

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR6E2 MULTIMEDIA COMMUNICATION	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objective: This course introduces fundamental technologies for video communications and networking. It will address 1) how to efficiently represent and process video signals, and 2) how to deliver video signals over networks.

Prerequisite: Computer Networks and D.S.P

COURSE CONTENTS

UNIT-I

Introduction to Multimedia What is multimedia, multimedia and hypermedia, Graphics and Image representation, Graphics/Image data types, popular file formats Fundamental concepts in Video. Types of video signals, Analog Video, Digital Video, Basics of Digital Audio, Digitization of Sound, MIDI, Quantization and transmission of audio.

UNIT-II

Lossless compression Algorithms : Run length coding, variable length coding, Dictionary based coding, Arithmetic coding, lossless image compression

UNIT-III

Lossy compression algorithm: Introduction, distortion measures, rate distortion theory, quantization, transform coding, Wavelet based coding, embedded zero tree wavelet coefficients, SPIHT

UNIT-IV

Image compression standards: The JPEG standard, JPEG 2000 standard, JPEG LS standard, JBIG

UNIT-V

MPEG Video Coding : Basic video compression techniques---H.261, MPEG-1, MPEG-2, MPEG-4, Video transport over the Internet and wireless networks

Learning Outcomes:

At the end of the course, the students would

- understand the basics of analog and digital video: video representation and transmission
- analyze analog and digital video signals and systems
- know the fundamental video processing techniques
- acquire the basic skill of designing video compression
- familiarize himself/herself with video compression standards
- know the basic techniques in designing video transmission systems: error control and rate control

BOOKS RECOMMENDED:

- [1].D. Taubman and M. Marcellin, "JPEG2000: Image Compression Fundamentals, Standards, and Practice," Kluwer, 2001.
- [2].Iain E G Richardson, "H.264 and MPEG-4 Video Compression," John Wiley & Sons, September 2003
- [3].M. E. Al-Mualla, C. N. Canagarajah and D. R. Bull, "Video Coding for Mobile Communications: Efficiency, Complexity and Resilience", Elsevier Science, Academic Press, 2002.
- [4].A. Murat Tekalp, "Digital Video Processing," Prentice Hall, Englewood Cliffs, NJ, 1995.
- [5].Khalid Sayood, "Introduction to Data Compression," 2nd ed., Morgan Kaufmann, 2000.
- [6].Jerry Gibson, Toby Berger, Tom Lookabaugh, Rich Baker and David Lindbergh, "Digital Compression for Multimedia: Principles & Standards," Morgan Kaufmann, 1998.
- [7].A. N. Netravali and B. G. Haskell, "Digital Pictures – Representation, Compression and Standards," 2nd ed. Plenum Press, 1995.

List of Practical Assignments:

Practical based on Audio and Vision System Toolbox of MATLAB:

- Computer Vision System Toolbox™ provides algorithms and tools for video processing workflows. Read and write from common video formats, perform common video processing algorithms such as deinterlacing and chroma-resampling, and display results with text and graphics burnt in to the video. Video processing in MATLAB® uses System objects, which avoids excessive memory use by streaming data to and from video files.
- Audio System Toolbox™ provides algorithms and tools for the design, simulation, and desktop prototyping of audio processing systems. It enables low-latency signal streaming from and to audio interfaces, interactive parameter tuning, and automatic generation of audio plugins for digital audio workstations. Audio System Toolbox includes libraries of

audio processing algorithms (such as filtering, equalization, dynamic range control, and reverberation), sources (such as audio oscillators and wavetable synthesizers), and measurements (such as A- and C-weighting). Interfaces to external MIDI controls and low-latency audio drivers such as ASIO, ALSA, and CoreAudio enable to validate multichannel audio designs in MATLAB[®] or Simulink[®].