

Full Name: ANSWERS

Do not put any explanations or work in this answer sheet. Only your answers will be considered.

Problem 1 (8%)

Is the system:

| | | | |
|------------------------|---|--|------------|
| 2% (a) Linear? | <input checked="" type="checkbox"/> YES | NO | CAN'T TELL |
| 2% (b) Time-invariant? | YES | <input checked="" type="checkbox"/> NO | CAN'T TELL |
| 2% (c) Causal? | YES | <input checked="" type="checkbox"/> NO | CAN'T TELL |
| 2% (d) Stable? | <input checked="" type="checkbox"/> YES | NO | CAN'T TELL |

Problem 2 (4%)

Is the system:

| | | | |
|----------------|-----|----|--|
| 2% (a) Causal? | YES | NO | <input checked="" type="checkbox"/> CAN'T TELL |
| 2% (b) Stable? | YES | NO | <input checked="" type="checkbox"/> CAN'T TELL |

Problem 3 (4%)

Is the system:

| | | | |
|----------------|---|--|------------|
| 2% (a) Causal? | YES | <input checked="" type="checkbox"/> NO | CAN'T TELL |
| 2% (b) Stable? | <input checked="" type="checkbox"/> YES | NO | CAN'T TELL |

Problem 4 (6%)

$$H_{xy}(z) = \frac{1+3z^{-1}}{1-\frac{1}{2}z^{-1}}$$

$$H_{ey}(z) = \frac{1}{1-\frac{1}{2}z^{-1}}$$

Problem 5 (5%)

$$H(e^{j\omega}) = \frac{1+\frac{1}{2}e^{-j\omega}}{1-\frac{1}{3}e^{-j\omega}}$$

Problem 6 (9%)

3% (a) $m_y[n] = 0$

3% (b) $\phi_{yy}[m] = \frac{1}{3}(2\delta[m] + \delta[m-1] + \delta[m+1])$

3% (c) $P_{yy}(e^{j\omega}) = \frac{2}{3}(1 + \cos \omega)$

Please turn over

Problem 7 (7%)

3% (a) $H_2(z) = \frac{1 - \frac{1}{4}z^{-1}}{1 - \frac{1}{2}z^{-1}}$

3% (b) $H_2(z)$ unique within a scalar factor? **YES** **NO** 3% (c) Are $x[n]$ and $y[n]$ uncorrelated? **YES** **NO** **Problem 8** (8%)The maximum such interval T is: $\frac{\pi}{\Omega_1 + \Omega_2}$ **Problem 9** (9%)5% (a) The largest possible T is: strictly less than 10^{-4} 4% (b) The estimate of A is **EXACT** **APPROXIMATE****Problem 10** (8%)4% (a) $y_c(t)$ is $x_c(t)$ delayed by $3.7T_1$ and then stretched in time by $\frac{T_2}{T_1}$.4% (b) $y_d[n]$ is the sequence obtained by delaying $x_c(t)$ by $3.7T_1$ and then sampling at period T_1 .**Problem 11** (4%)Is the overall system LTI? **YES** **NO** **Problem 12** (4%)

$$y[n] = \delta[n + 1] + 4\delta[n] + 8\delta[n - 1] + 8\delta[n - 2] + 3\delta[n - 3]$$

Problem 13 (8%)4% (a) (i) Stable? **YES** **NO** **CAN'T TELL** (ii) Causal? **YES** **NO** **CAN'T TELL** 4% (b) (i) Stable? **YES** **NO** **CAN'T TELL**(ii) Causal? **YES** **NO** **CAN'T TELL****Problem 14** (6%)

$$y(t) = s(t) \cos(\Omega_c t + \phi_0)$$

Problem 15 (8%)

$$y[n] = (\text{Circle one}) \quad y_1[n] \quad y_2[n] \quad y_3[n] \quad y_4[n] \quad y_5[n] \quad \boxed{y_6[n]} \quad y_7[n] \quad y_8[n]$$

Problem 16 (0%)

The best estimate of my grade is: 100