



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech VI Semester End Examinations (Regular), November – 2020

Regulation: IARE–R16

DIGITAL SIGNAL PROCESSING

Time: 2 Hours

(ECE)

Max Marks: 70

Answer any Four Questions from Part A

Answer any Five Questions from Part B

PART – A

1. Express and sketch the graphical representations of a unit impulse and step function. [5M]
2. List any four properties of Discrete Fourier Transform. [5M]
3. Compare IIR and FIR digital filters with real time examples [5M]
4. List the well known design technique for linear phase FIR filter design. [5M]
5. Show that the up sampler and down sampler are time variant systems. [5M]
6. What are the basic building blocks of realization structures? [5M]
7. Distinguish between linear convolution and circular convolution of two sequences. [5M]
8. What is mean by IIR filter and what are advantages of IIR filter? [5M]

PART – B

9. Find the output $y(n)$ of a filter whose impulse response is $h(n) = \{1, 1, 1\}$ and input signal $x(n) = 3, -1, 0, 1, 3, 2, 0, 1, 2, 1$ using overlap-add method [10M]
10. Determine the impulse response and step response of the causal system given below and discuss on stability.
 $y(n) + y(n-1) - 2y(n-2) = x(n-1) + 2x(n-2)$. [10M]
11. Develop a 8 point DIF-FFT algorithm. Draw the signal flow graph [10M]
12. Find the circular convolution of two finite duration sequences $x_1(n) = \{1, 2, 2, 1\}$; $x_2(n) = \{1, 2, 3, 1\}$ using concentric circle method [10M]
13. Explain transformation of analog filters into equivalent digital filters using impulse invariant method. [10M]
14. Determine $H(z)$ that results when the bilinear transformation is applied to
 $H_a(s) = (s^2 + 4.525)/(s^2 + 0.692s + 0.504)$. [10M]
15. Explain optimized design of FIR filter using Parks-McClellan remez algorithm and its limitations. [10M]
16. Using a rectangular window technique design a lowpass filter with passband gain of unity, cutoff frequency of 1000 Hz and working at a sampling frequency of 5kHz. The length of the impulse response should be 7. [10M]
17. Write short note on i) Limit cycle oscillations due to overflow in digital filters ii) Dead band effects. [10M]
18. With the help of block diagram explain the sampling rate conversion by a rational factor 'I/D'. Obtain necessary expressions. [10M]