



Name :

Roll No. :

Invigilator's Signature :

CS/M.Tech (ECE)/SEM-2/MCE-202/2013
2013
ERROR CONTROL CODING

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer Question No. 1 and any *four* from the rest.

GROUP – A

1. Answer *all* the following : $7 \times 2 = 14$

- a) What is code rate ?
- b) What is hamming bound ?
- c) What is Galois field ?
- d) Define syndrome and syndrome polynomial.
- e) What are the error trapping decoding of cyclic code ?
- f) Define viterbi algorithm.
- g) Explain Reed Solomon code.



GROUP – B

Answer any *four* of the following. $4 \times 14 = 56$

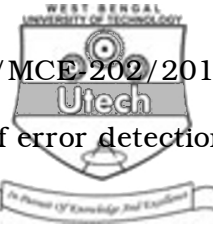
2. a) What is systematic and non-systematic cyclic code ?
- b) Write down the advantages and disadvantages of cyclic code.
- c) Construct the generator matrix for (7, 4) cyclic code using the generator polynomial $g(x) = 1 + x^2 + x^3$.

$4 + 4 + 6$

3. For (6, 3) linear block code whose parity check equation defined as $p_1 = x_1 + x_3$ $p_2 = x_1 + x_2 + x_3$ $p_3 = x_1 + x_2$

Find :

- i) generator matrix
- ii) parity check matrix
- iii) error checking capability
- iv) error check table.
4. Write down short notes on the following : $3 + 3 + 4 + 4$
- a) Extended block code
- b) Hamming bound
- c) BCH code
- d) Reed Solomon code.



5. a) Prove that for (n, k) coding t number of error detection is possible if and only if $2^{n-k} \geq \sum_{i=t}^n \binom{n}{i}$
- b) Prove that minimum hamming distance is possible for $d_{\min} \geq 2t + 1$. For t error correction.
6. a) Write down the advantages and disadvantages of convolution code.
- b) Convolution code describe by $g_1 = [1 \ 1 \ 0]$
 $g_2 = [1 \ 0 \ 1]$ $g_3 = [1 \ 1 \ 1]$.
- i) Draw the encoder corresponding to the code.
- ii) Draw state transition diagram.
- iii) Draw Trellis diagram.
7. a) Describe with block diagram decoding mechanism of BCH code ?
- b) Describe maximum likely hood detector.
- c) Show that $x^3 + x + 1$ is an irreducible polynomial over GF (2). 4 + 4 + 6

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