

Registration No.:

--	--	--	--	--	--	--	--	--	--

Total Number of Pages: 02

Course: IDD (B.Tech and M.Tech)
Sub_Code: EOPC2003

4th Semester Regular Examination: 2024-25

SUBJECT: Signals & Systems

BRANCH(S): EEE, ELECTRICAL, EE

Time: 3 Hours

Max Marks: 100

Q.Code: S607

Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 Answer the following questions: (2 x 10)

- Differentiate between continuous and discrete time signal.
- State the Dirichlet's condition for Fourier series.
- How to determine the time reversal of a signal?
- Explain the associative property of linear convolution.
- What are causal LTI systems?
- Distinguish between auto-correlation and cross-correlation.
- Write the trigonometric form of Fourier series of a periodic signal.
- What is sampling theorem?
- State the time scaling property of continuous time Fourier series.
- Find out the Fourier transform of a unit impulse function.

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- $y(n) = 3x(n) + 5$, is a LTI system or not, Justify?
- What is an energy signal, power signal? Explain with examples.
- State and prove the multiplication property of Continuous Time Fourier Transform.
- Find the cross correlation of the sequence $\{-2, 6, 7, 1, 9\}$ and $\{1, -2, 1\}$.
- Find the linear convolution between the sequences $\{2, 1, -3\}$ and $\{10, 8, 2\}$.
- Discuss Unit step, rectangular, and unit ramp signals with their mathematical and graphical representation.
- How Discrete-Time Systems are described by Differential equation?
- Describe the properties of Continuous Time Fourier Series.
- How can a signal be reconstructed from its samples?
- Discuss the properties of auto correlation.
- What is Discrete-Time processing of Continuous-Time signals?
- Explain the aliasing effect in signal processing with neat diagram.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

(16 x 2)

- Q3** Classify discrete time signals and systems in detail with examples. **(16)**
- Q4** a) Prove that for convolution of LTI system the distributive property holds. **(8 + 8)**
b) State the relationship between convolution and correlation and prove it.
- Q5** **Find out the Fourier series of the following functions:** **(16)**
(i) $f(x) = e^x$ on the interval $[-\pi, \pi]$.
(ii) $f(x) = x^3$ on the interval $[-\pi, \pi]$.
- Q6** Explain the following properties of Fourier Transform with a suitable example: **(16)**
(i) linearity (ii) frequency shifting (iii) time shifting (iv) Time Reversal (v) Frequency Differentiation (vi) Time Convolution (vii) Frequency Convolution (viii) Correlation