

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: 2026-27	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 July	22/06/2026	27/06/2026	4	Discussion of prerequisites			
	29/06/2026	04/07/2026	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
	06/07/2026	11/07/2026	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
	13/07/2026	18/07/2026	4	Riemann Integrability – Necessary and sufficient conditions.			A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
	20/07/2026	25/07/2026	4	Riemann Integrals of Step; monotonic and continuous functions;		Data projector	A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
Jul/Aug	27/07/2026	01/08/2026	4	Integrability of the absolute value; Monotonicity of Riemann integrals;			A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
August	03/08/2026	08/08/2026	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
	10/08/2026	15/08/2026	4	Properties of Riemann integrals: (i) $\int_a^b \alpha(x)dx = \alpha \int_a^b f(x)dx$. (ii) $\int_a^b (\alpha(x) \pm g(x))dx = \int_a^b \alpha(x)dx \pm \int_a^b g(x)dx$.		Smart Board	A. Kumar, and S. Kumaresan: A Basic

	17/08/2026	22/08/2026	4	(iii) $\int_a^c f(x)dx + \int_c^b f(x)dx = \int_a^b f(x)dx$, $a \leq c \leq b$. (iv) $ \int_a^b f(x)dx \leq \int_a^b f(x) dx$			A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
	24/08/2026	29/08/2026	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
August/Sept	31/08/2026	05/09/2026	4	Change of variables; Mean Value Theorem for integrals;			A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
Sep	07/09/2026	12/09/2026	4	Riemann's original definition; Sum of an infinite series as a Riemann integral.		Smart Board	A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
	14/09/2026	19/09/2026	0	Ganesh Chaturthi Break (14–19 Sep)			A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
	21/09/2026	26/09/2026	4	Improper integrals of Type I		Smart Board	A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
Sep/Oct	28/09/2026	03/10/2026	3	Improper integrals of Type II and III		Smart Board	A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
Oct	05/10/2026	10/10/2026	4	Convergence results and examples;			A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis
	12/10/2026	14/10/2026	2	Beta and Gamma functions – properties and examples.			A. Kumar, and S. Kumaresan: A Basic Course in Real Analysis

*** Assessment Rubrics**

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