

Time allowed: 3 Hours

Max. Marks: 50

**NOTE:** Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Section.

x-x-x

I. Answer in brief.

- Due to aliasing, which portion of bandwidth of the signal is affected?
- Define the pole location of an LTI stable system in Z-domain.
- What are demerits of Impulse Invariance method?
- What is the role of Correlation in RADAR system?
- Why is it required to have constant coefficient in difference equation of a digital system?
- Discuss any one addressing mode of TMS320C5X.
- Calculate computational requirement for direct computation of 16-point DFT.
- Why the response of a system to an impulse input is sufficient to describe the system?
- Explain reasons for Gibb's phenomenon.
- Why the order of a filter is kept at minimum?

(10x1)

## Section - A

- II. a) Compute the 8-point DFT of sequence  $x(n)$  by using the DIT-FFT flow diagram. (5, 5)
- $$x(n) = \begin{cases} 1 & 1 \leq n \leq 6 \\ 0 & \text{Otherwise} \end{cases}$$
- b) For analysis of what type of signals, wavelet transform is preferred? Explain sub-band coding procedure for calculation of wavelet transform.
- III. a) Taking a suitable example, explain the process for filtering of long data sequences. (5, 5)
- b) Determine particular solution of the following difference equation  
 $y(n) = 5y(n-1) - y(n-2) + x(n)$ , when the input is  $x(n) = 0.5^n$ . (5, 5)
- IV. a) The system function of a real-time system is given as
- $$H(z) = \frac{z^2 + z}{(z - \frac{1}{2})^2 (z - \frac{1}{4})}$$
- Determine the time domain response of the system for unit impulse input.
- b) Write a technical note on 'Discrete Cosine Transform'.

## Section- B

- V. a) Write technical note on 'Finite word length effect'. (5, 5)
- b) Design an FIR filter of length  $M = 15$  having a frequency response that satisfies the condition
- $$H_r\left(\frac{2\pi k}{15}\right) = \begin{cases} 1 & \text{for } k = 0, 1, 2, 3 \\ 0 & \text{for } k = 4, 5, 6, 7 \end{cases}$$
- VI. a) Obtain the cascade and parallel structures of the following system. (5, 5)
- $$y(n) = 0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2).$$
- b) Determine the transfer function of a low pass Butterworth filter to meet the following specifications: Pass band gain = 0.9, pass band frequency = 30 Hz, stop band attenuation = 0.2, stop band frequency = 75 Hz and sampling frequency = 500 Hz.
- VII. a) In multirate signal processing, discuss the impact of reducing sampling rate and the measure to be taken to overcome adverse effect.
- b) Write technical note on 'Architecture of TMS320C5X'. (5, 5)