Course code	Course name	L-T-P-Credits	Year of Introduction
AE307	SIGNALS AND SYSTEMS	3-0-0-3	2016

Prerequisite : Nil

Course Objective

- To impart the basic concepts of continuous and discrete signals and systems
- To develop understanding about frequency domain approaches used for analysis of continuous and discrete time signals and systems.
- To establish the importance of z-transform and its properties for analyzing discrete time signals and systems

Syllabus

Introduction to signals and systems - Classification of signals - Properties of systems - Representation of LTI systems - Continuous & Discrete Time LTI systems - Frequency response of LTI - Continuous Time Fourier Series - Discrete Time Fourier Transform - Laplace Transform – Causality and stability- Z Transform- Determining the frequency response from poles and zeros.

Expected outcome

The students are expected to:

i. Have an advanced knowledge in continuous and discrete signals and systems
ii. Have knowledge in z-transform

Text Books

1. Haykin S. & Veen B.V., *Signals & Systems*, John Wiley
2. Oppenheim A.V., Willsky A.S. & Nawab S.H., *Signals and Systems*, Tata McGraw Hill
3. Taylor F.H., *Principles of Signals & Systems*, McGraw Hill

References

1. Bracewell R.N., *Fourier Transform & Its Applications*, McGraw Hill
2. Haykin S., *Communication Systems*, John Wiley
3. Lathi B.P., *Modern Digital & Analog Communication Systems*, Oxford University Press
4. Papoulis A., *Fourier Integral & Its Applications*, McGraw Hill

Course Plan

Module	Contents	Hours	Semester exam marks
I	Introduction to signals and systems - Classification of signals - Basic operations on signals – Elementary signals - Concept of system - Properties of systems - Stability, invertability, time invariance - Linearity - Causality - Memory - Time domain description - Convolution - Impulse response.	7	15%
II	Representation of LTI systems - Differential equation and difference equation representations of LTI systems ,Continuous Time LTI systems and Convolution Integral, Discrete Time LTI systems and linear convolution.	6	15%
FIRST INTERNAL EXAMINATION			

III	Frequency response of LTI systems - Correlation theory of deterministic signals - Condition for distortionless transmission through an LTI system - Transmission of a rectangular pulse through an ideal low pass filter - Hilbert transform – Sampling and reconstruction	8	15%
IV	Frequency Domain Representation of Continuous Time Signals- Continuous Time Fourier Series: Convergence. Continuous Time Fourier Transform: Properties. Frequency Domain Representation of Discrete Time Signals- Discrete Time Fourier Transform: Properties, Sampling Theorem, aliasing, reconstruction filter, sampling of band pass signals. Fourier Series Representation of Discrete Time Periodic Signals.	7	15%
SECOND INTERNAL EXAMINATION			
V	Laplace Transform – ROC – Inverse transform – properties – Analysis of Continuous LTI systems using Laplace Transform – unilateral Laplace Transform. Relation between Fourier and Laplace Transforms. Laplace transform analysis of systems - Relation between the transfer function and differential equation - Causality and stability - Inverse system - Determining the frequency response from poles and zeros	7	20%
VI	Z Transform - Definition - Properties of the region of convergence - Properties of the Z transform - Analysis of LTI systems - Relating the transfer function and difference equation - Stability and causality - Inverse systems - Determining the frequency response from poles and zeros	7	20%
END SEMESTER EXAMINATION			

QUESTION PAPER PATTERN:

Maximum Marks:100 Exam Duration: 3 Hours

Part A

Answer any two out of three questions uniformly covering Modules 1 and 2 together. Each question carries 15 marks and may have not more than four sub divisions.

(15 x 2 = 30 marks)

Part B

Answer any two out of three questions uniformly covering Modules 3 and 4 together. Each question carries 15 marks and may have not more than four sub divisions.

(15 x 2 = 30 marks)

Part C

Answer any two out of three questions uniformly covering Modules 5 and 6 together. Each question carries 15 marks and may have not more than four sub divisions.

(20 x 2 = 40 marks)