

|                       |                                                             |
|-----------------------|-------------------------------------------------------------|
| <b>Branch Name:</b>   | <b>Information and Communication Technology</b>             |
| <b>Semester/Year:</b> | <b>Semester I / First Year</b>                              |
| <b>Subject Title:</b> | <b>Information Theory and Coding Practical</b>              |
| <b>Subject Code:</b>  | <b>2ET2080102P</b>                                          |
| <b>Pre-requisite:</b> | <b>Probability Principles, Linear Algebra, and Calculus</b> |

**Course Objective:**

PG Students of ICT Department need to possess good understanding of the fundamentals and applications of digital communication system. The course presents in detail the theory and practice of efficient storage and transmission of information over noisy channels. They are expected to be able to design efficient error correcting codes. Theory concepts of source coding, error detecting and correcting schemes, their encoding and decoding process, cryptography will be verified through implementation in MATLAB and Simulink.

| Credit | Teaching Scheme<br>Hours per week |   |     |       | Evaluation Scheme (Marks) |      |      |      |                   |      |      |      |               |
|--------|-----------------------------------|---|-----|-------|---------------------------|------|------|------|-------------------|------|------|------|---------------|
|        |                                   |   |     |       | Theory (Marks)            |      |      |      | Practical (Marks) |      |      |      | Total (Marks) |
|        | SEE                               |   | CCE |       | SEE                       |      | CCE  |      |                   |      |      |      |               |
|        | L                                 | T | P   | Total | Min.                      | Max. | Min. | Max. | Min.              | Max. | Min. | Max. |               |
| 1      | -                                 | - | 2   | 2     | -                         | -    | -    | -    | 10                | 25   | 10   | 25   | 50            |

**Course Outcome:**

Upon successful completion of this course the student would be able to:

- To obtain an understanding of the theoretical principles of source coding.
- To focus on the application of Information Theory to communications in general and on channel coding and capacity in particular.
- To analyze various error correcting codes.
- To compare coded vs. uncoded system.
- To Use MATLAB for analysis of various source coding and channel coding techniques.

**List of Experiments:**

1. Verify Kraft's inequality for binary and ternary codes and generate instantaneous codes.
2. A) Simulate binary Huffman code in MATLAB.

B) Find average length, entropy and coding efficiency of the code.

3. Write a MATLAB program that takes in channel transition probability matrix and compute Mutual Information & channel capacity of the discrete memory-less channel.
4. Write a MATLAB program to encode messages for a forward error correction system with a given Linear block code.
5. Write a MATLAB program to decode the encoded word for a forward error correction system with a given Linear block code.
6. Write a MATLAB program to encode messages for a system with given Cyclic Polynomial code.
7. Decoding the messages for a system with a given cyclic polynomial code and verifying through simulation.
8. Understanding the concept of loss less data compression technique using Huffman coding.
9. Write a MATLAB program to perform BCH encoding and decoding.
10. Write a MATLAB program to perform RS encoding and decoding.
11. Encoding the data bits using a Binary Cyclic block encoder in Simulink.
12. Decoding the code words using a Binary Cyclic block decoder in Simulink.
13. Encoding the data bits using a Binary Linear block encoder in Simulink.
14. Decoding the code words using Binary Linear block decoder in Simulink.
15. Implementation of Cryptography technique in MATLAB.