Reg. No: | | | | | | | | | | | | |

Question Paper Code: 80596

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/ DECEMBER 2016

Fifth Semester

Information Technology

IT 6502 – DIGITAL SIGNAL PROCESSING

(Regulations 2013)

Time: Three Hours **Maximum: 100 Marks**

Answer All Questions

PART – A (10 X 2 = 20 Marks)

1. What do you meant by signal and signal processing?
2. What do you meant by convolution?
3. Write N-point DFT for x (n), and IDFT for X (k)
4. What is meant by radix – 2 FFT?
5. Distinguish analog and digital filters?
6. What is meant by impulse invariant method?
7. What are the advantages of FIR filter over IIR filter?
8. What condition on the FIR sequence h (n) are to be imposed n order that this filter can be called linear phase filter? Write the necessary and sufficient condition for the FIR filter to have linear phase?
9. Compare fixed point and floating point representation?
10. Define dead band?

PART – B (5 X 16 = 80 Marks)

11. a. i. Determine power and energy of the signal x (n) = sin ($\pi/4$)n (8)

ii. Determine whether the system described by the input and output relation is time invariant or not? (8)

(or)

b. i. Determine Z – Transform and ROC of the signal x (n) = $\left(\frac{1}{3}\right)^n$ u (n) (8)

ii. Find the cross correlation of x (n) = {1, 2, 1, 1} and h (n) = {1, 1, 2, 1} (8)

12. a. Find the 8 – point DFT of the sequence x (n) = {1, 1, 1, 1, 1, 1, 0, 0} (16)

(or)

b. Compute the DFT for the sequence {2, 2, 2, 2, 1, 1, 1, 1} using radix – 2

DIT – FFT algorithm. (16)

13. a. Design a digital Butterworth filter satisfying the following constraints,

$\sqrt{0.5} \leq |H(e^{j\omega})| \leq 1, \quad 0 \leq \omega \leq \pi/2$

$\leq |H(e^{j\omega})| \leq 0.18, \quad 3\pi/4 \leq \omega \leq \pi$ with T = 1 sec using

Bilinear transformation. (16)

(or)

b. Design an analog chebyshev filter for the following specifications pass band gain 0.89. stop band attenuation 0.2, pass band edge frequency 30 Hz and stop band edge frequency 75 Hz. (16)

14. a. Design a HPF with a cut off frequency 1.2 rad of length N = 9 using Hamming window.(16)

(or)

b. using frequency sampling method design a LPF with the following specification cut off frequency, $w_c = \pi/4$ and N = 15, plot the magnitude response. (16)

15. a. Derive the steady state output noise power and find the steady state variance of the noise in the output due to quantization of input for the first order filter

y (n) = a y (n-1) + x (n) (16)

(or)

b. State the need for scaling and derive the scaling factor for a second order IIR filter.(16)