

SE SEM-IV NEP 2020 May '2026

ELEC

Date: 12/05/2026

(2 Hours)

Max Marks: 60

N.B.: (1) Question No.1 is compulsory.

(2) Attempt any **THREE** from the remaining **FIVE** questions.

(3) Assume Suitable data wherever required.

Q.1 Attempt any Five (15)

- Determine the Fourier series representation of $x(t) = \sin 6\pi t$.
- State the conditions for an LTI system to be stable and causal.
- Find out even and odd part of signal $x(t) = \sin 2t + \cos t + \sin t \cos 2t$.
- Explain sampling theorem in detail.
- Explain ROC and its properties.
- Determine the Z-transform of the following finite duration signal

$$x(n) = \{3, 1, 2, 5, 7, 0, 1\}$$

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Q.2 (a) Define LTI system. Check the causality, time invariance and linearity of (10)

the system $y(n) = x(n^2)$.

(b) Find $y(n)$ by using convolution if $x(n) = \{1, 3, 5, 3\}$ and $h(n) = \{2, 3, 1, 1\}$ (5)

Q.3 (a) Explain any Five properties of DFT. (10)

(b) Find the 4 point DFT of the sequence $x(n) = \{1, -2, 3, 2\}$ (5)

Q.4 (a) Explain any Five properties of Z-transform. (10)

(b) Find $x(n)$ for the following (5)

$$X(z) = \frac{10z}{(z-1)(z-2)}$$

Q.5 (a) Determine the response of the LTI system governed by the difference (10)

equation: $y(n) - 0.5y(n-1) = x(n)$

for input $x(n) = 5^n u(n)$ and initial condition $y(-1) = 2$

(b) Write relation between Fourier transform and Z-transform. (5)

Q.6 (a) A difference equation of a discrete time system is given below (10)

$$y(n) - \frac{3}{4}y(n-1) + \frac{1}{8}y(n-2) = x(n) + \frac{1}{2}x(n-1)$$

Draw Direct Form-I and Direct Form-II structures.

(b) Give Classification of Signals and Systems (5)
