ECE-320, Practice Quiz #1

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

5) The **bandwidth** (3 dB point) of the system with transfer function $H(s) = \frac{10}{s+10}$ is

a) 10 Hz b) 1 Hz c) 10 radians/sec d) 1 radians/sec

6) The **bandwidth** (smallest 3 dB point) of the system with transfer function $H(s) = \frac{40}{(s+2)(s+20)}$ is

a) 2 Hz b) 20 Hz c) 2 radians/sec d) 20 radians/sec

For problems 7-9 assume we have a system modeled by the transfer function $H(s)$.

7) 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) $Y(s) = H(s)\frac{1}{s^3}$

8) 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) $Y(s) = H(s)\frac{1}{s^3}$

9) 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) $Y(s) = H(s)\frac{1}{s^3}$

10) 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^2e^{-2t}
b) t and te^{-2t}
c) 1 and te^{-2t}
d) te^{-2t}
e) 1, e^{-2t}, and te^{-2t}

Problems 11 and 12 refer to the following transfer function $H(s) = \frac{2s+1}{(s+1)^2+4}$

11) For this transfer function, the corresponding impulse response $h(t)$ is composed of which terms?

a) $e^{-t}\cos(2t), e^{-t}\sin(2t)$ b) $e^{-2t}\cos(t), e^{-2t}\sin(t)$
c) $e^{-t}\cos(4t), e^{-t}\sin(4t)$ d) $e^{-4t}\cos(t), e^{-4t}\sin(t)$

12) The **poles** of the transfer function are

a) $2 \pm j$ b) $-2 \pm j$
c) $-1 \pm 2j$ d) $-1 \pm 4j$

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

14) 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

15) 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) $H(s) = \left(\frac{A}{s+1}\right)\left(\frac{C}{(s+2)^2}\right)$

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