CAUSSANEL COLLEGE OF ARTS AND SCIENCE

(Affiliated to Alagappa University, Karaikudi)

Accredited with 'A' Grade by NAAC

Recognized by UGC under 2(f) & 12(B)

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Type of Graduation	Under Graduation
Programme Name	**B.Sc.,Mathematics**
Regulation (CBCS)	2017

Outcome of the Programme

- Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.
- A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
- Ability to analyze a problem, identify and define the computing requirements, which may be appropriate to its solution.
- Introduction to various courses like graph theory, ring theory, field theory, metric spaces, number theory.
- Enhancing students' overall development and to equip them with mathematical modeling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- Ability to pursue advanced studies and research in pure and applied mathematical science.

Specific Outcome of the Programme

- ❖ Think in a critical manner.
- ❖ Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.
- ❖ Formulate and develop mathematical arguments in a logical manner.
- ❖ Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student from the given courses.
- ❖ Understand, formulate and use quantitative models arising in social science, Business and other contexts.
- ❖ A student should get adequate exposure to global and local concerns that explore them many aspects of mathematical sciences.
- ❖ Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study

Semester	Subject Code	Subject Title	Outcome	Specific Outcome
I	7BMA1C1	CALCULUS	• Gain Knowledge of fundamental concepts of real numbers.Verify the value of the limit of a function at a point using the definition of the limit.Introduction to sequence and series.Learn to check function is continuous understand the consequences of the intermediate value theorem for continuous functions.	• To study functions and several variables. • To study the notion of Continuity and Differentiability of multivariate functions. • To find extreme values of multivariable functions using derivatives. • To learn evaluation of double and triple integration and its application to area and volume.
I	7BMA1C2	ALGEBRA AND TRIGONOMETRY	• Learn to solve system of linear equation.	• To learn divisibility of integers

			• Learn to solve Diophantine equation. • Learn to find roots of polynomial over rational. • Learn to find graphs, roots and primes integer using maxima software.	and congruence relations. • To learn operations on polynomials, finding GCD of two polynomials and roots of polynomials. • To learn basic matrix algebra and method to find solutions to system of linear equations. Also to learn eigenvalues and eigenvectors of matrix. • To learn analytical geometry of 2 and 3 dimensions which include study of conics, planes, lines, sphere, cone and cylinder.
I	7BMAA1	ANCILLARY MATHEMATICS-I	• Define characteristic equation of matrices and illustrate. • State Cayley Hamilton Theorem • Compute inverse of a matrix using Cayley – Hamilton Theorem. • Find Eigen values and Eigen vectors of a given matrix. • Solve equations of the first order but of higher degree solvable by dy/dx , y, x. • Compute complementary function and particular integral of the type e^{ax}, cos ax,sin ax.	• Define characteristic equation of matrices and illustrate. • State Cayley Hamilton Theorem • Compute inverse of a matrix using Cayley – Hamilton Theorem. • Find Eigen values and Eigen vectors of a given matrix. • Solve equations of the first order but of higher degree solvable by dy/dx , y, x. • Compute complementary function and particular integral of the type e^{ax}, cos ax,sin ax.
II	7BMA2C1	ANALYTICAL GEOMETRY OF 3D AND VECTOR CALCULUS.	• Describe the various forms of equation of a plane, straight line, Sphere, Cone and Cylinder. • Find the angle between planes, Bisector planes, Perpendicular distance from a	• Students learn the representation of objects in 2D and 3D in the form of matrices • To study the transformations like reflection, rotation, scaling, shearing, translation of objects

			point to a plane, Image of a line on a plane, Intersection of two lines • Define coplanar lines and illustrate • Compute the angle between a line and a plane, length of perpendicular from a point to a line • Calculate the Shortest distance between two skew lines • Find and interpret the gradient curl, divergence for a function at a given point. • Interpret line, surface and volume integrals • Evaluate integrals by using Green's Theorem, Stokes theorem, Gauss's Theorem	in 2D and 3D and their geometrical significance. • Students learn to generate plane curves by using parametric equation • All the concepts help students to learn graphic display of objects on computer
II	7BMA2C2	SEQUENCES AND SERIES	• Define different types of sequence. • Discuss the behavior of the geometric sequence. • Prove properties of convergent and divergent sequence. • Verify the given sequence in convergent and divergent by using behavior of Monotonic sequence. • Prove Cauchy's first limit theorem, Cesaro's theorem, Cauchy's Second limit theorem. .	• Explain subsequences and upper and lower limits of a sequence. • Give examples for convergence, divergence and oscillating series. • Discuss the behavior of the geometric series. • Prove theorems on different test of convergence and divergence of a series of positive terms. • Verify the given series is convergent or divergent by using different test

II	7BMAA2	ANCILLARY MATHEMATICS-II	• Define Moments, Skewness and Kurtosis. • Fit a straight line, Parabola for the given data. • Obtain Fourier series expansions for the given functions. • Compute Cosine and Sine series expansions for the given functions.	• Calculate the correlation coefficient for the given data. • Compute Rank correlation for the given data. • Find intermediate values by using Newton's forward and backward formula and Lagrange's formula. • Apply Laplace transform to solve differential equations
III	7BMA3C1	ABSTRACT ALGRBRA	• Define subgroup, center, Normalizer of a subgroup. • Find cycles and transpositions of a given permutations. • Prove Lagrange's theorem ,Euler's theorem and Fermats theorem • Define cyclic groups . • Prove a group has no proper subgroup if it is cyclic group of prime order. • Define normal subgroups , quotient groups and index of a subgroup. • Define homomorphism ,kernel ofa homomorphism ,Isomorphism. • Prove Cayley's theorem , the fundamental theorem of homomorphism for groups • Define rings , zero divisors of a ring , integral domain , field and prove theorems	• Define subgroup, center, Normalizer of a subgroup. • Find cycles and transpositions of a given permutations. • Prove Lagrange's theorem ,Euler's theorem and Fermats theorem • Define cyclic groups . • Prove a group has no proper subgroup if it is cyclic group of prime order. • Define normal subgroups , quotient groups and index of a subgroup. • Define homomorphism ,kernel ofa homomorphism ,Isomorphism. • Prove Cayley's theorem , the fundamental theorem of homomorphism for groups Define rings , zero divisors of a ring , integral domain , field and prove theorems
III	7BMA3C1	DIFFERENTIAL EQUATIONS	• Student will be able to solve first order	• To learn methods to solve linear

		AND ITS APPLICATION	differential equations utilizing the standard techniques for separable, exact, linear, homogeneous, or Bernoulli cases. Student will be able to find the complete solution of a nonhomogeneous differential equation as a linear combination of the complementary function and a particular solution. Student will have a working knowledge of basic application problems described by second order linear differential equations with constant coefficients.	differential equation with constant coefficients. • To learn methods for solving non-homogenous differential equation. • To learn power series solution method using ordinary and singular points. • To solve system of first order differential equations.
IV	7BMA4C1	TRANFORMS TECHNIQUES	• To learn the evaluation of Laplace transform of different types of functions, their derivatives and integrations. To learn to evaluate the Fourier series of various even and odd functions	• To learn the evaluation of Inverse Laplace transform of functions, their derivatives and integrations, and to learn application of Convolution theorem. • To learn to apply Laplace Transform to solve Ordinary Differential equations with constant coefficients.
IV	7BMA4C2	LINEAR ALGRBRA	• Introduction to vector space and subspace. Use computational techniques and algebraic skills essential for the study of systems of Linear equations, matrix algebra, vector spaces, eigenvalues and eigenvectors, Orthogonality and Diagonalization. (Computational and Algebraic Skills).	• Define Vector Space, Quotient space Direct sum, linear span and linearindependence, basis and inner product. • Discuss the linear transformations, rank, nullity. • Find the characteristic equation, eigen values and eigen vectors of a matrix. • Prove Cayley- Hamilton theorem, Schwartz inequality,

				Gramschmidt orthogonalisation process. • Solve the system of simultaneous linear equations.
V	7BMA5C1	REAL ANALYSIS	• 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	• To learn basic techniques and examples in analysis to be well prepared for courses like Topology, Measure theory and Functional analysis. • To study various types of sets and relations, and concept of countable and uncountable.. • To study concept of sequence and series and hence find sum of infinite terms with different methods. • To study notion of lub and glb which helps to learn integrations which helps to find area under any functions.:
V	7BMA5C2	STATISTICS-I	• The course is to enable the students with understanding of various types of probability distributions and testing of hypothesis problems. It aims to equip the students with standard concepts of statistical techniques and their utilization. .	• Define Moments Skewness and Kurtosis. • Fit a straight line. • Calculate the correlation coefficient for the given data. • Compute Rank correlation for the given data. • Define attributes, consistency of data, independence of data. • Find index numbers for the given data. • Define Probability, Conditional probability. Derive Baye's theorem
V	7BMA5C3	OPERATIONS RESEARCH –I		• Students learn conversion of

			• 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.	real life problems into mathematical models which enhance their problem solving and decision making abilities. • Students learn to calculate optimal solution of models through graphical and iterative methods. • Students study transportation and assignment models and methods to solve them. • This helps them to get optimum solutions within the given constraints to problems arising in industry.
V	7BMAE1A	GRAPH THEORY	• To introduce the concept of Graphs, which is an important tool for Mathematical Modelling To study different types of graphs and operations on graphs To study the concept of trees in detail and algorithms to find special spanning trees To study Directed Graphs and its applications	• Describe the origin of Graph Theory. • Illustrate different types of graph theory. • Explain independent sets and covering sets and some basic theorems. • Discuss degree sequences and operations on graphs. • Explain connectedness and components and some theorems. • Characterize tree. • Derive some properties of planarity and Euler's formula. • Find chromatic number and chromatic polynomials for graphs. • Prove Five colour theorem. Explain basic properties of directed graphs.

V	7BMAE2A	NUMERICAL ANALYSIS	• To apply appropriate numerical methods to solve the problem with most accuracy. • Using appropriate numerical methods determine approximate solution of ODE and system of linear equation. • Compare different methods in numerical analysis w.r.t accuracy and efficiency of solution	• To learn to apply the various numerical techniques for solving real life problems. • The problems which cannot be solved by usual formulae and methods can be solved approximately by using numerical techniques. • To fit curve to the data by using 5 different methods of interpolation as well as extrapolation. • To find approximate solutions to difficult differential equations occurring in engineering sciences.
VI	7BMA6C1	MECHANICS	• To demonstrate knowledge of functional and extremum path and the application of the knowledge in solving some fundamental problems. To demonstrate the knowledge and understanding of the fundamental concepts in the dynamics of system of particles and Lagrangian and Hamiltonian formulation of mechanics. To represent the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulation of classical mechanics.	• Define Resultant, Component of a Force, Coplanar forces, like and unlike parallel forces, Moment of a force and Couple with examples. • Prove the Parallelogram of Forces, Triangle of Forces, Converse of the Triangle of Forces, Polygon of Forces, Lami's Theorem, Varignon's theorem of moments. • Find the resultant of coplanar couples, equilibrium of couples and the equation to the line of action of the resultant. • Discuss Friction, Forces of Friction, Cone of Friction, Angle of Friction and Laws of

				friction. • Define catenary and obtain the equation to the common catenary. • Find the tension at any point and discuss the geometrical properties of a catenary. • Define Projectile, impulse, impact and laws of impact. • Prove that the path of a projectile is a parabola. • Find the direct and oblique impact of smooth elastic spheres. • Define Simple Hormonic Motion and find its Geometrical representation. • Find the Composition of Simple Hormonic Motion and the differential equation of a central orbit. • Find the law of force if the orbit is given and vice versa.
VI	7BMA6C2	COMPLEX ANALYSIS	• The objective of this course is to introduce and develop a clear understanding of the fundamental concepts of Complex Analysis such as analytic functions, Cauchy-Riemann relations and harmonic functions and to make students equipped with the understanding of the fundamental	• To learn basic algebraic properties of complex numbers and limit and continuity of Complex functions. • To learn analytic functions and the C-R equations as its necessary and sufficient conditions.

			concepts of complex variable theory. In particular, to enable students to acquire skill of contour integration to evaluate complicated real integrals via residue calculus.	• To learn tools which are useful in finding integration of Complex valued functions. • To learn sequences and series of Complex valued functions. • To learn applications of residues and poles in integrals of complex functions.
VI	7BMA6C3	STATISTICS-II	• The course is to enable the students with understanding of various types of probability distributions and testing of hypothesis problems. It aims to equip the students with standard concepts of statistical techniques and their utilization.	• Define probability density function, probability distribution • Derive mathematical expectation, binomial, poisson, normal distribution • Solve the problems of large samples and small samples • Discuss the moment generating functions, chi-square distribution • Compute the analysis of variance, one way and two way classifications, Latin square design
VI	7BMA6C4	OPERATIONS RESEARCH –II	• Students learn conversion of real life problems into mathematical models which enhance their problem solving and decision making abilities	• Students learn to calculate optimal solution of models through graphical and iterative methods. • Students study transportation and assignment models and methods to solve them. • This helps them to get optimum solutions within the given constraints to problems arising in industry.
VI	7BMAE3B	FUZZY ALGEBRA	• Fuzzy logic is an extension or a superset of Boolean logic aimed at maintaining	• Define fuzzy sets, D-cuts, fuzzy complements.

			the concept of the partial truth. .	• Discuss types of operations on fuzzy sets, t-norms, fuzzy arithmetic. • Explain extension principle of fuzzy sets, fuzzy numbers. • Illustrate fuzzy relations, binary fuzzy relations, fuzzy equivalence relations. State some applications of fuzzy sets