PC-11234/NJ

D-31/2111

INFORMATION THEORY AND CODING
PAPER-1105T/203
(Semester–5th)
(Common for ECE (Reg.) Semester-I and ECE) (Part Time)

Time : Three Hours]   [Maximum Marks : 50

Note : Section C is compulsory. Attempt any *six* questions by selecting *three* questions from Section A and *three* questions from Section B.

SECTION–A

I.   State and prove Shannon's channel capacity theorem. What is its significance?

II.   A communication system consists of six messages with probabilities 1/4, 1/8, 1/8, 1/8, 1/8, and 1/4, respectively. Determine the entropy of the system.

III. What is Nyquist criterion? Prove its sampling theorem mathematically.

IV.   Explain the concept of base band shaping for data Transmission.

V.   Prove that the average information is maximum when the messages are equally likely.   (3×5=15)

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SECTION–B

VI. Explain the concept of bit error analysis in coherent and non-coherent systems in detail.

VII. Derive the formulae for probability of error in case of a coherent binary phase shift keying.

VIII. For a (7, 4) cyclic code, the generating polynomial $g(x) = 1 + x + x^3$. Find the code word for 0100.

IX. Compute the Hamming code for the given data bits 00111001.

X. Explain the encoding method of a (7, 4) linear block code.

(3×5=15)

SECTION–C

XI. (a) What are instantaneous codes?

(b) Define Conditional entropy.

(c) What is meant by constraint length and free distance of a convolution code?

(d) What is the difference between block codes and convolutional codes?

(e) Explain Viterbi Decoding Algorithm.

(f) What is the main difference between DPCM and DM?

(g) Find the parity check matrix for G = [100111; 010110; 001101].

(h) What is meant by the syndrome word?

(i) Define bandwidth efficiency.

(j) Define mathematical concept of information and its units.   (10×2=20)

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