

Course code	Course name	L-T-P-Credits	Year of Introduction
AE307	SIGNALS AND SYSTEMS	3-0-0-3	2016
<b>Prerequisite : Nil</b>			
<b>Course Objective</b> <ul style="list-style-type: none"> <li>To impart the basic concepts of continuous and discrete signals and systems</li> <li>To develop understanding about frequency domain approaches used for analysis of continuous and discrete time signals and systems.</li> <li>To establish the importance of z-transform and its properties for analyzing discrete time signals and systems</li> </ul>			
<b>Syllabus</b> 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.			
<b>Expected outcome</b> The students are expected to: <ol style="list-style-type: none"> <li>Have an advanced knowledge in continuous and discrete signals and systems</li> <li>Have knowledge in z-transform</li> </ol>			
<b>Text Books</b> <ol style="list-style-type: none"> <li>1. Haykin S. &amp; Veen B.V., <i>Signals &amp; Systems</i>, John Wiley</li> <li>2. Oppenheim A.V., Willsky A.S. &amp; Nawab S.H., <i>Signals and Systems</i>, Tata McGraw Hill</li> <li>3. Taylor F.H., <i>Principles of Signals &amp; Systems</i>, McGraw Hill</li> </ol>			
<b>References</b> <ol style="list-style-type: none"> <li>1. Bracewell R.N., <i>Fourier Transform &amp; Its Applications</i>, McGraw Hill</li> <li>2. Haykin S., <i>Communication Systems</i>, John Wiley</li> <li>3. Lathi B.P., <i>Modern Digital &amp; Analog Communication Systems</i>, Oxford University Press</li> <li>4. Papoulis A., <i>Fourier Integral &amp; Its Applications</i>, McGraw Hill</li> </ol>			
<b>Course Plan</b>			
Module	Contents	Hours	Semester exam marks
<b>I</b>	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%
<b>II</b>	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%
<b>FIRST INTERNAL EXAMINATION</b>			

<b>III</b>	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%
<b>IV</b>	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%
<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	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%
<b>VI</b>	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%
<b>END SEMESTER EXAMINATION</b>			

## 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)