Exam.Code:0929
Sub. Code: 33665

2076

B.E. (Electronics and Communication Engineering)

Fifth Semester

EC-502: Digital Signal Processing

Time allowed: 3 Hours Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part. Use of scientific calculator is allowed.

x-x-x

I. (a) What do you mean by stability and causality criterion? Give examples.

(b) What is the relation between DFT and Z-transform?

(c) Why it is not possible to take the DFT of sequence having infinite length?

(d) What do you mean by analog frequency transformation?

(e) What are the effects of finite precision arithmetic on digital filters? (5x2)

PART- I

II. (a) A system has unit sample response h(n) given by

$h(n) = -\frac{1}{\delta(n+1)} + \frac{1}{2\delta(n)-1} - \frac{1}{4\delta(n-1)}$. is the system BIBO stable or causal? Justify your answer

(b) Determine x(n) for all possible ROC's.

$$X(z) = \frac{1+2z^{-1}+z^{-2}}{1-(3/2)z^{-1}+(1/2)z^{-2}}$$

(2x5)

III. Compute the DFT of sequence x(n) = [2 22 2 1 11 1}.using N=8 DIT-FFT algorithm. (10)

IV (a) State and prove modulation property of DFT.

(b) An LTI system has impulse response h[n]= [2 1 -1]. Determine the output of system for the input x[n] =[1 3 2 2 3 1] using circular convolution method. (2x5)

PART- II

V. (a) Develop the parallel forms of the following transfer functions.

$$H(z) = \frac{(z-1)(z+1)(z-2)z}{\left(z-\frac{1}{2}+j\frac{1}{2}\right)\left(z-\frac{1}{2}-j\frac{1}{2}\right)\left(z-j\frac{1}{4}\right)\left(z+j\frac{1}{4}\right)}$$

(b) What is a Kaiser window? In what way is it superior to other window functions? (2x5)

P.T.O.

VI. Design a digital lowpass Butterworth filter with the following specifications:

a) 3 dB attenuation at the passband frequency of 1.5 kHz

b) 10 dB stopband attenuation at the frequency of 3 kHz

c) Sampling frequency of 8,000 Hz. (10)

VII. (a) Explain and draw architecture of TMS320C5X processor?

(b) The desired frequency response of a low pass filter is

$$H_d(e^{j\omega}) = \begin{cases} e^{-j2\omega} & \frac{-\pi}{4} \le \omega \le \frac{\pi}{4} \\ 0 & \frac{\pi}{4} < \omega \le \pi \end{cases}$$

Determine filter coefficients $h_d(n)$ if the window function is

$$w(n) = \begin{cases} 1 & 0 \le n \le 4 \\ 0 & otherwise \end{cases}$$

(2x5)

x-x-x