(F.T)

B.E / B.Tech Arrear Examinations, April/May 2019
Anna University, Chennai

Computer Science and Engineering
Sixth Semester
CS8651 – Digital Signal Processing Algorithms & Applications
(Regulation 2012)

Time: 3 Hours Max. Marks: 100

Answer ALL Questions

Part A – (10 * 2 = 20 marks)

1. Is the operations folding and time delaying a signal, commutative?
2. Identify and Sketch the basic elements of DSP.
3. State any two properties of DFT.
4. How do we use FFT in linear filtering?
5. Which IIR filter is designed initially? Why?
6. Give the frequency transformation for LPF to HPF.
7. Which window results in ideal filter? State the reasons.
8. Classify the errors in digital filters.
9. What is interference cancellation?
10. Highlight the features of speech synthesis systems.

Part B – (5 * 16 = 80 marks)

11. i. Check whether the following system is linear, time invariant, causal and stable $y(n) = n^2 x(n) + 5 x(n-1)$ (8)

ii. Determine the Z-transform and ROC for the following sequence (8)
$x(n) = 3^n u(n+1) - 3^{-n} u(-n-2)$

12. a Compute the FFT using DIF algorithm for the sequence given by
$x(n) = \{1, 2, 4, 8, 16, 8, 4, 2\}$ (16)

(OR)

b. If $x_3(n)$ is the circular convolution of $x_1(n)$ and $x_2(n)$, Determine $x_3(n)$ if
$x_1(n) = \{1, -1, 2, 4\}$ and $x_2(n) = \{1, 2, 3, 4\}$. (8+8)
By means of DFT and IDFT verify the computed value of $x_3(n)$.

13. a. Design a digital low pass Butterworth filter using bilinear transformation technique for the following specification with T = 1 sec. (16)

Passband gain: 0.7
Passband edge: - 0.5π rad/ sec
Stop band attenuation: 0.5
Stop band edge: 0.7π rad / sec

(OR)

b. Design a chebyshev filter using the following specification: (16)

Passband gain: 0.85
Frequency upto which Passband gain remains stable: 100 rad/ sec
Stop band attenuation: 0.55
Frequency from which attenuation starts: 250 rad / sec

14. a. Design an FIR low pass filter for the following specification (16)

$H_d(\omega) = e^{-j5\omega} \quad |\omega| \leq \pi/8$
$= 0 \quad (\pi/8) \leq |\omega| \leq \pi$

Use Hamming window for terminating the desired frequency response

(OR)

b. Design a FIR filter using frequency sampling technique for the following specification (16)

Pass band edge	= 700 Hz
Stop band edge	= 1700 Hz
Sampling frequency	= 6,000 Hz
Filter Length	= 7

15. a. Explain the concept behind decimation with a neat block diagram. Give its applications. (16)

(OR)

b. What are adaptive filters? Brief on the applications of adaptive filters, equalization and echo cancellation. (16)