

FACULTY OF ENGINEERING**B.E. 3/4 (ECE) II – Semester (New) (Main) Examination, April / May 2013****Subject : Digital Signal Processing****Time : 3 hours****Max. Marks : 75****Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.****PART – A (25 Marks)**

1. List the advantages of DSP.
2. Differentiate between linear convolution and circular convolution.
3. Find DTFT of $x(n) = \left[\frac{1}{2}\right]^n u(n+3)$.
4. Compute 4-Pt DFT of $x[n] = \{1, 2, 3, 4\}$ using DIF – FFT algorithm.
5. Compare FIR and IIR filters.
6. What is a Kaiser window? In what way is it superior to other window functions?
7. Using Bilinear transformation obtain $H(z)$ if $H(s) = \frac{2}{(s+1)(s+2)}$. Assume $T=1\text{sec}$.
8. Give the applications of multirate signal processing.
9. Realize the system with difference equation

$$y(n) = \frac{3}{4}y(n-1) - \frac{1}{8}y(n-2) + x(n) + \frac{1}{3}x(n-1) \text{ in cascade form.}$$

10. Differentiate between DSP and other microprocessors architectures.

PART – B (50 Marks)

- 11.a) Find the frequency response of the given causal system

$$y[n] = \frac{1}{2}x[n] + x[n-1] + \frac{1}{2}x[n-2]$$

Plot magnitude and phase response

- b) Check for the causality and linearity of the given systems

$$\text{i) } h(n) = x(-n-2) \qquad \text{ii) } h(n) = e^{x(-n)}$$

- 12.a) Determine 8-Pt DFT of the sequence

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

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using DIF – FFT algorithm

- b) Write differences between DIT and DIF FFT algorithms.

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13. Design an ideal LPF whose desired frequency response is

$$H_d(e^{j\omega}) = 1 \quad \frac{\pi}{3} \geq \omega \geq -\frac{\pi}{3}$$

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

Using Hamming window for $N = 9$.

14. Design a Chebyshev Type-1 digital filter with following specifications.

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

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

Using impulse invariant transform.

15.a) Explain the algorithm to decrease the sampling frequency by a factor D .

b) Explain Bilinear transformation techniques briefly.

16.a) Draw the architecture of TMS320C54XX processor.

b) Explain addressing modes of TMS320C54XX processor.

c) Explain any two data transfer instructions of TMS320C54XX.

17. Write short notes on :

a) Properties of Twiddle factor

b) Advantages of FFT algorithm

c) Direct Form – I and direct Form – II realization structures.
