

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014

Subject code: 1720702

Date: 03-12-2014

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.

- Q.1** (a) Explain various elements of DSP system. Compare DSP with ASP. Explain any one application of DSP. **07**
- (b) Explain following terms **07**
- (i) Time Invariant system
 - (ii) Causal system
 - (iii) Difference equation
- Q.2** (a) Find discrete time Fourier transform(DTFT) of $x(n)=a^{|n|}$. Explain any one property of DTFT. **07**
- (b) Explain ROC. Find Z-Transform of $x(n)=\cos \omega_0 n$ for $n \in \mathbb{Z}$. **07**
- OR**
- (b) Explain advantages & disadvantages of digital filter. Compare FIR and IIR Filter **07**
- Q.3** (a) Explain frequency shifting property of DFT. Determine the DFT of four point sequence $x(n)=\{0,1,2,3\}$ **07**
- (b) Write short note on DSP Processor. **07**
- OR**
- Q.3** (a) Write short note on Finite Word Length Effects in digital filter **07**
- (b) Find circular convolution of given two four point sequence $x(n)=\{0,1,2,3\}$ & $h(n)=\{2,1,1,2\}$ **07**
- Q.4** (a) Write short note on multi rate digital signal processing **07**
- (b) Explain any one non-parametric method of power spectrum estimation. **07**
- OR**
- Q.4** (a) Explain following with example **07**
- (i) Time shifting properties
 - (ii) Energy Signal
 - (iii) Unit step function
- Q.4** (b) Compare DFT & FFT. Draw decimation in Frequency 8 point FFT diagram. **07**
- Q.5** (a) Design a second order digital Butterworth filter with pass band of 300Hz to 500Hz and sampling frequency of 1500Hz using BLT method, given prototype LPF with transfer function $H(s)=Y_c/(s+Y_c)$ **07**
- (b) Consider a causal LTI system with system function $H(z)=(1+0.2z^{-1})/(1-0.5z^{-1}+1/3z^{-2})(1+0.25z^{-1})$ **07**
- Draw the signal flow graph and transposed structure, direct II structure for implementation of the system.

OR

- Q.5** **(a)** Compare **07**
 (i) Impulse invariance method with bilinear transformation method &
 (ii) DTFT & DFT
- (b)** List and explain different window methods for FIR filter Design. What are the **07**
 advantages and disadvantages of Window method?
