ANALOG FILTERS AND SIGNAL PROCESSING

Paper Code	**ECS-501**
Course Credits	4
Lectures/ Week	3
Tutorials/ Week	1

Course description

UNIT- I ACTIVE ELEMENTS AND THEIR APPLICATIONS

Introduction to active elements, primary and secondary building blocks, operational amplifier (op-amp), operational transconductance amplifier (OTA), immittance converter, pathological elements (Nullator, Narator and Nullor) and their use in realizing controlled sources and other active elements, active networks synthesis.

UNIT II ACTIVE FILTER DESIGN

Active filter synthesis, cascade approach, first order networks, simulated inductance approach and FDNR approach to op-amp RC Filters, the biquad (single amplifier and multi-amplifier biquads) filters, negative feedback topology positive feedback topology, some design problems, introduction to active-R filters, Active-C-filters.

UNIT III FILTER APPROMIMATION MODELS

Introduction to analog filter theory, filter approximations, Butterworth approximation, Chebyshev approximation and inverse Chebyshev approximation, frequency transformations, low pass-low pass, low pass-high pass, low pass-band pass and low pass to band reject transformations, some design problems.

UNIT IV SENSITIVITY FUNCTION

Sensitivity study, sensitivity function, magnitude and phase sensitivities, single parameter sensitivity, multiple parameter sensitivity, gain sensitivity, root sensitivity, general relation of network functions sensitivities.

UNIT V   SWITCHED CAPACITOR FILTERS

The MOS switch, the switched capacitor/resistor equivalence, analysis of switched capacitor filters using charge conservation equations, switched capacitor biquads, design examples.

Text/

Refrence Books

1.Wai Kai Chen, "Passive and Active Filter Theory and Implementations:, John Wiley and Sons, 1986

2. M.E. Vanvalkenburg," Analog Filter Design", Jolt Rinehart & Winston, New Yark, 1982.

3. Y.F. Lam, "Analog and Digital Filters: Design and Realization", Englewood N.J., 1979

4. GobindDaryanani, "Principles of Active network Synthesis and Design", John Wiley, New Yark,. 1976.

5. M.E. Van Valkenburg and Kinariwala, "Linear Circuits", Prenticed Hall of India.

6. R. Schaumann, M.S. Ghausi and K.R. Laker, "Design of Analog Filters: passive, active RC and switched capacitors", Prentice Hall, Englewood cliffs, NJ, 1990.

Course Outcome:

CO1. An ability to develop thorough understanding of the different active and Pathological elements.

CO2. Capability to develop skills in analysis and design of various analog filters.

CO3. Ability to understand the approximation in the Analog Filters and analyze their design.

CO4. Ability to develop skill regarding sensitivity functions of various filter transfer functions.

CO5. Capability to understand principle of operation of switched-capacitor filter circuits.

Computer usage/

PSPICE

Software required: