Seat No.

Total No. of Pages : 3

MAR_APR 2025 SUMMER EXAMINATION

11731 Bachelor of Technology (NEP-2.0)

Sub. Name: Signal and Systems

Sub. Code: 66316/80807/81067

Day and Date: MAY ,05-05-2025 **Total Marks: 70**

Time: 02:30 PM To 05:00 PM

Instructions: **1. All questions are compulsory**
2. Figures to the right indicate full marks

Q1) Solve following MCQ. **[14]**

i. For an energy signal, its power is _____
- A. infinity
- B. zero
- C. one
- D. none of the above

ii. A system is said to be causal if the output of the system at any time depends only on_____
- A. Present inputs
- B. present and past inputs
- C. past inputs
- D. past and future inputs

iii. A system described by equation y(t)=t.x(t) is_____
- A. linear and time-invariant
- B. linear and time-variant
- C. nonlinear and time-variant
- D. nonlinear and time-invariant

iv. The Fourier transform of unit step function is _____
- A. $\frac{1}{j\omega}$
- B. $\frac{1}{\omega}$
- C. $\frac{\omega}{j}$
- D. ω

v. Region of Convergence for signal δ(n) is_____
- A. entire z plane except at z=∞
- B. entire z plane except at z=0
- C. entire z plane except at z=0 and z= ∞

D. entire Z plane

vi. Which of the following schemes of realization uses separate delays for input and output samples?

A. Direct Form-I
B. Direct Form-II
C. Both A & B
D. None

vii. TThe DFT of sequence x[n]=δ(n-n0) is _____

A. 1
B. $e^{\frac{-j2\pi kn_0}{N}}$
C. $e^{\frac{j2\pi kn_0}{N}}$
D. $e^{\frac{-j\pi kn_0}{N}}$

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

a. List classification of systems. Explain any three classes using suitable examples. **[7]**

b. Plot the following signals for x[n]={-2,-3,-1,-1,0,1,2,3} **[7]**
i. x[-n].u[n]+x[n] ii. x[n+1]+x[n-2]

c. Find Fourier transform of $x(t) = e^{-at}u(t)$ **[7]**

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

a. State and prove time shifting and time scaling property of Fourier transform. **[7]**

b. Find convolution integral between **[7]**
$x(t) = 1 \qquad 0 \leq t < 2$ and
$h(t) = 1 \qquad 0 \leq t < 3$

c. Check whether the following signal is an energy or power signal **[7]**
$$x(t) = tu(t)$$

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

a. Compute 4-point DFT of x[n]={1,2,-1,2} **[7]**

b. Find z transform and ROC of sequence x[n]={2,-1,3,2,0,1} **[7]**

c. Explain properties of Region of Convergence of z- transform **[7]**

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

a. Using PFE method find inverse z-transform of **[7]**

$X(z) = \frac{8z-19}{z^2-5z+6}$ ROC: $|z| > 3$

b. Compute 4 point IDFT of X(k)={1, 1-2j, -1, 1+2j} **[7]**

c. Draw Direct form-II realization of the system given by equation **[7]**

$$y(n) - \frac{5}{6}y(n-1) + \frac{1}{6}y(n-2) = x(n) + 2x(n-1)$$

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