Signals and Systems

Course Description

Module: 1

Signals and their classifications

Signal:- definition, Classifications of Signals (Continuous-time & Discrete-time, Analog & Digital, Energy & Power, Deterministic & Random, Periodic & Aperiodic, Even and Odd etc.)

Module: 2

System and their classifications

Classifications of Systems Classifications of Systems (Linear & Nonlinear, Time invariant & Time varying, Causal & Non- causal, Memory & Memory less, Stable & unstable system), LTI Systems (continuous-time and discrete time).

Module: 3

Response of LTI system

Impulse response of a system, Response of LTI system, Convolution (Integral and Sum).

Module: 4

Fourier analysis of Continuous time signal and system

Continuous Transforms Fourier series, Convergence of Fourier series, Continuous-time Fourier Transform, properties of Fourier series and Transform, Frequency domain analysis of continuous time LTI system.

Module: 5

Fourier analysis of Discrete time signal and system

Discrete Transforms Fourier series, Convergence of Fourier series, Discrete-time Fourier Transform, properties of Discrete-time Fourier series and Transform, Frequency domain analysis of discrete-time LTI system.

Module: 6

Laplace Transform

Laplace Transform, Concept of ROC and Transfer function, pole-Zero plot, properties Laplace Transform, solution of differential equations using Laplace Transform, System function, Laplace approach to analysis the LTI system, stability analysis.

Module: 7

Z-transform

Z- Transform, Concept of ROC, properties Z- Transform, solution of difference equations using Z- Transform, System function, pole-Zero plot , Z- Transform approach to analysis the Discrete-time LTI system, stability analysis of Discrete-time LTI system.

Module: 8

Introduction to Digital Filters: FIR & IIR

Digital filters:- definition and frequency response of basic filtering function like BP, HP, LP, BR, AP
Definition and representation of IIR and FIR digital filter

COURSE OUTCOMES

COURSE OUTCOMES		COGNITIVE LEVELS
CO1	Understand the mathematical representation, classification, applications and analyze both continuous and discrete time signals and systems.	Understanding (Level II)
CO2	Analyze and interpret the response of continuous and discrete time LTI system in time domain	Evaluating (Level V)
CO3	Choose and demonstrate the use of different frequency domain transforms to examine and explain the spectral representation of the CT and DT signals and systems.	Evaluating (Level V)
CO4	Apply Laplace and Z transform to analyze and examine the response and behavior of the CT and DT system.	Analyzing (Level IV)

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25
Total	**100**

Recommended Reading material

1. A.V. Oppenheim, A.S. Willsky & S.H. Nawab, Signals & Systems, 2nd edition ,PHI ,2004
2. H.P. Hsu, Schaum's outlines of theory and problems of signals and systems. McGraw Hill; 1995.
3. S. Haykin & B. Van Veen, Signals and Systems, 2nd edition, John Wiley & sons, 2004.
4. M. Mandal, Amir Asif, Continuous and Discrete Time Signals and Systems, Cambridge, 2007
5. M. J. Roberts, Signals and Systems, Tata Mcraw-Hill, 2003
6. Tarun Rawat, Signals and Systems, Oxford University Press , 2010
7. J. G. Proakis & D. G. Manolakis, Digital Signal Processing, Principles, Algorithms and Applications, Fourth edition, PHI, 2007.

Thank You