



ARUMUGAM PILLAI SEETHAI AMMAL COLLEGE

(Re-accredited with B+ Grade by NAAC)

Tiruppattur – 630 211.

B.Sc., Mathematics Programme

Programme Outcome (POs) :

- PO-1. Help the students to enhance their knowledge in soft skills and Computing skills.
- PO-2. Enable the students to equip knowledge in various concepts involved in algebra, differential equations and graph theory.
- PO-3. Enable the students to acquire knowledge in C programming.
- PO-4. Students are trained in an effective manner to attend the competitive exams in order to brighten their future.
- PO-5. Facilitate students to acquire a flair knowledge in discrete mathematics, real analysis and solve problems efficiently.

Programme Specific Outcome (PPOs):

- PSO-1. To provide the student with pertinent information in the field of Mathematics.
- PSO-2. To teach the student with a broad understanding of Mathematical and their interactions with the Equations.
- PSO-3. To learn to apply mathematics to real life situations and help in problem solving
- PSO-4. The students will learn functions of real and complex variables, different types of integration.
- PSO-5. The students can solve various constrained and unconstrained problems in single variable as well as multivariable.
- PSO-6. Also by the understanding of Numerical Analysis they will be ready to develop computational skill to solve science and engineering problems.

Semester - I				
Course code:	Core Course – I	T/P	C	H/W
22BMA1C1	DIFFERENTIAL CALCULUS AND TRIGONOMETRY	T	5	5
Objectives	<ul style="list-style-type: none"> ➤ To find the rate of change of a quality with respect to other. ➤ To understand the concepts of differential calculus in depth. ➤ To analyze the behavior of various curves. 			
Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Find maxima and minima of function of two variables. ➤ Expand $\cos^n\theta$, $\sin^n\theta$ and $\tan^n\theta$ in terms of θ. ➤ Evaluate higher derivatives and expand the given function and find envelope, curvature and evolute of a given curve. ➤ Find the radius of curvature, $p - r$ equation of curve, asymptotes and radius of curvature in polar co – ordinates. ➤ Evaluate definite integrals and integrate a given function by integration by parts and Bernoulli's formula. ➤ Find double and triple integral and their properties, Jacobian. ➤ Do problems Beta and Gamma functions. 			

Semester – I				
Course code:	Core Course – II	T/P	C	H/W
22BMA1C2	CLASSICAL ALGEBRA	T	4	4
Objectives	<ul style="list-style-type: none"> ➤ To study the Relations between the roots and coefficients of equations. ➤ To understand the concepts of Various Inequalities and Series. 			
Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Describe the relation between roots and coefficients. ➤ Transform the equation through roots multiplied by a given number. ➤ Solve the reciprocal equations. 			

Semester – II				
Course code:	Core Course – III	T/P	C	H/W
22BMA2C1	ANALYTICAL GEOMETRY AND VECTOR CALCULUS	T	5	5
Objectives	<ul style="list-style-type: none"> ➤ To introduce the concept of three dimensional coordinate geometry in depth. ➤ To understand the concept of vector integration, gradient and volume integral. 			
Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ 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 point to a plane, Image of a line on a plane and Intersection of two lines ➤ Compute the angle between a line and a plane and length of perpendicular from a point to a line. 			

Semester – II				
Course code:	Core Course – IV	T/P	C	H/W
22BMA2C2	INTEGRAL CALCULUS	T	4	4
Objectives	<ul style="list-style-type: none"> ➤ To evaluate integration of irrational functions and improper integrals. ➤ To understand the concepts of double and triple integration. 			
Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Explain properties of Beta functions. ➤ Solve Basic Integral Calculus problems. ➤ Explain properties of definite integrals. ➤ Prove reduction formulae and solve some problems by using this formula. ➤ Evaluate double and triple integrals. 			

Semester – III				
Course code: 22BMA3C1	Core Course – V	T/P	C	H/W
	DIFFERENTIAL EQUATIONS	T	5	5
Objectives	<ul style="list-style-type: none"> ➤ To gain logical skills in the formation of differential equations. ➤ To expose students to use differential equations as a powerful tool in problem solving and to inculcate the application of differential equation in real world problems. ➤ Present the relationships between abstract algebraic structures with familiar numbers systems such as the integers and real numbers. ➤ Present concepts of and the relationships between operations satisfying various properties (e.g. commutative property). ➤ Present concepts and properties of various algebraic structures. ➤ Use results from elementary group theory to solve contemporary problems; ➤ Explain from elementary principles why certain algebraic facts are true. 			
Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Extract the solution of differential equations of the first order and of the first degree by variables separable, Homogeneous and Non-Homogeneous methods. ➤ Find a solution of differential equations of the first order and of a degree higher than the first by using methods of solvable for p, x and y. ➤ Compute all the solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients. ➤ Solve simultaneous linear equations with constant coefficients and total differential equations. ➤ Analyze and demonstrate examples of ideals and quotient rings, ➤ Use the concepts of isomorphism and homomorphism for groups and rings 			

Semester – III				
Course code: 22BMA3C2	Core Course – VI	T/P	C	H/W
	ABSTRACT ALGEBRA	T	4	4
Objectives	<ul style="list-style-type: none"> ➤ To develop an understanding of fundamental algebraic structures. ➤ To introduce the structure and characteristics of groups and rings. ➤ Identify essential characteristics of ordinary differential equations. ➤ Explore the use of differential equations as models in various applications ➤ classify differential equations by order, linearity, and homogeneity ➤ solve first order linear differential equations ➤ solve linear equations with constant coefficients ➤ use separation of variables to solve differential equations ➤ solve exact differential equations ➤ use variation of parameters to solve differential equations ➤ Laplace transforms and their inverses to solve differential equations ➤ solve systems of linear differential equations using matrix techniques and eigenvalues ➤ use numerical methods to solve differential equations 			
Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Define subgroup, Center, Normalizer of a subgroup. ➤ Find cycles and transpositions of a given permutations. ➤ Prove Lagrange's theorem, Euler's theorem and Fermat's theorem. ➤ Define normal subgroups, quotient groups and index of a subgroup. ➤ Understanding the concept of the rings and integral domain. ➤ Determine solutions to first order exact differential equations, Clairaut's equation. ➤ Determine solutions to second order linear homogeneous differential equations with constant coefficients. ➤ Determine solutions to second order linear non-homogeneous differential 			

	<p>equations with constant coefficients</p> <ul style="list-style-type: none"> ➤ Determine solutions to Partial Differential Equations – Formation of P.D.E. by the elimination of constants – Lagrange’s method – Charpit’s method ➤ Select and apply appropriate methods to solve differential equations; variation of parameters, LaPlace and inverse LaPlace transforms
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Semester – IV

Course code: 22BMA4C1	Core Course – VII	T/P	C	H/W
	SEQUENCES AND SERIES	T	4	4

Objectives	<ul style="list-style-type: none"> ➤ To understand the concept of convergence of a real sequence. ➤ To discuss the techniques of testing the behavior of infinite series. ➤ The aim of this course is to develop an understanding of convergence in its simplest setting. And also to learn about ➤ The difference between a sequence and a series in the mathematical context. ➤ The convergence/divergence of a series so we will give the basic ideas and definitions in this section. ➤ Using the Integral Test, Comparison Test, Limit Comparison Tests, Alternating Series Test, Ratio Test and Root Test to determine if a series converges or diverges. ➤ A brief discussion on absolute convergence and how it differs from convergence. ➤ A set of general guidelines to use when deciding which test to use.
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Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Understand different types of sequence. ➤ Discuss the behavior of the geometric sequence. ➤ Prove properties of convergent and divergent sequence. ➤ Verify the given series is convergent or divergent by using different tests. <p>The aim of this course is to develop an understanding of convergence in its simplest setting. And also to learn about</p> <ul style="list-style-type: none"> ➤ The difference between a sequence and a series in the mathematical context. ➤ The convergence/divergence of a series so we will give the basic ideas and definitions in this section. ➤ Using the Integral Test, Comparison Test, Limit Comparison Tests, Alternating Series Test, Ratio Test and Root Test to determine if a series converges or diverges. ➤ A brief discussion on absolute convergence and how it differs from convergence. ➤ A set of general guidelines to use when deciding which test to use.
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Semester – IV

Course code: 22BMA4C2	Core Course – VIII	T/P	C	H/W
	LINEAR ALGEBRA	T	4	4

Objectives	<ul style="list-style-type: none"> ➤ Intended to develop an understanding of linear algebraic structures. ➤ To understand of the concept of linear transformations and their matrix representation. ➤ Compute inner products on a real vector space and compute angle and orthogonality in inner product spaces ➤ Find eigenvalues and eigenvectors and use them in applications ➤ Find the dimension of spaces such as those associated with matrices and linear transformations. ➤ Compute linear transformations, kernel and range, and inverse linear transformations, and find matrices of general linear transformation
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Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Critically analyze and construct mathematical arguments that relate to the study of introductory linear algebra. ➤ Use computational techniques and algebraic skills essential for the study of systems of linear equations matrix algebras, vector spaces, Eigen values, Eigen vectors, orthogonality and diagonalization. ➤ Use visualization, spatial reasoning, as well as geometric properties and strategies to model, solve problems, and view solutions, especially in R^2 and R^3, as well as conceptually extend these results to higher dimensions. ➤ Critically analyze and construct mathematical arguments that relate to the study of introductory linear algebra. ➤ Communicate and understand mathematical statements, ideas and results, both verbally and in writing, with the correct use of mathematical definitions, terminology and symbolism. ➤ Work collaboratively with peers and instructors to acquire mathematical understanding and to formulate and solve problems and present solutions.
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Semester – IV					
Course code: 22BMA4C3		Core Course – IX	T/P	C	H/W
		TRANSFORM TECHNIQUES	T	3	3
Objectives	<ul style="list-style-type: none"> ➤ To introduce the concept on Laplace, Fourier and Z – transform of different functions. ➤ To learn the application of Laplace transform to solve Differential Equations and Z – transform to solve Different equations. 				
Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Ability to compute the Fourier series of the function with one variable. ➤ Understand the nature of the Fourier series that represent even and odd functions. ➤ Understand the concepts of Fourier transforms to the real world problems of circuit analysis and control system design. ➤ Apply z-transforms to solve the difference equations. 				

Semester – V					
Course code: 22BMA5C1		Core Course- X	T/P	C	H/W
		REAL ANALYSIS	T	4	5
Objectives	<ul style="list-style-type: none"> ➤ To enhance the knowledge of abstract mathematics on the real line. ➤ To introduce the concepts for understanding and analyzing mathematics on the metric space. 				
Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Learn the concepts for understanding and analyzing abstract mathematics on the metric space. ➤ Acquire the knowledge of real functions, limit of functions and their properties. 				

Semester – V					
Course code: 22BMA5C2		Core Course- XI	T/P	C	H/W
		GRAPH THEORY	T	4	5
Objectives	<ul style="list-style-type: none"> ➤ To introduce basic concept of graph theory. ➤ To develop theoretical aspects of graph theory. ➤ To apply graph theory based tools in solving practical problems. 				

Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Understand fundamental definitions of graph theory. ➤ Learn a clear perspective of solving real life problems using graph theory. ➤ Use a combination of theoretical knowledge and independent mathematical thinking for creative research in graph theory.
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Semester – V					
Course code: 22BMA5C3		Core Course- XII	T/P	C	H/W
		OPERATIONS RESEARCH - I	T	4	4
Objectives	<ul style="list-style-type: none"> ➤ To formulate linear programming problem for simple mathematical models. ➤ To develop mathematics skills to analyse and solve linear programming problems in a wide range of applications. 				
Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Develop a general understanding of the operation research methodology to decision making. ➤ Identify best techniques to solve a specific problem in linear model of operation research. 				

Semester – V					
Course code: 22BMA5C4		Core Course- XIII	T/P	C	H/W
		NUMERICAL ANALYSIS	T	4	4
Objectives	<ul style="list-style-type: none"> ➤ To expose the students to various tools in solving numerical problems. ➤ To prepare the students for competitive examinations like GATE, CSIR-NET, SLET, etc. 				
Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Learn a sufficient exposure in constructing difference tables and to use newton's forward and backward formula for interpolation in equal intervals. ➤ Understand the numerical integration by using trapezoidal and Simpson's rule. 				

SEMESTER V					
Course Code 22BMA5P1		Core Practical – I(A)	T/P	C	H/W
		A PRACTICAL APPROACH TO OPTIMIZATION TECHNIQUE	P	4	5
Objectives	<ul style="list-style-type: none"> ➤ To enlighten the students in the field of operations research. ➤ To train the students to apply OR techniques in business and management problems 				

Linear Programming Problems

1. Formulate a real life situation into an LPP and solve it using graphical method.
2. Formulate a real life situation into an LPP and solve it by selecting the appropriate method among simplex method, two phase simplex method, Big-M method and duality. Explain why you choose this method to solve this problem.
3. Solve LPP with unrestricted variables.

Transportation Problems

4. Explain Modified Distribution method for obtaining optimum solution to the given transportation problem. Solve a TP using this method.
5. Solve a transportation problem with prohibited route.
6. Solve a transportation problem with maximization objective.

Assignment Problems

7. Explain Hungarian algorithm for solving assignment problem and apply this algorithm to solve an assignment problem with maximization objective.
8. Solve an assignment problem with restricted assignment, that is, restrict to condition.
9. Solve an assignment problem with condition assignment, that is, facilitative condition.
10. Formulate a Crew assignment problem into an AP and solve it.

Outcomes

Students will be able to

- Acquire knowledge about the transportation and assignment problems.
- Understand to solve real life oriented problems.

Semester – V

Course code: 22BMA5P2	Core Practical – I(B)	T/P	C	H/W
	MS OFFICE WITH LAB	P	4	5
Objectives	<ul style="list-style-type: none"> ➤ To develop the knowledge of computer. ➤ To know the importance of Word, Excel and Power Point. 			
Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Enrich the knowledge in formatting document of varies types. ➤ Prepare Excel worksheets and Power Point design. 			

SEMESTER V

Course Code 22BMA5P3	Core Practical -II(A)	T/P	C	H/W
	AN ALGORITHMIC APPROACH IN NUMERICAL ANALYSIS	P	4	5
Objectives	<ul style="list-style-type: none"> ➤ To know the applications behind various numerical methods. ➤ To apply the concepts to solve mathematical problems. 			

Problems

1. Explain the secant method for solving algebraic equations. Execute this method with an example.
2. Explain Ramanujan's method to find the smallest root of algebraic or transcendental.
3. Explain Stirling's formula for interpolation with an example.
4. Explain Bessel's formula for interpolation with an example.
5. Explain Laplace - Everett formula for interpolation with an example.
6. Explain Newton's divided difference for interpolation with an example.
7. Explain Boole's rule for numerical integration with an example.
8. Explain Weddle's rule for numerical integration with an example.
9. Explain Gauss-Jordan method and hence solve the system of linear equations.
10. Explain Gauss-Seidal method and hence solve the system of linear equations.
11. Explain Milne's predictor-corrector method to solve ordinary differential equations with an example.
12. Explain Adam-Bashforth predictor-corrector method to solve ordinary differential equations with an example.

Outcomes

Students will be able to

- Establish the advantages of operations research.
- Gain a thorough knowledge of operations research for problems solving.

Semester – V				
Course code:	Core Practical – II(B)	T/P	C	H/W
22BMA5P4	LaTex	P	4	5
Objectives	<ul style="list-style-type: none"> ➤ Understand richness of Latex rather than using M.S word for documentation. ➤ Proficient in documentation using mathematical symbols, graphs and tables. 			
Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Understand basic concepts of Text formatting and LaTex file ➤ Demonstrating command names and arguments. ➤ Apply the commands to create document layout and displayed output ➤ Create Table, Printing Text, Foot notes and marginal notes ➤ Apply LaTex commands to mathematical formulae. 			

Semester – VI				
Course code:	DSE-I	T/P	C	H/W
22BMA6E1	COMPLEX ANALYSIS	T	6	6
Objectives	<ul style="list-style-type: none"> ➤ To introduce the basic concepts in complex analysis. ➤ Intended to develop an understanding of complex integration and evaluation of definite integrals. 			
Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Understand the importance of analytic function. ➤ Demonstrate and understand the concepts in complex integration. 			

Semester – VI				
Course code:	DSE-II	T/P	C	H/W
22BMA6E2	OPERATIONS RESEARCH – II	T	6	6
Objectives	<ul style="list-style-type: none"> ➤ To introduce the various techniques of operations research. ➤ Make the students to solve real life problems in business and management. 			
Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Understand the mathematical techniques to model and analyze decision problems with effective application to real life in optimization of objectives. ➤ Formulate simple reasoning and learning optimization problems. ➤ Analyze a problem and select a suitable strategy. ➤ Apply an approximate method to obtain a solution for a problem. 			

Semester – VI				
Course code:	DSE-III	T/P	C	H/W
22BMA6E3	MECHANICS	T	6	6
Objectives	<ul style="list-style-type: none"> ➤ To understand the concept of different forces and moments and their equilibrium with reference to a coordinate system. ➤ To widen appreciation of the variety of phenomena covered by mechanics and the techniques available to handle them. ➤ To provide an adequate foundation for further self – study. 			

Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Understand the concepts of statics and dynamics applicable in real life. ➤ Acquire wide knowledge of handling problems related to mechanics. ➤ Acquire sufficient knowledge for further studies in mechanics at a higher level.
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Semester – VI				
Course code: 22BMA6E4	DSE-IV	T/P	C	H/W
	NUMBER THEORY	T	6	6
Objectives	<ul style="list-style-type: none"> ➤ To study the concept of mathematical induction, prime numbers and division algorithms. ➤ To understand the concepts of congruence and quadratic reciprocity. 			
Outcomes	<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ Recall the basic concepts of divisibility. ➤ Demonstrate renowned theorems in solving congruence. ➤ Discuss quadratic congruence equations. ➤ Analyze various arithmetical functions. ➤ Identify the numbers of special form and apply divisibility rules in solving Diophantine equations. 			