SCHEME OF COURSE WORK

Faculty : Dr.M.V.S.Sairam , Professor, ECE

Course Details:

Course Title	:	INFORMATION THEORY AND CODING
Course Code	:	13EC2109 L T P C : 4 0 0 3
Program:	:	M.Tech. (COMMUNICATION ENGINEERING AND SIGNAL PROCESSING)
Specialization:	:	Electronics and Communication Engineering
Semester	:	II SEM
Prerequisites	:	Probability Theory, Digital Communications
Courses to which it is a prerequisite	:	Wireless Commutations, Satellite Communications

Course Outcomes (COs):

CO_1	:	Design the channel performance using Information theory
CO_2	:	Comprehend various error control code properties
CO_3	:	Apply linear block codes for error detection and correction
CO_4	:	Apply convolution codes for performance analysis & cyclic codes for error detection and correction
CO_5	:	Design BCH & RS codes for Channel performance improvement against burst errors.

Course Outcome Vs **Program Outcomes:**

COs	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}
CO_1	S	S	S	S	S	S	S	S	S	M	
CO_2	S	S	M	S	M	S	S		S		
CO_3	S	S	M	S	M	M			S		
CO_4	S	M	M	S	M	M			S		
CO_5	S	M	M	S	M	M			S		

S - Strongly correlated, *M* - *Moderately* correlated, *Blank* - *No correlation*

Assessment Methods : *Assignment / Seminar / Case Study / Mid-Test / End Exam*

Teaching-Learning and Evaluation

Week	Topic / Contents	Course Outcomes	Sample questions	Teaching-Learning Strategy	Assessment Method & Schedule
UNIT-I: INFORMATION THEORY					
1	Entropy, Information rate, source coding: Shannon-Fano and Huffman coding techniques	CO_1	1. Define Entropy and Information rate 2. Calculate efficiency using Shannon-Fano and explain with example	▫ Lecture ▫ Demo	Mid-1/Assignment -1
2	Mutual Information, Channel capacity of Discrete Channel	CO_1	1.write a short notes on i) Mutual information and ii) channel capacity of discrete channel	▫ Lecture ▫ Problem solving	Mid-1/Assignment -1
3	Shannon- Hartley law, Trade-off between bandwidth and SNR.	CO_1	1a) Derive Shannon-Hartley law 1b) Explain about Trade-off between bandwidth and SNR	▫ Lecture	Mid-1/Assignment -1
UNIT-II : ERROR CONTROL CODES					
4	Examples of the use of error control codes, basic notations	CO_2	1a)Explain about error control codes with example 1b)construct (7,4) hamming code for all possible 4bit information bits	▫ Lecture	Mid-1/Assignment -1
5	Coding gain, Characterization of Error control codes	CO_2	1. Explain about coding gain and draw the graph between E_b/N_o and BER 2. Explain about characterization of Error control codes	▫ Lecture	Mid-1/Seminar -1
6	Performance of error control codes, comparison of uncoded and coded systems	CO_2	1a) Comparison of uncoded and coded systems 1b) Explain the properties of error control codes	▫ Lecture	Mid-1/Seminar -1
7	**MID-I**	CO1 and CO_2			**MID TEST-I**
UNIT-III : LINEAR BLOCK CODES					
8	Linear block codes and their properties, standard arrays	CO_3	1.a) Write a short notes on Linear block codes and explain about their properties 1b) write a short notes on standard array	▫ Lecture	Mid-2/Seminar -2
9	Syndromes, weight distribution	CO_3	1.Explain weight distribution	▫ Lecture	Mid-2/Seminar -2

10	Error detection/correction properties, modified linear block codes.	CO_3	1.Explain about error detection/correction properties		
UNIT-IV: CONVOLUTION CODES					
11	Convolution encoders, structural properties of convolution codes, trellis diagrams	CO_4	1a) Explain about convolution encoder 1b) Explain the properties of convolution encode 2)Draw the trellis diagram by considering any example	▫ Lecture ▫ Discussion	Mid-2/Assignment -2
12	Viterbi algorithm, performance analysis. CYCLIC CODES: General theory, Shift Register Implementations	CO_4	1. Explain about viterbi algorithm with the help of example	▫ Lecture ▫ Discussion	Mid-2/Assignment -2
13	Shortened Cyclic codes, CRCs for Error Detection	CO_4	1.Explain about cyclic codes	▫ Lecture ▫ Discussion	Mid-2/Assignment -2
UNIT-V : BCH AND RS CODES					
14	Algebraic Description	CO_5	1. write a short notes on i) BCH codes ii) RS codes	▫ Lecture ▫ Discussion	Mid-2/Assignment -2
15	Frequency Domain Description	CO_5	1. Explain about frequency domain description of BCH and RS codes	▫ Lecture ▫ Discussion	Mid-2/Assignment -2
16	Decoding Algorithms for BCH and RS Codes	CO_5	1. Explain decoding algorithms for BCH and RS codes by considering example	▫ Lecture ▫ Discussion	Mid-2/Assignment -2
17	**MID-II**	CO_3, CO_4 **and** CO_5			MID TEST-II
18/19	**END EXAM**				