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.

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Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Differentiate between continuous and discrete time signal.
b) State the Dirichlet's condition for Fourier series.
c) How to determine the time reversal of a signal?
d) Explain the associative property of linear convolution.
e) What are causal LTI systems?
f) Distinguish between auto-correlation and cross-correlation.
g) Write the trigonometric form of Fourier series of a periodic signal.
h) What is sampling theorem?
i) State the time scaling property of continuous time Fourier series.
j) 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)**

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

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