

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VIII • EXAMINATION – WINTER • 2014

Subject Code: 182402**Date: 29-11-2014****Subject Name: Digital Signal Processing****Time: 02:30 pm - 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.
4. Notations/ symbols used have usual meanings.

- Q.1 (a)** Draw and explain the block diagram of basic generic hardware architecture for a signal processor. **07**
- (b)** Develop Decimation In frequency - FFT algorithm for $N = 4$ and also, draw signal flow diagram for the same. **07**
- Q.2 (a)** Obtain relation between z- transform and discrete Fourier transform **07**
- (b)** Define sampling. State and explain sampling theorem. **07**
- OR**
- (b)** Discuss discrete time processing of continuous time signals. **07**
- Q.3 (a)** Find inverse Z-transform of: **08**
- (i) $x(z) = 1/(1-az^{-1})$ for $|z| > |a|$. (ii) $x(z) = 1/(1-az^{-1})$ for $|z| < |a|$.
 Also, plot $x(n)$ for both.
- (b)** Discuss the parallel-form structure for first -order and second order sections of an FIR filter . **06**
- OR**
- Q.3 (a)** Find Z-transform of : **08**
- (i) $x(n) = -a^n u(-n-1)$; (ii) $x(n) = (1/2)^n u(n) + (-1/3)^n u(n)$.
 Also, state ROC for both.
- (b)** For linear phase FIR filters, how constant group and phase delay is achieved? Enlist design techniques for the same. **06**
- Q.4 (a)** Define DFT. Find DFT of the sequence $x(n) = \{0,1,2,3\}$. **07**
- (b)** Discuss the effect of round – off in the digital filter. **07**
- OR**
- Q.4 (a)** Define IDFT. Find 4- point IDFT of the sequence $x(k) = \{1,0,1,0\}$. **07**
- (b)** Discuss the concept of zero input limit cycle oscillation. How this can be eliminated? **07**
- Q.5 (a)** (i) Evaluate $\delta(n-1) * \delta(n+1)$. Comments on result obtained. (03 Marks) **07**
- (ii) For the signal shown in the Fig.1 .Evaluate the integral $\int_{-\pi}^{\pi} |x(e^{j\omega})|^2 d\omega$.
 (04 Marks)

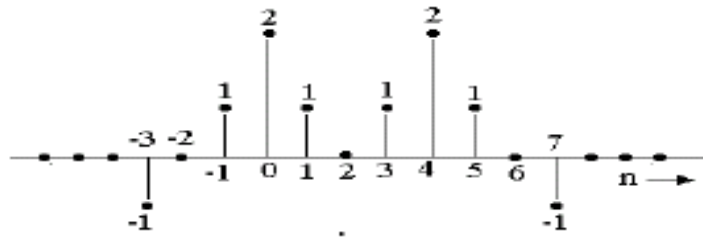


Fig.1

- (b) What are the different formats of fixed point representation? Explain the fixed point representation of binary numbers. 07

OR

- Q.5 (a)** (i) State equation for a forward and back ward difference systems. Out of these two systems, which one will be causal? 07
(03 Marks)

(ii) Write convolution sum formula for FIR and IIR systems.
State transfer function for FIR and IIR systems. (04 Marks)

- (b) Write short note on: Hilbert Transform 07
