

Please check that this question paper contains 09 questions and 02 printed pages within first ten

[Total No. of Questions: 09]

[Total No. of Pages: 02]

Uni. Roll No. ....

Program: B.Tech. (Batch 2018 onward)

EVENING

Semester: 4

Name of Subject: Signals and Systems

19 JUN 2023

Subject Code: PCEE-108

Paper ID: 16189

Scientific calculator is Allowed

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

Part – A

[Marks: 02 each]

Q1.

- a) Define Fundamental Time Period (FTP). What would be FTP for  $\sin 2\pi t$ ?
- b) Explain Time scaling of a signal with appropriate example.
- c) State the conditions for existence of Fourier Transform.
- d) Give the types of Fourier Series Expansion with their coefficients.
- e) Calculate Region of Convergence for  $f(t) = e^{-2t} u(-t+1)$ .
- f) Plot Impulse Train in discrete time system with proper expression.

Part – B

[Marks: 04 each]

- Q2. Discuss about Linear Time Invariant (LTI) system and importance of Impulse Response in LTI systems.
- Q3. Explain about Z transform and conversion from Z transform to Discrete Time Fourier Transform.
- Q4. Show that the average calculation is independent of time shifting and time scaling with single example.
- Q5. Consider the differential equation :  $\frac{d^2y(t)}{dt^2} + 2\frac{dy(t)}{dt} + y(t) = \delta(t)$  with  $y(0^-) = -2$  and  $dy/dt = 0$  at  $t=0^-$ . Evaluate the numerical value of  $dy/dt$  at  $t = 0^+$

Q6. The impulse response  $h(t)$  of an LTI continuous time system is  $\exp(-2t)u(t)$ . Obtain the output of the system, to the sinusoidal input  $x(t)=2\cos(2t)$ .

Q7. Select the appropriate Region of convergence for the signal  $x(t) = -e^{-at} u(-t)$  by evaluating the signal in frequency domain.

**Part – C**

**[Marks: 12 each]**

Q8. Explain in detail about the basic types of signals with their expression and representation in time domain with the help of appropriate examples.

OR

Give the methodology for testing linearity, causality and stability of a system.

Q9. Explain the methodology to reconstruct a signal using zero order hold and first order hold with block diagram and graphical representation.

OR

Calculate the Inverse Laplace transform  $F(s) = \frac{s^2+2s+5}{(s+3)(s+5)^2}$  for  $\sigma > -3$ ,  $\sigma < -5$  and  $-5 < \sigma < -3$ .

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