St. Paul's Cathedral Mission College

Department of Mathematics

Teaching Plan

Paper: DSCC 5 Name of the Faculty: Gopal Adak

Sem IV Core Course 5: Real Analysis II

Week	Topics to be covered			
	1st week	**2nd week**	**3rd week**	**4th week**
Week 1-4	Introduction of Real Valued Functions with their domain of definition, Concept of limit of a function at a point. Establishing some algebraic properties of limits.	Properties of functions in some deleted neighbourhood of a point where limit exists. Sequential and Cauchy's Criteria for existence of limit. Sandwich property, One sided limits, Limit at the point infinity and infinite limit	, One sided limits, Limit at the point infinity and infinite limit. Different Examples, Monotone Functions and existence of one sided limits. Doubt Clearing Class and Assesment	Introduction of continuity of a function at a point and in a set. Algebraic Properties of continuous fuctions, neighbourhood property of a function continuous at a point and examples.
Week 5-8	Continuity of a function in a closed bounded interval. Theorem: Every continuous function in a closed and bounded interval is bounded and it attains its bounds. Examples of unbounded functions if the domain is not a closed interval of the form [a, b]	Bolzano's theorem, Intermediate Value Property. Applications, Counter examples of the converse of IVP.	Uniform Continuity, Relation between continuous and uniform continuous functions in an interval, may be open or unbounded. Some Examples.	Discontinuity at a point. Types of Discontinuity and examples. Doubt Clearing Classes and Assesment.

Week 9- 12	Differentiability of a function at a point. Differentiability implies continuity but not the converse with counter example. Algebraic properties of differentiability of functions.	Functions not differentiable at a point, Functions differentiable in an interval. Darboux's Theorem and its Applications.	Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's Theorem, Applications of different mean value theorems.	Doubt Clearing Classes and Assesment.
Week 13-16	Functions in indeterminate forms, Existence of limits by L'Hospital's Rule. Higher order derivatives.	Taylor's Theorem with different types of remainder, Maclaurin's Theorem, Exapansion of a function in a power series. Expansion of $(1+x)^m$, $sinx$, e^x, $\log(1+x)$.	Extremum at a point, local and global extremum. Necessary and sufficient conditions for the existence of an extremum of a differentiable function at an interior point of the interval. Apllication to geometry and mensuration.	Doubt Clearing Classes and Assesment.