

SRM Institute of Science and Technology
Department of Mathematics
18MAB302T-Discrete Mathematics 2021-2022 Odd
Unit – IV: Group codes, error correction and decoding group codes
Tutorial Sheet - 12

S. No	Questions	Answers
Part – A [3 Marks]		
1	What is meant by odd parity check? Explain giving example.	
2	Find the parity check matrix given the generator matrix $G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 & 1 \end{bmatrix}$ corresponding to the encoding function $e: B^4 \rightarrow B^7$.	
3	What are the possible weight of code word x if $H \bullet x^T = \begin{bmatrix} 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 \end{bmatrix} \bullet x^T = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} ?$	
4	Using the parity check matrix H . Decode the following word 1100001 and find the original message. The matrix is given by $H = \begin{bmatrix} 1 & 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$	
5	Explain in detail how to construct a parity check matrix.	
Part – B [6 Marks]		
6	Find the code words generated by the parity check matrix $H = \begin{bmatrix} 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 \end{bmatrix}$ Where the encoding function is $e: B^2 \rightarrow B^5$.	
7	If the encoding function $e: B^3 \rightarrow B^8$ is given by $e(000)=000000000$ $e(010)=01011100$ $e(011)=01101110$	

	$e(110)=11011001$ $e(001)=00110010$ $e(100)=10000101$ $e(101)=10110111$ $e(111)=11101011$ find the corresponding parity check matrix.	
8	Decode each of the following received words corresponding to the encoding function $e:B^3 \rightarrow B^6$ given by $e(000)=000000$ $e(001)=001011$ $e(010)=010101$ $e(100)=100111$ $e(011)=011110$ $e(101)=101100$ $e(110)=110010$ $e(111)=111011$ assuming that no signal error has occurred: 011110, 110111, 110000.	
9	Construct the decoding table for the group code given by the generator matrix $G = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 & 0 \end{bmatrix}$	
10	Use the decoding table in the question 9 to decode the following received words: 11110, 11101, 11011.	