

R18

Code No: 156CV

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, February/March - 2022

SIGNALS AND SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

Answer any five questions

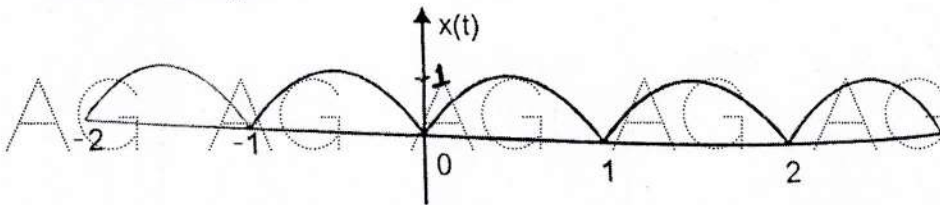
All questions carry equal marks

- 1.a) Explain orthogonality property between two complex functions $f_1(t)$ and $f_2(t)$ for a real variable t .
b) Explain the classification of signals and systems. [8+7]
- 2.a) Define and derive the expression for evaluating mean square errors.
b) Check the following system is linear or non-linear. [7+8]

i) $y(t) = |x(t)|$

ii) $y(n) = 2x(n) + \frac{3}{x(n-2)}$

- 3.a) Derive the following properties of Fourier series.
i) Linearity b) Time shifting
b) Find the Fourier transform of the signal $x(t) = e^{-t} \sin 5t u(t)$. [8+7]
- 4.a) Determine the exponential Fourier series representation for the full wave rectified sine wave shown in Figure.



- b) State and prove time shifting and frequency shifting properties of Fourier transform. [8+7]
- 5.a) Find the transfer function of the system governed by the following impulse response.
 $h(t) = u(t) + 0.5e^{-6t} u(t) + 0.2e^{-3t} \cos t u(t)$.
b) Perform the convolution between $x(t) = e^{-2t} u(t)$ and $h(t) = u(t+2)$. [8+7]

- 6.a) Show that the response of an LTI system is convolution integral of its impulse Response with input signal?
b) Calculate $x(n) * h(n)$ using graphical method. Where $x(n) = \{1, -2, -1\}$ and $h(n) = \{1, 2, 1, -2\}$ [8+7]

- 7.a) Find the Inverse Laplace Transform of $X(s) = \frac{2}{(s+2)(s+3)}$, ROC: $-3 < \text{Re}\{s\} < -2$.
b) Determine the Z-transform and sketch the pole zero plot with the ROC for the following Signal: $x(n) = 2(5/6)^n u(-n-1) + 3(1/2)^{2n} u[n]$. [8+7]

- 8.a) Discuss about the Impulse sampling in detail.
b) Write short notes on the Relation between Convolution and Correlation. [7+8]