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Question Paper Code: 45406

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

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. What is the maximum bit rate for a channel having bandwidth 4100Hz and SNR 10 dB using Shannon's theorem?
 - (a) 10000 bits/sec
 - (b) 41000 bits/sec
 - (c) 14183.67 bits/sec
 - (d) 1418.367 bits/sec
2. 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
3. Lempel Ziv algorithm belongs to which type of compression algorithm?
 - (a) Arithmetic coding
 - (b) Dictionary based
 - (c) static coding
 - (d) Huffman coding
4. Why is sound masking required?
 - (a) to bring the background level up to the optimum
 - (b) to synchronise the back ground level
 - (c) to stable the background level
 - (d) none of the above

5. GIF stands for _____.
- (a) Graphics Interchange Format (b) Green Impact Format
(c) Gentle Information Format (d) None of these
6. The compression ratio achieved by MPEG-1 standard is
- (a) 4000:1 (b) 400:1 (c) 40:1 (d) 4:1
7. The minimum distance of linear block code (d_{\min}) is equal to minimum number of rows or columns of H^T , whose _____ is equal to zero vector?
- (a) sum (b) difference (c) product (d) division
8. 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) $(EH)^T$
9. 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
10. In Viterbi decoding the surviving path represents the path of the decoded signal with
- (a) Maximum metric (b) Minimum metric
(c) Zero metric (d) '1' metric

PART - B (5 x 2 = 10 Marks)

11. What is meant by discrete memoryless channel?
12. Define linear predictive coding.
13. State motion compensation.
14. What are linear codes? Give example.
15. What are convolutional codes?

PART - C (5 x 16 = 80 Marks)

16. (a) Show that the Huffman coding is not unique by considering 7 possible symbols with corresponding probabilities $P(x_1)=0.46$, $P(x_2)=0.3$, $p(x_3)=0.12$, $P(x_4)=0.06$, $P(x_5)= 0.03$, $P(x_6)= 0.02$, $P(x_7)=0.01$. Use an alternate way of Huffman coding and discuss about the entropy and average number of binary digits per symbol. (16)

Or

- (b) Consider a source with source symbol set $S = \{S_1, S_2, S_3, S_4\}$ with probabilities $P = \{0.2, 0.3, 0.4, 0.1\}$. Obtain the entropy of the source. Prove that $H(S^2) = 2XH(S)$. (16)

17. (a) Explain with a block diagram model of speech synthesis. (16)

Or

- (b) Discuss on linear predictive coding with an example. (16)

18. (a) Discuss in detail about the Image and Video formats. (16)

Or

- (b) Discuss about H.261 standard in detail. (16)

19. (a) 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)

Or

- (b) Construct a systematic (7, 4) cyclic code using the generator polynomial $g(x) = x^3+x+1$. What are the error correcting capabilities of this code? Construct the decoding table and determine the transmitted data word for the received code word 1101100. (16)

20. (a) Discuss on convolutional turbo codes. (16)

Or

- (b) With an example draw the state diagram of trellis in convolutional code. (16)

