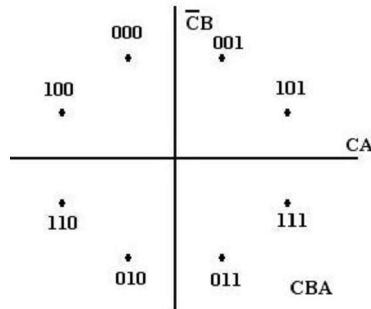# Digital Communication II – EADOM2B – Test 3 – 04/05/2015 – 14h00 to 15h00

1   Use the following table and constellation to find the results of the data received by an 8PSK differential system.

B/b	A/a	Phase
0	0	180°
0	1	+90°
1	0	-90°
1	1	0°

Data received: (100) 100 101 110 010 101 (cba)   (6)

2   In a document containing only 7 characters the character count was as follows: K – 45; F – 33, B – 51; G – 48; Q – 45, W – 36 and L – 42.

2.1   Determine the Huffman code for each character and the Huffman average for the coding system.

2.2   Calculate the compression ratio of the code.   (8)

3   The following data containing Hamming bits in the standard positions was received:
    0 1 0 0 1 0 1 1 1 0 0 1

3.1   If any, determine the error position and in that case, give the corrected data.

3.2   Determine the original character transmitted.   (4)

4   Use ODD parity, 01 as start bits an 1 as a stop bit. Code the word **fish** for RS232 transmission.   (6)

5   The RS232 code 5934B36B7533$_H$ contains 1 start bit and 2 stop bits.   (6)
    Determine the start bit, stop bits, type of parity used and the word transmitted.

TOTAL: /30/

0100 0001	A	0110 0001	a	0100 0010	B	0110 0010	b	0100 0011	C	0110 0011	c	0100 0100	D	0110 0100	d
0100 0101	E	0110 0101	e	0100 0110	F	0110 0110	f	0100 0111	G	0110 0111	g	0100 1000	H	0110 1000	h
0100 1001	I	0110 1001	i	0100 1010	J	0110 1010	j	0100 1011	K	0110 1011	k	0100 1100	L	0110 1100	l
0100 1101	M	0110 1101	m	0100 1110	N	0110 1110	n	0100 1111	O	0110 1111	o	0101 0000	P	0111 0000	p
0101 0001	Q	0111 0001	q	0101 0010	R	0111 0010	r	0101 0011	S	0111 0011	s	0101 0100	T	0111 0100	t
0101 0101	U	0111 0101	u	0101 0110	V	0111 0110	v	0101 0111	W	0111 0111	w	0101 1000	X	0111 1000	x

Digital Communication II – EADOM2B – Test 3 Memorandum

1

Present	Next	Phase	Quadrant	Output
100 (2)	100	180°	4	111
100 (2)	101	+90°	3	110
101 (1)	110	-90°	4	111
110 (3)	010	-90°	2	000
010 (3)	111	0°	3	110

(6)

2

Char	Count	P(x)	Diagram				Code	n	nP(x)
B	51	0,17		0,40 WFB			11	2	0,34
G	48	0,16	0,31 GK	0,60 GKQL	1,00		110	3	0.48
K	45	0,15					010	3	0,45
Q	45	0,15	0,29 QL				100	3	0,45
L	42	0,14					000	3	0,42
W	36	0,12	0,23 WF				101	3	0,36
F	33	0,11					001	3	0,33
	300	1,00							2,83

2.1 Determine the Huffman code for each character and the Huffman average for the coding system.
2.2 Calculate the compression ratio of the code. = 3/2,83 = 1,06 (8)
3 The following data containing Hamming bits in the standard positions was received:

   0 1 0 0 1 0 1 1 1 0 0 1

				H				H		H	H
12	11	10	9	8	7	6	5	4	3	2	1
0	1	0	0	1	0	1	1	1	0	0	1
0	1	0	0	1	0	1	0	1	0	0	1

11	1011
6	0110
5	0101
H	1101
E	0101=5

Data 0100 0100 = D

3.1 If any, determine the error position and in that case, give the corrected data.
3.2 Determine the original character transmitted. (4)
4   f = 0110 0110 → 01 0110 0110 1 1 → 59B
    i = 0110 1001 → 01 1001 0110 1 1 → 65B
    s = 0111 0011 → 01 1100 1110 0 1 → 739
    h = 0110 1000 → 01 0001 0110 0 1 → 459   fish = 59B65B739459$_H$ (6)
5   Group size = 8+1+1+2 = 12 (6)
   5   9   3   4   B   3   6   B   7   5   3   3
  0101 1001 00**11**, **0**100 1011 00**11**, **0**110 1011 01**11**, **0**101 0011 00**11**
       4   **4**   **6**   **4**
  0100 1101   **0110 1001**   **0110 1011**   **0110 0101**
     M   **i**   **k**   **e**
  start bit = 0, stop bits = 11, type of parity = EVEN and the word = Mike

TOTAL: /30/