**ELECTRICAL AND ELECTRONICS ENGINEERING**

**Sub code: EC2314 Sub Title: Digital Signal Processing**

 **Year/Sem:III/V**

**Part A Questions**

**UNIT – I**

1. What is an LTI system
2. What is meant by aliasing effect?
3. What are the classification of signal
4. List the types of ADC
5. Define the impulse & Unit step signal
6. Differentiate between energy & Power signal
7. Perform Addition, Subtraction, Multiplication, Division of the Discrete time Signal

 $x\_{1}$(n)= {2, 2, 1, 2} & $x\_{2}$(n) = {-2,-1, 3, 2}

1. Define Quantization ,Quantization Error
2. Define Sampling,Sampling Rate,Sampling Time,Coding
3. What are the three process involved in A/D conversion?
4. Define Nyquist Rate
5. Given a continuous time signal x(t)=2cos500пt. What is the Nyquist rate and fundamental frequency?
6. Determine whether x(n)=u(n) is a power signal or an energy signal
7. Check whether the system is linear or not y(n)=x3(n)
8. Check whether the system is Stable or not y(n)=cosx(n)
9. Given a continuous time signal x(t)=2cos500пt. What is the Nyquist rate and fundamental frequency?
10. Consider the analog signal x(t)= 3cos50пt+10sin300пt-cos100пt. What is the Nyquist rate for this signal?
11. Determine the fundamental period of the signal cos($\frac{п30n}{105})$ .
12. State Shannon’s sampling theorem.
13. Give the classification of signals?
14. What are the types of systems?
15. What are even and odd signals?
16. What are elementary signals and name them?
17. What is a continuous and discrete time signal?
18. What is the necessary and sufficient condition for stability?

**UNIT – II**

1. Given a difference equation y(n)=x(n) + 3x(n-1)+2y(n-1).Determine the system function H(Z).
2. Find the convolution for x(n)={0,1,0,2} and h(n)={2,0,1}
3. What is ROC of Z transform? State its properties.
4. Define discrete time fourier transform pair for a discrete sequence.
5. Give the nth order difference equation.
6. Write the expression for x(n)\*h(n)
7. Obtain the discrete Fourier series coefficients of x(n)=cosωn
8. What is the relation between DFT and Z-transform
9. Find the Z-transform of (a) A discrete impulse (b) A discrete step
10. What is the relation between Fourier Transform and Z-transform
11. State and prove convolution property of Z transform
12. State initial value and final value theorem of Z transform
13. State Parseval theorem of Z transform
14. Determine Z transform of the sequence x(n) = {2,1,-1,0,3}
15. Find the convolution of the following using Z-transform. x1(n)={1,2,1}; x2(n)={1,1,1}
16. Distinguish between Linear and Circular convolution of the two sequence
17. Find the Z-transform and ROC of the given sequence x(n)={2,-1,3,2,1,0,2,3,-1}.
18. Define Z Transform Pair
19. What are the different methods of evaluating inverse z transform?
20. Define discrete fourier series.
21. Define system function
22. Determine the convolution sum of two sequences x(n) = {3, 2, 1, 2} and

 h(n) = {1, 2, 1, 2}

1. Determine the Z transform of the Signal X(n)=$a^{n}u(n)$
2. Find the Z-transform of X (n) = [3$\left(2^{n}\right)-4\left(3^{n}\right)]u(n)$
3. Give any two properties of linear convolution.

**Part B Questions**

 **UNIT – I**

1. Describe in detail the process of sampling and Quantization. Also determine the

 Expression for quantization liner

1. whether the following are periodic

 i) x (n)= cos(3пn)

 ii) x (n)=sin(3n)

1. A discrete time systems can be

(i) Static or dynamic

(ii) Linear or non linear

(iii) Time invariant or time varying

(iv) Stable or unstable

Examine the following systems with respect to the properties above

y (n)=x(n) + nx(n+1)

y(n) = cosx(n)

1. What is meant by energy and power signal? Determine whether the following

Signals are energy or power or neither energy nor power signals.

(1) X1(n) = (1/2)n u(n)

(2) X2(n) = sin ( )

(3) X3(n) =

(4) X4(n) = u (n)

1. What is meant by sampling? Explain sampling theorem.
2. Explain the digital signal processing system with necessary sketches and give its merits and demerits.
3. Check the causality and stability of the systems

 y(n) = x(- n) + x(n-2) +x(2n-1)

1. Check the system for linearity and time invariance

y(n) = ( n-1)x2(n) +C

1. Check for following systems are linear,causal,time in variant,stable,static

 i) y(n)= sin(x(n))

 ii) y(n)= x(n)cos(x(n))

 iii) y(n)= x(-n+5)

 iv) y(n)= x(n)+nx(n+2)

v) y(n)= cos(x(n))

1. What is causality and stability of a system? Derive the necessary and sufficient

Condition on the impulse response of the system for causality and stability.

1. Starting from first principles, state and explain sampling theorem both in time domain and in frequency domain.
2. A discrete time systems can be

 (i) Static or dynamic

 (ii) Linear or non linear

 (iii) Time invariant or time varying

 (iv) Stable or unstable

 Examine the following systems with respect to the properties above

i) y(n)=cos[x(n)]

ii) y(n)=x(-n+2)

 iii) y(n)=x(2n)

1. Determine whether or not each of the following signals is periodic. In case a

 signal is periodic, specify its fundamental period.

 i) cos0.01пn ii) coscos3пn iii) sin3n iv) sin(

1. Describe in detail the process of Quantization.
2. Determine whether the following system are linear, time-invariant

i)y(n) = Ax(n) +B

ii)y(n) =x(2n)

iii)y(n) =n x2 (n)

iv)y(n) = a x(n)

**UNIT – II**

1. Determine the causal signal x (n) whose Z-transform is given by

1. Determine the Z-transform of the signal x(n)= (cosω0n) u (n)
2. The impulse response of a time invariant system is h(n)={1,2,1,-1} and

 **↑**

X (n) = {1, 2, 3, 1}.Find out the response of the system by using i) linear

 **↑**

Convolution ii) Circular convolution iii) linear with Circular convolution.

1. Determine the impulse response for the difference equation

y(n)+3y(n-1)+2y(n-2)=2x(n)-x(n-1)

1. Find the inverse Z transform of X (z) =

1. Determine the system function and the unit sample response of the system

described by the difference equation y(n)+y(n-1)+2x(n).

1. Determine the step response of the system y(n)-αy(n-1)+x(n), -1< α > 1,when

the initial condition is y(-1)=1

1. Find the Circular convolution of the two sequences

x(n)={2,4,0,2}, h(n)={4,4,2,2}

1. Determine the Z-transform of the signal x(n)= (sinω0n) u (n)
2. Using Z-transform determine the response y(n) for n≥0 if

 y(n)= y(n-1)+x(n) , x(n)=u(n)y(-1)=1

1. Find the Z transform and its ROC of

 x(n)=u(n) +u(-n-1).

1. A system is described by the difference equation y(n)-y(n-1)=5x(n).

1. Determine the solution, when the input x(n)= u(n) and the initial

condition is given by y(-1)=1, using Z transform.

1. Find the Inverse Z-Transform of X(Z)= z/(3z2-4z+1), ROC Z > 1.
2. Find the linear convolution of x(n)={2,4,6,8,10} with h(n)={1,3,5,7,9}.
3. Find the Inverse Z-Transform of the following function using Partial

Method

 i) X (z) =1/ (1-z-1) (1- z-1)2

 ii) X (z)= (Z+0.2)/(Z+0.5)(Z-1) Z >1