NIRMA UNIVERSITY
SCHOOL OF TECHNOLOGY, INSTITUTE OF TECHNOLOGY
M. Tech. in Electronics and Communication Engineering (Embedded System)
M.Tech. Semester - II
Department Elective I

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Course Code	**6EC261ME22**
Course Title	**Multimedia Systems and Applications**

Course Learning Outcomes (CLOs):

At the end of the course, students will be able to -

1. Evaluate lossy and lossless compression algorithms for text, image, audio and video data.
2. Analyse audio, image and video compression standards - LZW, JPEG, MPEG, HEVC, LPC.
3. Comprehend different protocols of multimedia communication networking and their applications.

Syllabus: **Teaching Hours:45**

UNIT I: Introduction to Multimedia **03**

Multimedia information representation and network, Multimedia applications, Application and networking terminology, Representation of text, audio images and video,

UNIT II: Text Compression **05**

Compression Principles, Entropy based and Arithmetic based compression methods, Dictionary based LZ77, LZ78 and LZW algorithms

UNIT III: Image Compression **10**

Transform Coding - DCT, KLT and Principal component analysis (PCA), Still image compression methods – JPEG, Wavelet transform based methods - EZW, SPIHT and JPEG 2000 standards, Scalar and vector quantization based compression methods, Other standard compression formats – GIF, DjVu, PNG

UNIT IV: Video Compression Algorithms and Standards **10**

Basic and fast motion estimation and compensation algorithms, Video compression standards - MPEG 1, MPEG 2, MPEG 4, MPEG 7, H.261, H.263, and H.265

UNIT V: **Speech and Audio Compression** **04**

Fundamentals of speech production mechanism and speech Model, LPC coding, Speech compression standards, MPEG audio compression

UNIT VI: Multimedia System Design **03**

Hardware - Multimedia processor architecture, digital and analog I/O, Video camera, I/O Devices, USB bus interface, and HDMI interface, Software - Operating system, Scheduling algorithms (EDF, RMS), Resource management and management of I/O system

UNIT VII: Multimedia Communication **06**

Multimedia networking, delivery modalities, Digital television transmission and reception, Set top box design and CAS mechanism, Properties of multimedia servers, Real time Internet Protocol architecture - RTP, RTSP, RTCP and SIP

UNIT VIII: Multimedia Content Management and Retrieval **04**

Stored media access, Media filtering, Content based query and Query based example (QBE), Content based image retrieval (CBIR), Video retrieval

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Suggested Readings:

1. Li and Drew, Fundamentals of Multimedia, Prentice Hall India
2. Khalid Sayood, Data Compression, Morgan Kauffman
3. Saloman, Data Compression Handbook, Springer
4. Halsall, Multimedia Communications and Networking, Person Education Asia