



**GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-VIII (old) - EXAMINATION – SUMMER 2018**

**Subject Code:182402**

**Date:30/04/2018**

**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.

- Q.1** (a) Compare Analog and digital signal processing in tabular form. **04**  
 (b) state whether the following signal is an Energy or power signal.give **04**  
 Justification for your answer:-  $x(n) = (0.5)^n * u(n)$   
 (c) What is the importance of ROC in z transform? State & prove any two the **06**  
 properties of Linear convolution.
- Q.2** (a) Define sampling. State and explain sampling theorem. **07**  
 (b) Differentiate continuous and discrete valued signal. For an analog signal **07**  
 $x(t) = 3\cos 50\pi t + 10\sin 300\pi t - \cos 100\pi t$ . Calculate Nyquist rate.
- OR**
- (b) Define stable system. Check whether the following system functions are **07**  
 memory-less, stable, causal, linear and time-invariant or not.  
 (1)  $y(n) = \text{sign}[x(n)]$  (2)  $y(n) = \text{Trunc}[x(n)]$
- Q.3** (a) State Parseval's relation for DTFT. Also prove it. **07**  
 (b) Find convolution of two sequences  $x(n) = (-1)^n * u(n)$  and  $h(n) = u(n)$  **07**
- OR**
- Q.3** (a) Explain the interconnection of LTI systems. **07**  
 (b) State the properties of Discrete Fourier Transform (DFT) and prove the Time **07**  
 Reversal property of DFT.
- Q.4** (a) What do you understand by twiddle factor? Derive the relationship between **07**  
 DFT and Z Transform.  
 (b) Explain following. (1) Radix-2 FFT algorithm (2) DIT algorithm **07**
- OR**
- Q.4** (a) (1) obtain the value of  $x(4)$  for 8 Point DFT if  $x(n) = \{ 1, -1, 0, 2, 1, -2, -1, 1 \}$  **07**  
 $\uparrow$   
 (2) Find out the circular convolution of  $x(n) = \{ 1, 2, 3, 4 \}$  and  $h(n) = \{ 1, 1, 2, 2 \}$   
 (b) Determine the value of signal  $x(n)$  at  $n=0$  and  $n=\infty$  if, **07**  

$$X(z) = \frac{2}{Z^2 + 1/6 * Z - 1/6}$$
- Q.5** (a) Explain the structures for realization of FIR systems. **07**  
 (b) Explain the following terms with respect to Digital Signal Processor: **07**  
 (1) Pipelining (2) MAC
- OR**
- Q.5** (a) What are the different formats of fixed point representation? Explain the fixed **07**  
 point representation of binary numbers.  
 (b) What do you understand by scaling? Discuss the effect of round-off in the **07**  
 digital filter.

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