} = \frac{1}{s} - \frac{1}{s+1}$$

9. In what way is the bode plot better in comparison to the analytical expressions for magnitude and phase for higher order transfer functions?

Bode plot is able to show the effects of individual factors of the transfer function which is not possible with analytical expressions

10. Give the low and high frequency slopes of the magnitude part of bode plot of the following transfer function in dB/decade units.

$$G(s) = \frac{s}{(s+1)(s+2)}$$

$\omega = 0 \rightarrow$ Slope = 20 dB/decade; $\omega = \infty \rightarrow$ Slope = -20 dB/decade