IEC 240 **Digital Signal Analysis and Applications** **L-T-P-C: 3-1-3-4**

***Syllabus**:*

A. Theory:

Module 1: Digital Signals and Systems Fundamentals -- Introduction, course overview, signal representation and types, signal conversion, signal classification and representation, natural and synthetic signals, types, representation, impulse, unit sample, unit step and ramp signals, digital signal scaling and shifting- signal and noise, noise types and sources. (3 Weeks)

Module 2: System Classification and Response -- Properties of signal and system, lti system, principle of superposition- system classification and system response, linear convolution. (3 weeks)

Module 3: Digital Signal Analysis and Transformation -- Fourier Series and Fourier transform and properties, coefficients and representations- analysis and synthesis, sine-cosine representation; sampling -- intro to sampling theorem, reconstruction and quantization. (3 Weeks)

Module 4: Discrete Transforms -- DFT, DTFT properties, correlation, Parseval's theorem, FFT, Z-Transform, system function, transfer function. (3 Weeks)

B. Practice Topics

1. Algorithms derived from the above theoretical content (9 weeks)
2. Applications (3 Months)
   - Communication: Signal propagation, amplitude modulation- frequency modulation
   - Image Processing- Image segmentation: edge detection and global thresholding
   - Bio-signals: EMG and EEG signals and their applications

***Texts**:*

1. Signals & Systems by Oppenheim, Wilsky and Nawab
2. Digital Signal Processing, Proakis

References:

1. Communication Systems (S. Haykin)
2. DIP using matlab (Gonzalez)
3. Signals and Systems using Matlab (L Chaparro)
4. DSP using matlab (V. Ingle and J. Proakis)
5. Introduction to electromyography (E. Criswell)
6. EEG Signal Processing, (S. Sanei and J. Chambers)
7. Essential Matlab for Engineers and Scientists (B. Hahn, D. Valentine)

Grading Policy (Subject to Revision)

Task	***Section***	***Grade in %***
Homework and surprise tests	A	10
Five Computer Assignments	B.1	25
Term Projects (May be taken from the Applications (B.2))	B.2	40
Three Class Exams	A	25