PVP 14

Code: EE6T1

III B.Tech - II Semester – Regular/Supplementary Examinations March 2018

DIGITAL SIGNAL PROCESSING
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1.

a) Define the terms signal and signal processing.
b) Give some applications of DSP.
c) Find Z transform and ROC of a sequence $x(n)= n^2u(n)$.
d) Compare overlap-add method with overlap-save method.
e) State and prove time scaling property of DFT.
f) Define the impulse invariant technique.
g) Write a short note on pre warping.
h) List the advantages of FIR filters.
i) What are the desirable characteristics of frequency response of window function?
j) What is the need of Multirate signal processing?
k) Define aliasing. How to avoid it?

PART – B

Answer any *THREE* questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Check the following systems for linearity, time-invariance, stability and causality.

i) $y(n) = n.e^{|x(n)|}$

ii) $y(n) = a^n \cos\left(\frac{2\pi n}{N}\right)$ 8 M

b) State and prove the following properties of Z-Transforms

i) Time shifting property

ii) Initial and final value theorems 8 M

3. a) Find the circular convolution of the two sequences x(n)= {1,2,2,1}and h(n)={1,2,3,1}using

i) concentric circle method ii) matrix method 8 M

b) Explain the steps involved in implementing radix-2, DIT-FFT algorithm. 8 M

4. a) Design a chebyshev filter with a maximum pass band attenuation of 2.5 dB, at Ω_p = 20 rad/sec and stop band attenuation of 30 dB, at Ω_s = 20 rad/sec . 8 M

b) Determine H(z) using impulse invariance method, for the given analog transfer function

$H(s) = \frac{2}{(s+1)(s+2)}$. Assume T=1 sec 8 M

5. a) Design a low pass filter using rectangular window, with passband gain of unity, cutoff frequency of 1000 Hz and working at a sampling frequency of 5 kHz. The length of the impulse response should be 7. 8 M

b) An LTI system is described by the difference equation

$$y(n) = ay(n-1) + x(n) + bx(n-1)$$

realize it in direct form –I structure and convert it into direct form-II structure. 8 M

6. a) Obtain the necessary expression for interpolation process 8 M

b) Discuss the applications of multirate digital signal processing with examples. 8 M