

141. APPLIED MATHEMATICS FOR ELECTRONIC ENGINEERS

CONTENTS

1 Semester (3h+2h)

Frequency analysis motivation. Outlook of linear differential equations. Linear dynamical systems. Frequency response.

Introduction to distribution theory. Delta function. Distributional calculus. Convergence of distributions. Application to linear differential equations.

Fourier series. Trigonometric and Fourier series. Fourier series convergence. Parseval formula. Convolution of sequences. Completely positive sequences.

Fourier transform. Heuristic approach. Elementary examples. Properties of the Fourier transform. Inversion of the Fourier transform. Plancherel formula. Fourier transform of distributions.

Sampling theory. Interpolation with trigonometric polynomials. Limited band signals: Shannon theorem. Poisson sum formula. Signal approximation by band limited signals. Bernstein's inequality.

Fast Fourier transform. Discrete Fourier transform. Elementary properties. FFT algorithms. Cyclic convolution. Relation with circulant matrices. Numerical computation of Fourier transforms.

TEXT (BASIC BIBLIOGRAPHY)

"The Fast Fourier Transform". Brigham B. O. Prentice-Hall, 1974.

"Numerical methods for scientists and engineers. Hamming R. W. McGraw-Hill, 1962.

"The Fourier integral and its applications". Papoulis A. McGraw-hill, 1962.

"Distribution theory and transform analysis". Zemanian A. McGraw-Hill, 1965.

Teachers: M. Alvarez

Exams:

F1: 02-02(T) F2: 01-03(M) F3: 30-05(T) F4: 15-06(T) F5: 21-09(T)