

Seat No.

MAR_APR 2025 SUMMER EXAMINATION**11731 Bachelor of Technology (NEP-2.0)****Sub. Name: Digital Signal Processing****Sub. Code: 81646/81856****Day and Date: MAY ,13-05-2025****Total Marks: 70****Time: 02:30 PM To 05:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Assume suitable data wherever necessary and mention it boldly
 3. Figures to the right indicate full marks

Q1) Solve following MCQ.**[14]**

- i. Twiddle factor W_8^3 is equal to _____
 - A. $+j$
 - B. $-0.707 + j0.707$
 - C. $-0.707 - j0.707$
 - D. *None of the above*
- ii. Multi-rate signal processing corresponds to _____ operation.
 - A. Sampling rate conversion
 - B. Interpolation and Decimation
 - C. Up-sampling and Down-sampling
 - D. All of the above
- iii. Which of the following filter gives Linear phase Response.?
 - A. FIR
 - B. IIR
 - C. both A and B
 - D. None of the above
- iv. TMS320C67XX processor has _____.
 - A. Von Neumann Architecture
 - B. Harvard Architecture
 - C. All of the above
 - D. None of the above
- v. Wavelet Transform of time domain signal $x(t)$ results in _____.
 - A. Frequency domain signal
 - B. Time domain signal
 - C. Time and Frequency domain signal
 - D. None of the above

- vi. The nonlinear relation between the analog and digital frequencies is called _____
- Aliasing
 - Warping
 - Pre-warping
 - None of the above
- vii. Fetching the next instruction while current instruction is being under execution is called as _____
- Cascading
 - Pipelining
 - Parallel processing
 - None of the above

Q2) Solve any Two of the following. [14]

- Draw flow diagram of DIF FFT algorithm for $N=8$. [7]
- Explain with example why FIR filters are called stable filters. [7]
- An analog filter has a transfer function given by $H(s)$. Design a digital equivalent filter to this $H(s)$ using Impulse Invariance method. Assume $T=0.2$ sec. [7]

$$H(s) = 10/(s^2 + 7s + 10)$$

Q3) Solve any Two of the following. [14]

- Compute 4-point DFT of sequence $x(n) = \{1,2,3,4\}$ using (i) DIT FFT algorithm [7]
(ii) DIF FFT algorithm.
- Determine the order of lowpass Butterworth filter that has 3 dB attenuation at 500 Hz and 40 dB attenuation at 1000 Hz. [7]
- Differentiate between FIR and IIR Filters. [7]

Q4) Solve any Two of the following. [14]

- Realize given IIR filter using cascade and parallel realization structure given by transfer function [7]

$$H(z) = \frac{z^{-1}}{1 + 0.2z^{-1} - 0.15z^{-2}}$$
- Explain two stage interpolator with suitable example. [7]
- Explain Discrete WT using one stage decomposition and reconstruction filter bank of a signal. [7]

Q5) Solve any Two of the following.

- a.** Explain TMS320C67XX architecture in detail. **[7]**
- b.** Explain applications of multi-rate signal processing. **[7]**
- c.** Explain Multiresolution Analysis (MRA) with respect to Wavelet Transform. **[7]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (1154) B.Tech. CBCS (81646) Digital Signal Processing Part 3 SEM 6

2] (101) Bachelor of Engineering (81856) Digital Signal Processing Part 3 SEM 6