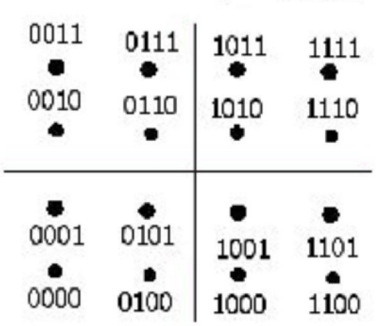
Digital Communication II – EADOM2B – Test 3

1	A 16 QAM differential receiver use 0101 as default value. The tables and data for the system is as follows: 0101, 1100, 1010, 0011, 1100 . 0000, 1111 Find the output.  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	(8)
2	A FDM system is constructed with 11 channels per group, 7 groups per major group, 13 major groups per super group and 3 super groups in the final stage. The channel separation is 3.9 kHz. Determine the number of voice channels in this system and explain if it is possible to use this structure in a co-axial transmission system. Show all calculations. Give criticism on the system.	(6)
3	For a 38/40 TDM system using the same standards as a 30/32 system and a sampling frequency of 12 kHz with 12 bits slots, calculate:	
3.1	The frame duration.	
3.2	The multi-frame duration.	
3.3	The slot duration.	
3.4	The bit duration.	
3.5	The output gross line bit rate in bits/second.	(6)
4	In a document containing only 6 characters the character count was as follows: G – 22 ; F – 12 ; B – 34 ; M – 20 ; Q – 24 and L – 28.	
4.1	Determine the optimal Huffman code for each character and the Huffman average for the coding system.	
4.2	Calculate the compression ratio of the code.	(10)
	TOTAL:	**/30/**

Digital Communication II – EADOM2B – Test 3 Memorandum

1

4 Previous	Next	Phase	Q out	Output
0101 (3) √	0101	180	1	1 1 1 0 √
0101 (3)	1100	-90	2	0 1 1 1 √
1100 (4)	1010	0	4	1 0 0 1 √
1010 (1)	0011	+90	2	0 0 1 0 √
0011 (2)	1100	-90	1	1 1 1 1 √
1100 (4)	0000	180	2	0 0 1 1 √
0000 (3)	1111	0	3	0 1 0 0 √

(8)

2

Voice channels = 11.7.13.3 = 3003 √√ BW = 3003x3.9 = 11.712 MHz √
Can fit with very little free space √√
Channel separation of 3.9 kHz acceptable √

(6)

3

FD = 1/12k = 83.33 µs √ MFD = FDx20 = 1.67 ms √
SD = FD/40 = 2.083 µs √ BD = SD/12 = 0.1736 µs √
GLBR = 1/BD = 5.76 MB/s √√

(6)

4

In a document containing only 6 characters the character count was as follows: G – 22 ; F – 12 ; B – 34 ; M – 20 ; Q – 24 and L – 28.

Chr	Cnt	P					Code	n	nP
B	34	0.243			0.569	1	11	2	0.486
L	28	0.200		0.429			10	2	0.400
Q	24	0.171	0.328				101	3	0.513
G	22	0.157					001	3	0.471
M	20	0.143	0.229				100	3	0.429
F	12	0.086					000	3	0.258
	140	1.000							2.557

√ √ √√√ √ √ √

CR = STD/HA = 3/2.557 = 1.173 √√

(10)

TOTAL: /30/