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**Question Paper Code: 31546**

B.E. / B.Tech. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Electronics and Communication Engineering

01UEC506 – INFORMATION THEORY AND CODING

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Define source coding theorem.
2. A discrete memory less source has three symbols  $x_1$ ,  $x_2$ , and  $x_3$  with probabilities  $1/5$ ,  $1/2$  and  $1/3$  respectively. Calculate Entropy.
3. State the principle of Psychoacoustic model.
4. Tell how arithmetic coding is advantageous over Huffman coding for text compression?
5. What is meant by motion estimation?
6. Distinguish between  $P$  and  $B$  frames.
7. What is Hamming distance? Give an example.
8. What is syndrome?
9. Define constraint length in convolutional codes.
10. What are convolutional codes?

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Apply the Shannon-Fano algorithm to a source which generates symbols  $x_1$ ,  $x_2$ ,  $x_3$ ,  $x_4$  with the probabilities  $1/8$ ,  $1/2$ ,  $1/4$  and  $1/8$  respectively. Calculate the code efficiency. (8)
- (ii) Discuss about mutual information and its properties. (8)

Or

- (b) (i) A discrete memory less source has an alphabet of six symbols whose probabilities of occurrence are as described here: (10)

Symbols	$x_1$	$x_2$	$x_3$	$x_4$	$x_5$	$x_6$
Probability	0.3	0.25	0.2	0.12	0.08	0.05

Compute the Huffman code for this source. Also calculate the code efficiency.

- (ii) Derive an expression for a capacity of Binary Symmetric Channel. (6)

12. (a) Apply arithmetic coding to encode the message “went#”, with the following symbols and their probability of occurrence are as described here: (16)

Symbols	$e$	$n$	$t$	$w$	$\#$
Probability	0.3	0.3	0.2	0.1	0.1

Or

- (b) (i) Explain the working principle of Dolby AC-3 coder. (8)

- (ii) Describe about linear predictive coding. (8)

13. (a) With the neat block diagram, explain the working of JPEG encoder and decoder. (16)

Or

- (b) (i) With the aid of a diagram, discuss the basic mode of operation of GIF and also describe TIFF. (10)

- (ii) Discuss about  $H.261$  standard. (6)

14. (a) (i) Discuss in detail about single parity codes with example. (8)

- (ii) Design a syndrome calculator for  $(7, 4)$  cyclic Hamming code generated by the polynomial  $G(p) = p^3 + p + 1$ . Calculate the syndrome for  $Y = (1001101)$ . (8)

Or

- (b) (i) Discuss linear block codes in detail. (10)

- (ii) Consider the generation of a  $(7,4)$  cyclic code by generator polynomial  $g(x) = 1 + x + x^3$ . Calculate the code word for the message sequence 1001. (6)

15. (a) (i) Describe the principle of turbo coding. (10)

- (ii) Compare linear block codes and convolutional codes. (6)

Or

- (b) Describe about sequential search and Viterbi algorithm for decoding of convolutional codes. (16)