

Subject Code: 171003

Date: 28/11/2019

Subject Name: Digital Signal Processing

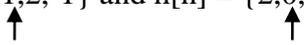
Time: 10:30 AM TO 01:00 PM

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) Perform the linear convolution of following sequences using graphical method. **07**
 $x[n] = \{1, 2, -1\}$ and $h[n] = \{2, 0, -2\}$



(b) State and prove the following properties of DTFT. **07**
 (1) Frequency Shifting
 (2) Differentiation in Frequency

Q.2 (a) Explain the following properties of a discrete time system with suitable example. **07**
 (1) Linearity (2) Causality (3) Time invariance

(b) What is ROC in context of Z-transform? List various properties of ROC. **07**

OR

(b) Define DTFT. Using DTFT, find impulse response of a LTI system described by difference equation $y[n] - \frac{1}{2}y[n-1] = x[n] - \frac{1}{4}x[n-2]$ **07**

Q.3 (a) Find inverse Z-transform of following: **07**

$$X(z) = \frac{1}{\left(1 + \frac{1}{2}z^{-1}\right)(1 - 2z^{-1})(1 - 3z^{-1})} \quad |z| > 3$$

(b) Write short note on Structures for linear phase FIR systems. **07**

OR

Q.3 (a) Find Z Transform and ROC of following signals. **07**

- (1) $x[n] = na^n u[n]$
- (2) $x[n] = \left(-\frac{1}{3}\right)^n u[n] - \left(\frac{1}{2}\right)^n u[-n-1]$

(b) Draw Direct form-I and Direct form-II structures for the system whose system function is **07**

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

Q.4 (a) What is circular convolution? How is it different from linear convolution? **07**
 Determine the circular convolution of two sequences

$$x(n) = \cos(\pi n/2) \text{ for } n=0, 1, 2, 3$$

$$h(n) = 2^n \text{ for } n=0, 1, 2$$

(b) Discuss frequency domain representation of sampling. **07**

OR

Q.4 (a) With help of block diagram explain architecture of TMS320C6XXX processor. **07**

(b) Define DFT. Show relationship between DFT and DTFT. Prove any one property of DFT. **07**

Q.5 (a) Describe the decimation in frequency algorithm, with the help of a flow graph, for 8-point DFT computation. **07**

(b) Explain windowing method of designing FIR filter. **07**

OR

Q.5 (a) Describe the decimation in time algorithm, with the help of a flow graph, for 8-point DFT computation. **07**

(b) List the various methods of designing IIR filter. Explain IIR filter design using Bilinear Transformation method **07**
