



## Term Evaluation (Odd) Semester Examination September 2025

Roll no.....

Name of the Course: B.Tech

Semester:5

Name of the Paper: Digital Signal Processing

Paper Code: TEC 502

**Time: 1.5 hour**

**Maximum Marks: 50**

**Note:**

- (i) Answer all the questions by choosing any one of the sub-questions
- (ii) Each question carries 10 marks.

Q1.

(10 Marks)

- a. Classify discrete-time signals into different types. Represent unit step, unit impulse, and exponential signals graphically. (CO1)

OR

- b. A signal  $x(n) = \{1, 2, 3, 4, 5\}$ . Sketch and explain its even and odd components. (CO1)

Q2.

(10 Marks)

- a. What do you understand by sampling and reconstruction of signals? Illustrate with suitable diagrams. (CO1)

OR

- b. Explain the properties of Discrete-Time Fourier Series (DTFS) with examples. (CO1)

Q3.

(10 Marks)

- a. Derive the expression of Discrete Fourier Transform (DFT) and list its applications. (CO2)

OR

- b. Compute the 4-point DFT of the sequence  $x(n) = \{1, 2, 3, 4\}$ . Show step by step solution. (CO2)

Q4.

(10 Marks)

- a. Explain Decimation-in-Time (DIT) and Decimation-in-Frequency (DIF) FFT algorithms. (CO2)

OR

- b. Find the circular convolution of the two sequences:

$$x_1(n) = \{1, 2, 1, 2\}, x_2(n) = \{1, 1, 1, 1\}. \text{ (CO2)}$$

Q5.

(10 Marks)

- a. Explain the efficient computation of the DFT of a  $2N$ -point real sequence. (CO2, CO3)

OR

- b. For the real sequence  $x(n) = \{2, 2, 2, 2, 0, 0, 0, 0\}$ , show how the 8-point DFT can be computed efficiently using symmetry. (CO2, CO3)