Digital Communication II – EADOM2B – Test 4 – 09/05/2015 – 08h00

1   A 16 QAM differential transmitter use 0101 as default value. The tables and data for the system is as follows: 0101, 1100, 1010, 0011, 1100. Find the output.

0011	0111	1011	1111
0010	0110	1010	1110
0001	0101	1001	1101
0000	0100	1000	1100

A/a	C/c	Phase
0	0	±180°
0	1	+90°
1	0	-90°
1	1	0°

B/b	D/d	b/B	d/D
0	0	0	1
0	1	0	0
1	0	1	1
1	1	1	0

(6)

2   In a document containing only 7 characters the character count was as follows: B – 90; D – 66, E – 102; G – 96; M – 90, P – 72 and X – 84.

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   Insert Hamming bits in the standard positions for the letter P. (4)

4   Use ODD parity, 1 as start bit an 11 as a stop bits. Code the word **Milk** for RS232 transmission. (6)

5   The RS232 code 59B65B739459$_H$ contains 2 start bits and 1 stop bit. (6)
Determine the start bits, stop bit, 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	AC	BD	Output
0101 (2)	0101 (2)	0°	11	11 - 10	1110
1110 (1)	1100 (4)	-90°	10	10 - 11	1101
1101 (4)	1010 (1)	+90°	01	00 - 01	0011
0011 (2)	0011 (2)	0°	11	01 - 00	1010
1010 (1)	1100 (4)	-90°	10	10 - 11	1101

(6)

2

Char	Count	P(x)	Diagram				Code	n	nP(x)
B	102	0,17		0,40 WFB			11	2	0,34
G	96	0,16	0,31 GK	0,60 GKQL	1,00		110	3	0.48
K	90	0,15					010	3	0,45
Q	90	0,15	0,29 QL				100	3	0,45
L	84	0,14					000	3	0,42
W	72	0,12	0,23 WF				101	3	0,36
F	66	0,11					001	3	0,33
	600	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 Insert Hamming bits in the standard positions for the letter P.

				H				H	H	H		11	1011
12	11	10	9	8	7	6	5	4	3	2	1	9	0110
0	1	0	1	1	0	0	0	1	0	0	1	H	1101

(4)

4 M = 0100 1101 → 1 1011 0010 1 11 → D97
  i = 0110 1001 → 1 1001 0110 1 11 → CB7
  l = 0110 1100 → 1 0011 1110 0 11 → 9F3
  k = 0110 1011 → 1 1101 0110 0 11 → EB3   Milk = D97CB79F3EB3$_H$ (6)

5 Group size = 8+1+1+2 = 12
  5   9   B   6   5   B   7   3   9   4   5   9
01 0110 0110 1 1, 01 1001 0110 1 1, 01 1100 1110 0 1, 01 0001 0110 0 1
    5   **5**   **5**   **3**
  0110 0110   0110 1001   0111 0011   0110 1000
    f   **i**   **s**   **h**
start bits = 01, stop bits = 1, type of parity = ODD and the word = fish (6)

TOTAL: **/30/**