

B.E. ELECTRONICS ENGINEERING
FOURTH YEAR SEMESTER VII

SUBJECT: Filter Theory and applications

Lectures: 4 Hrs per week
Practical: 2 Hrs per week

Theory: 100 Marks
Term Work: 25 Marks

***Rationale:** Digital Filters are widely used today in many diverse application areas. Naturally filter design techniques play vital role in DSP applications. Some of these techniques are based on analog domain designing. It is therefore necessary to know different analog & digital filter designing concepts.*

DETAILED SYLLABUS

Filter Analysis in Frequency domain

1. Review of Frequency response of IIR filter
- 📄👉 Linear Phase FIR Systems
- 📄👉 Condition for Linear Phase
4. Magnitude & phase response for Four types of Linear Phase systems
5. Location of zeros

Analog filter designing techniques

6. The design process
7. The Butterworth filter
8. The Chebyshev approximation
9. The elliptic approximation
10. The Bessel function

IIR Digital filter Design

11. Methodology, Analog & Digital domain mapping, Spectral transformations
12. Impulse - Invariance Method
13. Bilinear transform technique
14. Matched Z-Transform technique
15. Intuitive approaches

FIR Digital filter Design

16. FIR versus IIR filters
- 📁📄👉 Window-based Design of different types of filters
- 📁👉 Gibb's Phenomenon
- 📁👉 Design using different Windows
20. Use of Kaiser Window
21. Half-Band FIR filters
22. Frequency sampling technique
23. Design of optimal linear phase FIR filters
24. Structures for implementation of filters

Quantization Effects
Quantization methods Limit cycle oscillations due to Quantization Errors in frequency response due to coefficient Quantization
BOOKS
Text Books:
1A. Antoniou, Digital Filters: Analysis Design and Applications, Tata McGraw-Hill Publication, 2001
2.Ashok Ambardar, Analog and Digital Signal Processing, Thomson Learning Publication, second edition, 2001
Additional Reading:
1. T. J. Cavicchi, Digital Signal Processing, Wiley Publication, 2002
2. S.K. Mitra, Digital Signal Processing, Tata McGraw-Hill Publication, 2001
TERM WORK
1.Term work shall consist of at least six software programs written in C / MATLAB and two assignments covering the topics of the syllabus.
2.A term work test shall be conducted with a weightage of 10 marks.