Seat No.

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OCT-NOV 2025 WINTER EXAMINATION

1154 B.Tech. CBCS

Sub. Name: Digital Signal Processing

Sub. Code: 81646/81856

Day and Date: Friday ,12-12-2025 **Total Marks: 70**

Time: 10:30 AM To 01:00 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**
4. **Use of Scientific calculator is allowed**

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

i. Twiddle factor W_8^1 is equal to _____
- A. -0.707+j0.707
- B. 0.707 - j0.707
- C. 0.707+j0.707
- D. None of the above

ii. In FIR filter all the poles of the transfer function H(z) must occur at _____
- A. origin
- B. infinity
- C. conjugate pairs
- D. None of the above

iii. Which of the following filter has feedback in realization structure ?
- A. FIR
- B. IIR
- C. analog filter
- D. None of the above

iv. Which of the following is realization structures is not used for implementing an FIR Filters?
- A. Direct form
- B. Cascade form
- C. Parallel form
- D. None of the above

v. _____ is the process of decreasing sampling rate by a specified factor.
- A. Up-sampling
- B. Convolution
- C. Decimation
- D. None of the above

vi. In DSP Processor fetching the next instruction while current instruction is being under execution is called as _____

A. Cascading
B. Parallel processing
C. Pipelining
D. None of the above

vii. The wavelet transform is used in _____

A. Signal compression
B. Signal coding
C. Signal denoising
D. All of the above

Q2) Attempt any TWO **[14]**

a. Explain flow diagram of DIF FFT algorithm for N=8. **[7]**

b. Explain designing steps of FIR filter using Windowing technique. **[7]**

c. Convert analog filter with transfer function $H(s) = \frac{s + 0.4}{(s + 0.4)^2 + 9}$ into a digital filter using Impulse Invariant method. **[7]**

Q3) Attempt any TWO **[14]**

a. Using DIT FFT algorithm, compute DFT of sequence x(n)= {2,4,-3,1}. **[7]**

b. Explain important characteristics of FIR filters. **[7]**

c. Explain why frequency transformations are needed for IIR filters. **[7]**

Q4) Attempt any TWO. **[14]**

a. Obtain Direct form realization structure for the FIR filter whose impulse response is, h(n) = {1,3,4,-3, 2} **[7]**

b. Explain Decimation process in multi rate DSP with an example. **[7]**

c. Explain limitations of Fourier Transform. How Short Time Fourier Transform and Wavelet transform helps to avoid it. **[7]**

Q5) Attemt any TWO. **[14]**

a. Explain various addressing modes of DSP Processors. **[7]**

b. Explain the method of sampling rate conversion by a rational factor I/D. **[7]**

c. Explain mother wavelet in detail. **[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