PROGRAME NAME: B.Sc. (Hons.) Mathematics
COURSE NAME: Theory of Real Functions
SEMESTER DURATION: July to December

Week	Topic(s)	Teaching Methodology Adopted /Continuous Internal Evaluation
1	Definition of the limit, Sequential criterion for limits, Criterion for non-existence of limit.	LECTURES
2	Algebra of limits of functions with illustrations and examples, Squeeze theorem.	ASSIGNMENTS
3	Definition and illustration of the concepts of one-sided limits, Infinite limits and limits at infinity.	PRESENTATIONS
4	Definitions of continuity at a point and on a set, Sequential criterion for continuity.	TUTORIALS
5	Algebra of continuous functions, Composition of continuous functions.	CASE STUDY
6	Various properties of continuous functions defined on an interval, viz., Boundedness theorem, Maximum-minimum theorem.	SELF –INSTRUCTIONS
7	Statement of the location of roots theorem, Intermediate value theorem and the preservation of intervals theorem.	DEMONSTRATION
8	Definition of uniform continuity, Illustration of non-uniform continuity criteria, Uniform continuity theorem.	TUTORIALS
9	Differentiability of a function, Algebra of differentiable functions.	CASE STUDY
10	Carathéodory's theorem and chain rule.	PRESENTATIONS
11	Relative extrema, Interior extremum theorem.	CASE STUDY
12	Mean value theorem and its applications, Intermediate value property of derivatives - Darboux's theorem.	ASSIGNMENTS
13	Taylor polynomial, Taylor's theorem and its applications.	TUTORIALS
14	Taylor's series expansions of e^x , sin x and cos x .	DISCUSSION

Course Objectives: It is a basic course on the study of real valued functions that would develop an analytical ability to have a more matured perspective of the key concepts of calculus, namely, limits, continuity, differentiability and their applications.

Course Learning Outcomes: This course will enable the students to:

i) Have a rigorous understanding of the concept of limit of a function.

ii) Learn about continuity and uniform continuity of functions defined on intervals.

iii) Understand geometrical properties of continuous functions on closed and bounded intervals.

iv) Learn extensively about the concept of differentiability using limits, leading to a better understanding for applications.

v) Know about applications of mean value theorems and Taylor's theorem.