

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech.(ECE) (Sem.-6)**  
**INFORMATION THEORY AND CODING**

Subject Code : BTEC-907

M.Code : 71236

Date of Examination : 14-07-22

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

**1. Answer briefly :**

- a) Define source entropy in case of discrete and continuous channels.
- b) What are cyclic codes? What are its various kinds?
- c) What is ARQ? State its types.
- d) What do you mean by generator matrices of the cyclic codes?
- e) State the need and meaning of error control coding.
- f) Write the steps for decoding of BCH codes.
- g) Write short note on decoding methods of convolutional codes.
- h) Write short note on Hamming distance and Code efficiency.
- i) What do you mean by matrix description of cyclic codes?
- j) Compare LZ and LZW coding.

### SECTION-B

2. What is Nyquist criterion? Prove its sampling theorem mathematically. What is the need of antialiasing filter? How does it affect the distortion?
3. Explain the following terms :
  - a) Viterbi Coder
  - b) Lempel Ziv coding
4. Define Channel Capacity theorem and Shannon limit. Discuss Bandwidth-S/N trade off.
5. Discuss in detail convolution decoding procedure using the Trellis diagram.
6. Show how a 4bit stage shift register can generate a convolution code for input train 11001.

### SECTION-C

7. What do you understand by linear block codes? Briefly comment on the BCH codes.
8. Design a block code with minimum distance of three and a message block size of 8 bits.
9. a) A source emits symbols  $X_i$ ,  $1 \leq i \leq 6$ , in the BCD format with probabilities  $P(X_i)$  as given in Table 1, at a rate  $R_s = 9.6$  kbaud (baud=symbol/second). State
  - (i) the information rate and
  - (ii) the data rate of the source.
- b) Apply Shannon-Fano coding to the source signal characterized in Table 1. Are there any disadvantages in the resulting code words?

$X_i$	$PX_i$	BCD word
A	0.30	000
B	0.10	001
C	0.02	010
D	0.15	011
E	0.40	100
F	0.03	101

**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.**