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Question Paper Code : 21761

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Fifth Semester

Information Technology

IT 2302/IT 52 — INFORMATION THEORY AND CODING

(Regulations 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Consider a discrete binary source that emits a sequence of statistically independent symbols. The output is either 0 with Probability p or 1 with a Probability 1-p. Define the entropy of this binary source. Also draw the plot of the Binary Entropy function versus p.

2. Define a prefix code.

3. Give the logic behind Lempel-Ziv Universal Coding.

4. Draw the Huffman tree for the following encoding.
   A = 1
   B = 01
   C = 001
   D = 000

5. Give the usage of Graphics Interchange Format (GIF) in Internet.

6. What are the five main stages associated with lossy sequential mode?

7. How is a burst error of length k can be represented?

8. Suppose H is a parity check matrix of an (n,k) code, then for any vector $v \varepsilon GF(q)^n$, give the syndrome of v.

9. Define a Tree code.

10. What are the advantages of viterbi decoding?

PART B — (5 × 16 = 80 marks)

11. (a) (i) List the steps involved in Huffman coding algorithm (6)

(ii) Consider a DMS with seven Possible Symbols x_i, $i = 1,2,...,7$ and the corresponding probabilities $P_1 = 0.37$, $P_2 = 0.33$, $P_3 = 0.16$, $P_4 = 0.07$, $P_5 = 0.04$, $P_6 = 0.02$ and $P_7 = 0.01$. Give the Entropy of the source and calculate the average number of binary digits per Symbol. (10)

Or

(b) Consider a Gaussian channel that is limited both in power and bandwidth. Explore the limits of a communication System under these constraints. (16)

12. (a) Discuss various types of Huffman Coding with Suitable example. (16)

Or

(b) With a neat block diagram explain Linear Predictive Coding Signal Encoder and Decoder. (16)

13. (a) Explain in detail about the various types of MPEG standards. (16)

Or

(b) Explain in detail about the standard H.261. (16)

14. (a) (i) Prove that, for a linear code, the minimum distance is equal to the minimum weight of the Code. (8)

(ii) Write short notes on matrix description of Linear Block Codes. (8)

Or

(b) (i) Write short notes on CRC Codes. (8)

(ii) Discuss about various circuit elements used to implement cyclic codes. (8)

15. (a) Explain the construction of Trellis diagram and encoding using it with suitable examples. (16)

Or

(b) Discuss the various issues of Turbo Coding technique. (16)

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