

QP Code : 598101

(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. Answer the following (Any four) :-

20

(a) $H(z) = \frac{5z^2 - 12z}{z^2 - 6z + 8}$ show that $h(n) = 2^n + 4^{n+1}$ and find first 5 values.

(b) What are the advantage of DSP & define sampling theorem.

(c) Determine IDFT of $x(k) = \{ 3, 2+j, 1, 2-j \}$ by using DIF FFT algorithm.

(d) Convert the analog filter with system function $H(s) = \frac{(s + 0.1)}{(s + 0.1)^2 + 16}$ into a digital IIR filter using Bilinear transformation. The resonant frequency of $\omega_r = \pi/2$. 10

(e) Write a short note on Decimation by a integer factor. 10

2. (a) If $x(n) = \{ 2, 3, 4, 5 \}$ find (i) DFT of $x(k)$ (ii) using result obtained in one not otherwise find the DFT of following sequences. 10

$x_1(n) = \{ 5, 2, 3, 4 \}$, $x_2(n) = \{ 3, 4, 5, 2 \}$
 $[4, 5, 2, 3]$ $x_3 = [2, 5, 4, 3]$

(b) Perform Linear convolution using DIT FFT algorithm. 10
 $x(n) = \{ 1, 2, 3 \}$ $h(n) = [1, 2]$

3. (a) Determine the output of a Linear FIR & whose impulse response $h(n) = \{ 2, 2, 1 \}$ $x(n) = \{ 3, 0, -2, 0, 2, 1, 0, -2, -1, 0 \}$ using overlap save method. 10

(b) Derive & draw the FFT for $N=6 = 2 \times 3$ using DIT FFT algorithm. 10

4. (a) Determine the frequency response plot magnitude & phase response for the frequency $\omega = 0, \pi/4, \pi/2, 3\pi/4, \& \pi$. 10

$y(n) = x(n) + 0.9 x(n-2) - 0.4 y(n-2)$

[TURN OVER]

- (b) Realize the system by using, direct form - I cascade & parallel Realization. 10
 $y(n) = -0.1y(n - 1) + 0.2y(n - 2) + 3x(n) + 3.6x(n - 1) + 0.6x(n - 2)$
5. (a) Design IIR butter worth filter to satisfy following condition. 10
 $0.8 < |H(e^{j\omega})| \leq 1$ for $0 \leq \omega \leq 0.2\pi$
 $|H(e^{j\omega})| \leq 0.2$ for $0.6\pi \leq \omega \leq \pi$
 using Bilinear transformation method Assume $T = 1$ sec.
- (b) A Linear phase FIR filter has derived 10
 $H_a(e^{j\omega}) = 0$ for $-\pi/4 \leq \omega \leq \pi/4$
 $= e^{-j2\omega}$ for $\pi/4 \leq |\omega| < \pi$
 Design the filter using Hanning window Assume $M = 5$ and also draw Linear phase Realization.
6. (a) Explain the Architecture of TMS320 DSP processor. 10
- (b) Write a short note on Interpolation. 5
- (c) Difference between IIR & FIR filter. 5