

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (OLD) EXAMINATION – WINTER 2018****Subject Code: 171704****Date: 29/11/2018****Subject Name: Digital Signals & Systems****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** What do you understand by aliasing? How will you control aliasing? **07**
- (b)** What do you mean by sampling process? State the sampling theorem and explain the concept of sampling. **07**

- Q.2 (a)** Define periodic signal and fundamental period and Determine the signal $X(t) = 2 \cos(6\pi t - \pi/3) + 4 \sin(10\pi t)$ is periodic? If so find its fundamental period. **07**

- (b)** For a given **07**
- (i) $x(n^2)$
 - (ii) $x(2n + 5)$
 - (iii) $nx(n)$

discrete time systems, check whether they are: (1) Static or dynamic (2) Linear or non-linear (3) Shift invariant or shift-varying (4) Causal or non-causal (5) Stable or unstable.

OR

- (b)** Find homogeneous solution of a given system difference equation: **07**
- $$y(n) - 3y(n-1) - 4y(n-2) = x(n)$$
- $$y(-1) = 5; y(-2) = 0$$

- Q.3 (a)** Find the Z transform of $x(n) = n^2 u(n)$ by the help of differentiation property. **07**
- (b)** List out properties of z transform. **07**

OR

- Q.3 (a)** Draw and explain block diagram of DSP. **07**
- (b)** Explain Low pass and High pass filter. **07**

- Q.4 (a)** Obtain the linear convolution by graphical method of following sequences. **07**
- $$x(n) = \{1, 4, 3, 2, 1\} \text{ and } h(n) = \{1, 2, 1, 2, 1\}$$

- (b)** Compute the cross-correlation between $x(n) = \{1, 2, 3, 4\}$ and $y(n) = \{1, 2, 1, 2\}$ **07**

OR

- Q.4 (a)** Draw parallel realization of IIR filter having transfer function **07**
- $$H(Z) = (1 - Z^{-1}) / (1 - 0.2Z^{-1} - 0.15Z^{-2})$$
- (b)** Explain direct form –I and direct form –II structure of IIR filter. **07**

- Q.5 (a) Compute 4 point DFT of $x(n) = \{1, 2, 3, 4\}$ 07
(b) List out properties of DFT. 07
- OR**
- Q.5 (a) Explain forward DCT with necessary equations 07
(b) Explain lattice structure of FIR filter 07

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