BTECH
(SEM VI) THEORY EXAMINATION 2017-18
Fundamentals of Digital Signal Processing

Time: 3 Hours   *Total Marks: 100*

Note: **1.** Attempt all Sections. If require any missing data; then choose suitably.
          2. Any special paper specific instruction.

SECTION A

1.   **Attempt *all* questions in brief.**   **2 x 10= 20**

   a) Why DFT is preferred over Fourier Transform?
   b) What is DCT?
   c) What is multi rate signal processing?
   d) What do you mean by frequency domain representation of sampling?
   e) What do you mean by all pass system?
   f) What do you mean by minimum phase systems?
   g) What is the need of FIR filter design using windowing technique?
   h) What is the difference between IIR and FIR filter?
   i) What is Block convolution?
   j) What is non – stationary and stationary random signal?

SECTION B

2.   **Attempt any *three* of the following:**   **10 x 3 = 30**

   a) Explain the following:
      (i) Fourier Transform
      (ii) Discrete Fourier Transform.
      Also mention their application in fundamentals of digital signal processing?
   b) Explain how over sampling and noise shaping in A/D and D/A conversion is handled?
   c) What do you mean by frequency response of LTIsystem? What are the advantages
      and disadvantages offrequency response of LTI systems?
   d) Explain the optimum approximations of FIR filters?
   e) Explain the Goertzel algorithm. When is this algorithmpreferred over FFT method?

SECTION C

3.   **Attempt any *one* part of the following:**   **10 x 1=10**

   a) Derive the expression for Linear Convolution using DFT?
   b) Consider the finite-length sequence
      x (n) = δ(n) + 2δ(n - 5)
      Find the 10-point Discrete Fourier Transform of x (n).

4.   **Attempt any *one* part of the following:**   **10 x 1=10**

   a) Explain the Sampling and reconstruction of signals with suitable example?
   b) What do you mean by "A/D" and "D/A" conversion? Whatare the advantages and
      disadvantages of A/D and D/A conversions?

5.   **Attempt any *one* part of the following:**   **10 x 1=10**

a) Explain the significance of effects of coefficient quantization and Effects of round-off noisein digital filters?

b) Explain the frequency response of rational systemfunctions with suitable example?

6.   **Attempt any *one* part of the following:**   **10 x 1=10**

a) Find the Kaiser window parameters, β and N, to designa low-pass filter with acutofffrequency ω_c, $= \pi/2$, a stopband ripple δ_s, $= 0.002$, and a transition bandwidth no larger than 0.117?

b) Explain the equiripple approximation in FIR filter?

7.   **Attempt any *one* part of the following:**   **10 x 1=10**

a) Find the FFT using DIT of the following sequence x(n)={1,2,3,4,5,6,7,8}.

b) Discuss the spectrum analysis of random signals using estimates ofthe autocorrelation sequence?