**KAKATIYA INSTITUTE OF TECHNOLOGY AND SCIENCE: WARANGAL-15**
**DEPARTMENT OF ELECTRONICS & INSTRUMENTATION ENGINEERING**

# TEACHING SCHEDULE

## EC 225 SIGNALS & SYSTEMS II SEMESTER, II/IV B.TECH

*(Common for ECE, EIE and EEE)*

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|---|---|---|
| **Course** | : | **EC 225 - Signals & Systems** , II/IV B.Tech., II-Semester (EIE) |
| **Name of the faculty** | : | K. Ashoka Reddy<br>Professor, Dept of E&I Engg |
| **Email:** | : | **kar@eie.kitsw.ac.in** |

**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
5. Oppenheim, Willsky & Young; *Signals and Systems* PHI, EEE, New Delhi.

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

**Email List:** eie2013@kitsw.ac.in; ece2013@kitsw.ac.in; eee2013@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

## TEACHING SCHEDULE

**Date of Commencement of Class work : 15.12.2014**

| Assignment Portion | Topics to be covered | References | Assignment | |
|---|---|---|---|---|
| | **UNIT- I** | | **Date of posting** | **Date for Submission** |
| **Assignment** 1 | Introduction to Signals, Signal representation | Simon & Haykins | 15.12.14 | 29.12.14 |
| | 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 -- | | |
| | classification of Systems | Simon & Haykins | | |
| | LTI system, Convolution integral & its significance | -- do -- | | |
| **Assignment** 2 | Graphical convolution of some functions | -- do -- | 24.12.14 | 05.01.15 |
| | Analytical method of convolution | -- do -- | | |
| | | | | |
| | Convolution using impulses | -- do -- | | |
| | Signal approximation: Fourier series | Oppenheim Willsky & Young | | |
| | Trigonometric FS representation | -- do -- | | |
| | Trigonometric FS representation of some functions | -- do -- | | |
| | 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 find Fourier series for continuous time signals.

| Assignment Portion | Topics to be covered<br>UNIT- II | References | Assignment<br>Date of posting | <br>Date for Submission |
|---|---|---|---|---|
| Assignment 3 | Fourier spectrum, Fourier transform, Dirchlet conditions | Simon & Haykins | 05.01.15 | 19.01.15 |
| | Properties of Fourier transforms | -- do -- | | |
| | Evaluation of FT of some functions using properties | -- do -- | | |
| | FT of constant, signum function, unit step, exponential | -- do -- | | |
| Assignment 4 | FT of periodic functions: cosine, sine, periodic pulse train | -- do -- | 12.01.15 | 22.01.15 |
| | 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 -- | | |
| | Hilbert transform and its properties | -- do -- | | |
| | 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 transforms and Hilbert Transforms for different signals.
- Students will be able to analyze the Continuous Time systems by performing Convolution
- Students will be able to find the response of the system by using Convolution

**I-MID EXAMS : from 27.01.2015 to 02.02.2015**

| Assignment Portion | Topics to be covered<br>UNIT- III | References | Assignment<br>Date of posting | <br>Date for Submission |
|---|---|---|---|---|
| Assignment 5 | Introduction to Discrete Time Signals, representation of DT signals | Oppenheim, Willsky & Young | 02.02.15 | 16.02.15 |
| | Classification of DT systems | -- do -- | | |
| | LTI systems ,Impulse response and convolution sum, properties of convolution | -- do -- | | |
| | Convolution of some DT signals (i) Graphical convolution (ii) Matric and Tabular convolution | -- do -- | | |
| | Introduction to Z-Transforms, ROC | -- do -- | | |
| | Properties of Z-Transforms | -- do -- | | |
| | Evaluation of Z-Transforms of some DT signals | -- do -- | | |
| | Inverse Z-Transforms: Partial fractions method, problems | -- do -- | | |
| Assignment 6 | Inverse Z-Transforms: Residues method, problems | -- do -- | 12.02.15 | 23.02.15 |
| | Inverse Z-Transforms: Long division method, problems | -- do -- | | |
| | Evaluation of IZT of some transforms, problems | -- do -- | | |
| | Structural realization of DT systems | -- do -- | | |
| | 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 using Z-transforms
- Students will be able to realize the DT systems

| Assignment Portion | Topics to be covered<br>UNIT- IV | References | Assignment<br>Date of posting | <br>Date for Submission |
|---|---|---|---|---|
| Assignment 7 | Introduction to probability, distribution and density functions | P.Z.Peebles | 20.02.15 | 02.03.15 |
| | Probability distribution and density functions | -- do -- | | |
| | Relation between probability and density function, Joint CDF, variance | -- do -- | | |
| | Probability density functions: Raleigh's normal, Gaussian | | | |
| Assignment 8 | Statistical averages of random variables | -- do -- | 27.03.15 | 12.03.15 |
| | 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 parameters (mean, variance, auto correlation function) of random variables.

**LAST DAY OF INSTRUCTION: 15. 03. 2015, II-MID EXAMS: from 17. 03. 2015 to 24. 03. 2015**

**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

- **75% attendance is mandatory**

**Homework/Assignment:**

- Homework/Assignments will be posted according to scheduled.
- No late submission of assignments will be accepted *for any reason*.

**Exams & Grading:**

There will be two mid-term exams and one final exam

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|---|---|---|---|
| Mid-term 1 | : | 50 Marks, 2 Hr Duration | } Best of two |
| Mid-term 2 | : | 50 Marks, 2 Hr Duration | |
| Final Examination | : | 100 Marks, 3 Hr Duration | |

- Students are advised to be present for both mid-term exams.
- 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 from* the date of the exam.

**Examination malpractice is illegal:**

For additional information please visit: **www.kitsw.ac.in/examinations/rules**