

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Q. No. 1 (Part-A) which is compulsory and selecting atleast two questions each from Part-B & C.

- \*\_\*\_\* -

## Part-A

- I. (a) What are the applications of DSP? (2)
- (b) Under which criterion number of multipliers are reduced in realization of linear phase FIR filter? (2)
- (c) Name various methods available for IIR filter design. (2)
- (d) What is the region of convergence for causal and anticausal signals? (2)
- (e) Write convolution property of Z transform (2)

## Part-B

- II. (a) Perform the Z transform of the signal using various properties, (5)

$$x(n) = \left(\frac{1}{3}\right)^n u(n-5) \quad \text{Also find ROC for } x(n)$$

- (b) Find inverse Z-transform of the signal, if ROC is  $|Z| > 2$  (5)

$$X(z) = \frac{z}{(z-1)(z-2)} \quad (10)$$

- III. Find 8 point DFT of the signal using DIT FFT algorithm. Signal is  $x(n) = n$  (5)

- IV (a) What is the difference between DFT and FFT transforms? Explain in detail. (5)

- (b) Perform convolution of the signals  $x_1(n) = \{4, -2, 1\}$ ,  $x_2(n) = \{1, 1, 1, 1, 1\}$  by convolution property (5)

## Part-C

- V. Perform Direct form-I, Direct form-II, cascade and parallel realization of the following structure (10)

$$H(z) = \frac{1}{(1+az^{-1})(1-bz^{-1})} \quad (5)$$

- VI. (a) Determine  $H(z)$  for the following transfer function  $H(s) = \frac{s+0.2}{(s+0.2)^2+b^2}$

- (b) A low pass filter is to be designed with the following desired frequency response. Determine filter coefficients for rectangular window for  $M = 9$ . (5)

$$H_d(e^{j\omega}) = \begin{cases} e^{-3j\omega}, & -\frac{\pi}{4} \leq \omega \leq \frac{\pi}{4} \\ 0, & \text{and } 0 \text{ for } \frac{\pi}{4} \leq \omega \leq \pi \end{cases} \quad (10)$$

- VII. Write note on the following

- (a) Circular convolution
- (b) DSP chip ADSP21XX

- \*\_\*\_\* -