SC 461

Introduction to Coding Theory and its Applications

Dhirubhai Ambani Institute of Information and Communication Technology (DA-IICT)

Version 2 (Spring 2013)

INSTRUCTIONS:

- There are total 8 pages. Ensure that you have all the pages.

- Answer **all questions**, writing clearly in the space provided.

- Show all your work and explain how you arrived at your answers, unless explicitly told to do otherwise.

- You can do the rough work on the supplementary sheets.

- Write your name and student number **clearly** at the top of each page.

- You have **two hours** to complete the test

- Marks for each question are indicated in brackets at right. You may use point form for your answers, but make sure the points are clear and unambiguous.

FOR MARKER'S USE ONLY

Question	Possible	Received
1	11	
2	13	
3	13	
4	13	
TOTAL	50	

1. (a) An ICT engineer requires a binary linear rate $\frac{1}{2}$ code which can correct one error. Can you help him and suggest a code that will do the job ? Explain and Justify ! (11)

2. (a) Factor the polynomial $x^8 - 1$ over $GF(3)$. How many ternary cyclic codes of length $n = 8$ are there? Pick one of them as generator of the cyclic code and find the parity check matrix of that cyclic code. (13)

3. (a) Find the number of codewords of each of the weights $0, 1, 2, 3$ and 4 in the binary Hamming code of length 7. (13)

4. (a) Construct the generator matrix of the binary Golay code $\mathcal{G}_{24} : [24, 12, 8]$ and using the matrix show that it is self-dual i.e., $\mathcal{G}_{24}^{\perp} = \mathcal{G}_{24}$. (13)