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Paper Id: 

1	2	1	6	1	1
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Sub Code:EEN-011

Roll No. XXXXXXXXXX

**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 LTI system? What are the advantages and disadvantages of frequency response of LTI systems?
- d) Explain the optimum approximations of FIR filters?
- e) Explain the Goertzel algorithm. When is this algorithm preferred 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  
 $x(n) = \delta(n) + 2\delta(n - 5)$   
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? What are 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 noise in digital filters?
  - b) Explain the frequency response of rational system functions with suitable example?
6. Attempt any *one* part of the following: 10 x 1=10
- a) Find the Kaiser window parameters,  $\beta$  and  $N$ , to design a low-pass filter with a cutoff frequency  $\omega_c = \pi/2$ , a stopband ripple  $\delta_s = 0.002$ , 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 of the autocorrelation sequence?