

L8B

R09

Code No: 09A60405

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B. Tech III Year II Semester Examinations, May/June, 2013

Digital Signal Processing

(Electronics and Communications Engineering)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

1.a) Determine the impulse and unit step response of the systems described by the following difference equation

$$y(n] = 0.6y(n-1) - 0.08y(n-2) + x(n)$$

b) Find 0s frequency response. [15]

2.a) State and prove circular convolution property of DFT.

b) Perform Linear convolution of the two sequences $x(n) = \{1, -1, 2, -2, 3, -3, 4, -4\}$ and $h(n) = \{-1, 1\}$ using over-lap-add method. [6+9]

3.a) How the computational complexity is reduced in FFT over DFT?

b) Find the Four Point DFT of the sequence $x(n) = (-1)^n$, using DIF-FFT. [15]

4.a) Compare Direct form-I and Direct form - II Structures w.r.to hardware requirements.

b) Obtain the parallel and cascade realization structures for the system function given by $H(Z) = (1 + \frac{1}{4}Z^{-1}) / (1 + \frac{1}{2}Z^{-1})(1 + \frac{1}{2}Z^{-1} + \frac{1}{4}Z^{-2})$. [5+10]

5.a) What is Bilinear transformation and sketch the mapping of S-plane into Z-plane in bilinear transformation.

b) Explain how to convert an analog filter transfer function into digital filter transfer function using Bilinear transformation. [15]

6. Design an FIR Digital High pass filter using Hamming window whose cutoff freq is 1.2 rad/s and length of window N=5. Compare the same using Rectangular window. Draw the frequency response curve for both the cases. [15]

7.a) Discuss the sampling rate conversion by a factor I/D.

b) A sequence x(n) is upsampled by I=2, it passes through an LTI system H1(Z), and then down sampled by D=2. Can we replace this process with a single LTI system H2(Z)? If yes, determine the system function of this system. [15]

8.a) Discuss the effects due to finite word length in Direct form-I and II structures.

b) What is meant by over flow error and how it can be avoided? [15]
