

B. Tech 4th Semester Examination

Signals & Systems (NS)

EE-223

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, Selecting one question from each of the sections A, B, C & D. Section E is compulsory

SECTION - A

1. Define signal. Discuss basic continuous time signals, also differentiate energy and power signals. (20)

2. (a) Sketch the following signal

$$x(t) = A [u(t+a) - u(t-a)] \quad \text{for } a > 0$$

Also determine whether the given signal is a power signal or an energy signal or neither. (10)

(b) What do you mean by interconnections of systems? Define systems with and without memory. (10)

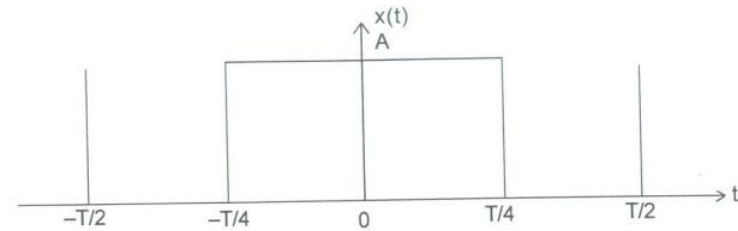
SECTION - B

3. (a) State and explain the convolution integral for continuous time LTI systems. (10)

(b) List various properties of Linear time invariant systems in detail with suitable example. (10)

[P.T.O.]

4. In this figure a periodic rectangular waveform is shown, obtain its Fourier series representation. (20)



SECTION - C

5. (a) Determine the Fourier transform of signal

$$x(t) = t \cos(at) \quad (10)$$

(b) Define convolution property of CTFT. (10)

6. (a) Explain the linearity property of discrete-time Fourier transform. (10)

(b) Find the Fourier transform of the signal.

$$x(t) = e^{-A(t)} \cdot \text{Sgn}(t) \quad (10)$$

SECTION - D

7. Given the difference equations of two second order causal and stable LTI System establish whether or not the step response of system is oscillatory.

$$(a) \quad y(n) + y(n-1) + 1/4 y(n-2) = x(n)$$

$$(b) \quad y(n) - y(n-1) + 1/4 y(n-2) = x(n) \quad (20)$$

8. List and explain properties of Fourier transform with suitable example. (20)

## SECTION - E

9. (a) Define Unit ramp signal.
- (b) Explain causal and non-causal systems.
- (c) Calculate the Fourier transform of unit step function.
- (d) Differentiate Even and Odd Signals.
- (e) Define Periodic and Aperiodic Signals.
- (f) Write short notes on Dirichlets conditions for Fourier series.
- (g) Define decimation.
- (h) Define linear and nonlinear phase.
- (i) State Sampling theorem.
- (j) What is the condition for stable system? (2×10=20)