SEMESTER – VI
MJC-12: Riemann Integration and Series of Functions

Course Outcomes

After the completion of the course, the student will be able to understand:

CO1: Some of the families and properties of Riemann integrable functions, and the applications of the fundamental theorems of integration.

CO2: Apply Beta and Gamma functions and their properties in finding improper integrals, area under a curve and surface of revolution.

CO3: The valid situations for the inter-changeability of differentiability and integrability with infinite sum, and approximation of transcendental functions in terms of power series.

MJC-12: Riemann Integration and Series of Functions (5 credits) Full Marks-100		
Unit	**Topics to be covered**	**No. of Lectures**
1	Definition and existence of Riemann Integral of bounded functions,Darboux theorem,necessary and sufficient condition for R-Integrability, Riemann integrability of continuous functions, monotonic function and function having finite number of discontinuities, Riemann integral as the limit of a sum, fundamental theorem of integral calculus, Mean value theorems.	14
2	Improper integrals of Type-I, Type-II and mixed type, test for convergence of improper integral such as comparison test and μ-test, Convergence of Beta and Gamma functions and their properties.	12
3	Pointwise and uniform convergence of sequence of functions, Cauchy criterion for uniform convergence, theorems on boundedness, continuity, derivability and integrability of the limit function of a sequence of functions with uniform convergence.	08
4	Series of functions, Theorems on the continuity, integrability and derivability of the sum function of a uniformly convergence series of functions, Cauchy criterion for uniform convergence and Weierstrass M-Test.	08
5	Power series, radius of convergence, Cauchy Hadamard Theorem, Differentiation and integration of power series, Abel's Theorem, Weierstrass Approximation Theorem.	08
	TOTAL	50

Book References:

1. Bartle, Robert G., & Sherbert, Donald R. (2015). Introduction to Real Analysis (4th ed.). Wiley India Edition. Delhi.
2. Ghorpade, Sudhir R. & Limaye, B. V. (2006). A Course in Calculus and Real Analysis. Undergraduate Texts in Mathematics, Springer (SIE). First Indian reprint.
3. Ross, Kenneth A. (2013). Elementary Analysis: The Theory of Calculus (2nd ed.). Undergraduate Texts in Mathematics, Springer.
4. Shanti Narayan, Elements of Real Analysis, S. Chand Publication.
5. S. Ponnusamy, Foundations of Mathematical Analysis, Birkhasuer.
6. K K Jha, Advanced Real Analysis.
7. S.K. Mapa, Introduction to Real Analysis, Sarat Book Distributor, Kolkata.