Code No: 156CV

**R18**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**
**B. Tech III Year II Semester Examinations, January/February - 2025**
**SIGNALS AND SYSTEMS**
**(Electrical and Electronics Engineering)**

**Time: 3 Hours** **Max. Marks: 75**

**Note:** i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

**PART – A**
**(25 Marks)**

| | | |
|---|---|---|
| 1.a) | Give the analogy between vectors and signals. | [2] |
| b) | Give the example of time invariant systems. | [3] |
| c) | What is the difference between Fourier transform and discrete time Fourier transform? | [2] |
| d) | Write the time shifting and frequency shifting property of discrete time Fourier transform. | [3] |
| e) | Give various properties of convolution integral. | [2] |
| f) | What is filtering give its importance in signal processing? | [3] |
| g) | Write the relation between Laplace and Fourier transforms. | [2] |
| h) | Give the statements of initial value and final value theorems. | [3] |
| i) | What is Band pass sampling? | [2] |
| j) | Define Parsevals theorem. | [3] |

**PART – B**
**(50 Marks)**

| | | |
|---|---|---|
| 2.a) | Give the relationship between unit step and unit impulse functions briefly. | |
| b) | Derive the expression for mean square error. | [5+5] |
| | **OR** | |
| 3.a) | What is a signal? Classify different signals with examples. | |
| b) | Discuss various elementary continuous time signals and indicate them graphically. | [5+5] |
| 4.a) | State and prove the property of convolution in time domain Fourier transform. | |
| b) | Write a short note on sampling methods. | [5+5] |
| | **OR** | |
| 5.a) | State and explain Dirchlet's conditions. | |
| b) | Get the cosine Fourier series of an full wave rectified sine function. | [5+5] |
| 6.a) | Briefly discuss different types of LTI systems with simple example. | |
| b) | Explain the importance of Paly-Wiener criterion for causality. | [5+5] |
| | **OR** | |
| 7.a) | Prove that the product of bandwidth and rise time is a constant. | |
| b) | Derive the relationship between rise time and bandwidth of a low pass filter when unit step signal is applied. | [5+5] |

8.a) What is ROC of Laplace Transform and give the properties of ROC of Laplace transform.

b) Using power series expansion method, determine the inverse z - transform of [5+5]

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

**OR**

9.a) Get the inverse z-transform of X(z)=(z(z+4)/(z-0.6)(z-1.5) with ROC: 0.6<|z|<1.5

b) Discuss different properties of Z-transform. [5+5]

10.a) What is cross correlation and Auto correlation and give the properties of cross correlation function.

b) Explain the sampling theorem for band limited signals with graphs analysis. [5+5]

**OR**

11.a) Explain the reconstruction of signal from its samples.

b) Write a short note on how a periodic signal is detected in the presence of noise by correlation. [5+5]

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