GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. EC (SIGNAL PROCESSING & COMMUNICATION)

PROPOSED TEACHING SCHEME (W.E.F. July 2012)

Semester III

SR. No.	SUBJECT	TEACHING SCHEME(HOURS)			CREDITS
		THEORY	TUTORIAL	PRACTICAL	
	Major Elective IV	4	0	2	5
734101	Lab	0	0	4	2
730001	Seminar	0	0	4	2
730002	Presentation of Literature Review	0	0	0	2
730003	Dissertation Phase-I	0	0	18	9
	TOTAL	**4**	**0**	**28**	**20**

Sr. No.	Major Elective - IV
734102	Digital Audio Coding
734103	Multimedia Signal Processing and Communication
734104	Digital Watermarking and Steganography

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Semester III

Subject Name: Digital Audio Coding

Subject Code: 734102

SrNo	Course Contents
1.	**Introduction:** Representation of audio signals, Digital audio coder, Audio coding goals, PCM, Compact disk, Potential coding errors, Quantization errors, Entropy coding, Audio notation, dirac delta, Summary properties of audio signals
2.	**Time to frequency mapping methods:** PQMF, PQMF Filter Bank, Two channel perfect reconstruction filter banks, MDCT, DFT, Overlap and add technique, Modified transform.
3.	**Psychoacoustics:** Introduction, Sound pressure levels, Loudness, Hearing range and threshold, Masking phenomenon and masking curves, Critical bandwidths, Psychoacoustics models for audio coding, excitation patterns and masking models, Bark scale, Models for Spreading of Masking.
4.	**Perceptual Audio Coder:** Introduction, overview of the coder building blocks, Computing masking curves, Bitstream formats, Business models and Coding secrets, Quality measurement of perceptual Audio Codec, Audio quality, System with small impairments.
5.	**Audio Coding Standards:** History of MPEG standards, MPEG-I audio, MPEG-2 audio, MPEG-I audio, MPEG-2 LSF and MP3, MPEG-2 AAC, Dolby AC-3, MPEG-4 audio.

Text and Reference Books:

1. Title: Introduction to Digital Audio Coding and Standards,
   Authors: Marina Bosi and Richard E Goldberg,
   Publisher: Springer(India) Private Limited Publications

2. Title: Multimedia Communication Systems: Techniques, Standard and Networks
   Authors: K.R.Rao, Zoran S. Bojkovic and D.A.Milovanovic
   Publisher: Pearson Education Asia

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Subject Name: Multimedia Signal Processing and Communication
Subject Code: 734103

Sr_No	Content
1.	**Multimedia Information Representation**: Digitization principles, Text, Images, Audio and Video
2.	**Text and Image Compression**: Compression principles, Lossy and Lossless Compression, Entropy Coding and Source Encoding, Static Huffman Coding, Dynamic Huffman Coding, Arithmetic Coding, Lempel - Ziv Coding, GIF Format, TIFF Format, Digitized documents, Digitized Pictures, JPEG
3.	**Audio and Visual Integration**: Media Interaction, Bimodality of Human Speech, Lip Reading and Synchronization, Audio- Visual Mapping.
4.	**Audio and Video Compression**: Audio Compression, DPCM, ADPCM, Adaptive Predictive Coding, Linear Predictive Coding, Code Excited LPC, Perceptual Coding, MPEG Audio Coder, Digital Video Processing Fundamentals, Video Compression Principles, Video Compression Standards.
5.	**Multimedia Networks and Applications**

Text and Reference Books:

1 Title: Multimedia Communications: Application ,Network, Protocols and Standards
Author: Fred Halsall
Publisher: Pearson Education Asia

2 Title: Multimedia Communication Systems: Techniques, Standard and Networks
Author: K.R.Rao, Zoran S. Bojkovic and D.A.Milovanovic
Publisher: Pearson Education Asia

3 Title: Data Compression :The Complete Reference
Author: David Salomon
Publisher: Springer International Edition

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M.E. EC (SIGNAL PROCESSING & COMMUNICATION)
Semester III

Subject Name: Digital Watermarking and Steganography
Subject Code: 734104

Sr_No	Content
1.	**Introduction: Digital Watermarking**: Digital Steganography, Difference between Watermarking and Steganography
2.	**Classification in Digital Watermarking and Fundamentals:** Classification Based on Characteristics, Blind versus Nonblind, Perceptible versus Imperceptible, Private versus Public, Robust versus Fragile, Spatial Domain versus Frequency Domain, Classification Based on Applications, Chaotic map, Error Correction Code, Set Partitioning in Hierarchical Tree, Spatial Domain Watermarking, Frequency Domain Watermarking, Fragile Watermarking, Robust Watermark.
3.	**Watermarking Attacks and To**ols**:** Image Processing Attacks, Geometric Transformation, Cryptographic Attack, Protocol Attacks, and Watermarking tools.
4.	**Introduction to Digital Steganography:** Types of Steganography, Application of Steganography, Embedding Security and Imperceptibility, Example of Steganographic Software.
5.	**Steganalysis:** An overview, Statistical Properties of Images, Visual Steganalytic System, IQM-based Steganalytic System, Learning strategies, Frequency Domain Steganalytic System.

Text and Reference Books**:**

1. Title: Digital Watermarking and Steganography
   Author: Frank Y. Shih
   Publisher: CRC Press
2. Title: Digital Watermarking and Steganography
   Author: I.J.Cox
   Publisher: Morgan and Kauffman Series