



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)