Roll No. ..... Total Pages : 03

BT-5/D-24 45245

INFORMATION THEORY AND CODING
EC-307A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Define random variables. List and explain its various properties. **8**

(b) Write a note on encoding of discrete sources. **7**

2. (a) Find the variance of the Gaussian RV with the PDF as : **8**

$$P_x(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-(x-m)^2/2\sigma^2}$$

(b) Define and explain information in detail with illustrations. **7**

Unit II

3. (a) Explain the construction of an instantaneous codes. 8

   (b) Describe Shannon's noisy coding theorem. 7

4. (a) State and discuss Markov sources. 8

   (b) A typical communication channel has a bandwidth of 3.1 KHz (300 Hz – 3400 Hz) and S/N as 40dB. Calculate the maximum channel capacity. 7

Unit III

5. (a) Write a note on the Huffman code with illustrations. 8

   (b) List and explain the various types of channels. 7

6. (a) Discuss the average length of a code. 8

   (b) Write a note on channel capacity. 7

Unit IV

7. (a) List and explain various types of codes. 8

   (b) Derive and explain Cyclic codes with suitable example. 7

8. (a) Explain the concept of maximum likelihood decoding. 8

(b) Discuss convolutional arithmetic codes in detail. 7