Seat No.

Total No. of Pages : 3

OCT-NOV 2025 WINTER EXAMINATION

1154 B.Tech. CBCS

Sub. Name: Signal and Systems

Sub. Code: 66316/80807/81067

Day and Date: Friday ,12-12-2025 **Total Marks: 70**

Time: 02:30 PM To 05:00 PM

Instructions:
1. **All questions are compulsory**
2. **Assume suitable data wherever necessary and mention it boldly**
3. **Draw neat labelled diagrams wherever necessary**
4. **Figures to the right indicate full marks**
5. **Use of Scientific calculator is allowed**

Q1) Answer following Multiple Choice Questions **[14]**

1. **1.** The Fourier Transform of Continuous Time signal is _____ in nature. **[2]**

A) Complex
B) Real
C) Imaginary
D) None of the above

2. If x(n)={1,2,3,1} then DFT point X(0) is equal to _____ **[2]**

A) 3
B) 7
C) 2
D) None of the above

3. 3. A system is said to be time-invariant only if _____ **[2]**

A) a shift in the input signal also results in the corresponding shift in the output
B) a shift in the input signal does not exhibit the corresponding shift in the output
C) a shifting level does not vary in an input as well as output
D) None of the above

4. The set of all values of z for which X(z) attains a finite value is called as _____ **[2]**

A) Region of convergence
B) Radius of divergence
C) Region of divergence
D) None of the above

5. The signal whose ROC is the entire z-plane is _____ **[2]**

A) δ(n)

B) u(n)
C) r(n)
D) None of the above

6. Convolution of two discrete-time signals in the time domain is equivalent to _____ in z-domain. **[2]**

A) Addition
B) Multiplication
C) Subtraction
D) None of the above

7. The z-transform of sequence n.x[n] is _____ **[2]**

A) $-Z\frac{dX(Z)}{dZ}$

B) $Z\frac{dX(Z)}{dZ}$

C) $j\frac{dX(Z)}{dZ}$

D) $\frac{dX(Z)}{dZ}$

Q2) Answer any Two questions **[14]**

A. Define periodic CT signals and derive an expression for the periodicity condition of CT signals and the sum of two CT signals **[7]**

B. Check if the signal $x(t) = e^{-3t}u(t)$ is energy or power signal **[7]**

C. Find the Fourier transform of $x(t) = \sin(\Omega_0 t)$. **[7]**

Q3) Answer any Two questions **[14]**

A. Determine Convolution Sum of two sequences **[7]**
$x[n] = \{1,2,3,2\}$ and $h[n] = \{1,2,2\}$

B. Check whether the system $y(t) = od\{x(t)\}$ is linear or nonlinear **[7]**

C. Explain linearity, time shifting, and frequency shifting properties of continuous time Fourier transform **[7]**

Q4) Answer any Two questions **[14]**

1. Find 4- point DFT of sequence **[7]**
$x[n] = \sin(\frac{n\pi}{2})$

2. Find the Discrete Time Fourier transform of the sequence $x(n) = a^n u(n)$. **[7]**

3. Find direct form-I realization for the system described by the difference equation **[7]**

$$y[n] = \frac{3}{7}y[n-1] - \frac{1}{6}y[n-2] + x[n] + 3x[n-1]$$

Q5) Answer any Two questions **[14]**

1. Explain with example ROC of finite duration right hand, left hand and both sided sequence. **[7]**

2. Find z-transform of $x[n] = -b^n u[-n-1]$ and find ROC **[7]**

3. Realize the system in given equation using direct form -II **[7]**

$$y[n] = \frac{2}{7}y[n-1] - \frac{1}{6}y[n-2] + x[n] + 5x[n-1]$$

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -
This Question Paper may be distributed for following Subjects as common code.
सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (101) Bachelor of Engineering (81067) Signal and Systems Part 3 SEM 5
2] (101) Bachelor of Engineering (66316) Signals and Systems Part 3 SEM 5
3] (1154) B.Tech. CBCS (80807) Signal and Systems Part 3 SEM 5