SRM Institute of Science and Technology
College of Engineering and Technology
Department of Mathematics
SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu
Academic Year: 2023-2024(ODD)
Tutorial sheet - 3

Date: 16/10/2023

Course Code &Title:18MAB302T-Discrete Mathematics for Engineers
Year & Sem: III/V

Q. No	Questions	Answer Keys
1	Prove that $B^n = \{(x_1, x_2, \ldots, x_n)/x_i \in B\}$ forms an abelian group with respect to addition modulo 2, where $B = \{0,1\}$.	
2	Define minimum distance of a code and calculate the minimum distance between the codes $$x = 11010, y = 10101, z = 10011$$	**Minimum distance between the codes = 1**
3	Find the weight of the word 110101	**4**
4	Find the minimum distance between the code words 0000, 0110, 1011, 1100.	**2**
5	Find the code word generated by the encoding function $e: B^2 \to B^5$ with respect to the parity check matrix $$H = \begin{pmatrix} 0 & 1 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$	**00000** **01011** **10011** **11000**
6	Find the code words generated by the parity check matrix $\begin{pmatrix} 1 & 1 & 01 & 0 & 0 \\ 1 & 0 & 10 & 1 & 0 \\ 1 & 1 & 10 & 0 & 1 \end{pmatrix}^T$ when the encoding function is $e: B^3 \to B^6$.	**000000** **001011** **010101** **100111** **011110** **101100** **110010** **111001**
7	Find the code words for $w \in B_2$ assume that $$G = \begin{pmatrix} 10110 \\ 01011 \end{pmatrix}$$	**e(00)=[0 0 0 0 0]** **e(01)=[0 1 0 1 1]** **e(10)=[1 0 1 1 0]** **e(11)=[1 1 1 0 1]**
8	Find the Hamming distance between x =11010 and y = 10101	**4**
9	Given the generator matrix $\begin{pmatrix} 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 0 & 1 \end{pmatrix}$ corresponding to the encoding function $e: B^3 \to B^6$, find the corresponding parity check matrix and use it to decode the received words 110101,	**Original message: 110, 001**

	001111 and hence to find the original message.	
10	How many errors can be corrected in the encoded words 000 and 111?	**0 or 1**