

3. Do the circular convolution of the following sequences graphically $x_1(n) = \{1, 1, 2, 2\}$ and $x_2(n) = \{1, 2, 3, 4\}$

Cross verify the same using matrix multiplication method. 7+3

4. Determine the 8-point DFT of the following sequence. $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$

Use in-place radix-2 decimation in time FFT algorithm. 10

5. Determine the direct form I and II for the second order filter given by 5+5

$$H(z) = \frac{0.28z^2 + 0.319z + 0.04}{0.5z^3 + 0.3z^2 + 0.17z - 0.2}$$

6. The transfer function of discrete-time causal system is given by

$$H(z) = \frac{1 + \frac{1}{4}z^{-1}}{(1 + \frac{1}{2}z^{-1})(1 + \frac{1}{2}z^{-1} + \frac{1}{4}z^{-2})}$$

Draw cascade and parallel realization. 5+5

7. Write the short note on

a) Butterworth filter

b) Chebyshev filter 5+5

8. Write a short note on

a) Zero-input limit cycle oscillations

b) Overflow limit cycle oscillations 5+5

B. Tech Odd Semester Examination, February, 2023

Electronics & Communication Engineering (5th Semester)

Course No.: ECE-505
(Digital Signal Processing)

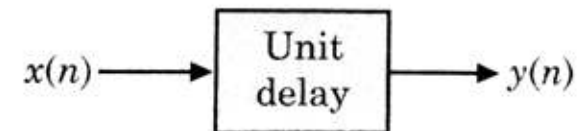
Full Marks: 50

Pass Marks: 25

Time: 2 hours

- Note:**
1. Attempt any five questions.
 2. Begin each answer in a new page.
 3. Answer parts of a question at a place.
 4. Assume reasonable data wherever required.
 5. The figures in the right margin indicate full marks for the question.
 6. All the mathematical symbols and abbreviations have their usual meanings.

1. The discrete-time system in figure below is known as unit delay element. Determine whether the system is (a) memoryless, (b) causal, (c) linear, (d) time-invariant, (e) stable. 5*2



2. Determine whether the given signal is energy or power signal. Find the respective values.

a. $x(t) = e^{-3|t|}$

b. $x(t) = e^{-4t}u(t)$ 5+5