MMA- E412
FOURIER TRANFORM AND WAVELET ANALYSIS

MM : 100 Sessional : 30
Time : 3 hrs ESE : 70
L T P Pass Marks : 40
5 2 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain 10 short answer type questions of six marks each and student shall be required to attempt any five questions. Sec.-B shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper

The Fourier transforms (FT) and examples, Basic properties FT, Derivatives of FT, Riemann-Lebesgue lemma, Inverse Fourier transform Convolution of functions and its examples, Convolution theorem, Parseval's relation, statement of Plancherel's theorem, Eigenvalues and eigenfunctions of FT.

Periodic functions, Trigonometric polynomial and series, Orthogonal Systems, Orthogonality of trigonometric systems, Fourier series of 2π-periodic functions, Fourier series for orthogonal system, Definition of Lp-space and examples, Complete system.

The limit as $n\rightarrow\infty$ of the trigonometric integrals, Formula for sum of cosine-auxiliary integral, Integral formula for partial summation Fourier series, Convergence of a Fourier series at the points of Continuity and discontinuity (Piecewise smooth function of period 2π).

Definitions of wavelets and examples, Continuous wavelet transforms and examples, Basic properties of wavelet transforms, Parseval's formula for wavelet transform, Inversion theorem for wavelet transform. The Discrete wavelet transforms and examples, Orthonormal wavelets and its examples.

Refinement equation and examples, Dyadic number, Definition of Multiresolution Analysis (MRA) and examples, Properties of scaling functions and orthonormal wavelets bases, Orthonormalization process, Construction of orthonornal wavelets (Some basic Examples).

Text /Reference Books

1. Georgi P. Tolstor, Fourier Series, Dover Pule., INC New York
2. Lokenath Debnath, Wavelet transforms and Their Applications, Birkhauser, Boston
3. A Boggess & F J. Narcowich, A First Course in Wavelets with Fourier Analysis, Prentice Hall
4. C. K. Chui, An Introduction to Wavelets, Academic Press, New York
5. E. Herna'ndez and G. Weiss, A First Course in Wavelets, CRC Press, New York
6. Ingrid Daubechies, Ten Lectures on Wavelets, SIAM Pub.