Reg. No. : | | | | | | | | | | |

Question Paper Code: 45046

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Fifth Semester

Electronics and Communication Engineering

14UEC506 - INFORMATION THEORY AND CODING

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. In a discrete memory less channel the output of channel decoder depends on

   (a) Present signal (b) future input signal
   (c) past signal (d) present and past signal

2. Huffman coding technique is adopted for constructing the source code with _____ redundancy.

   (a) Minimum (b) Constant (c) Maximum (d) Unpredictable

3. The bit allocation information mode that is used by the decoder to dequantize the set of sub band samples in a Dolby AC-1 is known as

   (a) Forward adaptive bit allocation (b) Backward adaptive bit allocation
   (c) Hybrid adaptive bit allocation (d) None of the above

4. Which among the following compression techniques is/are intended for still images?

   (a) JPEG (b) H.263 (c) MPEG (d) All the above

5. The compression ratio achieved by MPEG-1 standard is

   (a) 4000:1 (b) 400:1 (c) 40:1 (d) 4:1

6. The compression ratio achieved by JPEG2000 without loss of quality is

(a) 2000:1 (b) 200:1 (c) 20:1 (d) 2:1

7. If the parity check matrix is H and the error vector is E then syndrome vector S can be calculated by

(a) $S=HE^H$ (b) EH^T (c) $E^T H^T$ (d) $(EH)^T$

8. If the degree of the generator polynomial is 3 and the length of the message is 4 then the total number of bits in the cyclic coded sequence is

(a) 4 (b) 3 (c) 7 (d) 11

9. While representing the convolutional code by (n, k, m), what does 'm' signify or represent in it?

(a) Memory order (b) Message bits (c) Coded bits (d) All the above

10. The method of decoding used in Viterbi decoding is called

(a) Syndrome decoding (b) Least Mean Square decoding
(c) Maximum Likelihood decoding (d) Metric diversion

PART - B (5 x 2 = 10 Marks)

11. What is a Binary Symmetric channel?

12. Define on perceptual coding.

13. State motion compensation.

14. Write about cyclic codes for error correction.

15. What are convolutional codes?

PART - C (5 x 16 = 80 Marks)

16. (a) Apply Shannon-Fano encoding procedure to the following message ensemble

[X}= [x1, x2, x3, x4, x5, x6, x7, x8, x9]

[P] = [0.49, 0.14, 0.14, 0.07, 0.07, 0.04, 0.02, 0.02, 0.01]

Find the coding efficiency and coding redundancy. (16)

Or

(b) Show that the Huffman coding is not unique by considering 7 possible symbols with corresponding probabilities P(x1)=0.46, P(x2)=0.3, p(x3)=0.12, P(x4)=0.06, P(x5)= 0.03, P(x6)= 0.02, P(x7)=0.01. Use an alternate way of Huffman coding and discuss about the entropy and average number of binary digits per symbol. (16)

17. (a) Apply Arithmetic coding for the word 'WENT.' (16)

Symbol	W	E	N	T	.
Probability	0.1	0.3	0.3	0.2	0.1

Or

(b) Apply Lempel-Ziv algorithm to encode the string 101011011010101011 and obtain the dictionary for the Lempel-Ziv algorithm. (16)

18. (a) Discuss about H.261 standard in detail. (16)

Or

(b) What is TIFF? Draw and explain the TIFF audio encoder and decoder. (16)

19. (a) What is minimum distance decoding? Explain in detail. (16)

Or

(b) The generator polynomial of a (7,4) cyclic code is $G(P) = P^3+P+1$. Find all the code vectors for the code in the systematic and non-systematic form. (16)

20. (a) Draw the diagram of the ½ rate convolutional encoder with generator polynomials $g^{(1)}(D) = 1+D$ and $g^{(2)}(D) = 1+D+D^2$. Also compute the encoder output for input sequence 101101. Obtain the code tree, code trellis and state diagram. (16)

Or

(b) Discuss on convolutional turbo codes. (16)

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