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Question Paper Code : P 1375

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009.

Fourth Semester

Information Technology

IT 1251 — INFORMATION CODING TECHNIQUES

(Regulation 2004)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Channel Capacity Theorem.

2. Find entropy of source emitting symbols X, Y, Z with the probabilities of 1/5, 1/2, 1/3 respectively.

3. Explain slope overloading.

4. Give the differences between "Delta modulation" and "Adaptive delta Modulation".

5. List the properties of Syndrome polynomial of cyclic codes.

6. Why cyclic codes are extremely well-suited for error detection?

7. What do you understand by "GIF interlaced mode"?

8. How is arithmetic coding advantageous over Huffman coding for text compression?

9. What is dolby AC-1?

10. What is the significance of D-frames in video coding?

PART B — (5 × 16 = 80 marks)

11. (a) (i) A discrete memory less source has a alphabet of five symbols whose probabilities of occurrence are as described here.   (8)

Symbols : X_1 X_2 X_3 X_4 X_5

Probability :   0.2   0.2   0.1   0.1   0.4

Compute the Huffman code for this source and the efficiency of the source encoder.

(ii) A voice grade channel of telephone network has a band width of 3.4 KHz. Calculate   (8)

(1) The information capacity of the telephone channel for a signal-to-noise ratio of 30 dB.

(2) The minimum signal-to-noise ratio required to support information transmission through the telephone channel at the rate of 9.6 kb/s.

Or

(b) (i) Find the 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 ¼ and ¾ respectively.   (8)

12. (a) With the block diagram explain DPCM system. Compare DPCM and DM systems.

Or

(b) Explain DM systems with block diagram.

13. (a) Consider the generation of a (7,4) cyclic code by generator polynomial $g(x) = 1 + x + x^3$.

(i) Calculate the code word for the message sequence 1001 and construct systematic generator matrix G.   (8)

(ii) Draw the diagram of encoder and syndrome calculator generated by polynomial $g(x)$.   (8)

Or

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

14. (a) With the following symbols and their probability of occurrence, encode the message "went#" using arithmetic coding algorithms. Compare arithmetic coding with Huffman coding principles.

Symbols :   e   n   t   w   #

Probability : 0.3   0.3   0.2   0.1   0.1

Or

(b) Draw JPEG encoder block diagram and explain each block.

15. (a) (i) Explain the encoding procedure of I, P and B frames in video encoding with suitable diagrams. (14)

(ii) What are the special features of MPEG-4 standard? (2)

Or

(b) Briefly explain the following audio coders :

(i) MPEG audio coders (8)

(ii) DOLBY audio coders (8)

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