

**Total No. of Pages : 02**

**B.Tech.(ECE/ETE) (2011 Onwards Elective-I) (Sem.-6)**  
**INFORMATION THEORY AND CODING**

**INFORMATION THEORY AND CODING**

**Subject Code : BTEC-907**

Paper ID : [A2395]

**Time : 3 Hrs.**

**Max. Marks : 60**

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

## SECTION A

1. Write briefly :
  - a) Define Entropy.
  - b) What is coding efficiency?
  - c) Give differences between Discrete and Continuous communication channel.
  - d) Prove that :  $H(XY)=H(Y/X)+H(X)$
  - e) Prove that the trans information of a continuous system is non-negative.
  - f) What is Information Theory?
  - g) How is channel capacity calculated?
  - h) Define linear block codes.
  - i) Compare arithmetic coding algorithm with Huffman coding.
  - j) Define constraint length of Convolution Code.

## SECTION-B

2. What is meant by interleaving? Explain.
3. Show that entropy of signal is maximum when symbols are equally probable.
4. Explain briefly syndrome decoding for cyclic code.
5. State and prove Shanon Hartley Theorem.
6. A Gaussian channel has 1 MHz bandwidth. Calculate the channel capacity if its signal power to (two sided) noise spectral density ratio is  $5 \times 10^4$  Hz. Also find the maximum information rate.

## SECTION-C

7. Show how a 4bit stage shift register can generate a convolution code for input train 11001.
8. Design a block code with minimum distance of three and a message block size of 8bits.
9. Apply Huffman coding procedure for following message ensemble :  
 $[x] = [x_1 \ x_2 \ x_3 \ x_4 \ x_5 \ x_6 \ x_7]$   
 $[P] = [0.4 \ 0.2 \ 0.12 \ 0.08 \ 0.08 \ 0.08 \ 0.04]$