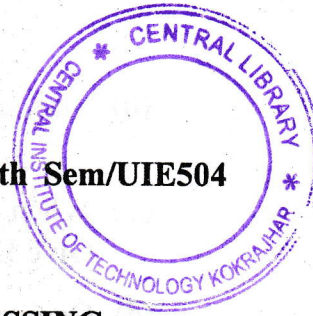


Total No. of printed pages = 4

19/5th Sem/UIE504



2021

DIGITAL SIGNAL PROCESSING

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer any *five* questions.

1. (a) Compute the convolution of these pairs of signals 6

$$x[n]=\{4,3,(5),1\} \text{ and } h[n]=\{5,(2),2,6\}.$$

- (b) Check whether the following system is static or dynamic and also causal or non-causal system : $y(n) = x(n+3)$. 5

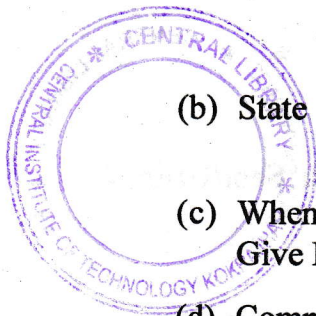
- (c) Find out $u(n) - u(n-5)$. 4

- (d) What is aliasing ? Explain. 5

2. (a) Determine the causal signal $x(n)$ having the

z-transform $H(z) = \frac{(1-z^{-1})}{(1-5z^{-1}+6z^{-2})}$. 6

[Turn over



- (b) State the significance of impulse response. 4
- (c) When a system is said to be memory less ?
Give Example. 4
- (d) Compute the convolution of these pairs of signals
 $x[n] = \{3,5,2\}$, $h[n] = u[n]$ 6
3. (a) A discrete time causal system has a transfer function 10
- $$H(z) = \frac{(1 - z^{-1})}{(1 - 5z^{-1} + 6z^{-2})}$$
- (i) Determine the difference equation of the system
- (ii) Show pole zero diagram
- (iii) Find the impulse response.
- (b) Define linear and non linear system. 5
- (c) What are the conditions for a system to be LTI systems ? 5
4. (a) Write down the Classification of Signals. 5
- (b) Check for periodicity of $\cos(.00\pi 5n)$ 5

- (c) What is the relationship between Fourier transform and Laplace transform ? 5
- (d) Find the fundamental period T of the following signals, if they are periodic.
 $x(t) = 5\cos 2\pi t$ 5
5. (a) A discrete-time signal $x[n] = \{2, 4, 1, (4), -1, 4, 2\}$. Sketch and label each. 10
- (i) $2x(-n)$ (ii) $x(n+1) + x(n-2)$
- (iii) $x\left(\frac{n}{3}\right)$ (iv) $x(n-1)\delta(n-1)$
- (b) Determine the power and RMS value of the following signals : 5
- $y(t) = 5\cos(10t + \pi/3)$;
- (c) Draw the block diagram of Circular convolution using DFT. 5
- 6 (a) Compute the DFT of sequence $x(n) = [6, i, 2, 4 + 5i]$. 10
- (b) What are the advantages of DSP ? 5
- (c) Why are FFT techniques so important in digital signal processing ? 5

7. (a) Draw the complete signal flow graph of 4 points FFT algorithm. 5
- (b) List the 3 properties of convolution integral. 5
- (c) Find the inverse Z-transform of

$$X(z) = \frac{z(z^2 - 4z + 5)}{(z-3)(z-1)(z-2)}$$

for ROC (i) $2 < |z| < 3$ (ii) $|z| < 1$ 10

