MANIPAL UNIVERSITY JAIPUR

School of Electrical, Electronics & Communication Engineering (SEEC)

Department of Electronics & Communication Engineering
Course Hand-out

Information Theory and Coding| EC 1704 | 4 Credits

Session: July 14 – Dec. 14 | Faculty: Mr. C.P Gupta | Class: Core Course

Course Outcomes: At the end of the course, students will be able to

[EC1704.1] Apply the principles of random signal theory to quantify the information and analyze communication system.
[EC1704.2] Develop various channel models and analyse for research skills.
[EC1704.3] Apply the Information theory in data compression, transmission and channel encoding, storage and processing, which is also useful in employbility.
[EC1704.4] Discuss different algorithms and their performances use in error control applications.

A. SYLLABUS

Random Signal Theory: Introduction to random variables, discrete and continuous random variables, probability distribution, Cumulative Distribution Function, Joint Distribution, Independent random variable and conditional distribution, Characteristics of random variable: Mean variance and standard deviation, Binomial, Poisson and Normal distributions, Random Processes, Markov Processes. Information Theory: Introduction to information theory and probability, entropy, rate of information, Joint and conditional entropy, Mutual information: noise free channel, channel with independent input and output, Channel capacity: Binary symmetric channel, binary erasure channel, noise free channel, cascaded channels, and binary channel. Coding: Introduction, code efficiency, Shannon theorem, capacity of Gaussian channel, Bandwidth and S/N trade off, Shannon-Fano coding, Huffman coding, LZ coding, Error control coding, Automatic Repeat Request and Forward error correction codes, Block codes and parity check codes, Hamming Weight, Hamming Distance, Minimum distance decoding, Single Parity codes, Hamming Codes, Repetition Codes, Linear block codes, Cyclic code, Convolution code.

B. TEXT BOOKS

- M Kulkarni & K S Shivaprakasha, "Information Theory and Coding", Wiley India Pvt. Ltd, 1st ed.
- R D Singh and S D Sapre, "Communication Systems", 2nd ed., Tata Mcgraw Hill
- R. Bose, "Information Theory, Coding and Cryptography", Tata Mcgraw Hill, 2nd ed.
- P. Z. Peebles, Jr., "Probability, Random Variables and Random Signal Principles", McGraw-Hill, Inc., 2nd ed.
- F.M. Reza, "Information Theory", McGraw Hill

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