

Exam.Code:0929
Sub. Code: 6910

1129
B.E. (Electronics and Communication Engineering)
Fifth Semester
EC-502: Digital Signal Processing

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.
x-x-x

1. a. Discuss the circular addressing modes of TMS320C5X processor.
- b. Compare FIR and IIR filters.
- c. State and prove the following properties of z-transform.
 - i. Time scaling
 - ii Differentiation
- d. Explain the relation between the z-transform and DFT.
- e. What are the effects of finite word length in digital filters? (5×2)

Section A

2. a. Describe the Discrete Cosine Transform. Discuss the applications of Wavelet transform. (5+5)
- b. Given $x(n) = 2^n$ and $N=8$, find $X(k)$ using DIT FFT algorithm.
3. a. Find the response of an FIR filter with impulse response $h(n) = \{1,2,4\}$ to the input sequence $x(n) = \{1,2\}$ using linear and circular convolution. Compare the results.
- b. State and prove the following properties of DFT: convolution, time scaling. (5+5)
4. a. Determine the inverse z-transform of the system function

$$X(z) = \frac{1}{(1 + 0.2z^{-1})z^{-2}}$$
- b. Explain Goertzel Algorithm for computation of DFT. Discuss its computational complexity. (5+5)

Section B

5. a. Describe the frequency domain analysis of Decimator. What are the effects of decimation on frequency spectrum of the signal?
- b. Determine $H(z)$ for a Butterworth filter satisfying following constraints

$$\sqrt{0.5} \leq |H(e^{jw})| \leq 1 \quad 0 \leq w \leq \pi/2$$

$$|H(e^{jw})| \leq 0.2 \quad 3\pi/4 \leq w \leq \pi$$
 with $T = 1s$. Apply impulse invariant transformation. (5+5)
6. a. Name the different types of window functions. How they are defined?
- b. Obtain the cascade realization of the system characterized by the transfer function

$$H(z) = \frac{2(z+2)}{z(z-0.1)(z+0.5)(z+0.4)}$$
 (5+5)
7. a. Apply bilinear transformation to $H(s) = \frac{2}{(s+1)(s+3)}$ with $T^*=0.1s$.
- b. Discuss the architecture of TMS320CXX series processor and also discuss the memory management block. (5+5)