



QP Code : 5079

(3 Hours)

[Total Marks : 80]

- N.B. (1) Question no. 1 is compulsory
 (2) Attempt any **three questions** out of remaining **five** questions.
 (3) Assume suitable data if necessary.

1. Solve any **four**:-

- (a) $h(n) = [1 \ 2 \ 3 \ 4]$, $y(n) = [5 \ 16 \ 28 \ 24]$ find $x(n)$, using convolution property of z transform. 5
- (b) Explain the block diagram of DSP. 5
- (c) Compare between chebysher and butter worth filter 5
- (d) What are the advantages of FFT over the DFT in terms of calculations? Justify your answer with suitable example 5
- (e) Draw the polezero plot and Transfer function of following filter 5
 (i) Comb filter (ii) Notch filter
2. (a) Find the DFT of $x(n) = [4+5j \ 3+6j \ 3+4j \ 2+2j]$ other wise find the DFT of 10
 $x_1(n) = [4 \ 3 \ 3 \ 2]$
 $x_2(n) = [5 \ 6 \ 4 \ 2]$
 $x_3(n) = [9 \ 9 \ 7 \ 4]$ 10
- (b) Differentiate between linear and circular convolution. Find the circular convolution of a sequences using DFT and IDFT method 10
 $x_1(n) = [2 \ 3 \ 1 \ 1]$ $x_2(n) = [1 \ 3 \ 5 \ 3]$
3. (a) Find the 8 point DFT using DIT-FFT algorithm 10
 $x(n) = [1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8]$
- (b) Determine the output of a linear FIR filter whose impulse response $h(n) = [1, 2, 3]$ $x(n) = [1 \ 1 \ 2 \ -1 \ 2 \ -3 \ -1 \ 1 \ 2 \ 1 \ -3 \ -1]$ using overlap save method. 10
4. (a) The system with differential equation $(n) = 0.9(n-1) + \sigma 1 x(n)$ find the magnitude and phase response of the system comment on filter characteristics 10
- (b) Obtain DF-II, cascade and parallel realization of system function

$$H(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 - 0.75z^{-1} + 0.125z^{-2}}$$

[TURN OVER

5. (a) Design a butterworth filter satisfy constreint

$$0.707 \leq |H(e^{j\omega})| \leq 1 \quad \text{for } 0 \leq \omega \leq \frac{\pi}{2}$$

$$|H(e^{j\omega})| \leq 0.2 \quad \frac{3\pi}{4} \leq |\omega| \leq \pi$$

with T z1 sec Invariance Technique

6. (a) The desired frequency response of LPF is

$$H_d(e^{j\omega}) = e^{-j3\omega} \quad \frac{-3\pi}{4} \leq \omega \leq \frac{3\pi}{4}$$

$$= 0 \quad \frac{3\pi}{4} \leq |\omega| \leq \pi$$

Determine $H(e^{j\omega})$ using Hamming window also find frequency response of it.

- (b) A one stage decimator is characterised by the following:-

Decimator factor = 3

Antialiasing filter coefficient

$$h(0) = -0.06 = h(4)$$

$$h(1) = 0.30 = h(3)$$

$$h(2) = 0.62$$

given the data $x(n)$ with a successive [6 -2 -3 8 6 4 -2]. Calculate and list filtered output $w(n)$ and the output of the decimator $y(n)$