LESSON PLAN 1

Course Title:				Real Analysis-II				
Course Code:				MTL MD202				
Course Coordinator				Dr. Surender Singh				
Credits				4-0-0=4				
Evaluation Scheme Total 100 Marks								
Quiz (Total 20 Marks)			Assignment/Project (Total 20 marks) (Minimum Two Assignments or one Project)		Mid-Term	Major Examination	Total	
Quiz I (5 marks	Quiz II (5 marks)	Quiz III (5 marks)	Quiz IV (5 marks)			20 marks) (1 ^{1/2} Hour Duration)	(40 marks) (3 Hour Duration	100 Marks
WEEKS			TOPICS TO BE COVERED					
Week 1				Definition and Examples of neighbourhood, interior point, open sets, Theorems based on open sets and related counterexamples.				
Week 2				Definition and examples of interior point closed set, some theorems and their proof related to closed set, counterexamples.				
Week 3				Definition and examples on Limit and continuity of functions and related numerical problems.				
Week 4				Basic properties of continuous functions, discontinuous functions.				
Week 5				Algebra of continuous functions, Properties of continuous functions on closed and bounded intervals;				
Week 6			Definition examples of Uniform continuity and related numerical problems, Non-uniform continuity criteria, Uniform continuity theorem.					
Week 7				Notion of lower and upper Darboux sum with examples, definition of Reiman integrability and evaluation of Reimann Integration.				
Week 8				Necessary and sufficient conditions for the Riemann integrability, Definition of Riemann integration by Riemann sum and equivalence of the two definitions,				
Week 9				Riemann integrability of monotone functions and continuous functions, Properties of Riemann integrable functions, Examples and problems based on applications of the properties of Reimann Integration.				
Week 10			Definitions of piecewise continuous and piecewise monotone functions and their Riemann integrability, intermediate value theorem for integrals, Fundamental theorems (I and II) of calculus, and the integration by parts					

Week 11 (17 th -21 st March, 2025)	Mid-Term
2 nd April, 2025	Showing of Mid-Term Answer Sheets
Week 13	Definition of Improper Integral with examples. Types of Improper Integration with examples. Evaluation of simple Improper Integrals.
Week 14	Integration of unbounded functions with finite limits of integration, Comparison tests for convergence
Week 15	 Convergence of Beta functions, Cauchy's test for convergence of improper integral, absolute convergence of improper integral, Convergence at ∞ and -∞, Comparison tests for convergence at ∞, Problem solving based on these studies.
Week 16	Convergence of Gamma functions, Abel's test and Dirichlet's test for convergence and related examples and numerical problems.
Week 17 (5 th -9 th May, 2025)	Revision Week
Week 18 (13 th – 22 nd May, 2025)	Major Examinations
29 th May, 2025	Showing of Major Exams Answer Sheets

Course Outcomes: After successful completion of this course, students shall be able to:

CO1: understand and analyse certain concepts in the Topology of Real-Numbers, and theory of continuous functions.

CO2: understand the notion of Reimann Integrable function and evaluate the Reimann Integration of various functions.

CO3: investigate the analytical results of Reimann Integration.

CO4: describe and evaluate improper integrals and examine their convergence.

Recommended Books:

1. Bartle, Robert G., & Sherbert, Donald R. (2015). Introduction to Real Analysis (4th ed.). Wiley India Edition. New Delhi 2. R. R. Goldberg, Methods of Real Analysis.

https://archive.nptel.ac.in/courses/111/101/111101134/

Calendar of Quizzes/Assignment etc. to be provided as per below details and exact dates to be fixed in consultation with other course coordinators to avoid overlap of Quizzes of different courses.

Component	Date
Quiz-I	27 th -31 st , January 2025

Quiz-II	24 th -28 th February, 2025
Assignment-I	10 th -12 th February, 2025
Mid-Term	17-21 st March, 2025
Assignment-II/	21 st – 24 th April, 2025
Project Submission	
Quiz-III	7 th – 11 th April, 2025
Quiz-IV	28 th April-2nd, May, 2025
Major Exam	$13^{\text{th}} - 22^{\text{nd}}$ May, 2025

Note:

- 1. One surprise Quiz may be fixed out of Quiz-II, Quiz-III or Quiz-IV.
- 2. In case of any deviation in evaluation methodology for courses such as AEC/VAC/SEC shall be mentioned accordingly. Thus, same shall be approved by the next BOS of school if not done earlier.

Signature of Course Coordinator : 5.5 3