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**B.Tech. (Sem. - 6<sup>th</sup>)**

**DIGITAL SIGNAL PROCESSING**

**SUBJECT CODE : EC-308**

**Paper ID : [A0321]**

[Note: Please fill subject code and paper ID on OMR]

**Time : 03 Hours**

**Maximum Marks : 60**

**Instruction to Candidates:**

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

**Section - A**

*(10 × 2 = 20)*

- Q1)** a) What is the disadvantage of using DSPs if signal with large bandwidth are involved?
- b) What is scaling of discrete time signals?
- c) What is the difference between static and dynamic discrete time signals?
- d) Describe linearity property of Z transform.
- e) Define Circular symmetric of a sequence in DFT.
- f) What is the computational advantage of FFT?
- g) What is the basic difference between cascade form and direct form structures for FIR systems?
- h) In what cases FIR filters will be preferred over IIR filters?
- i) What will happen if length of windows is increased in design of FIR filters?
- j) Write the basic difference between ADSP and TMS series of processors.

**Section - B**

(4 × 5 = 20)

**Q2)** Describe basic elements of DSP systems with block diagram.

**Q3)** Compute convolution of  $y(n)$  of the signals

$$X(n) = \begin{cases} \alpha^n, & -3n \leq n \leq 5 \\ 0, & \text{elsewhere} \end{cases}$$

$$h(n) = \begin{cases} 1, & 0 \leq n \leq 4 \\ 0, & \text{elsewhere} \end{cases}$$

**Q4)** Find Z-transform of the following discrete time sequences

$$X(n) = \sin(n\omega T), \quad n = 0, 1, \dots$$

**Q5)** A finite duration sequence of length  $L$  is given as

$$X(n) = \begin{cases} 1, & 0 \leq n \leq L-1 \\ 0, & \text{otherwise} \end{cases}$$

Determine  $N$ -point DFT of this sequence for  $N \geq L$ .

**Q6)** Discuss DIT and DIF algorithms and also compare the two algorithms.

**Section - C**

(2 × 10 = 20)

**Q7)** (a) Describe Cascade form structure for FIR system.

(b) Discuss quantization of filter coefficients in design of IIR and FIR filter.

**Q8)** Discuss design of FIR filter using window method. Also compare design using Kaiser and Hanning Windows.

**Q9)** (a) Why frequency transformation in analog domain is done? Discuss in detail.

(b) Discuss architecture of ADSP processor using a block diagram.

