SCHEME OF COURSE WORK

Course Details:

Course Title :	Transform Techniques
Course Code :	15EC2104 L T P C : 3 0 3
Program:	M.Tech.
Specialization :	Communications Engineering and Signal Processing
Semester :	1
Prerequisites :	Signals and Systems, Digital Signal Processing
Courses to which it is a prerequisite :	--

Course Outcomes (COs):

1	Comprehend the various two dimensional transforms and their applications
2	Analyze and compare the different image transforms.
3	Comprehend the time-frequency analysis of transforms.
4	Design and Analyze the continuous and discrete wavelet transforms.
5	Analyze the orthogonal wavelets and Multi Resolution Analysis of transforms.

Course Outcome Versus Program Outcomes:

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO-1	M										
CO-2	M										
CO-3	M	M	S								
CO-4	S	S	M	S	S						
CO-5	S	S			M	M	S		M	S	M	M

S- Strongly correlated, M- Moderately correlated, Blank- No correlation

Assessment Methods:	Assignment/Quiz/Seminar/Case Study/Mid Test/End Exam

Teaching-Learning and Evaluation

Week	TOPIC/CONTENTS	Course Outcomes	Sample Questions	TEACHING-LEARNING STRATEGY	Assessment Method and Schedule
1	Introduction, need for transforms, concept of Two Dimensional Fourier transforms	CO-1 &CO-2	1. What is the need for Image transforms? 2. Define 2D DFT and IDFT.	o Lecture/ Discussion/ Problem solving	Assignment I/Quiz-I/Mid-I
2	Two Dimensional Fourier transforms-properties &their significance	CO-1 &CO-2	1. State and prove R,S,T Properties of 2D DFTs. 2. Define and prove	o Lecture/ Discussion Problem solving	Assignment I/Quiz-I/Mid-I

			Convolution Theorem.		
3	Energy &Power spectral density functions, Discrete Cosine Transform and applications	CO-1 &CO-2	1. Define ESD and PSD functions. 2. Obtain the kernel coefficients of1D DCT for N=8.	o Lecture/ Discussion Problem solving	Assignment I/Quiz-I/Mid-I
4	Walsh transform, Hadamard transform, Haar transform	CO-2	1. Distinguish between Walsh and Hadamard Transforms. 2. Obtain Haar transform matrix for N=8.	o Lecture/ Discussion Problem solving	Assignment I/Quiz-I/Mid-I
5	Slant transform, KL transform, Singular Value Decomposition	CO-2	1. Obtain Slant transform matrix for N=8. 2. Explain the principle of SVD.	o Lecture/ Discussion Problem solving	Assignment I/Quiz-I/Mid-I
6	Hough Transforms, Radon Transforms	CO-2	1. Explain about Hough Transforms. 2. Explain the principle of Radon transforms.	o Lecture/ Discussion	Assignment I/Quiz-I/Mid-I
7	Comparison of different Image transforms	CO-2	1.Compare various Image transform with respect to their advantages, disadvantages and applications	o Lecture/ Discussion	Assignment I/Quiz-I/Mid-I
8	Window function, Short Time Fourier transform, Properties of STFT	CO-3	1. Define Window function. 2. Explain the properties of STFT.	Lecture	Assignment I/Quiz-I/Mid-I
9	Mid-Test 1				
10	Discrete Short Time Fourier Transform, The Origin of Wavelets, Continuous Wavelet Transforms(CWT)	CO-3	1. Define Discrete STFT. 2.Define CWT.	o Lecture/ Discussion/ Problem solving	Assignment II/Quiz-II/Mid-II
11	The Uncertainty Principle and Time frequency Tiling, Properties of wavelets in CWT	CO-3	1. Explain about Uncertainty principle of CWT. 2.Explain the properties of wavelets in CWT.	o Lecture/ Discussion	Assignment II/Quiz-II/Mid-II
12	Introduction to the Discrete Wavelet Transforms, Continuous versus Discrete Wavelet Transform	CO-4	1. Define DWT. 2.Distinguish between CWT and DWT.	o Lecture/ Discussion	Assignment II/Quiz-II/Mid-II
13	Haar Scaling and Wavelet	CO-4	1. Explain about Haar	o Lecture/	Assignment

			scaling and wavelet functions. 2. Define function Space.	Discussion	II/Quiz-II/Mid-II
14	Scales Haar wavelet Functions and Orthogonal wavelets, Support of Wavelet system, Daubechies Wavelets, Applications	CO-4	1. Define Daubechies wavelet. 2.What are the applications of DWT.	o Lecture/ Discussion	Assignment II/Quiz-II/Mid-II
15	Refinement Relation for Orthogonal Wavelet Systems, Restrictions on Filter Coefficients	CO-5	1. Explain about relation for Orthogonal wavelet systems. 2. What are the restrictions on filter coefficients?	o Lecture/ Discussion	Assignment II/Quiz-II/Mid-II
16	Signal Decomposition and Relationship with Filter Banks, Frequency Response, Signal Reconstruction, Perfect Matching Filters	CO-5	1. Explain about signal decomposition and relationship with filter banks. 2. Explain about perfect matching filters.	o Lecture Discussion/ Problem solving	Assignment II/Quiz-II/Mid-II

17	Multi-Resolution Analysis (MRA), Two Scale Relations, Ortho Normal Wavelets and Their Relationship to Filter Banks, PR QMF Filter Banks	CO-5	1. Define and Explain about MRA. 2. Write short notes on PRQMF Filter banks.	o Lecture/dis cussion/ problem solving	Assignment II/Quiz-II/Mid-II
18	Mid-Test 2	CO-3,4,5			
19/20	END EXAM	ALL CO'S			