
16

B.E / B.Tech (Full-Time) Degree End Semester Examinations, Nov/Dec 2011
Anna University, Chennai

Computer Science and Engineering
Sixth Semester

CS9351 – Digital Signal Processing
(Regulations 2008)

Time: 3Hrs Max Marks: 100

Answer ALL Questions

Part A – (10 * 2 = 20 marks)

1. Represent the a unit step signal
2. State any two properties of Z-transform
3. Draw the basic butterfly of radix-2 FFT
4. Write the formula for computing DCT.
5. What are the advantages of IIR filters over FIR filters?
6. Explain the procedure to convert analog to digital filter using approximation of derivatives
7. What is Gibbs phenomenon?
8. Write short notes on Limit cycle oscillations.
9. What are the issues in speech recognition system?
10. Draw the block diagram of an echo cancellation system using adaptive filter and explain.

Part B – (5 * 16 = 80 marks)

11. i. Determine the response y(n) of the following system given that if $h_2(n) = u(n) - u(n-5)$, $x(n) = \{1, 0, -1, 2, 3\}$ and $y(n) = x(n) * h(n)$. Also compute the correlation between x(n) and y(n) (10)
    ii. Determine the Z-transform and ROC for the following sequence (6)
    $x(n) = 3^n u(n+2)$

12. a. Compute the FFT using DIT algorithm for the sequence given by
    $x(n) = 2^n$, $0 \leq n \leq 7$ (16)

(OR)

b. If $x_3(n)$ is the circular convolution of $x_1(n)$ and $x_2(n)$, Determine $x_3(n)$ if $x_1(n) = \{1, 1, 1, 1\}$ and $x_2(n) = \{-1, -2, -3, -4\}$. (16)

13. a. Realize the following system using Cascade and Parallel realization and represent them using Direct form II (8+8)

$$H(z) = \frac{(z+1)(z+2)(z-2)}{(z-1)(z+0.5)(z-0.2)}$$

(OR)

b. Design a digital low pass Butterworth filter using bilinear transformation technique for the following specification with T = 1 sec. Realize the designed filter using Direct form II structure (16)

Passband gain – 0.9
Passband edge: - 0.2π rad/ sec
Stop band attenuation – 0.2
Stop band edge – 0.8π rad / sec

14. a. Design an ideal FIR low pass filter for the following specification and realize it using Direct Form structure with cut off frequency $\pi/3$. Use Hamming window for terminating the desired frequency response (16)

(OR)

b. Discuss the effect of finite word length and the errors in a DSP system (16)

15. a. Explain the process of decimation and interpolation with a neat block diagram. (10)

(OR)

b. Write short notes on the following
   i. Speech Processing (8)
   ii. Adaptive filters (8)