K 1058

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2004.

Fifth Semester

Information Technology

IF 356 — INFORMATION CODING AND TECHNIQUES

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State channel capacity theorem.

2. An alphabet set contains 3 letters 'A, B, C' transmitted with probabilities of 1/3, 1/4, 1/4. Find entropy.

3. Briefly explain slope overloading.

4. Draw the block diagram for differential pulse code modulator.

5. Write the syndrome properties of linear block codes.

6. Briefly explain Hamming distance.

7. Give the meaning of the terms "GOP" and "Prediction Span" with reference to video compression.

8. Brief "Spatial Frequency" with the aid of a diagram.

9. What do you understand by "GIF Interlaced mode"?

10. Define the terms "processing delay" and "algorithmic delay" with respect to speech coders.

PART B — (5 × 16 = 80 marks)

11. What is modulation? Explain how the Adaptive delta modulator works with different algorithms. Compare Delta modulation with adaptive delta modulation. (16)

12. (a) (i) Find capacity of a Binary (Symmetric) channel in Bits/sec, when probability of error is 0.1 and the symbol rate is 1000 symbols/sec. (8)

    (ii) Find the information transfer when binary symbol '0' and '1' are generated with the probability of 1/4 and 3/4 respectively. (8)

Or

(b) Apply Huffman Encoding procedure to following message ensumble and determine average length of encoded message also. Determine the coding efficiency. Use coding alphabet $D = 4$. There are 10 symbols.

$[X] = [x_1, x_2, x_3 \cdots x_{10}]$

$P_x = [.18, .17, .16, .15, .10, .08, .05, .05, .04, .02]$. (16)

13. (a) Verify whether $g(x) = 1 + x + x^2 + x^4$ is a valid generator polynomial for generating a cyclic code for message [111]. (16)

Or

(b) Construct a convolution encoder for the following specifications rate efficiency = 1/2, constraint length = 4. The connections from the shift registers to modulo-2 address are described by the following equations :

$g_1(x) = 1 + x$

$g_2(x) = x$.

Determine the output codeword for the input message [1110]. (16)

14. (a) (i) Elucidate with an example the "Static Huffman encoding" scheme. (8)

(ii) Explain with an example how "Static Arithmetic encoding" is advantageous over "Static Huffman encoding"? (8)

Or

(b) (i) Assuming an MMR coding scheme for digitized documents explain the following terms with the help of pel patterns

Pass mode, Vertical mode, Horizontal mode. (8)

(ii) Investigate on the "Block Preparation" and "Quantization" phases of JPEG compression process with diagrams wherever necessary. (8)

15. (a) (i) With a schematic diagram of an LPC encoder and decoder, identify the perception parameters and associated vocal tract excitation parameters that are used. Give explanations wherever necessary. (8)

(ii) Elucidate the terms "Frequency masking" and "temporal masking" with diagrams wherever necessary. (8)

Or

(b) (i) Explain the "Motion estimation" and "Motion compensation" procedures of "P" and "B" frame encoding process. (8)

(ii) Draw the "implementation schematic" diagram depicting the H.261 video encoding procedure. Elucidate the role of "Quantization control" block along with FIFO operation. (8)