

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2170914

Date: 15/11/2018

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.

	MARKS
Q.1 (a) A discrete –time signal $x(n)$ is given below : $X(n) = \{1, 2, 1, -2, 1, 2, 3, 4, 14\}$ ↑ Sketch and label carefully each of the following signals: (i) $x(n-2)$ (ii) $x(-4-n)$ (iii) $x(n/2)$	03
(b) List advantages of Digital Signal Processing over Analog Signal Processing.	04
(c) Find the linear convolution of following pairs of discrete sequences (i) $x_1(n) = \{1, 2, 3, 4, 12, 4, 6\}$ $h_1(n) = \{4, 3, 2, 1\}$ (ii) $x_1(n) = \{1, 2, 1, 2, 1, 2, 1\}$ $h_1(n) = \{1, 2, 3, 4, 3, 2, 1\}$	07
Q.2 (a) Obtain Fourier transform of single sided exponential pulse $x(n) = a^n u(n)$	03
(b) Check the following systems for time invariance and Linearity : (i) $y(n) = n[x(n)]^2$ (ii) $y(n) = a[x(n)]^2 + b x(n)$	04
(c) Calculate DTFT of following signals (i) $x(n) = [\frac{1}{4}, \frac{1}{4}, \frac{1}{4}, \frac{1}{4}]$ (ii) $x(n) = 2(\frac{3}{4})^n u(n)$	07
OR	
(c) Explain Inverse system, minimum phase system and all pass system. Determine Inverse of the system characterized by $y(n) = 0.5y(n-1) + x(n)$ assuming zero initial conditions.	07
Q.3 (a) Find the Z Transform of $\sum_{n=-\infty}^{\infty} u(n-1)$	03
(b) The impulse response of the LTI system is $h(n) = \{2, 4, 5, 6\}$. ↑ Determine the response of the system to the input signal $x(n) = \{1, 1, 2, 3\}$	04
↑ (c) Determine the inverse z-transform of the function $X(Z) = \frac{1}{(1-Z)^2(1-Z^{-1})}$, $ Z > 1$	07
OR	
Q.3 (a) Find Z-transform of $x(n) = [2(4)^n - 4(2)^n] u(n)$	03
(b) State and prove the differentiation property of Z transform.	04
(c) Determine the response of the system, $y(n) = \frac{1}{2}y(n-1) - \frac{1}{4}y(n-2) + x(n)$ to the input signals. $x(n) = \delta(n) - \delta(n-1)$	07
Q.4 (a) Define DFT.	03

