Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER II (OLD) – • EXAMINATION – SUMMER 2016

Subject Code: 1720702 **Date:18/05/2016**

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 DSP with other processing system. Draw block diagram of DSP system & explain elements of each block **06**

(b) Explain following terms **08**

(1) Aliasing
(2) Bit reversal
(3) Direct form I structure
(4) Digital filter

Q.2 **(a)** Explain with example, various properties of discrete time system. **07**

(b) What do you mean by convolution? How it helps in signal processing? **07**
Find out the convolution between $x(n)=a^n u(n)$ and $h(n)=u(n)$ using graphical method of convolution.

OR

(b) What do you mean by impulse response? **07**
Consider the impulse response of the system
$h(n)= a^n$ when $n>=0$
$= b^n$ when $n<0$.
Find range of a & b such that system becomes stable.

Q.3 **(a)** Compare various transform techniques using an example **06**

(b) Explain following terms **08**

(1) Difference equation
(2) LTI
(3) Recursive system
(4) Zero padding

OR

Q.3 **(a)** Write short note on 'multi rate signal processing **06**

(b) Prove & explain following properties of DFT. **08**

(1) Circular time shift
(2) Duality
(3) Circular frequency shift
(4) Periodicity

Q.4 **(a)** Find Z-transform of following **06**

(1) $x(n)=\cos w_0 n\, u(n)$
(2) $x(n)= n\, a^n u(n)$

(b) Find inverse Z-transform of following using partial fraction expansion method for give X(Z) such that resulting signal is causal **08**

(1) $x(z) = (1+3z^{-1}) / (1+3z^{-1}+2z^{-2})$
(2) $x(z) = (1+2z^{-1}) / (1+z^{-2})$

OR

Q.4 **(a)** Explain following terms **08**
(1) ROC
(2) FIR
(3) Hanning window
(4) Redix-2 algorithm

(b) Compare analog & digital filter. Explain any one window method of filter design. **06**

Q.5 **(a)** Compare general purpose & DSP processor. Explain any one type of DSP processor architecture with block diagram. **08**

(b) Find circular convolution of x(n)={1,2,1,2} and h(n)={4,5,4,5} using circle method **06**

OR

Q.5 **(a)** Compute 8 point DFT of sequence x(n)={1,1,1,1,0,0,0,0} using decimation in time FFT algorithm **08**

(b) Explain following terms **06**
(1) Final value theorm
(2) Non-causal system
(3) Twiddle factor

****