Code No: 127CK **R15**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, September - 2021
DIGITAL SIGNAL PROCESSING
(Electrical and Electronics Engineering)

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

Answer any Five Questions
All Questions Carry Equal Marks
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1.a) Show that an LSI system can be described by its unit step response.
b) Determine the impulse response of the system described by the difference equation y(n)-3y(n-1)-4y(n-2)=x(n)+2x(n-1) using Z transform. [7+8]

2.a) How are discrete time signals classified ? Differentiate between them.
b) Write the properties of ROC of $X(z)$. [7+8]

3.a) Find the y(n) for the sequences x(n)={1,-1,1,2,1,0,1,-4,3,2,1,0,1,1} and h(n) = {1,1,2,1} using overlap-save method.
b) What is FFT? Calculate the number of multiplications needed in the calculation of DFT using FFT algorithm with 32 point sequence. [7+8]

4.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. [7+8]
x(n) = {0.5, 1.5, -0.5, -0.5}

5.a) Justify the statement IIR filter is less stable and give reason for it.
b) Compare different IIR filter design methods. [7+8]

6.a) Find the order and poles of a low pass Butterworth filter that has a -3db bandwidth of 500 Hz and an attenuation of 40db at 1KHz.
b) Compare the impulse invariance and bilinear transformation methods. [7+8]

7.a) Write the steps in the design of FIR filters.
b) Compare the hamming and Kaiser windows. [7+8]

8. Explain the necessity of multirate signal processing and hence define decimation and interpolation with suitable equations and give one example each. [15]

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