Dr. Ashraf S. Hasan Mahmoud

KFUPM - COMPUTER ENGINEERING DEPARTMENT
COE-540 – Computer Networks
Quiz 03 – Due March 11th, 2015 – Take home quiz

Student Name:

Student Number:

a) The transmitted frame is $T(X) = X^{13} + X^{12} + X^{10} + X^8 + X^7 + X^6 + X^5 + X^4 + X$

b) The division is shown – Note that the division shown produce a ZERO remainder.

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

Division of T(X) by G(X) using binary representation

Note that the division process may be done in binary as shown or using the polynomial representation (easier to follow!) – Division in ONE representation form is required ONLY.

							X^9	X^8					X^3	X^2	X
X^4	X	1	X^13	X^12	X^10		X^8	X^7	X^6	X^5	X^4				X
			X^13		X^10	X^9									
				X^12		X^9	X^8	X^7	X^6	X^5	X^4				X
				X^12		X^9	X^8								
								X^7	X^6	X^5	X^4				X
								X^7		X^4	X^3				
									X^6	X^5		X^3			X
									X^6			X^3	X^2		
										X^5			X^2		X
										X^5			X^2		X
										0	0	0	0	0	

Division of T(X) by G(X) using polynomial representation

c) The error syndrome is given by 00 1000 0000 0100 or $E(X) = X^{11} + X^2$

The received frame is $T_R(X) = T(X) + E(X) = X^{13} + X^{12} + X^{11} + X^{10} + X^8 + X^7 + X^6 + X^5 + X^4 + X^2 + X$ or 11 **1**101 1111 0**1**10. The underlined bits are the ones affected by the error.

d) The division of the received frame TR(X) by G(X) is as shown. Note the division produces a remainder and therefore, the

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

Division of TR(X) by G(X) using binary representation

Note that the division process may be done in binary as shown or using the polynomial representation (easier to follow!) – Division in ONE representation form is required ONLY.

Note that the remainder of the division is X^3+X which is the bit pattern 1010

								X^9	X^8	X^7			X^4		X^2	
X^4	X	1	X^13	X^12	X^11	X^10		X^8	X^7	X^6	X^5	X^4		X^2	X
			X^13			X^10	X^9								
			X^12	X^11			X^9	X^8	X^7	X^6	X^5	X^4		X^2	X
			X^12				X^9	X^8							
				X^11				X^7	X^6	X^5	X^4		X^2	X	
				X^11			X^8	X^7							
							X^8		X^6	X^5	X^4		X^2	X	
							X^8			X^5	X^4				
								X^6					X^2	X	
								X^6				X^3	X^2		
												X^3		X	

Division of TR(X) by G(X) using polynomial representation