SRM Institute of Science and Technology
Department of Mathematics
18MAB302T-Discrete Mathematics2021-2022 Odd
Unit – IV: Rings, Field, Integral domain and coding theory
Tutorial Sheet - 11

S. No.	Questions	Answers
	Part – A [3 Marks]	
1	.Prove that every field is an integral domain.	
2	Define an integral domain and give an example.	
3	What do you mean by encoder and decoder?	
4	What is meant by i) weight of the code word ii) Hamming distance between two code words?	
5	What are the restrictions on A occurring in the generator matrix $[I_m \backslash A]$.	
	Part – B [6 Marks]	
6	Prove that the set $Z_4=\{0, 1, 2, 3\}$ is a commutative ring with respect to binary operations $+_4$ and $\times_4$.	
7	If S is the set of ordered pairs (a, b) of real numbers and if the binary operations $\oplus$ and $\otimes$ are defined by the equations (a, b) $\oplus$ (c, d)= (a+c, b+d) (a, b) $\otimes$ (c, d)= (ac-bd, bc+ad) prove that (S, $\oplus$, $\otimes$) is a field.	
8	Prove that a finite integral domain is a field.	
9	If $C \subseteq B^7$ where C is the set of code words and r=c+e, where $c \in C$, e is the error pattern and r is the received word find r, e and c respectively from the following: 1. c= 1010110 and e=0101101 2. c=1010110 and r= 1011111 3. e=0101111 and r=0000111	
10	For the following encoding function find the minimum distance between the code words. State also the error detecting and error correcting capabilities of each code. 1. e(0,0)=0000, e(1, 0)=0110, e(0,1)=1011 and e(1, 1)=1100. 2. . e(0,0)=00001, e(1, 0)=10100, e(0,1)=01010 and e(1, 1)=11111.	