

Please check that this question paper contains \_\_\_\_\_ questions and \_\_\_\_\_ printed pages within first ten minutes.

[Total No. of Questions: 09]

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Uni. Roll No. ....

Program: B.Tech.

Semester: 5<sup>th</sup>

Name of Subject: Digital Signal Processing

Subject Code: PCEC-111

Paper ID: 16418

11-01-2022(E)

**Time Allowed: 02 Hours**

**Max. Marks: 60**

**NOTE:**

- 1) Each question is of 10 marks.
- 2) Attempt any six questions out of nine
- 3) Any missing data may be assumed appropriately

**Q1.** Prove that folding and time delaying or advancing of a signal are not commutative operations.

**Q2.** Calculate linear convolution using mathematical equation method for the given discrete time signal:

$$x(n) = u(n) - u(n - 4)$$

$$h(n) = 2\delta(n) + \delta(n - 2) - 3\delta(n - 3)$$

**Q3.** Use DFT and IDFT method to determine the circular convolution of sequence

$$x(n) = \{1, 2, 3, 4\}$$

$$h(n) = \{1, 1, 1\}$$

**Q4.** For the sequence

$$x(n) = \{1, 0, -1, 0\}$$

Determine DFT using DIFFFT algorithm.

**Q5.** Using IZT, obtain  $x(n)$  if

$$X(Z) = \frac{2(2 - Z^{-1})}{4 - Z^{-2}}$$

**Q6.** Find the magnitude and phase response function of 7<sup>th</sup> order FIR LPF with cut-off frequency 1 rad/sec using hanning window.

**Q7.** Using impulse invariance method find  $H(Z)$  at 5Hz sampling frequency if

$$H(s) = 1/(1/2 (s^2 + 3s + 2))$$

**Q8.** Determine Z-transform of

$$x(n) = \cos\omega_0 n u(n)$$

**Q9.** Compute the circular convolution of the following sequence and compare the result with linear convolution.

$$x(n) = \{1, 1.5, 2.25\}$$

$$h(n) = \{-3, -1, 1, 3\}$$

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