

DIGITAL SIGNAL PROCESSING

III Year ECE II Semester Sections A & B

UNIT – I

1. With a neat block diagram explain about Digital Signal Processing system and also give the limitations and advantages.
2. Define the following terms as referred to LTI discrete time systems.
(a) Linear (b) causal (c) stable (d) Time – Invariant
3. Determine whether the following system is
 $y(n)=\log |x(n)|$
(a) Linear (b) causal (c) stable (d) Time – Invariant
4. Explain the properties of DTFT.
5. Find out the solution of the given difference equation $y(n)=\frac{5}{6}y(n-1) - \frac{1}{6}y(n-2)+x(n)$ for $x(n)=2^n u(n)$.
6. Determine and sketch the magnitude and phase response of $y(n)=(1/2)[x(n) + x(n-2)]$.
7. Find out the convolution sum $y(n)$ of the given signals
 $x_1(n) = 2^n u(-n)$ and $x_2(n) = u(n)$.
8. Test the stability of the system whose impulse response is $h(n)=(\frac{1}{2})^n u(n)$

UNIT –II

1. Find the DFT of the sequence $x(n) = \{ 1,2,3,4,4,3,2,1 \}$ using DITFFT algorithm.
2. Compute the eight point DFT of the sequence using DIFFFT algorithm
 $x(n) = 1 \quad 0 \leq n \leq 7$
 $0 \quad \text{otherwise}$
3. Find the IDFT of the sequence $X(k)=\{4, 1-j2.414, 0, 1-j0.414, 0, 1+j0.414, 0, 1+j2.414 \}$ using DIFFFT algorithm.
4. Find the IDFT of the sequence $X(k)=\{10, -2+j2, -2, -2-j2 \}$ using DITFFT algorithm.
5. Determine the output response $y(n)$ if $h(n)=\{ 1, 1, 1 \}$ and $x(n)=\{ 1, 2, 3, 1 \}$
 - (i) Linear Convolution
 - (ii) Circular Convolution
 - (iii) Circular Convolution with zero padding
6. Find the DFT of a sequence
 $x(n) = 1 \quad \text{for } 0 \leq n \leq 2$
 $0 \quad \text{otherwise}$ for (i) $N=4$ and (ii) $N=8$. Plot $|H(k)|$ and $\angle H(k)$ comment on the result.

UNIT – III

1. Find the Z transform and ROC of the signal $x(n) = -b^n u(-n-1)$
2. State and prove the following properties of Z transform
 - (a) Time Shift
 - (b) Convolution
3. Find Inverse Z transform of $X(Z) = \log(1 - 0.5z^{-1})$, using differentiation property.
4. Determine the unit step response of the system whose difference equation is $y(n) - 0.7y(n-1) + 0.12y(n-2) = x(n-1) + x(n-2)$ if $y(-1) = y(-2) = 1$.
5. Determine the Direct Form – II realization for the following system $y(n) = -0.1y(n-1) + 0.72y(n-2) + 0.7x(n) - 0.252x(n-2)$
6. Obtain the Cascade Form & Parallel Form realizations for the following system $y(n) = -0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2)$