TEACHING PLAN	
Course Title: Wavelet Analysis and Applications	**Duration of Examination: 3 hours**
Course Code: MAMT--419	**Maximum Marks: 100**
Course Instructor: Prof. S. D. Sharma	
Unit I	
LECTURE I	Fourier transformations in L2 (R)
LECTURE 2	A Sampling Theorem
TUTORIAL 1	Exercises related to Lecture I and Lecture 2
LECTURE 3	The Discrete and Fast Fourier transformations
LECTURE 4	The DFT in Matrix form
TUTORIAL 2	Examples and exercises related to Lecture 3 and Lecture 4
LECTURE 5	Inversion Theorem for DFT, DFT map
LECTURE 6	Fast Fourier Transform for N = 2k
TUTORIAL 3	Examples and Exercises related to Lecture 5 and Lecture 6
LECTURE 7	Buneman's Algorithm
LECTURE 8	FFT for N = RC, FFT form
TUTORIAL 4	Exercises related to Lecture 7 and Lecture 8
Unit II	
LECTURE 9	Wavelets: Definition and examples
LECTURE 10	Orthonormal basis from one function
TUTORIAL 5	Exercises and examples related to Lecture 9 and Lecture 10
LECTURE 11	Multiresolution analysis
LECTURE 12	Orthonormal Direct Sums
TUTORIAL 6	Exercises and examples related to Lecture 11 and Lecture 12
LECTURE 13	Mother wavelets
LECTURE 14	Theorems related to Lecture 13
TUTORIAL 7	Exercise related to Lecture 13 and Lecture 14
LECTURE 15	From MRA to Mother wavelets
LECTURE 16	Theorems related to Lecture 15
TUTORIAL 8	Exercises related to Lecture 15 and Lecture 16
Unit III	
LECTURE 17	Construction of a scaling function with compact support
LECTURE 18	Shannon wavelets
TUTORIAL 9	Examples and exercises related to Lecture 17 and Lecture 18
LECTURE 19	Riesz bases and MRAs
LECTURE 20	Franklin wavelets

TUTORIAL 10	Examples and exercises related to Lecture 19 and Lecture 20
LECTURE 21	Frames
LECTURE 22	Weyl-Heisenberg Frames Splines
TUTORIAL 11	Examples and exercises related to Lecture 21 and Lecture 22
LECTURE 23	The continuous wavelets transforms
LECTURE 24	Continue lecture 23
TUTORIAL 12	Examples and exercises related to Lecture 23 and Lecture 24
Unit IV	
LECTURE 25	Wavelets constructions
LECTURE 26	Biothogonal wavelets
TUTORIAL 13	Examples and exercises related to Lecture 25 and Lecture 26
LECTURE 27	Wavelets in several variables
LECTURE 28	Theorems related to Lecture 19
TUTORIAL 14	Examples and exercises related to Lecture 27 and Lecture 28
LECTURE 29	Wavelets packets
LECTURE 30	Multi-wavelets
TUTORIAL 15	Examples and exercises related to Lecture 29 and Lecture 30
LECTURE 31	Wavelets frames
LECTURE 32	Theorems related to Lecture 23
TUTORIAL 16	Examples and exercises related to Lecture 31 and Lecture 32
Unit V	
LECTURE 33	Applications of wavelets
LECTURE 34	Coninue Lecture 33
TUTORIAL 17	Examples and exercises related to Lecture 33 and Lecture 34
LECTURE 35	Applications in Statistics
LECTURE 36	Continue Lecture 35
TUTORIAL 18	Examples and exercises related to Lecture 35 and Lecture 36
LECTURE 37	Netural networks
LECTURE 38	Differential equations
TUTORIAL 19	Examples and exercises related to Lecture 37 and Lecture 38
LECTURE 39	Turbulence, Medicine
LECTURE 40	Economics and Finance
TUTORIAL 20	Examples and exercises related to Lecture 39 and Lecture 40
Total Lectures: 40	Total Tutorials: 20 Total = 60

Textbooks:

1. G. Bachman, Lawrence Narici and Edward Beckenstein, Fourier and Wavelet Analysis, Springer-Verlag, New-York, 2000 (for Units 1,2,3).
2. Khalid Ahmad and F. A. Shah, Introduction to wavelets and Applications, World Education Publisers, 2013 (for Units 4 and 5).

Reference books:

1. D. F. Walnut, An introduction to Wavelets Analysis, Birkhauser, 2002.
2. M. V. Wickerhauser, Adapted Wavelets Analysis from the Theory to Software, A. K. Peters Ltd., Wellesley, 1994.