C   Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. In an N point DFT of a finite duration sequence x(n) of length, the   CO1- U
   value of N should be such that_____

   (a) N> L   (b) N≥ L   (c) N<L   (d) N≤L

2. The poles of Butterworth filter lies _____ in s-plane   CO1- U

   (a) Sphere   (b) Circle   (c) Ellipse   (d) Parabola

3. The frequency response of a digital filter is periodic in the range   CO1- U

   (a) $0 < \omega < 2\pi$ (b) $-\pi < \omega < \pi$

   (c) $0 < \omega < \pi$ (d) $0 < \omega < 2\pi$ or $-\pi < \omega < \pi$

4. The Finite word length effects are due to,   CO1- U

   (a) Quantization of input   (b) Quantization of coefficients

   (c) Quantization of product   (d) All the above

5. The total memory space of TMS320C5x family of processors is   CO1- U

   (a) 224k-words   (b) 224k-bytes   (c) 192k-words   (d) 192k-bytes

PART – B (5 x 3= 15 Marks)

6. aw the basic butterfly structure for radix-2 DIT algorithm?   CO1 U

7. Determine the order of the butter worth analog filter for the given specification   CO2 App

   $\alpha p = 5$, $\alpha s = 20$, $\Omega p = 1000$ rad/sec and $\Omega s = 500$ rad/sec

8. How the constant group delay and phase delay achieved in linear phase FIR filters?   CO1 U

9. What is meant by finite word length effects in digital filters?   CO1 U

10. List any two instructions set of TMS320C54x Digital Signal Processors.   CO1 U

<center>PART – C (5 x 16= 80 Marks)</center>

11. (a) By means of the DFT and IDFT , determine the response of FIR filter with impulse response h(n) ={1,2,3} to the input sequence x(n)={1,2,2,1}.   CO2- App   (16)

<center>Or</center>

(b) Compute 8-point DFT of the discrete time signal,   CO2- App   (16)

x(n) ={1,2,1,2,1,3,1,3}

using Radix-2 DIF FFT.

12. (a) Design a Butter worth digital IIR low pass filter using bilinear transformation by taking T=0.1 sec, to satisfy the following specification.   CO2- App   (16)

$$0.6 \leq \ | H(e^{j\omega})| \ \leq 1.0; \text{ for } 0 \leq \omega \leq 0.35\pi$$

$$| H(e^{j\omega})| \ \leq 0.1; \text{ for } 0.75\pi \leq \omega \leq \pi$$

<center>Or</center>

(b) Design a Chebyshev digital IIR low pass filter using impulse invariant transformation by taking T= 1 sec, to satisfy the following specification.   CO2- App   (16)

$$0.87 \leq \ | H(e^{j\omega})| \ \leq 1.0; \text{ for } 0 \leq \omega \leq 0.25\pi$$

$$| H(e^{j\omega})| \ \leq 0.35; \text{ for } 0.375\pi \leq \omega \leq \pi$$

13. (a) Design a linear phase FIR BPF to pass frequency in the range 0.35π to 0.48π rad/sample using rectangular window, by taking 5 samples of window sequence. Analyze the above with Hamming window and comment about the result.   CO3- Ana   (16)

<center>Or</center>

<center>2</center>

(b) Design a bandpass filter using frequency sampling method for the specifications,   CO3- Ana   (16)

Sampling frequency F= 8000Hz

Cutoff frequency fc_1 =1000 Hz

$\qquad fc_2$=3000 Hz

Determine the filter coefficients for N=7. If N=5 what will be the filter coefficients?

14. (a) For second-order IIR filter, $H(z) = 1 /(1-0.5z^{-1})(1-0.45z^{-1})$. Study the effect of shift in pole location with 3bit coefficient representation in direct and cascade form.   CO2- App   (16)

Or

(b) In the IIR system given below the products are rounded to 4-bits (including sign bit). $H(z) = 1 / (1-0.35z^{-1}) (1-0.62z^{-1})$. Find the output round off noise power in a)direct form realization b)cascade realization..   CO2- App   (16)

15. (a) With a neat functional block diagram, explain the architecture of TMS320C5X processor and explain   CO1- U   (16)

Or

(b) List the addressing modes of TMS320C5X processor with relevant examples.   CO1- U   (16)

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