Code No: 157BG

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, July/August - 2022
DIGITAL SIGNAL PROCESSING
(Electrical and Electronics Engineering)

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

Answer any five questions
All questions carry equal marks
- - -

1.a) Define stability and causality. State the conditions for discrete systems for stable and causal.
b) Determine the response of the system with impulse response $h(n)=a^n u(n)$ to the input signal. [8+7]

2.a) For linear constant coefficient difference equation calculate the frequency response $y(n)=0.6\,y(n-1)-0.1y(n-2)+x(n)$ to the input signal $x(n)=\delta(n)$.
b) Derive the expressions for up sampling and down sampling. [8+7]

3.a) Derive the relation between DFS and DTFT.
b) Compute the circular convolution of the sequences x(n)=[1, 2, 3,1]; h(n)=[4,3,2,2]; using time domain formula. [7+8]

4.a) Compute the eight point DFT of the sequence $x(n)=\{0.5,0.5,0.5,0.5,0,0,0,0\}$ using DIT-FFT algorithm.
b) Compare overlap add and overlap save method. [9+6]

5. Using the design formulas find the order and system function H(z) of digital Butterworth filter for IIR LPF with passband ripple≤0.5dB, passband edge=1.2 kHz, stopband attenuation≥30dB, stop band edge 2kHz, sampling rate 8kHz. [15]

6.a) Explain the Bilinear transformation method for designing IIR filter using design formulas.
b) List the frequency transformations relations for analog filters from low pass filter to high pass, band pass and band stop filter. [8+7]

7.a) Compare the characteristics of IIR and FIR filters.
b) Design an FIR linear phase digital filter with order 7, approximating the ideal frequency response $H(w)=1$ for $|\omega|\leq\pi/6$; and 0 for $\pi/6\leq|\omega|\leq\pi$. [5+10]

8.a) Realize the system defined by the difference equation given by
$y(n) = 2.5y(n-1)-y(n-2)+x(n)-5x(n-1)+6x(n-2)$ using direct form I and direct form II.
b) Compute convolution of two signals {1, 2, 3, 4} and {4, 3, 2, 1} using Z-transform. [8+7]

---oo0oo---