

IV B.Tech I Semester Supplementary Examinations, November 2005
INFORMATION THEORY AND CODING
(Information Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks

1. Write short notes on the following
 - (a) Channel efficiency
 - (b) conditional entropy
 - (c) binary symmetric channel [5+5+6]
2. (a) Explain shannon's second fundamental theorem on coding for memory less noise channels. [8]
 (b) Show that for a discrete channel $I(x,y) \geq 0$. [8]
3. (a) Explain channel coding theorem for a discrete memory less channel. [8]
 (b) Compute the channel capacity for the following channel matrix [8]

$$\begin{bmatrix} 0.8 & 0.1 & 0.1 \\ 0.1 & 0.8 & 0.1 \\ 0.1 & 0.1 & 0.8 \end{bmatrix}$$
4. (a) Explain why the computed source code has an efficiency of 100%. [8]
 (b) Consider a binary block code with 2^{nd} code words of same length n. Show that the kraff in equality is satisfied for such code. [8]
5. Consider a (3,1,2) convolutional code with $g^{(1)}=(011)$, $g^{(2)}=(110)$, $g^{(3)}=(101)$
 - (a) Draw the encoder block diagram.
 - (b) Find the generation matrix.
 - (c) Find the code-vector corresponding to the information sequence d=10001.[16]
6. The numbers 0 to 7 are binary-encoded
 - (a) Write the 3 binary digits for each decimal number [4]
 - (b) Add a single parity-check bit to each code word [4]
 - (c) Each 4-bit code word forms a \overline{T} matrix. Show that if $\overline{H} = [1111]$, $\overline{H} \overline{T} = 0$ for each \overline{T} . [4]
 - [4] Also show that if a single error occurs, $\overline{H} \overline{T} = 1$ [4]
7. A "stop and wait" ARQ system is using a full-duplex channel. Each block of data uses 200 ms, and the ARQ message takes 50 ms. How many blocks of data are sent in 5 sec's.? How much time is lost to the ARQ message? What percentage of the total time is this? [6+6+4]

8. (a) Draw the block diagram of modified Duobinary Technique and explain with necessary wave forms.
- (b) What is the need for precoder in modified duobinary signaling scheme. [10+6]

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