SEMESTER – IV

MJC-05: Theory of Real Functions

Course Outcomes

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

CO1:   The concept of limit of a function.
CO2:   The geometrical properties of continuous functions on closed intervals.
CO3:   The applications of mean value theorem and Taylor's theorem.

Unit	Topics to be covered	No. of Lectures
MJC-05: Theory of Real Functions (Theory: 5 credits) Full Marks-100		
1	Limit of functions, Sequential criterion for limits, Divergence criteria, Limit theorems, One-sided limits, Infinite limits and limits at infinity.	10
2	Continuous functions, Sequential criterion for continuity and discontinuity, Algebra of continuous functions, Properties of continuous functions on closed intervals, Uniform continuity, Uniform continuity theorem.	14
3	Differentiability of a function, Algebra of differentiable functions, Increasing and Decreasing functions, Sign of derivatives, Chain rule, Darboux's theorem, Intermediate value theorem for derivatives, Rolle's theorem, Lagrange's and Cauchy's Mean value theorem and their applications.	14
4	Taylor's theorem with Lagrange's and Cauchy's remainder forms, Maclaurin's theorem, Application of Taylor's theorem in error estimation, Extreme values, Theorems related to extrema.	12
	TOTAL	50

Book References:

1. Bartle, Robert G., & Sherbert, Donald R. (2015). Introduction to Real Analysis (4th ed.). Wiley India Edition. New Delhi.
2. Ross, Kenneth A. (2013). Elementary Analysis: The theory of calculus (2nd ed.). Undergraduate Texts in Mathematics, Springer. Indian Reprint.
3. Malik, S. C. & Arora, S. (2021). Mathematical Analysis (6th ed.), New Age International Publishers, New Delhi
4. Jha,K.K. Advanced Course in Real Analysis and Higher Analysis. New Bharat Publishing House.