Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2020

Subject Name: Digital Signal Processing

Subject Code: 4TE05DSP1 **Branch: B.Tech (EC)**

Semester: 5 **Date: 06/03/2020** **Time: 10:30 To 01:30** **Marks:70**

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Define the following terms.** **(14)**

a) Energy signal
b) Time invariant system
c) Folded signal
d) Linear phase system
e) Power signal
f) Even Signal
g) Frequency domain sampling
h) Multi rate Signal Processing
i) Recursive system
j) Shift invariant system
k) Convolution
l) Bilinear Transformation
m) Causal system
n) ROC

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

(a) Define the inverse system, how to make non invertible system to an invertible system.

(b) What is frequency domain sampling? Why it is required? Explain relation between number of samples (L) of a discrete time signal x(n) and its frequency domain samples (N) .

Q-3 **Attempt all questions** **(14)**

(a) Prove time shifting property of Z-Transform, also give an example.

(b) Find Z- transform of sequence $x(n) = \cos(\omega_o n)u(n)$, where x(n) is causal.

Q-4 **Attempt all questions** **(14)**

(a) Explain Radix-2 decimation in frequency FFT algorithm with neat diagram.

(b) For the sequence x(n)={1,2,1} and impulse response h(n)={1,2}, find the linear convolution using circular convolution. Match result of same using tabulation/matrix method.

Q-5 **Attempt all questions** **(14)**

(a) What is Discrete Fourier Transform(DFT)? Why it is periodic? Explain regarding its periodicity property.

(b) What is BIBO stable system? Give derivation in support to the necessary condition for BIBO stable system.

Q-6 **Attempt all questions** **(14)**

(a) Explain design of FIR filters by Kaiser window and mention its advantages against the commonly used windows.

(b) Explain the minimum-phase and all-pass decomposition of a system.

Q-7 **Attempt all questions** **(14)**

(a) Discuss advantages of digital over analog signal processing.

(b) Describe how sampling rate can be reduced by a non integer factor.

Q-8 **Attempt all questions** **(14)**

(a) Explain how the decimation in time technique works with necessary equations and diagrams.

(b) Explain about DSP processor architecture.