

Sub Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tutorial	Theory	TW/pract	Tut	Total
SEITC406	Information Theory and Coding	4		1	4	1	--	5

Sub Code	Subject Name	Examination Scheme							Total
		Theory				TW	Pr	Oral	
		Internal Assessment			End Sem Exam				
		Test 1	Test 2	Avg. of Test 1 & 2					
SEITC406	Information Theory and Coding	20	20	20	80	25	--	--	125

Course Objective:

To introduce to the students the concept of information and entropy of Information

To give the student the concept of compression of information , error control of Information, and securing information through cryptography.

To give the student the mathematical foundation of compression, error control and security of information.

Course Outcome:

Ability of students to understand true meaning of Information and Entropy

Ability of students to understand three aspects of information i.e. compression, error control and security.

Detailed Syllabus:

Unit. No	Topics	Number of Hours
1	Information Theory & Source Coding 1.1. Introduction to Information Theory 1.2. Entropy & Types of Entropy 1.3. Source Coding 1.4. Prefix Coding 1.5. Channel Capacity	8
2	Compression Algorithms 2.1 Optimal Compression 2.2 Compression Algorithms 2.3 Huffman Coding, Adaptive Huffman Compression 2.4 Dictionary Based Compression 2.5 Speech Compression 2.6 Sliding Window Compression 2.7 LZW,RLE 2.8 Lossy & Lossless Compression Schemes 2.9 Image Compression – GIF,JPEG	10
3	Error Control Coding Techniques 3.1 Types of Codes 3.2 Error Checking & Correcting Codes 3.3 Linear Block Codes 3.4 Cyclic Codes 3.5 BCH Codes 3.6 Convolution Codes	10
4	Basic Number Theory 4.1 Modular Arithmetic 4.2 Solving $ax+by=d$ 4.3 Congruences 4.4 Chinese Remainder Theorem 4.5 Modular Exponentiation 4.6 Fermat's Little and Euler Theorem 4.7 Prime Number Generation 4.8 Random Number Generation 4.9 Primitive Roots 4.10 Legendre and Jacobi Symbols 4.11 Discrete Probability 4.12 Discrete Logarithms	12

5	<p>Cryptographic Techniques</p> <p>5.1 Security Goals, Threats and Attack on Information</p> <p>5.2 Classic Cryptography</p> <p>5.3 Symmetric Key Cryptography – Stream Ciphers, Block Cipher, Stream Cipher, DES, Triple DES, AES</p> <p>5.4 Public and Private Key Cryptography – RSA, Diffie-Hellman</p> <p>5.5 Hash Function – MD5, SHA-1, Digital Signature</p>	8
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Text Books:

1. “Information Theory, Coding and Cryptography” Ranjan Bose, Tata McGrawHill , Second Edition.
2. “Information Coding Techniques” R Avudaiammal, Tata McGrawHill , Second Edition.
3. “Essentials of Error-Control Coding”, Jorge Castineira Moreira, Wiley-India Edition
4. “Introduction to Cryptography with Coding theory” Trappe and Washington” Pearson

References:

1. Element of information theory: Thomas Cover wiley
2. An introduction to Theory of numbers: Ivan nivan Wiley

Tutorial:

Journal work should comprise of writing 10 assignments based on the above syllabus.

Theory Examination:

- Question paper will comprise of 6 questions, each carrying 20 marks.
- Total 4 questions need to be solved.
- Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
- Remaining question will be randomly selected from all the modules.
- Weightage of marks should be proportional to number of hours assigned to each module.