III II Sem ECE

Code No: 09A60405 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B. Tech III Year II Semester Examinations, June - 2014
DIGITAL SIGNAL PROCESSING
(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

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1.a) Write whether an LTI system with an impulse response represented below is causal or not ? Justify.

$$h[n] = u[n+2] - u[n-2]$$

b) Write whether an LTI system with an impulse response represented below is stable or not ? Justify.

$$h[n] = 3^n u[-n-1]$$

c) Determine the range of values of 'a' for which an LTI system represented below is stable,

$h[n] = a^n$ for $n \geq 0$
$= 0$ otherwise.

2.a) Find the convolution of the sequences $x_1[n]$ and $x_2[n]$ using overlap add method.
$x_1[n] = \{3,-1,0,12,3,0,1,1,2\}$
$x_2[n] = \{1,1,1\}$

b) Obtain the relationship between DTFT and DFS.

3.a) Compute the DFT of the sequence x[n] = {1,2,3,4,3,4,1,2} using DIT FFT algorithm. Write the steps involved.

b) Compute IDFT of X(k) = { 4,-1,0,-1} using FFT technique.

4.a) Realize a filter with transfer function in parallel and cascade forms

$$H(z) = \frac{3 + 3.6z^{-1} + 0.6z^{-2}}{1 + 0.1z^{-1} - 0.2z^{-2}}.$$

b) Determine the frequency response of the system represented by the difference equation y(n) + 3y(n-1) + 2y(n-2) = 2x(n) – x(n-1) and comment up on the stability of the system.

5.a) For the analog filter with transfer function H(s) = 2/(s+1)(s+3), determine H(z) using bilinear transformation technique. Use T = 0.1 sec.

b) Explain impulse invariant method of IIR filter design.

6.a) Compare FIR and IIR filters.

b) Design a high pass FIR filter whose cut-off frequency is 1.4 rad/sec and N=5 using Hamming window.

7.a) Explain the process of decimation using relevant expressions and block diagram.

b) Explain the implementation of polyphase filter structure for interpolator.

8. Write notes on:
a) Limit cycles b) Over flow oscillations c) Dead band effects.

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