

GUJARAT TECHNOLOGICAL UNIVERSITY
BE –SEMESTER-VII (NEW SYLLABUS) EXAMINATION- SUMMER - 2018

Subject Code: 2170914**Date: 28/04/2018****Subject Name: Digital Signal Processing (Department Elective-II)****Time: 02:30 PM TO 05:00 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) Define following discrete time functions **03**
 (1) Unit impulse
 (2) Unit step
 (3) Unit ramp
- (b) Explain following terms of discrete time system with example **04**
 (1) Recursive and Non recursive system
 (2) Causal and Anti-causal system
- (c) Define sampling. State and explain sampling theorem. **07**
- Q.2** (a) State the properties of z-transform. **03**
 (b) Define Z-transform and state the importance of ROC **04**
 (c) Determine the z-transform and ROC of the signal **07**
 $x(n) = [3(2^n) - 4(3^n)] u(n)$
- OR**
- (c) Classify the discrete time systems **07**
- Q.3** (a) A discrete time signal is given by, **03**
 $x(n) = \{ 1, 1, 1, 1, 2 \}$ the find out $x(n-1) \cdot \delta(n-1)$
- (b) Determine the inverse z-transform of **04**
 $x(n) = 1/(1 - 1.5z^{-1} + 0.5z^{-2})$
- (c) Find the convolution of two finite duration sequences. **07**
 (1) When $a = b$ and (2) when $a \neq b$
 $h(n) = a^n u(n)$ for all n
 $x(n) = b^n u(n)$ for all n
- OR**
- Q.3** (a) Explain the warping effect in IIR filter **03**
 (b) Compare Impulse Invariance and Bilinear Transformation method in IIR filter **04**
 (c) Explain the following terms in FIR filter **07**
 (1) Hamming window
 (2) Blackman window
 (3) Hanning window
- Q.4** (a) List out advantages and disadvantages of FIR filter **03**
 (b) Determine whether the system is time invariant or not **04**
 $y(n) = x(n) + nx(n-1)$
 (c) Explain the properties of DFT **07**
- OR**
- Q.4** (a) Determine whether the system is causal or not **03**
 (1) $y(n) = x(-n+2)$ (2) $y(n) = x(n^2)$
 (b) Explain the MAC unit in Digital signal processors. **04**
 (c) Explain the radix-2 DIT - FFT algorithm. **07**

- Q.5 (a)** Realize a linear phase FIR filter with following impulse response **03**
 $H(z) = \frac{2}{3}z + 1 + \frac{2}{3}z^{-1}$, also determine the output response
- (b)** Draw direct form I structure for first order system: **04**
 $y(n) = -a_1y(n-1) + b_0x(n) + b_1x(n-1)$
- (c)** Find out $H(z)$ using invariance method at 5Hz sampling frequency from $H(s)$ as **07**
given by; $H(s) = \frac{2}{(s+1)(s+2)}$

OR

- Q.5 (a)** Explain the difference between fixed point and floating point digital signal processor. **03**
- (b)** Explain the concept of pipelining in DSP. **04**
- (c)** Describe any one type of DSP architecture. **07**
