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

Question Paper Code : 91565

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Fifth Semester

Information Technology

IT 2302/IT 52 — INFORMATION THEORY AND CODING

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the properties of Mutual Information.

2. What is coding efficiency?

3. What is the need for adaptive Huffman coding?

4. State the LZW algorithm.

5. What are B & P frames?

6. What is the need for quantizer?

7. How many bit errors can be detected using a Hamming code of distance – 3?

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

9. What is the principle of Turbo coding?

10. Compare Convolutional and block codes.

PART B — (5 × 16 = 80 marks)

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

Symbols :	X1	X2	X3	X4	X5
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) Show that the BSC capacity, C = 1-H (P). (8)

Or

(b) (i) Write the Shannon-Fano encoding algorithm. (4)

(ii) Apply the above 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 entropy and efficiency of the source. (12)

12. (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) Explain

(i) MPEG Audio coders (8)

(ii) Dolby Audio coders. (8)

13. (a) Draw JPEG encoder block diagram and explain each block.

Or

(b) Explain in detail about the MPEG-1 standard.

14. (a) Explain about the Linear Block codes used in error detection and correction.

Or

(b) (i) Design an encoder for the (7, 4) binary cyclic code generated by $g(x) = 1 + x + x^3$ and verify its operation using the message vector (0101) . (10)

(ii) Explain Syndrome calculation in detail. (6)

15. (a) (i) Construct a convolution encoder for the following specifications: rate efficiency ½, constraint length 3, the connections from the shift register to modulo-2 adder are described by the following equations, $g1(x) = 1 + x + x^2$, $g2(x) = 1 + x^2$. (6)

(ii) Determine the output codeword for the message [10011]. (5)

(iii) Draw the code tree, state diagram. (5)

Or

(b) Explain Turbo decoding in detail.
