R13

Code No: 117CK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, April/May - 2018
DIGITAL SIGNAL PROCESSING
(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a)	Define a shift invariant system.	[2]
b)	List the applications of Z – transform?	[3]
c)	What is zero padding? Why it is needed?	[2]
d)	Find the IDFT of X(k) = {1, 2, 3, 4}.	[3]
e)	What is frequency warping?	[2]
f)	What are the advantages and disadvantages of bilinear transformation?	[3]
g)	What is Gibbs phenomenon?	[2]
h)	Write the characteristics features of rectangular window.	[3]
i)	Where is multi-rate signal processing used?	[2]
j)	What do you mean by aliasing?	[3]

PART-B
(50 Marks)

2.a) How are discrete time signals classified ? Differentiate between them.
b) Find the linear, invariance and casuality of given system: [5+5]
$y(n) = x(n) - ax(n - 1)$

OR

3.a) Write the properties of ROC of $X(z)$.
b) Find the digital network in direct and transposed form for system described by the difference equation. [5+5]
$y(n) = x(n) - 0.3\,x(n - 1) - 0.7\,x(n - 2) + 0.6\,y(n - 1) + 0.8\,y(n - 2)$

4. Perform circular convolution of the following sequences using DFT and IDFT: [10]
$x_1(n) = \{1, 2, 1, 2\}$ and $x_1(n) = \{4, 3, 2, 1\}$

OR

5.a) Develop a radix-4 DIT FFT algorithm for evaluating the DFT for $N = 16$.
b) Find the DFT of the given sequence by using DIF FFT. [5+5]
$x(n) = \{0.5, 1.5, -0.5, -0.5\}$

6.a) Write the transfer function of unnormalized butterworth low pass filter.
b) Discuss the digital frequency transformation. [5+5]

OR

7.a) Justify the statement IIR filter is less stable and give reason for it.
b) Discuss the impulse invariant method and also explain its limitations. [5+5]

8.a) Write the steps in the design of FIR filters.
b) Compare the hamming and Kaiser windows. [5+5]

OR

9. Design a FIR digital low-pass filter with a cutoff frequency of 1 kHz and a sampling rate of 4 kHz with 7 samples using Fourier series method. [10]

10.a) Obtain the necessary expression for interpolation process.
b) Discuss the applications of multi-rate signal processing. [5+5]

OR

11. Explain the effect of aliasing in decimation with the frequency spectrum and discuss how the aliasing can be eliminated. [10]

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