PAPER ID-411035

Roll No:

MTECH
(SEM II) THEORY EXAMINATION 2023-24
DISCRETE TIME SIGNAL PROCESSING

TIME: 3 HRS   **M.MARKS: 70**

Note: **1.** Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. **Attempt** *all* **questions in brief.**   **2 x 7 = 14**

a.	What is Digital Signal Processing (DSP)?
b.	What is quantization?
c.	Explain direct addressing.
d.	Define interpolation in DSP.
e.	What is an alias-free QMF system?
f.	Explain transform coding.
g.	What is the Discrete Fourier Transform (DFT)?

SECTION B

2. **Attempt any** *three* **of the following:**   **7 x 3 = 21**

a.	Explain the process of converting an analog signal to a digital signal.
b.	What is a rational factor in sampling rate conversion?
c.	How do M-channel filter banks differ from traditional two-channel filter banks?
d.	Describe the significance of the Discrete Fourier Transform (DFT) in signal processing.
e.	Discuss the key differences between general-purpose microprocessors and Digital Signal Processors (DSPs).

SECTION C

3. **Attempt any** *one* **part of the following:**   **7 x 1 = 7**

(a)	Describe the ADC process in detail.
(b)	Discuss the impact of DSP on biomedical signal processing.

4. **Attempt any** *one* **part of the following:**   **7 x 1 = 7**

(a)	Explain the design considerations for low-pass filters in interpolation.
(b)	Describe the use of multirate signal processing in biomedical applications.

5. **Attempt any** *one* **part of the following:**   **7 x 1 = 7**

(a)	Describe the lattice structures used for linear phase FIR PR QMF banks.
(b)	Discuss the computational advantages of using poly-phase representation in filter banks.

6. **Attempt any** *one* **part of the following:**   **7 x 1 = 7**

(a)	Explain the structure and function of a butterfly operation in the FFT algorithm.
(b)	Describe the process of reconstructing a time-domain signal from its DFT.

7. **Attempt any** *one* **part of the following:**   **7 x 1 = 7**

(a)	Explain bit-reversed addressing and its use in FFT algorithms.
(b)	Explain how DSPs are used in audio processing applications.