

Roll No.

3098

B. Tech. 4th Semester (EE)

Examination – July, 2021

SIGNALS AND SYSTEMS

Paper : PCC-EE-214-G

Time : Three hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each unit (I, II, III & IV). Question Number 1 is compulsory. All question carry equal marks.

1. (a) Define Delta function. 2.5
- (b) What is meant by convolution property in DTFT ? 2.5
- (c) State the properties of Fourier Transform of a discrete-time aperiodic sequence. 2.5
- (d) Write the limitations of Fourier Transform. 2.5
- (e) State the methods to find inverse Z-transform. 2.5
- (f) What is meant by bilateral Laplace Transform ? 2.5

UNIT - I

2. Give the mathematical expression and graphical representation of the following continuous-time and discrete-time signal: 15

- (i) Unit Step
- (ii) Unit impulse
- (iii) Exponential signal
- (iv) Signum function
- (v) D.C. signal

3. (a) Explain Energy and Power signal with the help of example. 8

- (b) Determine whether the given signal is energy signal or power signal and calculate their energy or Power. 7

$$x(t) = \text{rect}(t/T_0) \cos \omega_0 t$$

UNIT - II

4. (a) What is inverse Fourier transform? Find the inverse Fourier transform of $\delta(\omega)$. Also draw spectrum. 7
- (b) State and prove Parseval's theorem for Energy signal of CTFT. 8

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5. (a) State and prove Frequency-shifting property of DTFT. 8

- (b) State and explain Sampling theorem. 7

UNIT - III

6. (a) Explain the frequency response of linear-time invariant system. 7

- (b) Explain the time-domain and frequency-domain aspects of non-ideal filters. 8

7. Explain and evaluate second order continuous-time LTI system. 15

UNIT - IV

8. (a) A damped sine wave is given by: 7

$$f(t) = e^{-at} \cos \omega t$$

Find Laplace Transform of this signal.

- (b) Drive Initial value and Final value theorem. 8

9. (a) Determine the Z-transform of the discrete-time signal. Also find the ROC. 7

$$x(n) = 2^n u(n) + 3(1/2)^n u(n)$$

- (b) Define Region of convergence of Z-transform and explain its properties. 8

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