Department of Mathematics

Course Learning Outcomes

Name of teacher : Rajesh Kumar

Designation : Assistant Professor

B.Sc. (Mathematics) second year

Course Code : MATH201

Name of course : Real Analysis

Course Leaning Outcomes : On completion of course , students will be able to

- Describe fundamental properties of the real numbers that lead to the formal development of real analysis.
- Comprehend rigorous arguments developing the theory underpinning real analysis.
- Demonstrate an understanding of limits and how they are used in sequences, series, Construct rigorous mathematical proofs of basic results in real analysis. Understand Integrability and theorems on integrability. Recognize the difference between point wise and uniform convergence of a sequence of functions.
- Illustrate the effect of uniform convergence on the limit function with respect to c ontinuity, differentiability, and integrability.
- Study improper integration using Riemann integration.

B.Sc. (Mathematics) second year

Course Code : MATH310

Name of course : Vector Calculus

Course Leaning Outcomes : On completion of this area of course , students will be able to

- Find the Triple product of Products and their Applications
- Deduce the Vector equations subject to different conditions.
- Understand the applications of vector algebra (particularly, vector products) to geometry and mechanics — concurrent forces in a plane, theory of couples, system of parallel forces.
- Learn operations with vector-valued functions.
- Find the limits and verify continuity of vector functions.
- Differentiate and integrate vector functions of one variable.

M.Sc. (Mathematics) first semester
Course Code : M-101

Name of the course : Real analysis

Course learning Outcomes : On completion of course , students will be able to

CO1 Develop the understanding of Reimann Stieltjes integrals so as to relate Riemann-integral and Reimann Stieltjes integral. Also understand the partial integration theorem to evaluate R-S integrals of functions.

CO2 Understand the knowledge about term by term integration and term by term differentiation for evaluating uniform convergence of series of real valued functions.

CO3 Have the knowledge of methods to examine uniform convergence of sequences and series of real valued functions such as Cauchy criteria, Weiestrass M-test, Abel and Dirichlet's test for uniform convergence with idea about the uniform convergence of sequence and series of functions.

CO4 Understand the relation between uniform convergence and continuity, uniform continuity and differentiation and integration of sequences of real valued functions.

CO5 Have the knowledge of the concepts of complete metric space, perfect set and connected set.

CO6 Understand the Stone-Weierstrass theorem to examine the uniform convergence of polynomials in real variables.

CO7 Have the idea about rectifiable curves to evaluate lengths.

M.Sc. (Mathematics) second semester

Course Code : M-201

Name of the course : Measure Theory and integration

Course learning Outcomes : On completion of course , students will be able to

CO1 Have the understanding about the importance of outer measure on measure of sets, real-valued functions, positive and negative parts of a function, Characteristic function of a set, limit superior and inferior of sequence of measurable functions.

CO2 Provide the comprehensive understanding of three principles of Littlewood, Egoroff, Lusin and Frechet theorems.

CO3 Define the Lebesgue integral of a bounded function over a set and to prove the linearity, additivity, monotonicity and triangle inequality properties under a

variety of defining property of the functions.

CO4 Understand Fatou's lemma, Monotone convergence theorem, Lebesgue dominated convergence theorem and its generalization and Riesz theorem on convergence in measure.

CO5 Understand Vitali Lemma and its application in particular, the Lebesgue theorem; existence of functions of Bounded Variation and Jorden Decomposition theorem, Jensen's inequality.

CO6 Have knowledge of differentiation, existence of partial derivatives and continuously differential functions of vector valued function of several variables.

CO7 Understand the implicit function theorem and their applications; in particular, existence of a unique solution of implicit equations near the mentioned point

M.Sc. (Mathematics) Third semester

Course Code : M-304

Name of the course : Operation research-II

Course learning Outcomes : On completion of course , students will be able to

Develop linear programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transshipment problems.

Understand the mathematical tools that are needed to solve optimization problems.

Formulate pure, mixed, and binary integer programming models.

Formulate the nonlinear programming models.

Use some solution methods for solving the nonlinear optimization problems.

M.Sc. (Mathematics) Fourth semester

Course Code : M-401

Name of the course : Complex Analysis-II

Course learning Outcomes : On completion of course , students shall be able to

CO1 Have the idea of arithmetical and geometrical properties of complex numbers and linear fractional transformations.

CO2 Have the basic concepts of the limit, continuity and derivative of the complex valued functions of a complex variable.

CO3 Have the knowledge of convergence and divergence of the sequences, series and power series.

CO4 Have the general concept of the complex integration and many important properties of analytic functions which follow from the complex integration.

CO5 View that the calculus of residues provide a very efficient tool for the evaluation of definite integrals.

M.Sc. (Mathematics) Fourth semester

Course Code : M-401

Name of the course : Complex Analysis-II

Course learning Outcomes : On completion of course , students shall be able to

CO1 Have the idea of arithmetical and geometrical properties of complex numbers and linear fractional transformations.

CO2 Have the basic concepts of the limit, continuity and derivative of the complex valued functions of a complex variable.

CO3 Have the knowledge of convergence and divergence of the sequences, series and power series.

CO4 Have the general concept of the complex integration and many important properties of analytic functions which follow from the complex integration.

CO5 View that the calculus of residues provide a very efficient tool for the evaluation of definite integrals.