ii) What are direct (or slow) convolution and fast convolution?

iii) Compare the DIT and DIF radix -2 FFT.

UNIT - V

9. a) What are FIR filters? Write the steps involved in FIR filter design. What are the advantages and disadvantages of FIR filters?

b) List the desirable features of Kaiser window. Write the expression for Kaiser window function and compare the kaiser window with hamming window.

OR

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10. a) Compare

i) IIR filters and FIR filter

ii) Digital filter and analog filter

b) What is bilinear transformation? Sketch the mapping of S-plane to Z plane in bilinear transformation. What is the relation between digital and analog frequency in bilinear transformation. How is bilinear transformation performed. Give its advantages and disadvantages.

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Roll No.....

EC - 603

B.E. VI Semester

Examination, June 2014

Digital Signal Processing

Time : Three Hours

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Maximum Marks : 70

Note : 1. Attempt one question from each Unit.

2. All questions carry equal marks.

UNIT - I

1. a) Define and compare

i) Static and dynamic systems.

ii) Time invariant and time variant system.

iii) Linear and non linear system

iv) Causal and non causal system

b) Determine the response of the LTI system whose input $x(n)$ and impulse response $h(n)$ are given by

$$x(n)=\{\underset{\uparrow}{1},2,0,5,1\} \text{ and } h(n)=\{\underset{\uparrow}{1},2,1,-1\}$$

OR

2. a) Test the causality of the following systems

i) $y(n)=x(n)-x(n-2)$

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ii) $y(n)=\sum_{K=-\infty}^{n} x(K)$

iii) $y(n)=b\,x(n)$

iv) $y(n)=n\,x(n)$

b) Prove that in an LTI system, the response $y(n)$ of the system for an arbitrary input $x(n)$ is given by convolution of input $x(n)$ with impulse response $h(n)$ of the system.

UNIT - II

3. a) State and prove following properties of Z transform

   i) Shifting property

   ii) Time reversal property

   b) Determine the inverse Z transform of the function

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

OR

4. a) Determine the Z-Transform and ROC of the following discrete time signal $x(n)=0.3^{n}u(n)+0.8^{n}u(-n-1)$.

   b) Determine the impulse response h(n) for the system described by the second order difference equation $y(n)+4y(n-1)+3y(n-2)=x(n-1)$.

UNIT - III

5. a) State and prove following properties of DFT.

   i) Circular time shift

   ii) Circular Convolution

   b) Compute circular convolution of the following two sequences using DFT $x_1(n)=[0,1,0,1]$ *and* $x_2(n)=\{1,2,1,2\}$

OR

6. a) State and prove following properties of DFT

   i) Periodicity

   ii) Circular frequency shift

   b) Compute linear and circular convolutions of the following two sequences using DFT. $x(n)=\{1,2\}$ *and* $h(n)=\{2,1\}$

UNIT - IV

7. a) What is FFT? Explain. Give comparison of number of computations in direct DFT and FFT.

   b) Draw the flow graph and show computation of 4 point DFT using Decimation in time (DIT) Radix-2 FFT algorithm.

OR

8. a) Calculate the percentage saving in calculation in a 512 point radix -2 FFT, when compared to direct DFT.

   b) i) Why is FFT needed?

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