Roll No..... Total No of Pages-01

BTECH(ECE) –2014

INFORMATION THEORY & CODING

Paper Code (BTEC-907)

Paper Id. [A2395]

Time : 3 Hrs **Maximum Marks: 60**

Instruction to Candidate:

1). Section A is compulsory consisting of Ten questions of Two marks each.
2). Section B contains Five questions carrying Five marks each and student has to attempt any Four questions.
3). Section C contains Three questions carrying Ten marks each and student has to attempt any Two questions.

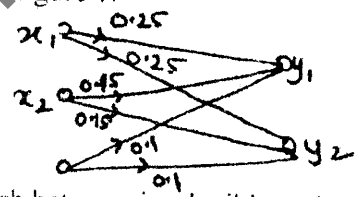
Q1 **Section A**

a) Define Mutual Information.
b) State source coding theorem.
c) A source X generates four symbols with probability $p_1=0.5$, $p_2=0.3$, $p_3=0.1$, $p_4=0.1$. Find source entropy and efficiency for prefix code {0 01 110 111}.
d) Define the capacity of DMC.
e) What is the probability of error of BSC with symbol error probability p?
f) What is Hamming Distance?
g) List the properties of Linear code.
h) When a polynomial is called as monic?
i) How TCM achieves increased power efficiency without bandwidth expansion?
j) Define constraint length of Convolution Code.

Section B

Q2. Consider BSC with transition probability $p=10^{-2}$. Calculate its capacity and state the condition for reliable communication.

Q3. Find the mutual information for shown in figure 1:



Q4.Give desired properties of code. Distinguish between irreducible and separable codes.

Q5. Discuss Lempel-Ziv coding and apply it to the given string: 1010110110 0101011.

Q6. Explain error detecting capability of linear block code.

Section C

Q7. Explain the following with suitable example :
(i) Variable Length Code (ii) Prefix Free Code (iii) Uniquely Decodable Code (iv) Instantaneous Code.

Q8. State and prove Shanon Hartley Theorem. Using an appropriate example explain the concept of BW ans S/N trade-off.

Q9. Apply Huffman coding procedure for following message ensemble:

$$[X]=[x_1 \quad x_2 \quad x_3]$$
$$[P]=[0.4 \quad 0.35 \quad 0.25]$$

Find the coding efficiency. Also find the efficiency if two group at a time are formed. Comment and compare the results.

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