

EI - 402
B.E. IV Semester
Examination, June 2015
Signals and Systems
Time : Three Hours

Maximum Marks : 70

- Note:* i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
- ii) All parts of each questions are to be attempted at one place.
- iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.
- iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) What are the properties of a linear system must satisfy.
- b) Determine whether the signal is periodic or not
 $x(n) = \sin(\pi + 0.2n)$
- c) Define eigen value and eigen function of LTI-CT system.
- d) Give the classification of signals.

OR

$$\text{If } x_1(n) = \delta(n+1) + 2\delta(n) + \delta(n-1)$$

$$x_2(n) = 3\delta(n+1) + 5\delta(n) + 3\delta(n-1)$$

Determine $x(n)$, where $x(n)$ is the convolution of $x_1(n)$ and $x_2(n)$

Unit - II

2. a) Obtain Fourier transform of $x(t) = \cos \omega t$
b) What is Dirichlet's condition.
c) Find Inverse Fourier Transform of $\delta(\omega)$
d) Give any five properties of CTFT.

OR

Explain Parseval's theorem.

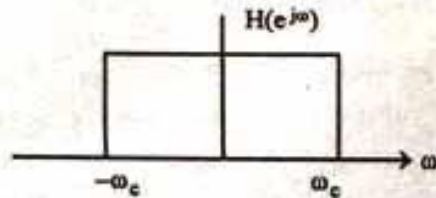
Unit - III

3. a) Write down the sufficient condition for the existence of DTFT.
b) What is meant by DTFT pair.
c) Find the Discrete Time Fourier Transform of
 $x(n) = (0.5)^n u(n) + 2^{-n} u(-n-1)$
d) Explain the following properties of DTFT
i) Convolution
ii) Duality
iii) Scaling

OR

Obtain the impulse response of the system

$$H(e^{j\omega}) = \begin{cases} 1 & \text{for } |\omega| \leq \omega_c \\ 0 & \text{for } \omega_c \leq |\omega| \leq \pi \end{cases}$$



Unit - IV

4. a) State the four methods to find inverse Z-transform.
b) Determine Z-transform of
 $\left(\frac{1}{2}\right)^n u(-n)$
c) Explain Region of Convergence.
d) Give the relation between s-plane and z-plane.

OR

Two discrete time signals are given $x_1(n) = \left(\frac{1}{3}\right)^n u(n)$

$x_2(n) = \left(\frac{1}{5}\right)^n u(n)$ and $x(n)$ is the convolution of $x_1(n)$ and $x_2(n)$. Find $X(Z)$ using convolution property of Z-transform.

Unit - V

5. a) Define Ergodic process.
b) A continuous random variable has a PDF expressed as
 $f_x(x) = 2e^{-2x}$ for $x \geq 0$. Determine the probability that it will take a value between 1 and 3.
c) What are Gaussian random variable.
d) Explain white noise.

OR

Define joint probability density function. Explain its various properties.

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