KAKATIYA INSTITUTE OF TECHNOLOGY AND SCIENCE: WARANGAL-15
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
Academic Year 2013-14

EC 225 SIGNALS & SYSTEMS   II SEMESTER, II/IV B.TECH
(Common for ECE, EIE and EEE)

Course	:	**EC 225 - Signals & Systems** , II/IV B.Tech., II-Semester
Name of the faculty	:	Dr. K. Ashoka Reddy *Professor of E&I Engg,* *Research Lab, Dept. of E&I Engg, First Floor, Block-I*
Email:	:	**kar@eie.kitsw.ac.in**

Text/Software:

Text books:

1. Simon & Haykins, *Signals & Systems,* John Wiley & Sons
2. B.P.Lathi, *Signals & Systems and Communications*, BSP
3. Proakis, *Digital Signal Processing: Principles, Algorithms and Applications*, PHI
4. P.Z. Peebles, *Probability, Random Variables & Random Signal Principles*, TMH

Software: *Matlab Student Version Release 2011a, Mathworks, Inc.* The *Matlab Student Version* and toolboxes may be purchased through the Mathworks website at `http://www.mathworks.com/`.

Webpage: **http://kitsw.ac.in/departments/EI/ashok/classes/EC225.html**

Email List: eie2012@kitsw.ac.in; ece2012@kitsw.ac.in; eee2012@kitsw.ac.in

Online Material: A significant amount of course-related material may be found at the class website. It is the responsibility of the student to be cognizant of this information; thus, the student should visit the website frequently. Additionally, important class announcements will be sent by email to the official email lists mentioned above. This list sends mail to **Institute Official Student Email addresses**. By policy, it is the responsibility of the student to read **Institute Official Student Email** frequently. The students are encouraged to use this list for class-related questions and discussions.

Course Objective:

The objectives of this course are

- to develop good understanding about signals, systems and their classification;
- to provide with necessary tools and techniques to analyze electrical networks and systems
- to develop expertise in time-domain and frequency domain approaches to the analysis of continuous and discrete systems;
- to introduce to the basics of probability, random variables and the various distribution and density functions; and
- to develop students' ability to apply modern simulation software to system

Course Outcome:

- Students will be able to represent & classify signals, Systems & identify LTI systems
- Students will be able to derive Fourier series for continuous time signals
- Students will be able to find Fourier transform for different signals
- Students will be able to analyze the Continuous Time systems by performing Convolution
- Students will be able to understand Discrete-time systems and LTI systems.
- Students will be able to analyze DT systems & their realization using Z-transforms
- Students will be able to understand probability concepts
- Students will be able to find statistical properties (mean, variance, auto correlation function) of random variables

SYLLABUS - TEACHING SCHEDULE (2013-2014)

Week & Date	UNIT- I (Topics to be covered)	References	Assignment will be posted on	Due Date for Assignment Submission
week -1 (25.11.13 to 30.11.13)	Introduction to Signals, Signal representation	Simon & Haykins	25.11.2013	02.012.13
	Classification of CT signals, Problems on signal classification	Simon & Haykins		
	Singularity functions	B.P.Lathi		
	Signal representation using Singularity functions	-- do --		
	Unit impulse function properties, Signal representation using impulse function	-- do --		
week -2 (2.12.13 to 7.12.13)	classification of Systems	Simon & Haykins	02.12.13	09.012.13
	LTI system, Convolution integral & its significance	-- do --		
	Graphical convolution of some functions	-- do --		
Week-3 (9.12.12 to 14.12.13)	Analytical method of convolution	-- do --	09.12.13	16.12.13
	Convolution using impulses	-- do --		
	Signal approximation: Fourier series	Oppenheim, Willsky & Young		
	Trigonometric FS representation	-- do --		
week - 4 (16.12.13 to 21.12.13)	Trigonometric FS representation of some functions	-- do --	16.12.13	23.12.13
	Exponential FS representation of CT signals	-- do --		
	Relation between two series, some examples	-- do --		
	Review Class/Contents beyond the syllabus			

Outcome:

- Students will be able to represent and classify signals and Systems.
- Students will be able to derive Fourier series for continuous time signals.

Week & Date	UNIT- II (Topics to be covered)	References	Assignment will be posted on	Due Date for Assignment
5week (23.12.13to 28.12.13)	Fourier spectrum, Fourier transform, Dirchlet conditions	Simon & Haykins	23.12.13	30.12.13
	Properties of Fourier transforms	-- do --		
	Evaluation of FT of some functions using properties	-- do --		
	FT of constant, signum function, unit step, exponential	-- do --		
6 week (30.12.13to 04.01.14)	FT of periodic functions: cosine, sine, periodic pulse train	-- do --	30.12.13	06.1.14
	FT of impulse train, Inverse FTs	-- do --		
	Energy Spectral density,parseval's theorem for energy signals	B.P.Lathi		
	Power Spectral density, parseval's theorem for power signals	-- do --		
7 week (06.01.14 to 10.1.14)	Hilbert transform and its properties	-- do --	06.1.14	10.1.14
	LTI Systems,Impulse response of LTI systems	-- do --		
	Transfer function of LTI systems	-- do --		
	Review Class/Contents beyond the syllabus			

Outcome:

- Students will be able to find Fourier transform for different signals.
- Students will be able to analyze the Continuous Time systems by performing Convolution

SHORT-TERM VACATION (SANKRANTI): 11.01.2014 TO 18.01.2014
I-MID EXAM: 20.01.2014 TO 25.01.2014

Week & Date	UNIT- III (Topics to be covered)	References	Assignment will be posted on	Due Date for Assignment Submission
8 week (27.1.14 to 1.2.14)	Introduction to DT signals, representation of DT signals	Oppenheim, Willsky & Young	27.01.2014	03.02.2014
	Classification of DT systems	-- do --		
	LTI systems ,Impulse response and convolution sum, properties of convolution	-- do --		
9 week (03.02.14to 08.02.14)	Convolution of some DT signals (i) Graphical convolution (ii) Matric and Tabular convolution	-- do --	03.2.14	10.2.14
	Introduction to Z-Transforms, ROC	-- do --		
	Properties of Z-Transforms	-- do --		
	Evaluation of Z-Transforms of some DT signals	-- do --		
10 week (10.02.14to 15.2.14)	Inverse Z-Transforms: Partial fractions method, problems	-- do --	10.2.14	17.2.14
	Inverse Z-Transforms: Residues method, problems	-- do --		
	Inverse Z-Transforms: Long division method, problems	-- do --		
	Evaluation of IZT of some transforms, problems	-- do --		

11 week (17.02.14to 22.02.14)	Structural realization of DT systems	-- do --	17.2.14	24.3.14
	Direct Form-I Structural realization	-- do --		
	Direct Form-II Structural realization	-- do --		
	Cascade and Parallel decomposition forms	-- do --		
	Review Class/Contents beyond the syllabus			

Outcome:

- Students will be able to understand Discrete-time systems and LTI systems.
- Students will be able to analyze DT systems & their realization using Z-transforms

Week & Date	UNIT- IV (Topics to be covered)	References	Assignment will be posted on	Due Date for Assignment Submission
12week (24.2.14 to 1.3.14)	Introduction to probability, distribution and density functions	P.Z.Peebles	24.3.14	03.3.14
	Probability distribution and density functions	-- do --		
13 week (03.03.14 to 08.03.14)	Relation between probability and density function, Joint CDF, variance	-- do --	03.3.14	10.3.14
	Probability density functions: Raleigh's normal, Gaussian	-- do --		
14 week (10.03.14 to 15.3.14)	Statistical averages of random variables	-- do --	10.03.2014	15.03.14
	Mean and variance of the sum of the random variables	-- do --		
	Tchebycheff's inequality, error function	-- do --		
	Correlation, Central limit theorem	-- do --		
	Review Class/Contents beyond the syllabus			

Outcome:

- Students will be able to understand probability concepts.
- Students will be able to find statistical properties (mean, variance, auto correlation function) of random variables.

LAST DAY OF INSTRUCTION: 15. 03. 2014

II-MID EXAMs: 17. 03. 2014 TO 22. 03. 2014

Expectations: The teacher expects all the students to

- Attend each class !
- Read the recommended Text Book !
- Work all the Homework !

Attendance: Attendance is vital in the academic success of a student

- Class roll will be taken in every class
- If an absence from class is unavoidable due to some situation beyond a student's control, the student should inform the teacher *before* a class is missed.
- **75% attendance is mandatory**

<u>Homework/Assignment</u>:

- Homework will be **assigned each Monday** and will be **due the following Monday**, unless otherwise specified.
- Homework must be turned in during lunch time on the day it is due.
- No late homeworks will be accepted *for any reason*.
- Homework assignments will include some programming in **MATLAB**.

<u>Exams & Grading</u>:

There will be two mid-term exams and Final University exam

<u>Grading</u>

Mid-term 1	:	50 Marks, 2 Hr Exam	Best of two
Mid-term 2	:	50 Marks, 2 Hr Exam	
Final Examination	:	100 Marks	

- Students are advised to be present for both mid-term exams.
- As there are no make-up exams, students are advised to take First mid –term exam without fail as student may miss the second mid-term exam due to some situation beyond the student's control (such as a serious illness,, etc.) which is unexpected, unavoidable.
- After mid-term exam , the student should go through the evaluated scripts and may wish to dispute the exam score: This must be made within *one week* following the date of the exam

****