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मध - 034

Information Theory & Coding Tech. (1100)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Assume suitable data if necessary.
5. Solve **any two** sub question from each unit.

UNIT - I

1. a) An analog signal is band limited to 'B' Hz sampled at the nyquist rate & samples are quantized into 4 levels (i.e. messages) are assumed to be independent & occurs with probabilities
 $P_1 = 1/8, P_2 = 3/8, P_3 = 3/8 \text{ \& } P_4 = 1/8$
find information rate of source. How it can be increased. 10
- b) Apply Shannon-Fano encoding procedure to the following message symbols
 $P = \{0.49, 0.14, 0.14, 0.07, 0.07, 0.04, 0.02, 0.02, 0.01\}$
Find efficiency & coding verify Kraft inequality & source coding theorem. 10
- c) Define channel capacity, for BSC with $P(0/1) = p = P(1/0)$. If $C = 1 - H(p)$.
Draw the plot of capacity versus 'p' & comment on capacity
if $p = 0, p = 0.5 \text{ \& } p = 1$. 10

UNIT - II

2. a) State the properties of linear codes verify the code is linear code or not for the following code -
 - i) $C = \{0000, 1010, 0101, 1111\}$
 - ii) $C = \{00000, 10100, 11110, 11001\}$ 10
- b) The parity check matrix of a (7, 4) linear block code is given by -

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

Find :

- i) Generator matrix
- ii) Minimum distance
- iii) All code vector
- iv) How many errors can be detected & corrected. 10

- c) The generator polynomial of (7, 4) cyclic code is $G(P) = P^3 + P + 1$ find code vector for message vector $M = 0101, 1110$. 10

UNIT - III

3. a) Find out the output sequence of the convolutional encoder described by $V_1 = S_1, V_2 = S_1 \oplus S_2 \oplus S_3 \oplus S_4, V_3 = S_1 \oplus S_3 \oplus S_4$
Draw encoder circuit using 4 shift register. 10
- b) Explain the decoding procedure of convolutional code with neat diagram. 10
- c) Draw & explain encoder & decoder of turbocode. 10

UNIT - IV

4. a) Enlist applications of RS code for (31, 15) RS code find :
i) No of bits in symbol.
ii) block length
iii) d min
iv) No of error the code can correct. 10
- b) What is encryption also comment on RSA algorithm. 10
- c) What is JPEG standards. Describe various objectives of JPEG. 10

UNIT - V

5. a) Explain the following terms related to the mobile communication - 10
- i) Cell ii) cluster iii) Frequency Reuse
 - iv) Cell splitting v) Hand over
- b) Compare GSM & IS - 95 standards. 10
- c) Draw & explain the satellite transponder define uplink & downlink freq. 10
