Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – SUMMER • 2015

Subject Code: 171704 **Date: 04/05/2015**

Subject Name: Digital Signals and Systems

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)	Discuss the time domain behaviour of a discrete time system from the pole location.	**07**
(b)	For a given discrete system, check whether they are (1) Time variant / Time invariant (2) Stable / Unstable (3) Linear / Nonlinear (4) Causal / Anti causal (5) Static / dynamic • $Y(n)= a\, x(n) + b$	**05**
(c)	Find out the power of $A\, e^{jwn}$.	**02**
Q-2 (a)	Find out the linear convolution of two sequences $X(n)= \{1,\underline{2},1,-1\}$, $h(n)= \{1,2,3,1\}$	**07**
(b)	Find out solution of second order difference equation $Y(n) – 3\, Y(n-1) -4\, Y(n-2) = X(n) + 2\, X(n-1)$ when the input sequence is $X(n)= 4^n\, u(n)$	**07**
	or	
(b)	Explain with suitable example recursive and nonrecursive system.	**07**
Q-3 (a)	Prove the following properties of z transform. 1. Convolution 2. Initial value theorem	**06**
(b)	Find out inverse z transform of $X(z)= \dfrac{1+z^{-1}}{1-z^{-1}+0.5z^{-2}}$	**08**
	OR	
Q-3 (a)	Prove the following properties of z transform. 1. Perseval's relationship 2. Differentiation	**06**
(b)	Find out Z transform of following signal 1. $X(n)=-n\, a^n\, u(-n)$ 2. $X(n)=n^2\, u(n)$	**08**
Q-4 (a)	Explain symmetry properties of DTFT.	**07**

(b) Compute 8 point DFT using decimation in time using radix 2 algorithm. **07**

$X(n)= \cos \pi n$

OR

Q-4 (a) Compute 8 point DFT using decimation in frequency radix-II algorithm. **07**

$X(n)= \sin \frac{\pi}{2} n$

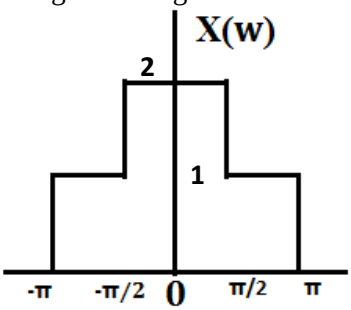
(b) Determine the direct form I , form II and cascade realization for following systems **07**

Y(n)=x(n)- x(n-1) + 2 x (n-2) -3 y(n-1)+4y(n-2)

Q-5 (a) Compute the fourier transform of the following signals and plot the spectra. **07**

1. X(n) = u(n) – u(n-3)
2. $X(n) = a^n u(n)$

(b) Determine the signal having following Fourier transform. **07**



OR

Q-5 Determine and sketch magnitude and phase spectra of the following periodic signals. **14**

1. cos (2Л n/3) + sin (2Л n/5)
2. x(n) = 4 sin ((Л (n-2))/3)