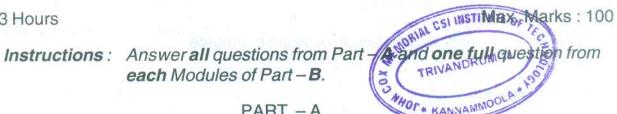
Reg. No	. :			
---------	-----	--	--	--

Seventh Semester B.Tech. Degree Examination, November 2015 (2008 Scheme) 08.703 : DIGITAL SIGNAL PROCESSING (E)

Time: 3 Hours

each Modules of Part - B.

PART - A



- 1. Discuss the steps involved in creating digital signal from given analog signals with the help of neat sketch.
- 2. What is the need of processing of signals? In telephony system which processing method is utilised?
- 3. Define periodic and aperiodic signals and hence explain how spectrum of these signals can be obtained.
- 4. Define DTFT of a sequence x(n). Show that DTFT of an aperiodic sequence is periodic with period 2π .
- 5. What is ROC in a z-plane? Discuss ROC of finite duration signals.
- 6. Find z-Transform of $x(n) = na^n u(n)$.
- 7. Distinguish between decimentation in time and decimentation in frequency algorithms of FFT.
- 8. Explain the relation between s-plane and z-plane with the help of neat sketch; hence comment on stability of system.
- 9. What are the objectives of digital filters in DSP?
- Compare between IIR and FTR filters.

 $(10\times4=40 \text{ Marks})$



4

6

6

10

6

5

PART-B

Module - I

11. a) What will be the problems associated with reconstruction of signals after sampling? How these problems can be avoided?

b) Define causality and linearity of a system and check for causality and linearity for $y(n) = x(n) - x(n^2 - n)$.

c) Test for energy and power of following sequence

i)
$$x(n) = e^{j\left(\frac{\pi}{2}n + \frac{\pi}{8}\right)}$$

ii) $x(n) = Cos \frac{\pi}{6}n$.

- d) Given $x_1(n) = \begin{cases} 1, 3, 2, 1 \\ \uparrow \end{cases}$ $x_2(n) = \begin{cases} 1, -2, 3, 2 \\ \uparrow \end{cases}$ find following and sketch the result
 - i) x(2n)

ii) $[x_1(n)] \times [x_2(n)]$.

12. a) Perform convolution sum of two sequences using graphical method and hence verify the result using tabulation method

$$x(n) = \begin{cases} 1, 2, 2, 1 \\ \uparrow \end{cases} h(n) = \begin{cases} 1, 2, 2, 2, 1 \\ \uparrow \end{cases}.$$

b) State and explain any two properties of DTFT.

c) Find DTFT of sequence $x(n) = a^n u(n)$. Where 'a' is a real and |a| < 1 and hence plot the spectrum.

Module - II

13. a) State and explain scaling property of z-Transform and using this property find z-Transform of $x(n) = 2^n u(n)$.

10



b) Find z-Transform of following including ROC.

i)
$$x(n) = \frac{1}{2}\delta(n) + \delta(n-1) - \frac{1}{3}\delta(n-3)$$

ii)
$$x(n) = a^n \sin(\omega_0 n) u(n)$$
.

- c) Obtain inverse z-Transform of $X(z) = \frac{Z}{3z^2 4z + 1}$ if ROCs are
 - i) |z|>|
 - ii) $|z| < \frac{1}{3}$

iii)
$$\frac{1}{3} < |z| < |z|$$

14. a) Check the stability of system described by system function

$$H(z) = \frac{1}{1 - \frac{9}{2}z^{-1} - \frac{3}{2}z^{-2}}$$
 also explain the principle of Schur-Cohn stability test.

b) Given $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$, find DFT using Radix 2 FFT.

Module - III

15. a) Obtain direct form I and direct form II realization of the system function.

$$H(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 - 0.75z^{-1} + 0.125z^{-2}}$$

b) Obtain cascade and parallel form realization of
$$H(z) = \frac{3(2z^2 + 5z + 4)}{(2z + 1)(z + 2)}$$
.



16. a) Obtain the ladder structure of the given system function

$$H(z) = \frac{2 + 8z^{-1} + 6z^{-2}}{1 + 8z^{-1} + 12z^{-2}}.$$

8

 Design low pass Butterworth filter using bilinear transformation method for satisfying following constraints.

Pass band $w_p = 0.162 \text{ rad}$

Stop band w_s = 1.63 rad

Pass band ripple = 3dB

Stop band attenuation = 30 dB

Sampling frequency = 8 KHz.

12