MANGALORE UNIVERSITY

DEPARTMENT OF ELECTRONICS
MSc Electronics

-

ELS 408 - SIGNALS AND SYSTEMS

Course Outcomes:

1. Analyze and classify the signals based on the continuity and discrete property of signals.
2. Mathematical description of systems, its properties that are suitable for real-world designs.
3. Analyze the signals in time domain using convolution, difference/differential equations
4. Analyze Linear Time Invariant (LTI) systems in time and transform domains.
5. A pre-programme to courses based on signals (DSP) and systems (Control Systems)

Unit I

Introduction and classification of Signals: Definition of signal and systems, Sampling of analog signals, Continuous time and discrete time signal, Classification of signals.
Elementary Signals and Operations on Signals: exponential, sine, impulse, step and its properties, ramp, rectangular, triangular, signum, sync functions. Operations on Signals – Amplitude scaling, addition, multiplication, differentiation, integration, time scaling, time shifting and time folding
Systems: Definition, Classification of Systems; **Signal Transmission through Linear System:** Linear system, Impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems.

12 hours

Unit II

Fourier Representation: Periodic Signals- Introduction to CTFS and DTFS, definition, properties and basic problems. Aperiodic CT Signals - FT representation of aperiodic CT signals - FT, definition, FT of standard CT signals, Properties and their significance.
FT representation of aperiodic discrete signals: DTFT, definition, DTFT of standard discrete signals, Properties and their significance, Impulse sampling and reconstruction:

12 hours

Unit III

Laplace Transforms: Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, Properties of Laplace Transform, relation between L.T's, and F.T. of a signal.
Convolution and Correlation of Signals: Concept of convolution in time domain and frequency domain, Convolution property of Fourier transforms. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between convolution and correlation.

12 hours

Books:

1. Simon Haykins and Barry Van Veen, "Signals and Systems", 2nd Edition, 2008, Wiley India.
2. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
3. Ganesh Rao and Satish Tunga, "Signals and Systems", Pearson/Sanguine Technical Publishers, 2004.
4. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.