PVP-19

DIGITAL SIGNAL COMPRESSION

Course Code	19EC4701B	**Year**	IV	**Semester**	I
Course Category	Program Elective IV	**Branch**	ECE	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Digital Signal Processing
Continuous Internal Evaluation:	30	**Semester End Evaluation:**	70	**Total Marks:**	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Analyse various coding techniques used for signal compression (L4)
CO2	Calculate rate distortion for different sources (L2).
CO3	Compare different quantization techniques used for compression (L4)
CO4	Examine the compression standards of audio, image and video signals. (L2).
CO5	Apply various signal compression techniques and evaluate their performance (L3).

Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix)

Note: 1- Weak correlation 2-Medium correlation 3-Strong correlation

* - Average value indicates course correlation strength with mapped PO

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	2	2							1	2	1
CO2	3	3	2	2	2							1	2	1
CO3	3	3	2	2	2							1	2	1
CO4	3	3	2	2	2							1	2	1
CO5	3	3	2	2	2							1	2	1
Average* (Rounded to nearest integer)	3	3	2	2	2							1	2	1

Syllabus		
Unit No.	**Contents**	**Mapped CO**
I	**Mathematical Preliminaries for Lossless Compression:** Overview, a brief introduction to information theory, derivation of average information, models, coding. **Huffman Coding:** Overview, the Huffman coding algorithm. **Arithmetic Coding:** Introduction, coding a sequence, generating a binary code,comparison of Huffman and Arithmetic coding, Adaptive Arithmetic coding.	**CO1**
II	**Mathematical Preliminaries for Lossy Coding:** Introduction, distortion criteria, information theory revisited models. **Scalar Quantization:** Introduction, the quantization problem, uniform quantizer, adaptive quantization, non-uniform quantization.	**CO2, CO3**

III	**Vector Quantization:** Introduction, advantages of vector quantization over scalar quantization, the Linde-Buzo-Gray algorithm. **Differential Encoding:** Introduction, the basic algorithm, prediction in DPCM,Adaptive DPCM, delta modulation, speech coding.	**CO3**
IV	**Transform Coding:** Transforms of interest, quantization and coding of transform coefficients, application to image compression—JPEG, application to audio compression-the MDCT. **Subband Coding:** Introduction, filters, some filters used in subband coding, the basic subband coding algorithm.	**CO3, CO4**
V	**Audio Coding:** Introduction, MPEG audio coding. **Video compression:** Introduction, motion compensation, video signal representation, ITU-T recommendation H.261.	**CO5**

Learning Resources
Text Books
1. Khalid Sayood, Introduction to Data Compression, 4/e, Elsevier, India, 2012.
Reference Books
1. Jayant, Noll, Digital Coding of Waveforms-Principles and Applications to Speech and Video Prentice Hall, New York, 1984. 2. David Salomon, Data Compression: The Complete Reference, Springer, 2000. 3. ZiNian Li, Fundamentals of Multimedia, Pearson Education, 2003.
e- Resources & other digital material
1. http://www.nptel.iitm.ac.in/
