Exam.Code:0937
Sub. Code: 6993

1078

B.E. (Electrical and Electronics Engineering)
Seventh Semester
EE-708: Digital Signal Processing

Time allowed: 3 Hours Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.*

x-x-x

I Answer in brief. (1x10)

a) List down the merits of Digital Signal Processing.
b) Define conditions for stability of a system in Z-domain.
c) What is the role of LPF in practical sampling?
d) Give computational complexity of DFT calculation.
e) Discuss one practical application of Correlation process.
f) Differentiate energy and power signals.
g) What are the factors responsible for reduced computations in FFT algorithms?
h) How DSP processors are different from Analog processors?
i) Differentiate between homogeneous and particular solutions of LCCDE''
j) Out of FIR and IIR implantations of digital filters, which one is preferable and why?

Section - A

II a) Compute the auto-correlation of the signal x(n) and comment on the result. (5, 5)
$x(n) = \{1,2,3,4,2,1\}$
b) State sampling theorem and show the aliasing effect if the signal is $x(t) = \sin 100\pi t$.

III a) Differentiate convolution and correlation and discuss one application of each. (5, 5)
b) Determine all possible signals that can have the following z-transform
$X(z) = (1 - 1.5\, z^{-1} + 0.5\, z^{-2})^{-1}$.

IV a) Compute the 8-ponit circular convolution of the following sequences: (5, 5)
$x(n) = \{1, 0, 2, 1\}$ and $y(n) = \sin(3\pi n/8)$
b) Define and derive the DITFFT algorithm.

Section- B

V a) Obtain cascade and parallel form structures for the system defined by (5, 5)

$$y(n) = \tfrac{1}{4}y(n-1) + \tfrac{1}{4}y(n-2) + x(n) + x(n-1)$$

b) Explain the effects of finite word length on digital IIR filter structures.

VI a) Design an FIR filter of length M = 15 having a frequency response that satisfies the condition

$$H_r\left(\frac{2\pi k}{15}\right) = \begin{cases} 1 \ for\ k = 0,1,2,3 \\ 0 \ for\ k = 4,5,6,7 \end{cases}$$ (5, 5)

b) Obtain the linear phase realization of the system function

$$H(z) = \frac{1}{2} + \frac{1}{3}z^{-1} + z^{-2} + \frac{1}{4}z^{-3} + z^{-4} + \frac{1}{3}z^{-5} + \frac{1}{5}z^{-6}$$

VII a) Draw the internal architecture of TMS 320XX and explain the function of each unit. (5, 5)
b) Computer order of a low pass Butterworth filter to meet the following specifications:
Pass band gain = 0.89, pass band frequency = 30 Hz, stop band attenuation = 0.2, stop band frequency = 75 Hz.

x-x-x