

## Question Sheet

1) A group code has generator matrix

$$G = \begin{pmatrix} 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 \end{pmatrix}.$$

List the codewords and state how many errors are detected and how many are corrected by this code.

Write down the parity check matrix and a table of syndromes for this code for all possible single digit errors in transmission.

A message is encoded with the letter equivalents

A	E	G	H	R	T	S	Space
001	010	100	011	101	110	111	000

Correct and read the received message

110011 011101 011011 010001 111110

000010 100010 101101 110111 001001 111001

2) A group code has generator matrix

$$G = \begin{pmatrix} 1 & 0 & 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 & 0 & 1 \end{pmatrix}.$$

List the codewords and state how many errors are detected and how many are corrected by this code.

Write down the parity check matrix and a table of syndromes for this code for all possible single digit errors in transmission.

A message is encoded with the letter equivalents

T	I	L	S	D	U	R	E
000	100	010	001	110	011	101	111

Correct and read the received message

10100111, 11111111, 01100101, 01101111, 00001010, 00100000,  
00010010.

3) A group code has generator matrix

$$G = \begin{pmatrix} 1 & 0 & 0 & 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 0 & 1 & 0 \end{pmatrix}.$$

List the codewords and state how many errors are detected and how many are corrected by this code.

Write down the parity check matrix and a table of syndromes for this code for all possible single digit errors in transmission.

A message is encoded with the letter equivalents

R	A	T	M	I	C	E	S
100	010	001	110	101	011	000	111

Correct and read the received message

1001000, 0100101, 0011010, 1101101, 1010011, 0111110, 0000000, 1101101.