

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme		Bachelor of Technology				Branch/Spec.		Electronics and Communication Engineering	
Semester		VII				Version		1.0.0.0	
Effective from Academic Year			2026-27			Effective for the Batch admitted in			July 2023
Course Code		2EC71PE08		Course Name			Information Theory and Coding		
Teaching Scheme					Examination Scheme(Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50
Pre-requisites									
Probability theory, Linear Algebra									
Course Outcomes									
On successful completion of the course, the students will be able to:									
CO1	Understand the basics of Information theory, techniques of coding and decoding.								
CO2	Analyze and compare different coding and decoding schemes Evaluate.								
CO3	Solve numerical problems on channel capacity and coding.								
CO4	Evaluate and case study broadcast channels for different coding schemes and also multiuser channel coding.								
Theory Syllabus									
Unit	Content								Hrs.
1	Basics of information theory: Measure of information, Entropy for discrete ensembles, differential entropy and mutual information; Shannon's noiseless coding theorem, Calculation of channel capacity and bounds for discrete channels, Gaussian channel, Binary Symmetric Channel (BSC), continuous channels, application to continuous channels.								10
2	Source Coding: Encoding of discrete sources, Markov sources, Shannon's noisy coding theorem and converse for discrete channels, Huffman coding.								08
3	Introduction to Error Control Coding: Introduction, Types of errors, examples, Types of codes Linear Block Codes: Matrix description, Error detection and correction, Standard arrays and table look up for decoding.								10
4	Cyclic Codes: Binary Cycle Codes, Algebraic structures of cyclic codes, Encoding using an (n-k) bit shift register, Syndrome calculation. BCH codes, RS codes, Golay codes, Shortened cyclic codes, Burst error correcting codes. Burst and Random Error correcting codes.								08
5	Convolutional Codes & Iterative Decoding: Convolutional codes; majority logic decoding; Viterbi decoding algorithm, Trellis codes, Turbo Codes, constituent encoder, Interleaver, Low-Density Parity Check (LDPC) codes, MAP algorithms.								09
Practical Content									
Practical assignments are based on the above syllabus.									
Text Books									
1	Digital communication, Simon Haykin, John Wiley, 2003								
2	Information Theory Coding and Cryptography, Ranjan Bose, TMH, II edition, 2007								
Reference Books									
1	Digital communication, Amitabha Bhattacharya, McGraw Hill Education, 2017.								
2	Elements of Information Theory, Thomas M. Cover, Joy A. Cover, John Wiley, 2 nd Editon.								
3	Digital Communications - Glover and Grant; Pearson Ed. 2nd Ed 2008								
ICT/MOOCs Reference									

1	https://nptel.ac.in/courses/108102117

Mapping of CO with PO and PSO:															
	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
CO1	3	3	2	3	3	0	0	0	0	1	0	2	3	3	2
CO2	2	2	2	3	2	0	0	0	1	1	1	3	3	2	3
CO3	1	2	3	2	3	0	0	0	0	1	0	3	3	1	2
CO4	3	1	2	3	2	0	0	0	0	1	0	2	2	3	3