Code No: 136CJ **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, November/December - 2020
LINEAR SYSTEMS ANALYSIS
(Electrical and Electronics Engineering)

Time: 2 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1. Determine the state model of the system governed by the equation: [15]
$\frac{d^3}{dt^3}y(t) + 3\frac{d^2}{dt^2}y(t) - 2\frac{d}{dt}y(t)+0.5y(t) = 4\frac{d^3}{dt^3}x(t) + 2.5\frac{d^2}{dt^2}x(t) + 1.5\frac{d}{dt}x(t) + 2x(t)$

2. A system is described by $A = \begin{bmatrix}2 & 0\\ 1 & 0\end{bmatrix}$, $B = \begin{bmatrix}0\\1\end{bmatrix}$, $C = [0 \quad 1]$, $D = [1]$ and $x(0) = \begin{bmatrix}2\\1\end{bmatrix}$; f(n)=u(n). Find the output using the time domain method. [15]

3. The exponential fourier series of a certain periodic function is given as
$$f(t) = (2 + j2)e^{-j\omega t} + j2e^{-j\omega t} + 3 - 2e^{jt} + (2 - j2)e^{j3t}$$
Sketch the exponential fourier spectra and trigonometric fourier spectra for f(t). [15]

4. Obtain the relation between Fourier transform and Laplace transform. [15]

5. Test for positive real function:
a) $F(s) = \frac{S(S+3)(S+5)}{(S+1)(S+4)}$
b) $F(s) = \frac{s^3+6s^2+7s+3}{s^2+2s+1}$ [7+8]

6. Test for Hurwitz polynomial using continued fraction expansion method: [15]
$$P(S) = S^4 + 7S^3 + 6S^2 + 21S + 8$$

7. What is aliasing? Explain its effect on sampling. [15]

8. Determine the inverse z-transform of the function, $X(z) = \frac{3+2z^{-1}+z^{-2}}{1-3z^{-1}+2z^{-2}}$ using Power series expansion method and Residue method. [15]

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