Lecture Plan

Name of the College: Government College of Arts, Science and Commerce, Sanquelim-Goa

Name of Faculty: Prajyot Maruti Patil	**Subject:** Mathematics	
Paper code: MAT -300 Riemann Integration and Improper Integrals	**Program:** B.Sc.	**Division: -**
Academic year: 2025-26	**Semester:** V	**Total Lectures:** 60

Course Objectives:

1. To be competent in discussing the integrability of real valued functions and to build the skills required in establishing results in integration.

Expected Course Outcome:

1) Apply the theory of Riemann integration in evaluating integrals.
2) Prove various results in Riemann integration.
3) Analyze and compare various number theoretic functions.
4) Examine the convergence of improper integrals.

Student Learning Outcome: Student will be able to

1) Have a skill of proving theorems specifically in Riemann integration.
2) Apply the theory of Riemann integration in evaluating integrals.

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
June	20/06/2025	21/06/2025	1	Discussion of prerequisites			
	23/06/2025	28/06/2025	4	Partition of an interval; properties of partitions – Upper and Lower sums of a bounded real valued function over a closed interval;		Smart Board PDF	A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
July	30/06/2025	05/07/2025	4	Upper and Lower integrals; Examples and related results; Darboux condition for integrability;		Smart Board PDF	A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
	07/07/2025	12/07/2025	4	Riemann Integrability – Necessary and sufficient conditions.			A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
	14/07/2025	19/07/2025	4	Riemann Integrals of Step; monotonic and continuous functions;		Data projector	A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
	21/07/2025	26/07/2025	4	Integrability of the absolute value; Monotonicity of Riemann integrals;			A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
July August	28/07/2025	02/08/2025	4	Integrability of composition of a continuous function with an integrable function on a closed and bounded interval.			A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
August	04/08/2025	09/08/2025	4	Properties of Riemann integrals: (i) $\int_a^b \alpha(x)dx = \alpha \int_a^b f(x)dx$. (ii) $\int_a^b ((x) \pm g(x))dx = \int_a^b f(x)dx \pm \int_a^b g(x)dx$.		Smart Board	A. Kumar, and S. Kumaresan: A Basic

							Course in Real Analysis
	11/08/2025	16/08/2025	3 Independ enceDay	(iii) $\int_c^a (x)dx + \int_b^c f(x)dx = \int_b^a f(x)dx$, $a \le c \le b$. (iv) $\left\| \int_b^a f(x)dx \right\| \le \int_b^a \|f(x)\|d$			A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
	18/08/2025	23/08/2025	4	First and Second Fundamental theorem of Calculus; Integration by parts;		Smart Board PDF	A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
	25/08/2025	30/08/2025	0 Chaturthi Break 26/08/25 To 01/09/25				
September	02/09/2025	06/09/2025	3	Change of variables; Mean Value Theorem for integrals;		Smart Board	A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
	08/09/2025	13/09/2025	4	Riemann's original definition; Sum of an infinite series as a Riemann integral.			A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
	15/09/2025	20/09/2025	4	Improper integrals of Type I		Smart Board	A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
	22/09/2025	27/09/2025	4	Improper integrals of Type II and III		Smart Board	A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
September October	29/09/2025	04/10/2025	3 Gandhi Jayanti /	Convergence results and examples;			A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis

			Dussehra				
October	06/10/2025	11/10/2025	4	Beta and Gamma functions – properties and examples.			A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
	13/10/2025	18/10/2025	4	Revision.			

*** Assessment Rubrics**

Component	Max Marks
ISA 1	10
ISA 2	10
Practical	Nil
Project	Nil
Semester End Exam	80