

R18

Code No: 153BT

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2022

SIGNALS AND SYSTEMS

(Common to ECE, EIE)

Time: 3 Hours

Max. Marks: 75

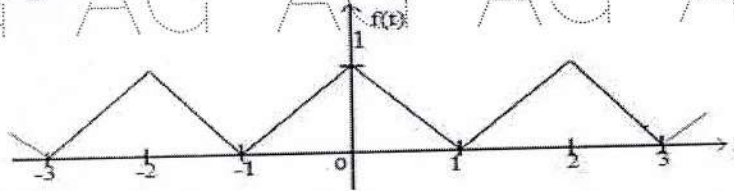
Answer any five questions

All questions carry equal marks

- 1.a) Define Dirac Delta function, draw its waveform and Summarize its properties.
b) Obtain the condition under which two real signals $f_1(t)$ and $f_2(t)$ are said to be orthogonal to each other. Hence, prove that $\sin m\omega_0 t$ and $\cos n\omega_0 t$ are orthogonal to each other for all integer values of m, n . [6+9]

2. Classify the signals under different categories and then explain the same. [15]

- 3.a) State the existence conditions of fourier series.
b) Find the Trigonometric Fourier series coefficients and build Fourier series for the following signal.



- c) Explain about Complex fourier spectrum. [4+7+4]
4.a) Obtain the Fourier transform of the following signals
i) $4 \cos 2\omega_0 t$ ii) $e^{-4t} u(t)$
b) State and prove the following properties of Fourier transform.
i) Convolution in time domain ii) Differentiation in time domain. [8+7]

- 5.a) With the help of plots, determine the convolution of the following two signals in time domain. $x_1(t) = e^{-4t} u(t)$ and $x_2(t) = u(t+4)$. [10+5]
b) Explain about stability and causality of an LTI system.

- 6.a) Perform the graphical convolution of the following signals:
 $x_1(t) = e^{-at} u(t)$; $x_2(t) = u(t) - u(t-3)$. [10+5]
b) List and explain the properties of convolution and prove any one.

- 7.a) Determine the Laplace transform of the following two signals.
i) $e^{at} \sin(bt) u(t)$ ii) $x(t) = t e^{-at} u(t)$
b) State and prove the following properties of z-transform [8+7]
i) Time shifting ii) Convolution

- 8.a) State and explain the sampling theorem for band limited signals with graphs analysis.
b) Define cross correlation function? State and prove the properties of cross correlation function. [7+8]

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