BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
K K Birla Goa Campus
INSTRUCTION DIVISION
SECOND SEMESTER 2022-2023

Course Handout (Part II)

Date: 17/01/2023

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. **: ECE /EEE/ INSTR F-243**
Course Title **: Signals & Systems**
Instructor-in-Charge **: Nitin Sharma**
Instructors **: Dr Anurag Nishad/Dr Naveen Gupta**

Scopes 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 & prepares the knowledge base for the design of analog & digital filters. For better clarity and understanding of this subject evaluation components like, assignments and/or tests are included. The students are required to review following mathematical topics: Calculus, Vector analysis, coordinate systems, arithmetic and geometric progression, probability and Complex variables.

Text Book:

T1: B. P. Lathi, "Signal Processing & Linear Systems", Oxford University Press, 2009.
T2: A. V. Oppenheim, A. S. Willsky with S. H. Nawab, Signals and Systems, Prentice- Hall of India Private Limited, Second Edition, 1997.

Reference Book:

R1: S. Haykin and B. V. Veen, Signals and Systems, John Wiley and Sons, Inc., Second Edition, 1999.
R2: M. J. Roberts, Signals and Systems: Analysis using, Transform Methods and MATLAB, Tata McGraw-Hill Publishing Company Limited, Second Edition, 2003.

Course Plan

Lecture No.	Main Topic	Contents	Reference
01	Introduction	Introduction	
02-05	Continuous–Time (CT) and Discrete –Time (DT) Signals:	Classifications; Mathematical Representation; Elementary signals: Unit Impulse, Unit Step, Unit Ramp, and Exponential; Transformations of the Independent Variable; Arithmetic Operations;	T1-1.1 to 1.5 T1-8.1to 8.4 T2-1.1 to 1.4
06-08	CT and DT Systems	Interconnections of Systems; Basic System Properties (Causality, Stability, Time-Invariance, Linearity, Invertibility, systems with and without memory).	T1-1.6 to 1.8 T1-8.5 T2-1.5 to 1.6

09-13	Linear Time –invariant systems (CT and DT)	Unit Impulse Response; Convolution Sum and Convolution Integral Representation; Properties of LTI Systems; The Unit Step Response of an LTI System; LTI Systems Described by Differential and the Difference Equations; Block Diagram Representations;	T1- ch2, ch9 T2- ch2
14-17	Fourier Series	Fourier Series Representation; Convergence of the Fourier Series; Properties of Fourier Series.	T1-ch3, T2-ch3
18-21	CT Fourier Transform:	The Fourier Transform for Periodic and Aperodic Signals; Properties of CT Fourier Transform; CT Fourier Transform and LTI Systems.	T1- ch4, T2- ch4
22-25	DT Fourier Transform:	DT Fourier Transform for Periodic and Aperodic Signals; Properties of the DT Fourier Transform; Discrete-Time LTI Systems and DT Fourier Transform.	T1- ch10 T2- ch5
26-29	Sampling:	Representation of a CT Signal by its Samples; The Sampling Theorem; Reconstruction of Signals; Effect of Under Sampling (Frequency Domain Aliasing).	T1- ch5 T2- ch7
30-33	The Laplace Transform:	The Laplace Transform; Region of Convergence for Laplace Transform; Properties of Laplace Transform; LTI Systems and Laplace Transform;	T1- ch6 T2- ch9
34-37	The Z Transform:	The Z Transform; The Region of Convergence for the Z-Transform; Properties of Z-Transform; DT LTI Systems and Z-Transform;	T1- ch11 T2- ch10
38-40	Advanced Topics	DFT, FFT, Circular Convolution	T1 ch5 & Notes

Evaluation Scheme :

EC No	Component & Nature	Duration	Weightage	Date, Time*	Nature
1.	Mid-Term Test	1.30 Hr	30%	15/03/2023; 9:00 AM- 10:30 AM	CB
2.	Assignments/Quizzes*/Online Test	-	30%	Regular	OB
3.	Compre. Exam	3 Hrs	40%	06/05/2023 (FN)	CB

Chamber Consultation Hour: To be announced in the class.

All Quizzes will be announced in nature and will be announced one week in advance. Best N-1 quizzes will be considered and hence no makeup for quizzes will be possible.

Make-up Policy: Make-up (mid-semester and comprehensive exam) will be allowed only in the case of hospitalization/on the written recommendation of Medical Officer. Prescription will not be considered as medical certificate for makeup/leave.

Course Notice: Will be displayed on Quanta course folder.

* Note: Please refer latest time-table or emails from AUGSD to confirm/verify for any change in Date and time.
Also make sure to buy hard copy of the text book for open book exams. Soft copies of any material including notes will not be allowed.

Instructor-in-Charge
EEE F243 / INSTR F243/ECE F243