Exam.Code:0969
Sub. Code: 34529

2123

M.E. (Electronics and Communication Engineering)
First Semester
ECE-1105: Information Theory and Coding
(For UIET)

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Section.

x-x-x

I. Attempt the following:
(a) What is the information content of a source with zero entropy?
(b) What is a source encoder?
(c) How can the channel capacity be maximized?
(d) What is the Shannon rate limit?
(e) What are cyclic codes? (5x2)

SECTION-A

II. a) Let A be an information source with alphabet A = {0,1,2,3}. Let each symbol 'a' be equally probable and let B={0,1} be a parity generator with

bj = 0 if a = 0 or a = 3;
= 1 if a = 1 or a = 2.

What are the joint and conditional entropies of A and B?

b) A memoryless source with A ={0,1} having equal symbol probabilities emits a sequence of six symbols. Following the sixth symbol, a seventh symbol is transmitted which is the sum modulo 2 of the six previous symbols. What is the entropy of the seven-symbol sequence? (2x5)

III. a) Are Huffman codes fixed length or variable length codes? How are they constructed? Explain the algorithm with the help of an example.

b) A certain code has an alphabet consisting of the following code words:

0000000	1000111	0101011	0011101
1101100	1011010	0110110	1110001

Find the minimum Hamming distance of this code and determine its error correction and error detection capabilities. (2x5)

P.T.O.

IV. a) What is the significance of Symmetric channels in communication? What is a binary symmetric channel? What is its channel capacity?

b) What is the capacity of a noiseless discrete channel? Derive the Hartley law for channel capacity. (2x5)

SECTION – B

V. a) What is a Gaussian Channel? How do you find out the entropy of a Gaussian distribution?

b) Derive the efficiency of noisy continuous channels. What is the significance of bandwidth on efficiency? (2x5)

VI. a) Describe the syndrome decoder method of decoding linear block codes. What is a parity check matrix?

b) What are cyclic codes? Construct a systematic(7,4) cyclic code. (2x5)

VII. a) With the help of an example, construct the state diagram and trellis representation of a convolutional encoder.

b) What is a public-key cryptosystem? Explain the RSA algorithm. (2x5)

x-x-x