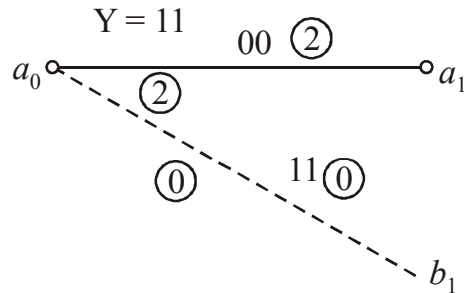(b) Consider the convolutional encoder and for a received signal Y = 11 01 11. Show the 1st three branches of the valid paths emerging from the initial node a_0 in the code trellis. **12.5**

Y = 11

9. (i) Define Probability Space.

(ii) Differentiate between mean and variance.

(iii) State Sampling Theory.

(iv) Write the statement of Markov Chain and Karhunen-Loeve expansions.

(v) What is Bayes criteria ?

(vi) What is Occupancy Distribution ?

(vii) Define code redundancy and efficiency.

(viii) Define Block Coding.

(ix) Differentiate between Soft-decoding and Hard decoding.

(x) What is viterbi-decoder ? **2.5×10=25**

MAR-21-210274

B. Tech. EXAMINATION, March 2021

Semester VIII (N/S)

INFORMATION THEORY AND CODING

EC-422

Time : 2 Hours   *Maximum Marks : 100*

The candidates shall limit their answers precisely within 20 pages only (A4 size sheets/assignment sheets), no extra sheet allowed. The candidates should write only on one side of the page and the back side of the page should remain blank. Only blue ball pen is admissible.

Note : Attempt *Four* questions in all, selecting *one* question from each Sections A, B, C and D. All questions carry equal marks.

Section A

1. (a) Define Probability. Write all properties of probability. **12.5**

(b) Derive the expression for Bernoulli Trials. **12.5**

2. (a) How to calculate CDF for discrete random variables ? **12.5**

(b) Describe conditional distributions. **12.5**

Section B

3. (a) Derive the expression for mean value of a continuous random variables. **12.5**

(b) What is standard deviation ? What are the significance of standard deviation ? **12.5**

4. (a) Explain the Markov Sequences ? Also the entropy of the Markov Source. **12.5**

(b) Suppose 10,000 digits are transmitted over a noisy transmission channel having the probability per digit equal to 5×10^{-5}. Estimate the probability of getting two digits in errors. Use the Poisson's distribution. **12.5**

Section C

5. (a) Define Prefix Coding. Describe the process of prefix decoding. **12.5**

(b) What is maximum capacity of a noiseless channel of BW 100 Hz in which the values of the data transmitted may be indicated by any one of 10 different amplitudes ? **12.5**

6. (a) Define Joint, Conditional and Marginal probabilities. **12.5**

(b) Develop Shanon-Fano code for five messages given by probabilities 1/2, 1/4, 1/8, 1/16, 1/16. Calculate the average number of bits/msg. **12.5**

Section D

7. (a) Explain Burke's Theorem and prove. **12.5**

(b) A discrete memoryless source has an alphabet of seven symbols whose probabilities of occurrence are as follows :

S_0	S_1	S_2	S_3	S_4	S_5	S_6
0.25	0.25	0.125	0.125	0.125	0.0625	0.625

Determine the Huffman code. **12.5**

8. (a) Derive the expression for transfer function of the convolutional codes. **12.5**