

PES INSTITUTE OF TECHNOLOGY BANGALORE SOUTH CAMPUS

Hosur Road,

ELECTRONIC CITY, BANGALORE

LESSON - PLAN

INFORMATION THEORY AND CODING

Subject Code : 17EC54

Hours/Week : 04

Total Hours : 50

Faculty: PROF.AJEY.S.N.R/PROF.RAJESH.C

IA Marks : 40

Exam. Hours : 03

Exam. Marks : 60

Module	TOPICS	%Portion Coverage	
		Reference	Cumulative
Module 1- Information Theory	Introduction to Information theory, Measure of Information	20%	20%
	Average Information content of symbols in Long Independent sequences		
	Average Information content of symbols in Long Independent sequences		
	Average Information content of symbols in Long dependent sequences		
	Average Information content of symbols in Long dependent sequences		
	Markov Statistical Model of Information Sources		
	Markov Statistical Model of Information Sources		
	Entropy and Information rate of Markoff Sources		
	Entropy and Information rate of Markoff Sources		
	Module 2- Source Coding		
Prefix Codes			
Kraft McMillan Inequality property – KMI			
Encoding of the Source Output			
Shannon’s Encoding Algorithm			
Shannon Fano Encoding Algorithm			
Huffman codes			
Extended Huffman coding			
Arithmetic Coding			
Lempel – Ziv Algorithm			

Module 3- Information Channels	Communication Channels	20%	60%
	Channel Models		
	Channel Matrix, Joint probability Matrix		
	Binary Symmetric Channel		
	System Entropies		
	Mutual Information, Channel Capacity		
	Channel Capacity of : Binary Symmetric Channel, Binary Erasure Channel		
	Muroga's Theorem, Continuous Channels		

Module 4 - Error Control Coding	Introduction, Examples of Error control coding	20%	80%
	Methods of Controlling Errors, Types of Errors		
	Types of Codes		
	Linear Block Codes: matrix description of Linear Block Codes		
	Error Detection and Error Correction Capabilities of Linear Block Codes		
	Single Error Correcting hamming Codes		
	Table lookup Decoding using Standard Array		
	Binary Cyclic Codes: Algebraic Structure of Cyclic Codes		
	Encoding using an (n-k) Bit Shift register		
	Syndrome Calculation, Error Detection and Correction		
Module 5- Some Important Cyclic Codes	Golay Codes, BCH Codes	20%	100%
	Convolution Codes: Convolution Encoder		
	Time domain approach		
	Transform domain approach		
	Code Tree, Trellis and State Diagram		
	The Viterbi Algorithm		

TEXT BOOKS

- 1.** Digital and analog communication systems, K. Sam Shanmugam, John Wiley India Pvt. Ltd, 1996.
- 2.** Digital communication, Simon Haykin, John Wiley India Pvt. Ltd, 2008.
- 3.** Information Theory and Coding, Muralidhar Kulkarni, K.S. Shivaprakasha, Wiley India Pvt. Ltd, 2015, ISBN:978-81-265-5305-1.

REFERENCE BOOKS

- 1.** ITC and Cryptography, Ranjan Bose, TMH, II edition, 2007
- 2.** Principles of digital communication, J. Das, S. K. Mullick, P. K. Chatterjee, Wiley, 1986 - Technology & Engineering
- 3.** Digital Communications – Fundamentals and Applications, Bernard Sklar, Second Edition, Pearson Education, 2016, ISBN: 9780134724058.
- 4.** Information Theory and Coding, K.N.Haribhat, D.Ganesh Rao, Cengage Learning, 2017.