BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI-Hyderabad Campus
SECOND SEMESTER 2018 - 2019
COURSE HANDOUT (PART II)

Dt: 07/01/2019

In addition to Part I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course No : **EEE / ECE / INSTR F243**
Course Title : **Signals & Systems**
Instructor-in-charge : Dr. Rajesh K. Tripathy
Instructors : Dr. Shaikshavali Chitraganti & Dr.R.Venkateswaran

1. 1: Scope and Objective:

This course is a preparatory course in which the basics of signal processing are covered. It deals with the basic transforms used in signal processing & introduces the analog filters. For practical exposure **Matlab based assignments** are included.
The students are required to review following mathematical topics: **Fourier Series, Fourier Transforms, Laplace Transform, Calculus, Complex variables and Statistic**s.

1.2: Learning outcomes:

On completion of this course, student should be able to:

(1) **Represent** both continuous-time and discrete-time signals as a Fourier series.
(2) **Use** the Fourier transform and the Laplace transform to analyze continuous-time signals and systems
(3) **Explain** the importance of superposition and convolution in the analysis of linear time invariant systems.
(4) **Demonstrate** an understanding of the relationship between the stability and causality of systems and the region of convergence of their Laplace transforms
(5) **Use** the discrete-time Fourier transform and the z-transform to analyze discrete-time signals and systems
(6) **Use** FFT algorithm

2. Text Book :

T1: Lathi B P, Principles of *Signal Processing & Linear Systems* Oxford University Press, 2009.

3. Reference Books :

R1: A V Oppenheim, A S Willsky, Nawab S N, *"Signals & Systems",* PHI, Second Edition, 2006
R2: Nagrath I J, Sharan S N, Ranjan Rakesh & Kumar S, S*ignals & Systems,* Second Edition TMH, 2001.

4. Course Plan:

Lecture	Learning Objectives	Topics to be covered	Chapter in the Text

No.			Book
1	Importance of the signals & Systems course	Introduction to course	-------
2 - 4	Introduction about function, understanding different types of continuous time signals and performing different time signal operations	Classification of Signals & Signal operations	Class notes and T1: 1.1 - 1.5
5 - 6	Signal representation using basis signals	Orthogonal Signal set & Fourier series	Class notes and T1 :3.3 T1: 3.4 - 3.5 (self-study)
7 - 9	Synthesize and analysis of various continuous time signals	Aperiodic Signal Representation, Fourier Transforms & its properties	Class notes and T1: 4.1-4.3 (exclude : 4.3-6)
10	Defining various systems	Classification of Systems	Class notes and T1: 1.6 & 1.7
11 - 12	Obtaining of LTI system output for any arbitrary input signal using impulse response	Linear convolution (LC) & LC using Fourier Transform	Class notes and T1: 2.4 & 4.3-6
13 - 14	Studying exponentially growing signals and analyzing stable systems	Laplace transform & its properties	Class notes and T1: 6.1 - 6.2
15	Analyzing stable systems	Solution of LTI continuous time systems using Laplace transforms	Class notes and T1: 6.3
16 - 18	Sampling of continuous time signals and their recovery	Sampling & reconstruction	Class notes and T1: 5.1
19 - 20	Understanding different types of discrete time signals and performing different time signal operations	Discrete-time signals & Signal operations	Class notes and T1: 8.1 - 8.4
21 - 22	Synthesize and analysis of various discrete time signals	Discrete Time Fourier Transform & its properties	Class notes and T1: 10.2 - 10.5
23 – 24	Analysis of discrete time systems	Z-transforms & its properties	Class notes and T1 : 11.1 – 11.2
25 – 26	z-transform solution of Linear difference equation	Z-transforms converting difference equations into algebraic equations	Class notes and T1 : 11.3
27 -28	Numerical computation of Discrete Fourier transform	DFT & its Properties	Class notes and T1: 5.2
29- 30	Obtaining output for discrete time systems for any arbitrary discrete input signal	Discrete time systems, Discrete time convolution (graphical procedure)	Class notes and T1 : 9.4-1
31 - 33	DFT method using FFT algorithms	Fast Fourier Transform, DIT FFT & DIF FFT algorithms	Class notes and T1: 5.3
34 - 37	DFT & IDFT using FFT algorithms	DFT using FFT & Inverse DFT, Discrete-time convolution using FFT	Class notes and T1 : 10.6
38- 42	Study of frequency response of	Introduction to analog filters	Class notes and

	different systems			T1: 7.1, 7.4 & 7.5

*The primary reference for the coverage (breadth and depth)/nomenclature/notations for a particular topic would be as per the lecturers/tutorials. Students are advised to take class notes during the lectures.

5. Evaluation Scheme (CB-Closed book and OB-Open Book)

EC No.	Evaluation Component	Time Duration (min)	Weightage (%)	Marks	Date & Time	Nature of Component
1	Midsem Test	90	30	90	13/3 1.30 -3.00 PM	CB
2	Quizzes		30	90	To be announced in Class	CB
3	Comprehensive	180	40	120	07/05 FN	CB+OB (20% +20%)

6. Make-up Policy:
No Make-up for the quizzes.
Make-up for the midterm will be granted as per ID rules and regulations (in case of sickness it should be supported by a medical certificate endorsed by Hostel warden as per ID rules). In all cases prior intimation must be given to IC.

7. **Notices**: Displayed only on CMS

8. Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in–charge