

MPHC4151

Core Lab I and Computational Techniques

Group A: Core Lab-I (Electronics)

1. Design of Passive Filters: Symmetric T- and Π - filters (LPF and HPF) designed using inductances and capacitances
2. Design of Active Filters: LPF, BPF, HPF and Notch filters designed using OPAMP IC –741C.
3. Design of oscillators: Astable multivibrator designed using BJT as a square wave generator as well as VCO. Relaxation oscillator designed using UJT (2N 2646)
4. Design of A/D and D/A converters using discrete components
5. Experiment with MOS device: Drain and Transfer characteristic of MOSFET (Depletion and Enhancement mode)
6. Programming a micro-processor (8085) and interfacing using a 7 – segment display (Counting of pulses).
7. Programming a micro-controller (80851)

References:

1. Foundation of solid state devices by Streetman and Banerjee, Pearson
2. Digital Electronics by Malvino and Leach, Tata McGraw Hill
3. Electronic Communication by Roddy and Coolen , Pearson
4. P. B. Zbar and A. P. Malvino – Basic Electronics: A text-lab manual (Tata-McGraw Hill Publ. Co.)

[36 lectures]

Group B: (Lab) (Computational Technique)

Brief Introduction to ELN

Matlab/Scilab: Matrix computing, Matrix vs. Array operations, Storage, Constants (e,pi, Inf,NaN etc) and Test matrices (Hadamard, Pascal, Magic etc). Simple applications using signals and images. Data Visualization: 2D/3D/Interactive plotting, Curve fitting, Interpolation and root finding (tools and algorithms).

Scientific Report writing: The LaTeX ecosystem, Document structure, Commands and Environments, Typesetting Mathematics, Including graphics and generating bibliographies.

[36 lectures]