R09

Code No: D3802, D6101, D7002, D6501

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech II - Semester Examinations, March 2011
CODING THEORY AND TECHNIQUES
(COMMON TO DIGITAL ELECTRONICS & COMMUNICATION SYSTEMS, COMMUNICATION SYSTEMS, ELECTRONICS & COMMUNICATION, WIRELESS & MOBILE COMMUNICATIONS)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks
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1.a) Plot Binary entropy function and write its equation.
b) Let X denote a random variable, and a, b denote arbitrary constants. If X is discrete, how are the entropies H (ax) and H(x+b) related to H(x).
c) What are the various types of errors? [12]

2.a) Prove that (n, k) linear block code is capable of correcting 2^{n-k} error patterns.
b) Draw the block diagram of general decoder for a linear block code and explain it.
c) Show that the minimum distance d_{min} of an (n, k) linear code satisfies the following inequality

$$d_{\min} \le \frac{n.2^{k-1}}{2^k - 1}$$ [12]

3.a) Draw the encoder circuit for the (7,4) cyclic code generated by $g(x)= 1+x+x^3$.
b) Explain how syndrome is computed for cyclic codes and from this how the error is detected. [12]

4.a) Draw the circuit diagram for error-tapping decoder for the (15,7) cyclic code generated by $g(n)=1+x^4+x^6+x^7+x^8$ and explain it.
b) Write the error correcting procedure for BCH codes. [12]

5.a) Draw the block diagram of general type-II one step majority-logic decoder and explain it.
b) Determine the weight enumerator for the entenderd Hamming code of length 2^m. [12]

6.a) Prove that the number of parity-check digits of an l-burst error correcting code must be at least 2 l.
b) Explain the error correction process of single Burst error connecting codes. [12]

Contd….2

7. a) Consider the (3, 1, 2) convolutional code with

$g^{(1)} = (1\ 1\ 0)$
$g^{(2)} = (1\ 0\ 1)$
$g^{(3)} = (1\ 1\ 1)$

i) Draw the encoder block diagram
ii) Find the generator matrix.
iii) Find code word corresponding to the information sequence u = (1 1 1 0 1)

b) Explain the decoding of convolutional codes based on maximum likelihood criteria. [12]

8. Write a short note on:
a) BCH Bounds.
b) Iterative algorithm. [12]