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

## Question Paper Code: 31546

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2016

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. A source $x$ generates four symbols with probabilities $P(x_1) = 0.5$, $P(x_2) = 0.3$, $P(x_3) = 0.1$ and $P(x_4) = 0.1$. Calculate entropy of this source.
2. State channel capacity theorem.
3. List the three features which determine the perception of a signal by the ear.
4. Explain about channel vocoder.
5. What is SIF?
6. Define prediction span.
7. Find the Hamming weight and Hamming distance for a code, $C = (0100, 1111)$.
8. Define cyclic codes.
9. Differentiate block code from convolutional code.
10. Give the disadvantages of sequential decoding?

PART - B (5 x 16 = 80 Marks)

11. (a) State and prove Kraft inequality theorem and source coding theorem. (16)

Or

(b) Consider a source with seven possible symbols $x_i$ , i = 1,2,…7 and the corresponding probabilities $P(x_1)$ = 0.37, $P(x_2)$ = 0.33, $P(x_3)$ = 0.16, $P(x_4)$ = 0.07, $P(x_5)$ = 0.04, $P(x_6)$ = 0.02 and $P(x_7)$ = 0.01.

(i) Construct the Huffman tree

(ii) Calculate the entropy of the source

(iii) Find the efficiency of this code. (16)

12. (a) (i) The following character string is to be transmitted using Huffman coding: TENNESSEE

(1) Derive the Huffman code tree

(2) Find average code length and entropy (10)

(ii) Explain frequency masking and temporal masking. (6)

Or

(b) Explain linear predictive coding with suitable block diagram. (16)

13. (a) With a neat schematic, describe JPEG encoder and decoder. (16)

Or

(b) Describe about the video compression standard which are defined by ITU-T for video conferencing services over ISDN? (16)

14. (a) For a (7, 4) code with generator matrix $G = \begin{vmatrix} 1 & 1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 & 1 \end{vmatrix}$

(i) Find all possible code words. (8)

(ii) Find parity check matrix *H*. (8)

Or

(b) (i) Explain about CRC. (4)

(ii) Find a generator polynomial *g(x)* for a (7, 4) cyclic code. Also find all the code vectors of this code. (12)

15. (a) Design a rate ½ convolutional encoder with constraint length $k = 3$.

(i) Construct state table for this encoder

(ii) Construct state diagram

(iii) Construct Trellis diagram for this encoder (16)

Or

(b) Explain the principle of turbo coding with encoder and decoder block diagram. (16)