

END SEMESTER ASSESSMENT (ESA) - JULY - 2023**UE20EE352 - Digital Signal Processing****Total Marks : 100.0**

1.a. Find 4 point IDFT for the following sequence $x[n] = \{10, -2+2j, -2, -2-2j\}$ using linear transformation. State parseval's theorem and circular convolution property. (10.0 Marks)

1.b. Find 8 point DFT for $\{1 \ 1 \ 1 \ 1\}$ using linear transformation method. State Linearity property. (10.0 Marks)

2.a. Find DFT of the following sequence using DIT FFT algorithm. $x(n) = \{1,1,1,1,1,1,0,0\}$ (10.0 Marks)

2.b. Determine the output of linear FIR filter whose impulse response is $h(n)=\{1,2,3\}$ and the input signal is $x(n)=\{1,2,3,4,5,6,7,8,9\}$ using overlap add method. (10.0 Marks)

3.a. Design a cheby shev filter with the following specifications
Pass band edge frequency= 20 rad/sec , Pass band attenuation = 2.5 db
Stop band edge frequency= 50 rad/sec Stop band attenuation = 30 db (10.0 Marks)

3.b. List the steps for designing an analog Butterworth filter, mention the order and cutoff frequency formulae along with Butterworth table for $N=1, 2$ and 3. (10.0 Marks)

4.a. Design a Chebyshev filter for the following specifications using Bilinear Transformation. Assume $T= 1$ Sec.

$$0.8 \leq |H(e^{j\omega})| \leq 1, \quad 0 \leq \omega \leq 0.2\pi$$
$$|H(e^{j\omega})| \leq 0.2, \quad 0.6\pi \leq \omega \leq \pi$$

(10.0 Marks)

4.b. **Design a digital IIR filter using Impulse Invariant method , given**

$$h(t) = e^{-2t} u(t) + e^{-3t} u(t)$$

Given T = 1sec.

(10.0 Marks)

5.a. **Design a Low Pass Filter using frequency sampling Technique ,having cut off frequency of ω_c rad/sample , the filter should have linear phase and length=17**

(10.0 Marks)

5.b. **List any five features of FIR Filters. Discuss Symmetric and antisymmetric Filter with corresponding formulae. List the four important steps of designing FIR Filter using windowing technique.**

(10.0 Marks)