

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E Sem-I Regular Examination January / February 2011****Subject code: 710422N****Subject Name: Digital Signal Processing and Applications****Date: 05 /02 /2011****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.

- Q.1** (a) (i) Explain important of DSP in field of Engineering. Compare it with analog signal processing. **03**
(ii) Explain (i) causal system (ii) difference equation **04**
(b) (i) Explain important of ROC in Z-Transform **03**
(ii) Find Z-transform of $a^n u(n) - b^n u(n-1)$. Draw all possible ROC. **04**
- Q.2** (a) (i) Determine system transfer function $H(z)$ & its poles and zeros if the system difference equation is $y(n) + 3/4y(n-1) + 1/8y(n-2) = x(n) + x(n-1)$ **03**
(ii) Explain (i) LTI system (ii) stability **04**
(b) (i) Explain relation between DFT and Z-Transform **03**
(ii) Find circular convolution of two sequence $x(n) = \{4, 3, 2, 1\}$ & $h(n) = \{3, 2, 1, 0\}$ **04**
- OR**
- (b) Given $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$. Find $X(k)$ using decimation in time fast Fourier transform algorithm **07**
- Q.3** (a) (i) Draw direct form-I realization structure of general 3rd order system. **03**
(ii) Explain (i) aliasing error (ii) bit reversal **04**
(b) Give detail comparison between FIR and IIR filter **07**
- OR**
- Q.3** (a) (i) State advantage and disadvantages of digital filter **03**
(ii) Explain impulse invariant technique **04**
(b) (i) Explain various desirable features of windows in filter design **03**
(ii) Find DFT of sequence $x(n) = \{4, 3, 2, 1\}$ **04**
- Q.4** (a) Write short note on Effect of finite word length in FIR filter design **07**
(b) State various non parametric methods of power spectrum estimation. Explain any one of them **07**
- OR**
- Q.4** (a) Write short note on desirable features of a DSP processor **07**
(b) What is multi rate digital signal processing? Explain need of it. Give examples and state various advantages of it. **07**
- Q.5** (a) State various application of DSP. Explain any one in brief **07**
(b) A relax DSP system is describe by linear difference equation $y(n) = 0.2x(n) - 0.5x(n-2) + 0.4x(n-3)$. digital input sequence $\{-1, 1, 0, -1\}$ is applied to this DSP system. Determine the corresponding digital output sequence. **07**
- OR**
- Q.5** (a) (i) Explain why FFT is more efficient than DFT? **03**
(ii) Explain steps to design FIR filter using Kaiser windows **04**
(b) Explain various properties of discrete time system with examples **07**
