EC328: Information Theory and Coding

Details of course:-

Course Title	Course Structure			Pre-Requisite
	L	T	P	
Information Theory and Coding	3	1	0	Communication Systems

Course Objective: Introduction to concepts of Information theory and Coding

Course Outcomes:

CO1: Understand and apply fundamental concepts in information theory such as probability, entropy, information content and their inter-relationships

CO2: Compute information theoretic quantities, construct bounds and implement algorithms for source coding and noisy channel theorems

CO3: Apply linear block codes for error detection and correction

CO4: Design binary cyclic codes using shift register and perform syndrome calculations for error detection and correction

CO5: Implementation of encoders for convolutional codes

S. No.	Content	Contact Hours
Unit 1	Information Theory: Introduction, Measure of information, Average information content of symbols in long independent sequences, Averageinformation content of symbols in long dependent sequences. Mark-offstatistical model for information source, Entropy and information rateof mark-off source. Source Coding: Encoding of the source output,Shannon's encoding algorithm. Communication Channels, Discretecommunication channels, Continuous channels.	12
Unit 2	Fundamental Limits on Performance: Source coding theorem, Huffmancoding, Discrete memory less Channels, Mutual information, ChannelCapacity. Channel coding theorem, Differential entropy and mutualinformation for continuous ensembles, Channel capacity Theorem	8
Unit 3	Introduction to Error Control Coding: Introduction, Types of errors, examples, Types of codes Linear Block Codes: Matrix description,	8

	Error detection and correction, Standard arrays and table look up for decoding		
Unit 4	Binary Cycle Codes, Algebraic structures of cyclic codes, Encoding using an (n-k) bit shift register, Syndrome calculation. BCH codes.	6	
Unit 5	RS codes, Golay codes, shortened cyclic codes, Burst error correctingcodes. Burst and Random Error correcting codes. Convolution Codes,Time domain approach. Transform domain approach	8	
	Total	42	

Books:-

S. No	Name of Books/Authors/Publisher
1	Digital and analog communication systems, K. Sam Shanmugam, John Wiley
2	Digital communication, Simon Haykin, John Wiley.
3	ITC and Cryptography, Ranjan Bose, TMH, II edition
4	Digital Communications - Glover and Grant; Pearson Ed.