B. Tech. Sem -VI (E & TC Engg.) (2014 COURSE) (CBCS) :
SUMMER - 2019

SUBJECT: INFORMATIN THEORY & CODING

Day: Friday
Date: 31/05/2019

S-2019-2781

Time: 02.30 PM TO 05.30 PM
Max. Marks: 60

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.

Q.1 State and explain all property of entropy? Also explain information rate? **(10)**

OR

Q.1 Apply Shannon fano coding for the following? **(10)**
P(x)= [0.45, 0.15, 0.1, 0.1, 0.08, 0.08, 0.04]
Determine entropy of source find coding efficacy?

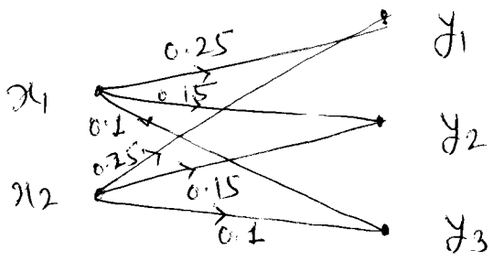
Q.2 A describe source transmits messages x1, x2, x3 with probability P(x1)=0.35, **(10)**
$P(x_2)=0.25$, $P(x_3)=0.40$ with probability matrix is-

$$P(Y/X) = \begin{array}{c} \\ x_1 \\ x_2 \\ x_3 \end{array} \begin{array}{c} \begin{array}{ccc} y_1 & y_2 & y_3 \end{array} \\ \begin{bmatrix} 0.9 & 0.1 & 0 \\ 0 & 0.8 & 0.2 \\ 0 & 0.3 & 0.7 \end{bmatrix} \end{array}$$

Cal all the entropy and mutual information with channel?

OR

Q.2 Find mutual information for channel? **(10)**



Q.3 Derive expression for channel capacity of binary channel whose channel **(10)**
matrix is given by: $P(Y/X) = \begin{bmatrix} (1-p) & p & 0 \\ 0 & p & (1-p) \end{bmatrix}$
Also draw channel diagram?

OR

Q.3 A Gaussion channel has 5MHz band width cal. Channel capacity if SNR 10^5 Hz **(10)**
also find maximum information rate?

P. T. O.

Q.4 Consider (7,4) liner block code whose matrix: **(10)**

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

1) All code vectors?
2) Parity check matrix?
3) Error correcting and detecting.
4) Syndrome vector.

OR

Q.4 A parity check matrix : **(10)**

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

1) All code vectors?
2) Parity check matrix?
3) Decode code word (110111) and (111011)

Q.5 Construct an encoder and syndrome calculator for (7,4) cyclic code generated by $g(x)=X^3 + X + 1$ and very its operation using message vector (1001)also determine syndrome vector for error is (0000100) **(10)**

OR

Q.5 Find G matrix and code polynomial for RS- code using GF (2^3) for polynomial $= X^3 + X^2 + 1$. With message vector (100, 111, 110) **(10)**

Q.6 Write short note on **(10)**

1) Viterbi algorithm.
2) Turbo codes.

OR

Q.6 A convolution encoder r = 1/3 **(10)**
g1=[101], g2=[010], g3=[111]

1) draw code tree
2) state diagram
3) trellis diagram if message is =10111.

* * * *