**Seat No.: _____** **Enrolment No._____**

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–VIII (OLD) - EXAMINATION – SUMMER 2017**

**Subject Code:182402** **Date:29/04/2017**

**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.**

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|---|---|---|---|
| **Q.1** | **(a)** | Differentiate: Analog and digital signal processing. | **03** |
| | **(b)** | Differentiate: Energy and Power signal.<br>Determine which of following signal is periodic.<br>(1) $x_1(t) = \sin 10\pi t$ (2) $x_2(t) = \sin 3\pi t$ | **05** |
| | **(c)** | Discuss discrete time processing of continuous time signals. | **06** |
| **Q.2** | **(a)** | State and prove properties of Fourier transform. | **07** |
| | **(b)** | What is the importance of ROC in z transform? State the properties of z transform and ROC. | **07** |
| | | **OR** | |
| | **(b)** | Obtain the value of x(4) for 8 Point DFT. The sequence for x(n) is<br>$x(n) = \{ \underset{\uparrow \atop n=0}{0}, -1, 1, 2, 1, -2, 1, 1\}$ | **07** |
| **Q.3** | **(A)** | A Causal LTI System Has The Function<br>$H(Z) = \dfrac{1+2z^{-1}+Z^{-2}}{(1+1/2z^{-1})(1-Z^{-1})}$<br>Find out the values of h(n) for above LTI System. | **07** |
| | **(b)** | Explain the concept of pipelining in DSP. Also discuss the need of interlocking in brief. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Describe any one type of DSP architecture. | **07** |
| | **(b)** | (1) Determine the z-transform of the signal<br>$x(n) = \delta(n+1)+6\delta(n)+12\delta(n-3) )- \delta(n-4)$<br>(2) Find x(n) if $X(z) = \dfrac{1+1/2z^{-1}}{1-1/3z^{-1}}$ | **07** |
| **Q.4** | **(a)** | Draw and explain the block diagram of basic generic harward architecture for a signal processor. | **07** |
| | **(b)** | Discuss the concept of zero input limit cycle oscillation. How this can be eliminated? | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | For H (z) = 2/(z+3), sketch Direct form - II and its transposed realization . | **07** |
| | **(b)** | Explain the structures for realization of IIR systems. | **07** |
| **Q.5** | **(a)** | Define the following terms:<br>1) State space 2) Correlation 3) ROC 4) Sampling 5) Aliasing 6) Impulse Response 7) Convolution | **07** |
| | **(b)** | Describe the properties of Discrete Fourier Transform (DFT). | **07** |

**OR**

**Q.5** **(a)** Explain Radix-2 FFT and DIT algorithm. **07**

**(b)** Consider the complex sequence **07**

$x(n) = e^{j\omega 0n}$ $0 \leq n \leq N-1$

$=0$ otherwise

Find Fourier transform $x(e^{j\omega})$ of x(n). also find N point DFT X[k] of finite length for x (n).

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