Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 08

M.Tech. (ECE) (2018 Batch) (Sem.–1)

INFORMATION THEORY AND CODING
Subject Code : MTEC-PE2C-18-3
M.Code : 75179

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWELVE marks.

Q1. Explain Huffman coding with an example. State the advantages of Huffman coding over Lempel-Ziv algorithm in brief. [12]

Q2. (a) A zero-memory source is defined by the table : [6]

S_i	s_1	s_2	s_3	s_4
$P(S_i)$	0.5	0.25	0.125	0.125

Find the entropy and the source information rate if the symbol rate is $v_s = 400$[symb/sec].

(b) Explain the difference between DPCM and DM scheme for speech coding application. [6]

Q3. (a) Explain marginal, conditional and joint entropy with an example. [6]

(b) Explain the significance of Shannon's second theorem related to channel coding theorem. [6]

Q4. What is the significance of Viterbi algorithm? Draw and explain the algorithm steps of Viterbi decoding with a neat diagram. [12]

Q5. What are the various entropy encoding schemes? Explain the entropy encoding block of JPEG standard. [12]

Q6. What is the significance of cyclic codes? Explain the procedure of error control coding using cyclic codes for with a suitable example. [12]

Q7. Discuss the various types of channel. Explain channel capacity and derive the channel capacity for binary symmetric channel. [12]

Q8. Zero-memory binary source emits symbols with rate v_s = 100. [b/s], the probability of one symbol is $P(x_1)$ = **0.3.** The corresponding channel is described by transition matrix.

$$P = \begin{bmatrix} 0.4 & 0.6 \\ 0.75 & 0.25 \end{bmatrix}$$

(a) Find the entropy and the information rate of the source. [6]

(b) Find the mutual (transmitted) information and the information rate of the channel. [6]

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.