University of Kerala

Discipline	Mathematics				
Course Code	UK1MDCMAT101				
Course Title	Mathematical Thinking				
Type of Course	MDC				
Academic Level	100-199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours per week
	3	3 Hours	-	-	3
Pre-requisites	1. A good basic School Mathematics				
Course Summary	This course is an introduction to the foundations of logic, proof, Divisibility and Linear Diophantine Equations				

Detailed Syllabus

Module	Unit	Contents	Hrs
I		**Foundations of Logic and Proof**	**9**
	1	Logical connectives, Quantifiers. Basic set operations, Relations and Functions. (Chapter 1: Sections 1, 2, 3 of in Text[2], Chapter 2:Sections 1, 2, 3 of in Text [2])	
II		**Divisibility of integers**	**9**
	2	Divisibility, Euclid's Theorem, The Sieve of Eratosthenes, The Division Algorithm, The Greatest Common Divisor, The Euclidean Algorithm, (Chapter: Section 1.1, 1.2, 1.3, 1.4, 1.5, 1.6 of Text [1])	
III		**The Greatest Common Divisor**	**9**
	3	The Greatest Common Divisor, The Euclidean Algorithm, (Chapter: Section 1.7, 1.8, 1.9 of Text [1])	

Module	Unit	Contents	Hrs
IV	**Diophantine equations and the Fundamental Theorem of Arithmetic**		**9**
	4	Diophantine equations, The Postage Stamp Problem. The Fundamental Theorem of Arithmetic, (Chapter 2: Sections 2.1, 2.2, Chapter 3: Sections 3.1, 3.2 of Text [1])	
V	**Suggestions for teacher designed topics**		**9**
	5	Techniques of proof, Chapter 1: Section 3 of in Text[2]	
	6	Number in other bases, Fermat and Mersenne Numbers, Euclid and the Fundamental Theorem of Arithmetic. (Chapter: Section 1.9, 1.10, Chapter 3: Section 3.3 of Text [1])	

Textbooks

1. James S.Kraft, Lawrence C. Washington. *Elementary Number Theory*, CRC Press, 2014.

2. S R Lay. *Analysis with an Introduction to Proof*, 5th Edition, Pearson Education, 2015.

References

1. J P D'Angelo, D B West. Mathematical Thinking- Problem Solving and Proofs 2nd Edition, Prentice Hall, 2018.

2. Daniel J Velleman. How to Prove it : A Structured Approach, 2nd Edition, Cambridge University Press, 2006

3. Elena Nardi, Paola lannonne. How to Prove it : A brief guide for teaching Proof to Year 1 mathematics undergraduates, University of East Anglia, Centre for Applied Research in Education, 2006.

4. Thomas Koshy, Elementary Number Theory with Applications, 2nd Edition, Academic Press, 2007.

Course Outcomes

CO No.	Upon completion of the course the graduate will be able to	PO/PSO	Cognitive Level	Knowledge Category	Lecture(L) Tutorial (T)	Practical (P)
CO 1	Understand the fundamental concepts of Differentiation	PSO1, 2	U	F,C	L	
CO 2	Explore Differentiation techniques to functions involving vectors and matrices	PSO 2,4	An, C	C, M	L	
CO 3	Develop problem-solving skills through the application of differentiation concepts and systems of linear equations	PSO 2,3	An, C	P, M	L	

(R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create)
(F-Factual, C-Conceptual, P-Procedural, M-Metacognitive)

Mapping of CO with PSOs and POs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	2	2	3	3	3	-	1	-	-	2	1	1
CO2	1	3	1	2	1	1	1	1	3	-	-	2	1	1
CO3	1	3	2	3	2	3	1	3	3	-	-	3	1	1

(- -Nill, 1-Slightly/Low, 2-Moderate/Medium, 3-Substantial/High)

Assessment Rubrics

- Quiz/Assignment/Discussion/Seminar
- Midterm Exam
- Programming Assignments
- End Semester Exam