

Roll No.

Total No. of Pages : 02

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B.Tech. CSE (Internet of Things and Cyber Security including Block Chain Technology) (Sem.-5)

INFORMATION THEORY AND CODING

Subject Code : BTES504-20

M.Code : 92358

Date of Examination : 13-12-22

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. Write briefly :

- a) Discuss the reason for using logarithmic measure for measuring the amount of information.
- b) Prove that the entropy for a discrete source is a maximum when the output symbols are equally probable.
- c) Define random error channels. Give examples.
- d) Give a formal definition of linear block code.
- e) Explain the properties of binary cyclic codes.
- f) Explain the concept of shortened cyclic code.
- g) What do you understand by code tree of a convolution encoder? Explain clearly.
- h) What do you mean by sequential decoding?
- i) Explain the various types of error control strategies.
- j) List the applications of convolutional codes in ARQ system.

SECTION-B

2. Explain the concept of information, average information, information rate and redundancy as referred to information transmission. A binary source emitting an independent sequence of 0's and 1 's with probabilities p and $(1-p)$ respectively. Plot the entropy of the source.
3. Write about the error detecting and error correcting capabilities of a block code in detail.
4. What are BCH codes? Describe the decoding procedure for BCH codes.
5. Discuss the basic idea behind the Viterbi decoding algorithm. Write about its various applications.
6. Discuss the structural properties of convolutional codes.

SECTION-C

7. Explain clearly the procedure for the construction of compact Huffman code. A discrete source transmits six messages symbols with probabilities of 0.3, 0.2, 0.2, 0.15, 0.1, 0.05. Devise suitable Shannon-Fano and Huffman codes for the messages and determine the average length and efficiency of each code.
8. Draw a block diagram of an error trapping decoder and explain the working of error trapping decoder for cyclic codes.
9. Write a detailed note on syndrome and error detection for linear block codes.

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.