Course: B. Tech.   Branch : Electrical   Semester : IV

Subject Code & Name: BTEEPE405B/ Signals and System

Max Marks: 60   Date:27.08.2022   Duration: 3.45 Hrs.

Instructions to the Students:
1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks

Q. 1   Solve Any Two of the following.

A) Plot the following signals: Create   6
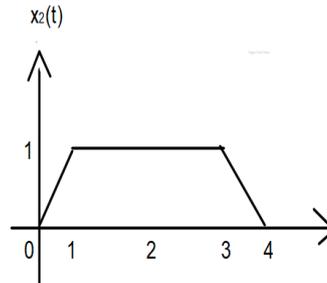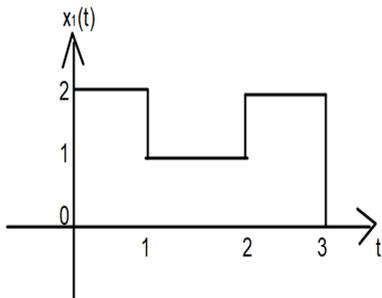
(i) $e^{-|t|}$ (ii) $r(t) + \delta(t-2)$ (iii) $A\Delta(t/T)$

B) $x_1(t)$ and $x_2(t)$ are shown in following figures: Evaluate   6

Find:

(i) $x_1(t) + x_2(t)$

(ii) $x_1(t) - x_2(t)$

C) If $X[n] = \{1,2,\mathbf{3},4,1\}$, then: Find x[2n-3] and plot x[2n/3] and plot x[-2n].   Evaluate   6

Q.2   Solve Any Two of the following.

A) Define systems. Write the properties of the systems.   Understand   6

B) Check the following systems for Static/Dynamic/Causal/Non-Causal   Analyze   6
(i) $y[n] = 2x[n+1] + 3x[n] - x[n-1]$
(ii) $y(t) = \frac{dx(t)}{dx} + x^2(t) + x(t+1)$

C) By using the conventional approach check the causality and time invariant property of the following systems: Analyze   6
(i) $y(t) = e^{x(t)} + x(t-1)$

(ii) $y(t) = tx(2t) + x(t) + u(t-1)$

Q. 3   Solve Any Two of the following.

A) Find the convolution of following signals   Evaluate   6

(i) x(t) = rect(t/T) and y(t) = u(t)

(ii) x(t) = u(t+5) and y(t) = δ(t-7)

B) How the causality and stability of the system can be checked by impulse response of the system explain in detail. — Understand — 6

C) The response of discrete time LTI system is {**2**,4} when the input is step. Find the response of the system for the input {1,**3**,3}. — Analyze — 6

Q.4 Solve Any Two of the following.

A) Consider a Continuous time LTI system for which input x(t) and output y(t) are related by the following differential equation — Evaluate — 6

$$\frac{d^2y(t)}{dt^2} - \frac{dy(t)}{dt} - 2y(t) = x(t)$$

Determine h(t)

(i) When system is Causal

(ii) When the system is stable

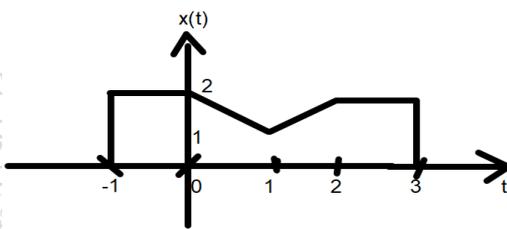**B)** Find the Laplace transform of following signals and define ROC. — Evaluate — 6

(i) $x(t) = u(t).\ e^{(t+1)}$

(ii) $x(t) = \sin 2t.\ e^{2t}.\ u(t)$

(iii) $x(t) = u(t) - u(t-1)$

C) Find Z- transform of following signals, and comment on ROC. — Evaluate — 6

(i) $x[n] = \{1,\mathbf{2},3\}$

(ii) $x[n] = 3^n u[n] - 2^n u[n-1]$

(iii) $x[n] = (\tfrac{1}{2})^n u[n]$

Q. 5 Solve Any Two of the following.

A) For x(t) shown in figure: — Evaluate — 6

Find:

(i) $\int_{-\infty}^{\infty} X(\omega)d\omega$

(ii) $\int_{-\infty}^{\infty} X(\omega)e^{j4\omega}d\omega$

B) Write the properties of Fourier transform. — Remember — 6

C) Derive the relation between trigonometric, exponential and polar Fourier series coefficient. — Create — 6

*** End ***