

ENG203 Filter Theory and Design

Level: 2

Credit Units: 5 Credit Units

Language: ENGLISH

Presentation Pattern: EVERY JAN

Synopsis:

Filter Theory and Design is a level 2 course which follows the prerequisite course Eng201 (Linear System Analysis and Design). It addresses basic knowledge of system analysis and modeling, the theory of filters and design techniques for analog and digital filters based on the theories of signals and systems introduced in course Eng201. Filters are essential components which are extensively used in various electronic systems. Comprehension and mastery of filter theories will be necessary to achieve expected performance in electronic system design. This course also serves as the prerequisite for other coursework in the areas of signal processing and communications engineering.

This course is to provide a theoretical foundation and some practical experience for analog and digital filters design in electronic systems and signal processing techniques.

Topics:

- Foundation of Filter Theories
- Ideal Low Pass Filter
- Design of Analog filters
- Z-transforms, transfer function manipulations, stability and causality
- Design of Digital Filter I (FIR Digital Filters)
- Design of Digital Filter II (IIR Digital Filters)

Textbooks:

Haykin, S. S. Van Veen, B.: Signals and Systems (eTextbook) 2nd edition John-Wiley and Sons (2004)
ISBN-13: 9781119496212

Haykin, S. S. Van Veen, B.: Signals and Systems (eTextbook) 2nd edition John-Wiley and Sons (2004)
ISBN-13: 9781119496212-AA

Learning Outcome:

- Sketch the frequency response of filter, zeros & poles of filter in s-plane and z-plane and block diagram representation of filters.
- Give the transfer function of filter.
- Discuss Butterworth, Chebyshev type I, II filter designs.
- Use frequency transformation method, bilinear transformation method to design filters.
- Analyze filter response and filter parameters.
- Compute cutoff frequencies, gain, roll-off, order, output signal and other parameters of filters.
- Determine the various responses (impulse, natural, forced) of the given system.
- Design FIR and IIR filters using the specified method.

Assessment Strategies:

Continuous Assessment Component	Weightage (%)
CLASS TEST	10
CLASS TEST	10
LAB TEST	10
Sub-Total	30

Examinable Component	Weightage (%)
Written Exam	70
Sub-Total	70

Weightage Total **100**