K.L.E Society's
Raja Lakhamagouda Science Institute (Autonomous), Belagavi

(PO's/PSO's/CO's)

Program: M. Sc. Mathematics (PG02A01)

Programme Outcomes

PO1: Disciplinary knowledge and skills: Capable of demonstrating comprehensive knowledge and understanding of major concepts, theoretical principles in mathematics and its different subfields.

PO2: Skilled communicator: Ability to transmit complex solution relating to mathematics in a clear and concise manner in writing and orally.

PO3: Critical thinker and problem solver: Ability to employ critical thinking and efficient problem-solving skills in the allied areas of mathematics.

PO4: Sense of inquiry: Capability for asking relevant/appropriate questions relating to issues and problems in the field of mathematics, and planning, executing and reporting the results of investigation.

PO4: Ethical awareness/reasoning: Avoiding unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, and appreciate environmental and sustainability issues.

PO6: Lifelong learners: Capable of self-paced and self-directed learning aimed at personal development and for improving knowledge/skill development and reskilling.

Programme Specific Outcomes

PSO1: Demonstrate a fundamental/systematic or coherent understanding of the academic field of mathematics, its different learning areas and applications, and its linkages with related disciplinary areas/subjects.

PSO2: Demonstrate a procedural knowledge that creates different types of professionals related to mathematics area of study, including research and development, teaching and government and public service.

PSO3: Demonstrate a skill in areas related to specialization area relating the subfields and current developments in the academic field of mathematics.

PSO4: Demonstrate subject-related and transferable skills that are relevant to mathematics -related job trades and employment opportunities.

Course Outcomes

Semester I

Course Type	Course Code	Course Title	Course Outcome
DSC-I	AM01	Real Analysis	**CO1:** Develop the logical thinking to proof the basic results of real analysis **CO2:** Apply Riemann Stieltjes Integration on different boundary value problems **CO3:** Gain knowledge of fundamental theorem of calculus **CO4:** Able to understand the theorems such as Heine-Borel and Bolazano-Weierstrass **CO5**: Gain knowledge of fundamental theorem ofcalculus
DSC-II	AM02	Group Theory	**CO1:** To extend result from Group theory to study the properties of Rings and Fields **CO2:** Homomorphism & isomorphism: Discrete mathematics to advance Abstract mathematics **CO3:** Understand the concept of sylow theorems & its applications
DSC-III	AM03	Linear Algebra	**CO1:** Apply the theory of linear algebra to specific research problems **CO2:** Find the eigenvalues and eigenvectors of a square matrix **CO3:** Non-diagonalizable matrix by upper triangular form / Jordan canonical form **CO4:** Apply linear algebra to solve initial and boundary value problems
DSC-IV	AM04	Ordinary Differential Equation	**CO1:** Identify, analyze and solve physical situations of ordinary differential equations **CO2:** Determine the solution of differential equations (initial & boundary value problems) **CO3:** Knowledge of Greens function, Sturm Liouville theory **CO4:** Able to understand initial value problems for homogeneous equations
DSC-V	AM05	Topology	**CO1:** Understand the concept of topology in real world problems **CO2:** Understand the concept of countability axioms **CO3:** Gain knowledge of normal, regular and completely regular spaces
DSC-VI	AM06	Complex Analysis	**CO1:** Gain the knowledge Line integral, Cauchy's theorem and integral formula **CO2:** Able to represent the power series of an analytic function **CO3:** Able to classify the singularities of analytic functions **CO4**: Able to applySchwarz'slemmato characterize conformal maps

Semester II

Course Type	Course Code	Course Title	Course Outcome
DSC-I	BM01	Advancecalculus	**CO1:** Decide the behaviour of sequences and series using appropriate tests. **CO2:**Able to understand the various types of convergence of sequences **CO3:**Knowledge of Directional derivatives and their continuity **CO4:**Understand the sufficient condition for differentiability
DSC-II	BM02	Rings And Modules	**CO1:**The importance of Rings as fundamental object in Algebra **CO2:**Understand the homomorphism and isomorphism theorem of ring **CO3:**Understand the concept of unique factorization domain and Einstein's criterion of irreducibility for polynomials
DSC-III	BM03	Discrete Mathematical Structure	**CO1:**To prove Mathematical Theorems using mathematical induction. **CO2:** Identify functions and determine their properties. **CO3:**Determine the properties of relations and identifying equivalence and partial order relations.
DSC-IV	BM04	PartialDifferentialequations	**CO1:** Able to solve partial differential equation using Charpit's method **CO2:** Able to understand kelvin's Inversion theorem **CO3:** Able to Classify Second order partial Differential Equations
DSC-V	BM05	Numerical analysis	**CO1:**Solve algebraic and transcendental equation using an appropriate numerical method **CO2:**.Able to solve Nonlinear system of equations using Iterative methods **CO3:** To understand theoretical and practical aspects of use of numerical methods.
OEC-I	BM012	Statistical method and probability theory	**CO1:** Understand the conditional probability of random variables. **CO2:** Analyze data statistically and interpretation of the results **CO3:** Knowledge of test of significance
OEC-II	BM06	Mathematical Physics-I	**CO1:** Understand the Bessel functions of first kind **CO2:** Knowledge of Hermite polynomial and generating function **CO3:** Able to apply Laplace transform for the solution of differential equation and problems in physics.
OEC-III	BMO6	Computer Application-I	**CO1:** Understand the basic knowledge of computers and applications **CO2:** Understand the basic structure of C program.
Practical	BM16	Python Lab	**CO1:** To write loops and decision statements in python. **CO2:**To build and package python modules for reusability.

Semester III

Course Type	Course Code	Course Title	Course Outcome
DSC-I	CM01	Functional analysis	**CO1:** Understand the concept of Normed linear space in real world problems **CO2:** Able to derive Hahn-Banach theorem **CO3:** Understand the concept of Uniform boundedness principle. **CO4:** Able to derive Spectral theorem for finite dimensional Hilbert spaces
DSC-II	CM02	Lebesgue Measure and Integration	**CO1:** Understand the sigma algebra of Lebesgue measurable sets **CO2:** Apply measure theory of functional analysis **CO3:** Able to understand the concepts of functions of Bounded Variations **CO4:** Knowledge of Egoroff's theorem and Lusin's Theorem
DSC-III	CM03	Numerical Analysis -II	**CO1:** To solve the problems in economics and related subjects. **CO2:** Demonstrate a knowledge and understanding of mathematical principles. **CO3:** To design and analysis of techniques to give a approximate but accurate solutions.
DSC-IV	CM04	Number Theory	**CO1:**Able to derive the fundamental theorem of arithmetic **CO2:**Computethe primitive roots **CO3:**UnderstandtheLegendresymbolanditsproperties
DSC-V	CM13	Fuzzy relations and logic	**CO1:** Understand the fuzzy Relations equations **CO2:** Knowledge of approximate reasoning. CO3: Knowledge of quantified and qualified proposition
OEC	CM11	Statistical Inference	**CO1:** Understand the concept of various distribution and its application **CO2:** Gain knowledge of Wald-Wolfowitz Run Test
OEC	CM06	Applications of Mathematical Physics	**CO1:** Able to solve linear integral equations of the first and second kind **CO2:** UnderstandtheEuler's, picard's, milne's, runge-Kutta method
OEC	CM08	Computer Applications-II(MATLABPROGRAMMING)	**CO1:** Understand the History of MATLAB **CO2:** Able to understand conditional statements and Loop
Practical		Latex and Beamer Lab	CO1: Describes the Development process of Latex CO2: To Understand the advantages of Latex over other traditional Softwares

Semester IV

Course Type	Course Code	Course Title	Course Outcome
DSC	DM01	Graph theory	**CO1:**Understand the basic concepts of graph theory **CO2:**Identify the real-life problems in terms of graph theory **CO3:**Understand the Eulerian and Hamiltonian graphs **CO4:**UnderstandtheKrakowskicriterionforplanarity
DSC-	DM02	Algebraic Topology	**CO1:**Understand the orientation of Geometric Complexes **CO2:**Knowledge of fundamental concepts and methods in algebraic topology, in particular singular homology **CO3:**Understand the basic properties of covering spaces **CO4:**Able to prove Brower fixed point theorem
DSC	DM07	Differential Geometry	**CO1**: Compute the speed and length of the curve. **CO2**: Able to derive and apply Frenet formulae. **CO3**: Understand the concept of coordinate patches R3. **CO4**: Understand the concept of Gaussian and mean curvature. **CO5**: Knowledge of special varieties of curves
DSC	DM09	BanachAlgebra	**CO1:**Abletounderstand finite dimensional operators **CO2:**Able to prove spectral mapping theorem for polynomials **CO3**: Knowledge of spectra and the resolvent set **CO4:** Able to prove the spectral theorem forBounded
DSC	DM11	Wavelet Analysis	**CO1:** Provide time localized frequency information. **CO2:** Understand the behaviour of signals.
Project	DM10	Project	**CO1:** To lay a strong foundation in mathematics at PG level. **CO2:** Encourage students to take up projects in industry and research organizations