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Question Paper Code : 60761

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

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. Give the Kraft-Mc millan inequality for the instantaneous code.
2. State Shannon's theorem.
3. Differentiate LZ coding with LZW coding.
4. State the principles of Psychoacoustic model.
5. Give the usage of Graphics Interchange Format (GIF) in Internet.
6. What are the five main stages associated with lossy sequential mode?
7. What is hamming distance?
8. What is meant by Repetition code?
9. Define constraint length of a convolutional code.
10. What is the significance of Turbo coding?

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) Assume that the character set and probabilities are e=0.3, n=0.3, t=0.2, w=0.1, .= 0.1. Derive the codeword value for the string 'went". Explain how the decoder determines the original string from the received codeword value.

Or

(b) Explain the masking techniques in detail.

13. (a) Explain JPEG image compression techniques in detail.

Or

(b) Discuss in detail about Motion Estimation and Motion compensation Techniques.

14. (a) Explain the Hamming Codes with example. (16)

Or

(b) Construct a systematic (7, 4) cyclic code using the generator polynomial $g(x) = x^3 + x + 1$. (16)

(i) What are the error correcting capabilities of this code?

(ii) Construct the decoding table.

(iii) For the received code word 1101100, determine the transmitted data word.

15. (a) (i) Consider the ate $r = 1/2$, constraint length K = 4 convolutional encoder. The encoder outputs are represented v_1 = XOR (s_1, s_3) and v_2 =XOR (s_1, s_2, s_3). Determine the encoder output produced by the message sequence 10100 using state diagram, tree diagram and trellis diagram. (12)

(ii) Explain how do you determine d_{free} using Trellis diagram. (4)

Or

(b) (i) Explain the Viterbi decoding algorithm. (6 + 10)

(ii) Determine the decoded data bits by applying Viterbi decoding algorithm, if r = 1100000111 rest all 0.

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