

## ECE-205 Practice Quiz 7

(no Tables, Calculators, or Computers)

Problems 1-3 assume we have a system modeled with the transfer function

$$H(s) = \frac{s+2}{(s+1)(s+3)(s+4)}$$

- 1) This system model has how many **zeros**?      a) 0   b) 1   c) 2   d) 3
- 2) This system model has how many **poles**?      a) 0   b) 1   c) 2   d) 3
- 3) How many terms will there be in the partial fraction expansion?  
a) 0   b) 1   c) 2   d) 3
- 4) How many terms will there be in the partial fraction expansion of  $H(s) = \frac{1}{s(s+1)^2}$ ?  
a) 0   b) 1   c) 2   d) 3

For problems 5-7 assume we have a system modeled by the transfer function  $H(s)$ .

5) To determine the **impulse response** we should compute the inverse Laplace transform of

- a)  $Y(s) = H(s)$     b)  $Y(s) = H(s)\frac{1}{s}$     c)  $Y(s) = H(s)\frac{1}{s^2}$     d)  $Y(s) = H(s)\frac{1}{s^3}$

6) To determine the **(unit) step response** we should compute the inverse Laplace transform of

- a)  $Y(s) = H(s)$     b)  $Y(s) = H(s)\frac{1}{s}$     c)  $Y(s) = H(s)\frac{1}{s^2}$     d)  $Y(s) = H(s)\frac{1}{s^3}$

7) To determine the **(unit) ramp response** we should compute the inverse Laplace transform of

- a)  $Y(s) = H(s)$     b)  $Y(s) = H(s)\frac{1}{s}$     c)  $Y(s) = H(s)\frac{1}{s^2}$     d)  $Y(s) = H(s)\frac{1}{s^3}$

8) For the transfer function

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

the corresponding impulse response  $h(t)$  is composed of which terms?

- a)  $t^2 e^{-2t}$       b)  $t$  and  $t e^{-2t}$       c)  $1$  and  $t e^{-2t}$   
d)  $t e^{-2t}$       e)  $1$ ,  $e^{-2t}$ , and  $t e^{-2t}$

9) An impulse response  $h(t)$  is composed of the terms  $1$ ,  $t$ ,  $e^{-t}$

A possible corresponding transfer function (for some constant value  $A$ ) is

- a)  $H(s) = \frac{A}{s(s+1)}$       b)  $H(s) = \frac{A}{s^2(s+1)}$   
c)  $H(s) = \frac{As}{(s+1)}$       d)  $H(s) = \frac{A}{s(s+1)^2}$

10) In using partial fractions to go from the Laplace domain to the time domain for a transfer function with no pole/zero cancellations, the number of terms used in the partial fraction expansion is determined by

- a) the zeros of the transfer function      b) the poles of the transfer function

11) For the transfer function

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

The partial fraction expansion will be of the form

- a)  $H(s) = \left( \frac{A}{s+1} \right) \left( \frac{B}{s+2} \right) \left( \frac{C}{(s+2)^2} \right)$       b)  $H(s) = \frac{A}{s+1} + \frac{B}{s+2} + \frac{C}{(s+2)^2}$   
c)  $H(s) = \frac{A}{s+1} + \frac{C}{(s+2)^2}$       d)  $H(s) = \left( \frac{A}{s+1} \right) \left( \frac{C}{(s+2)^2} \right)$

12) The Laplace transform of  $x(t) = u(t) - u(t - 2)$  is

a)  $X(s) = 1 - e^{-2s}$    b)  $X(s) = 1 - e^{+2s}$    c)  $X(s) = \frac{1}{s} - \frac{e^{-2s}}{s}$    d) none of these

13) The Laplace transform of  $x(t) = te^{-3t}u(t)$  is

a)  $X(s) = \frac{1}{s} \frac{1}{s+3}$    b)  $X(s) = \frac{1}{s+3}$    c)  $X(s) = \frac{1}{(s+3)^2}$    d)  $X(s) = \frac{2}{(s+3)^2}$

14) The Laplace transform of  $x(t) = (t - 2)u(t - 2)$  is

a)  $X(s) = \frac{1}{s-2}$    b)  $X(s) = \frac{e^{-2s}}{s}$    c)  $X(s) = \frac{e^{-2s}}{s-2}$    d) none of these

15) The Laplace transform equivalent impedance of an inductor (assuming the initial conditions are equal to zero) is

a)  $Z(s) = \frac{1}{Ls}$    b)  $Z(s) = \frac{L}{s}$    c)  $Z(s) = Ls$    d)  $Z(s) = \frac{s}{L}$

16) The Laplace transform equivalent impedance of a capacitor (assuming the initial conditions are equal to zero) is

a)  $Z(s) = Cs$    b)  $Z(s) = \frac{C}{s}$    c)  $Z(s) = \frac{s}{C}$    d)  $Z(s) = \frac{1}{sC}$

Answers: 1-b, 2-d, 3-d, 4-d, 5-a, 6-b, 7-c, 8-e, 9-b, 10-b, 11-b, 12-c, 13-c, 14-d, 15-c, 16-d