Reg. No.:

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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CERT

Question Paper Code: 7016

B.E. / B.Tech. DEGREE SUPPLEMENTARY EXAMINATIONS – FEB. / MAR. 2020
Fifth Semester
Electronics and Communication Engineering
U15EC514 – INFORMATION THEORY AND CODING TECHNIQUES
(Regulation 2015)

Time : Three Hours Maximum : 100 Marks

Answer ALL the questions

PART – A

(10 x 2 = 20 Marks)

1. Define rate of information transmission across the channel.
2. State the channel coding theorem for a discrete memoryless channel.
3. State sampling theorem.
4. Illustrate the characteristics of Perceptual Coding.
5. Label the main application of Graphics Interchange Format.
6. Compare lossy and lossless compression.
7. Define constraint length in convolutional codes.
8. List the properties of generator polynomial of cyclic codes.
9. Sketch (1, n) convolutional code of constraint length 6 and rate efficiency 0.5.
10. State the principle of Turbo Coding.

PART – B

(5 x 13 = 65 Marks)

11. a) Construct Shannon Fano Coding for a discrete memoryless source. Probabilities are given in the table below and calculate entropy of the source, average length of the code, efficiency and redundancy of the code.

X(symbol)	X_1	X_2	X_3	X_4	X_5	X_6
P(x)	0.30	0.25	0.20	0.12	0.08	0.05

(OR)

b) State and prove the properties of mutual information.

12. a) Analyze the adaptive quantization and prediction with backward estimation in ADPCM system with block diagram.

(OR)

b) i. Explain about code excited LPG. (5)

ii. Explain the working performance of Dolby Audio Coders. (8)

13. a) Explain different image compression standards.

(OR)

b) Explain the principles involved in Video compression. Compare H.263 & H.261 standards. (8+5)

14. a) The generator matrix of a (6, 3) systematic block code is given by

$$G = \begin{matrix} 1\,0\,0\,0\,1\,1 \\ 0\,1\,0\,1\,0\,1 \\ 0\,0\,1\,1\,1\,0 \end{matrix}$$

i. Find the Code vectors. (3)

ii. Find the Parity check matrix. (5)

iii. Determine the Error Syndrome. (5)

(OR)

b) Consider a (7, 4) cyclic code whose generator polynomial is $g(x) = 1 + x^2 + x^3$. Encode the message (1001) using encoder.

15. a) Consider the rate r = 1/2, constraint length K = 4 convolutional encoder. The encoder outputs are represented as v_1 = XOR (s_1, s_3) and v_2 = XOR (s_1, s_2, s_3). Determine the encoder output produced by the message sequence 10100 using state diagram, tree diagram and trellis diagram.

(OR)

b) Enumerate the Viterbi decoding algorithm with suitable example.

PART – C

(1 x 15 = 15Marks)

16. a) In the message, each letter occurs the following percentage of times:

Letter	A	B	C	D	E	F
% of occurrence	23	20	11	9	15	22

i. Calculate the entropy for this alphabet of symbols. (7)

ii. Find the average codeword length using Huffman Technique. (8)

(OR)

b) For a systematic linear block code, the three parity check digits C_4,C_5 and C_6 are given by,

$C_4 = d1 + d2 + d3$

$C_5 = d1 + d2$

$C_6 = d1 + d3$

i. Construct generator matrix (4)

ii. Construct code generated by this matrix (4)

iii. Determine error correcting capability (4)

iv. Prepare a suitable decoding table. (3)