BACHELOR OF TECHNOLOGY (C.B.C.S.) (2021-COURSE)

B. Tech. Sem - III Electronics & Communication : WINTER- 2022

SUBJECT : SIGNALS & SYSTEMS

Day : Thursday | Time : 10:00 AM-01:00 PM

Date : 15-12-2022 | W-25326-2022 | Max. Marks : 60

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** is allowed.
4) Assume suitable data if necessary.

Q.1 Define and plot the following signals: **[10]**

i) Ramp iii) Pulse v) Exponential

ii) Step iv) Impulse

OR

Q.1 a) Sketch the following signals: **[06]**

i) $u(-t+1)$ ii) $-2u(t-1)$ iii $3r(t-1)$

b) Find the fundamental period T of the following continuous time signals: **[04]**

i) $\sin 50\pi t$ ii) $2\cos(10\pi t + \pi/6)$

Q.2 a) Check whether the following system are linear or not. **[06]**

i) $y(n) = 2x(n) + \dfrac{1}{x(n-1)}$

ii) $y(n) = nx(n)$

b) Test the causality of the following systems: **[04]**

i) $y(t) = x(t) - x(t+1)$

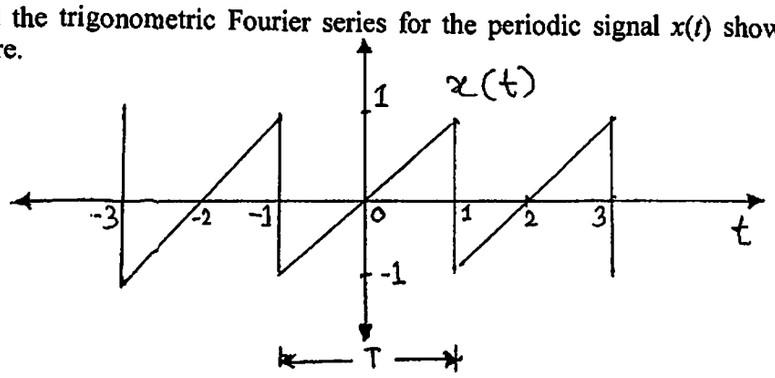
ii) $y(t) = x(t) + 2x(3-t)$

OR

Q.2 Determine the output response $y(n)$.Use graphical method if **[10]**

$x(n) = \{1, 2, 3, 2\}$; $h(n) = \{1, 2, 2\}$

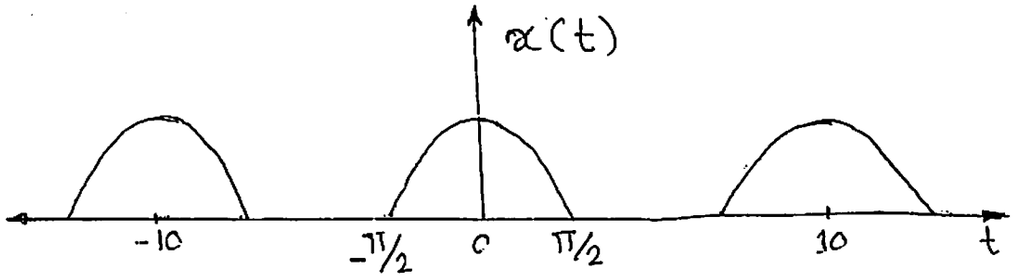
Q.3 Find the trigonometric Fourier series for the periodic signal $x(t)$ shown in figure. **[10]**



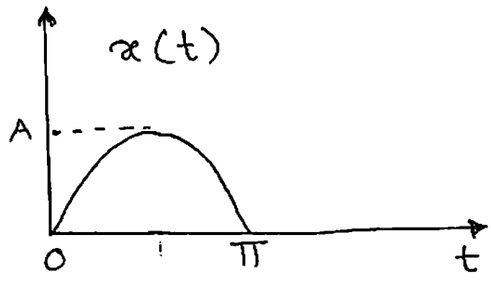
OR

P.T.O.

Q.3 For the following signal, find the exponential series. [10]



Q.4 a) Determine the Laplace transform of sine pulse shown in figure. [06]



b) Determine Laplace transform $x(t)=e^{-3t}u(t);\ t\geq 0$ [04]

OR

Q.4 a) State and prove properties of Laplace transform: [06]
i) Linearity ii) Time shifting

b) What is Region of Convergence (ROC) right sided sequence? [04]

Q.5 a) Find the one sided z-transform of the discrete signal. [06]
$x(n)=\cos \omega n$

b) State and prove shifting property using z – transform. [04]

OR

Q.5 Determine the inverse z-transform of the following function: [10]

i) $X(z)=\dfrac{1}{1-1.5z^{-1}+0.5z^{-2}}$ ii) $X(z)=\dfrac{z^2}{z^2-z+0.5}$

Q.6 a) Determine autocorrelation sequence for $x(n)=\{1, 2, 3, 4\}$. [05]

b) State the equations for correlation of power and energy signals. [05]

OR

Q.6 a) What is sampling theorem? Describe types of sampling techniques. [06]

b) What is aliasing? How it can be eliminated? [04]

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