

Roll No.....

EC - 603

B.E. VI Semester

Examination, June 2015

Digital Signal Processing

Time : Three Hours

Maximum Marks : 70

- Note:** i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
ii) All parts of each questions are to be attempted at one place.
iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.
iv) Except numericals, Derivation, Design and Drawing etc.

Unit-I

1. a) Compute N-point DFT of unit sample $\delta(n)$.
- b) An analog signal is sampled at 15 KHz and 1024 point DFT is computed. Determine the frequency spacing between spectral samples of DFT.
- c) If $x(n)$ and $X(k)$ be the DFT pair, prove that $X(k)$ obey periodicity property.
- d) State and prove Symmetry and Periodicity property of Twiddle factor.

OR

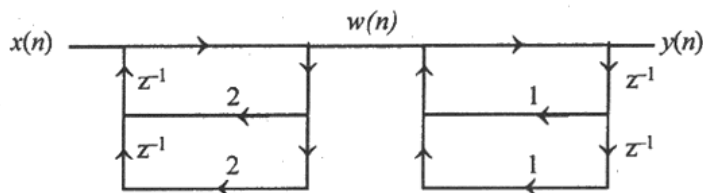
Discuss computational complexity of direct computation of N-point DFT in terms of complex multiplications, addition and real multiplications and additions.

Unit-II

2. a) Draw and explain Traversal filter.
- b) How direct form I structure differs from direct form II structure?
- c) A difference equation describing a filter is given below, find out filters transfer function also show : - Does this $H(z)$ represent a FIR or IIR filter. Why?

$$y(n) - \frac{3}{4}y(n-1) + \frac{1}{8}y(n-2) = x(n) + \frac{1}{2}x(n-1)$$

- d) For the flow graph given below write difference equation and system function.



OR

Write Tellegen's theorem for digital filter and its applications.

Unit-III

3. a) How do we map from S plane to Z plane in bilinear transformation?
- b) How do we obtain causal FIR filters.
- c) State and prove condition of phase linearity for FIR filter.
- d) Explain frequency sampling method of FIR filter design.

OR

Make comparison between FIR and IIR filter.

Unit-IV

4. a) Explain that Goertzel algorithm is based on linear filtering approach.
- b) How discrete time and frequency indexes are decoupled in chirp Z-transform?
- c) Prove that in DIT-FFT algorithm input appears in bit reversed order.
- d) What are the advantages of FFT over DFT's? Also draw butterfly diagram for DIF-FFT algorithm and explain.

OR

Classify FFT algorithm and explain each of them in brief.

Unit-V

5. a) What are the limitations of non-parametric method.
- b) What is energy spectral density?
- c) Prove that time average autocorrelation function is an estimate of the statistical autocorrelation function.
- d) Write different properties of autocorrelation function.

OR

Write short note on power spectral estimate.
