20MSM501T					Real Analysis					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs. /Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	--	--	100

COURSE OBJECTIVES

- To be able to understand the concept of metric space, compactness, connectedness and uniform convergence.
- To be able to develop ideas in constructing rigorous mathematical proofs.
- To be able to determine if a function on a metric space is continuous or discontinuous.
- To understand the concept of pointwise and uniformconvergence.

UNIT 1 INTRODUCTIONTO REAL NUMBER SYSTEMAND METRIC SPACES **09 Hrs.**

Real Number system: Completeness property, Finite, Countable and Uncountable Sets, Cantor's set. Metric Spaces: Metric spaces, Some Useful inequalities: Holder's inequality, Cauchy's inequality, Minkowski's inequality. Open sets, Closed sets in a metric space, Closure of a set, Limit Point, Interior Point, Exterior Point and their theorems.

UNIT 2 SEQUENCES **11 Hrs.**

Sequence, Convergence of a sequence, Cauchy Sequence, Limit point of a Sequence. Continuity, Completeness: Complete metric space, Cantor's Intersection Theorem, Dense Set, Contraction Mapping.

UNIT 3 COMPACTNESS AND CONNECTEDNESS **11 Hrs.**

Compactness: Totally bounded, Characterizations of compactness, Finite intersection property, Continuous functions on compact sets.
Connectedness: Characterizations of connectedness, Continuous functions on connected sets.

UNIT 4 PROPER AND IMPROPER INTEGRATION **09 Hrs.**

Riemann integration, Sequences and Series of Functions: Definition of point-wise and uniform convergence, Uniform convergence and continuity, Uniform convergence and differentiation.

40 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1 – Identify rigorous arguments developing the theory of underpinning real analysis
CO2 – Understand fundamental properties of the real numbers that lead to the formal development of real analysis
CO3 – A pply the acquired knowledge in important practical problems and extend ideas to a new context.
CO4 – Analyze the concept of compactness, connectedness and uniform convergence with various aspects
CO5 – Evaluate the problems of the subsets of a metric space are open, closed, compact and/or connected.
CO6 – Develop abstract ideas in analyzing proofs of theorems

TEXT/REFERENCE BOOKS

1. W. Rudin, Principles of Mathematical Analysis, McGraw Hill, 1976.
2. R. G. Bartle, Introduction to Real Analysis, John Wiley and Sons, 2000.
3. T. M. Apostol, Mathematical Analysis, Addison-Wesley Publishing Company, 1974.
4. A. J. Kosmala, Introductory Mathematical Analysis, WCB Company , 1995.
5. W. R. Parzynski and P. W. Zipse, Introduction to Mathematical Analysis, McGraw Hill Company, 1982.
6. H. S. Gaskill and P. P. Narayanaswami, Elements of Real Analysis, Prentice Hall, 1988.