

St. Mary's College (Autonomous)
Thoothukudi
Re-Accredited with 'A+' Grade by NAAC



SYLLABUS



2024 - 27

B.Sc. Mathematics

ST. MARY'S COLLEGE (AUTONOMOUS), THOOTHUKUDI

Bachelor of Science (Mathematics)

Course Structure (w.e.f. 2024)

Preamble

Mathematics, the foundation of all sciences is a subject which offers limitless scope for diversification in higher education. The improvements and achievements in various fields are the gift of Mathematics. The world of education without mathematics would be non-existent. The fields of Information Technology, Social Research and Economic forecasts will not be successful but for the effective application of Mathematics. The demand for courses in Mathematics is bound to be consistent, continual and increasing.

Vision

To promote and support a comprehensive, innovative and dynamic learning environment that meets the changing needs of a diverse global student population.

Mission

- To provide an exemplary mathematics program that prepares students to be life-long learners and responsible, numerate citizens.
- To enhance the students logical, reasoning, analytical and problem solving skills.
- To provide meaningful support services, responds to the changing environment of mathematics education.
- To promote effective instructional strategies with students actively participating in the learning process.

Programme Outcome

PO No.	After completion of the Undergraduate programme the students of St. Mary's College will be able to
PO 1	acquire an in-depth domain knowledge and a comprehensive knowledge of various disciplines to become skilled professionals
PO 2	enrich their communicative skills, and enhance their creative, numerical, analytical and problem solving skills
PO 3	gain potential skills to excel in digital literacy, team management, scientific reasoning, research and self-directed life-long learning to emerge as entrepreneurs
PO 4	be aware of the environment with a social responsibility for the well-being of humanity and the planet at large
PO 5	be an empowered, economically independent woman with a global perspective to emerge holistically in the egalitarian society

Programme Specific Outcome

PSO. No.	Upon completion of the B.Sc. Mathematics program, students will be able to
PSO 1	acquire a systematic understanding of the fundamental concepts and theories of mathematics.
PSO 2	adjust and adopt the changing scientific environment in the process of sustainable development by using mathematical tools.
PSO 3	develop the problem solving skills to succeed in various competitive examinations NET, SET, CAT and UPSC.
PSO 4	understand and appreciate integrated learning to create mathematical models, practice ethical values and realize societal responsibilities.
PSO 5	strengthen the mathematical ability, abstract intelligence and orient themselves towards higher mathematics and research.

UG Course Structure (w.e.f. 2024-2027)

Semester - I

Mathematics

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max. Marks		
						CIA	ESE	Total
I	Tamil / French			6	3	40	60	100
II	General English			6	3	40	60	100
III	Core I	24UMAC11	Classical Algebra	4	4	40	60	100
	Core II	24UMAC12	Differential Calculus	4	4	40	60	100
	Generic Elective (Allied)		Physics-I	4	3	40	60	100
	Elective Practical		Physics Practical I	2	1	40	60	100
IV	Skill Enhancement Course (Discipline Specific Course)	24UMASE1	Quantitative Aptitude I	2	2	20	30	50
	Ability Enhancement Course		Value Education	2	2	20	30	50
Total				30	22			

Semester –II

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max. Marks		
						CIA	ESE	Total
I	Tamil / French			6	3	40	60	100
II	General English			6	3	40	60	100
III	Core III	24UMAC21	Analytical Geometry	4	4	40	60	100
	Core IV	24UMAC22	Integral Calculus	4	4	40	60	100
	Generic Elective (Allied)		Physics II	4	3	40	60	100
	Elective Practical		Physics Practical II	2	1	40	60	100
IV	Skill Enhancement Course (Discipline Specific Course)	24UMASE2	Quantitative Aptitude II	2	2	20	30	50
	Ability Enhancement Course		EVS	2	2	20	30	50
Total				30	22			

Semester III

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
I	Tamil / French			6	3	25	75	100
II	General English			6	3	25	75	100
III	Core		Sequences and Series	5	5	25	75	100
	Core		Differential equations	4	3	25	75	100
	Generic Elective (Allied)		Statistics I	4	3	25	75	100
	Skill Enhancement Course (Discipline Specific)		Excel	2	2	20	30	50
	Generic Elective (NME)		Mathematics for Competitive Examinations-I	2	2	20	30	50
IV	Ability Enhancement Course		Yoga & Meditation	1	1	--	50	50
	Self Study/ MOOC / Internship (Compulsory)				+2			
Total				30	22+2			

Semester IV

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
I	Tamil / French			6	3	25	75	100
II	General English			6	3	25	75	100
III	Core		Abstract Algebra	5	5	25	75	100
	Core		Mathematical Modelling	4	3	25	75	100
	Generic Elective (Allied)		Statistics II	4	3	25	75	100
	Skill Enhancement Course (Discipline Specific)		R Programming	2	2	25	75	100
	Generic Elective (NME)		Mathematics for Competitive Examinations-II	2	2	20	30	50
IV	Ability Enhancement Course (Entrepreneurial Based)		Computer for Digital Era	1	1	--	50	50
	CDP				+1			
	NCC / NSS / Sports				1			
Total				30	23+1			

Semester V

Part	Components	Course Code	Course Title	Hr/Week	Credits	Max.Marks		
						CIA	ESE	Total
III	Core		Linear Algebra	6	6	25	75	100
	Core		Graph Theory	6	5	25	75	100
	Core		Real Analysis	6	5	25	75	100
	Core		Operation Research	6	5	25	75	100
	Discipline Specific Elective (Provide two choices with full Syllabus)		Numerical Analysis /Transforms and their applications	4	3	25	75	100
IV	Ability Enhancement Course		EVS	2	1	20	30	50
	Self Study/ MOOC / Internship (Optional)				+2			
				30	25+2			

Semester VI

Part	Components	Course Code	Course Title	Hrs/Week	Credits	Max.Marks		
						CIA	ESE	Total
III	Core		Complex Analysis	6	5	25	75	100
	Core		Modern Analysis	6	5	25	75	100
	Core		Mechanics	6	5	25	75	100
	Project		Project	6	4	25	75	100
	Discipline Specific Elective (Provide two choices with full Syllabus)		C++/Vector Calculus	4	3	25	75	100
IV	Skill Enhancement Course		Python Programming	2	2	20	30	50
				30	24			

Semester - I			
Classical Algebra			
Course Code: 24UMAC11	Hrs/week: 4	Hrs/Semester: 60	Credits: 4

Objectives:

- Provide a platform where students can develop algebraic problem solving strategies without the tediousness of pen and paper.
- Transform real life problems into equations and then solving them.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	Cognitive Level
CO-1	describe the relation between the roots and coefficients, identify the reciprocal equations, locate real and imaginary roots of the equations	K1
CO-2	explain the process of increasing, decreasing and multiplying the roots of the equations, Outline the sum of the powers of the roots of an equation	K2
CO-3	solve polynomial equations, reciprocal equations, cubic equations and biquadratic equations	K3
CO-4	determine the sum of the powers of the roots of an equation and remove the terms of an equation	K4
CO-5	evaluate the roots of an equation using Newton's, Horner's, Cardon's and Ferrari's methods	K5

Relation Matrix

Course Outcomes	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)				
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5
CO-1	3	3	2	1	1	3	3	2	3	3
CO-2	3	3	2	1	1	3	3	2	2	3
CO-3	3	3	2	1	1	3	3	1	2	3
CO-4	3	3	2	1	1	3	3	1	3	2
CO-5	3	3	2	1	1	3	3	1	2	3
Ave.	3	3	2	1	1	3	3	1.4	2.4	2.8

Semester - I			
Part III Core I - Classical Algebra			
Course Code: 24UMAC11	Hrs/week: 4	Hrs/Semester: 60	Credits: 4

Unit I

Fundamental theorem of algebra - In an equation with real coefficients, imaginary roots occur in pairs - In an equation with rational coefficients, irrational roots occur in pairs -Relations between the roots and coefficients of equations. Symmetric function of the roots

(Chapter 6, Sec 1 – 12, pages 282-307)

Unit II

Sum of the powers of the roots of an equation - Newton's theorem on the sum of the powers of the roots -Transformation of equation - Reciprocal equation - Standard form of reciprocal equations - To increase or decrease the roots of a given equation by a given quantity – Form of the quotient and remainder when a polynomial is divided by a binomial

(Chapter 6, Sec 13-18, pages 308-334)

Unit III

Removal of terms – To form an equation whose roots are any power of the roots of a given equation - Transformation in General - Descarte's rule of signs - Rolle's theorem.

(Chapter 6, Sec 19-25, pages 334-358)

Unit IV

Multiple roots -Strum's Theorem - Solutions of numerical equations – A rational fraction cannot be a root of an equation with integral coefficients, the coefficient of being unity – Integral roots – Newton's method of divisors.

(Chapter 6, Sec 26 – 29, pages 358-376)

Unit V

Horner's method.- General solution of the cubic equations - Cardon's method – Trigonometrical method – Solution of biquadratic equation - Solution of cubic equations - Ferrari method.

(Chapter 6, Sec 30,34 , pages:376-382, 390-398)

Text Book

1. Manicavachagom Pillay T.K., Natarajan T., Ganapathy K.S., Algebra, Volume-I, Ananda Book Depot, Chennai, Reprint 2017.

Books for Reference

1. Arumugam S. and A. Thangapandi Isaac, Algebra, New Gamma Publishing House, August 2006.
2. Kandasamy P and K. Thilagavathi, Mathematics for B.Sc., 2004, Volume I and Volume IV, S. Chand & Co., New Delhi.

Semester – I			
Part III Core II- Differential Calculus			
Course Code: 23UMAC12	Hrs/week: 4	Hrs/Semester: 60	Credits: 4

Objectives:

- The basic skills of differentiation, successive differentiation, and their applications.
- Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates and in solving related problems.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	Cognitive Level
CO-1	recognize and retrieve fundamental calculus concepts, including successive differentiation, partial differentiation, envelope analysis, and curvature	K1
CO-2	categorize and synthesize fundamental calculus concepts, incorporating successive differentiation, partial differentiation, homogeneous functions, Lagrange's method and envelope analysis.	K2
CO-3	apply and integrate fundamental calculus concepts, encompassing differentiation, envelope analysis, and curvature, demonstrating proficiency in the application	K3
CO-4	Apply concepts of homogeneous functions and Lagrange's method of undetermined multipliers for optimization.	K4
CO-5	Predict and compute the radius and center of curvature and discuss practical implications of envelope construction methods	K5

Relation Matrix

Course Outcomes	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)				
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5
CO-1	3	2	1	2	2	3	2	3	2	1
CO-2	2	2	2	2	3	2	3	2	1	2
CO-3	3	2	2	2	2	3	2	2	2	2
CO-4	3	3	2	2	2	2	3	3	2	2
CO-5	2	2	2	2	2	3	2	2	2	3
Ave.	2.6	2.2	1.8	2.0	2.2	2.6	2.1	2.4	1.8	2

Semester – I			
Part III Core II - Differential Calculus			
Course Code: 24UMAC12	Hrs/week: 4	Hrs/Semester: 60	Credits: 4

Unit I

Successive Differentiation: Introduction (Review of basic concepts) – The n^{th} derivative – Standard results– Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product.

(Chapter 3, Sec 1.1 - 1.6 & 2.1, Pages: 69 - 87)

Unit II

Partial Differentiation: Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient

Chapter 8, Sec 1.1 - 1.3, Pages: 178 - 188)

Unit III

Partial Differentiation (Continued): Homogeneous functions – Partial derivatives of a function of two variables –Lagrange’s method of undetermined multipliers.

(Chapter 8, Sec 1.6 - 1.7 & 5, Pages: 191 - 204 & 231 - 240)

Unit IV

Envelope: Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter.

(Chapter 10, Sec 1.1 - 1.3, Pages: 281 - 291)

Unit V

Curvature: Definition of Curvature – Circle, Radius and Centre of Curvature – Evolutes and Involutives – Radius of Curvature in Polar Co-ordinates.

(Chapter 10, Sec 2.1 - 2.8, Pages: 291 - 317 & 320 -323)

Text Book

1. S.Narayanan and T.K.ManicavachagomPillay, *Calculus*, Vol I,S.Viswanathan (Printers & Publishers) PVT. LTD. (Edition-2015).

Reference Books

1. H. Anton, I. Birens and S. Davis, *Calculus*, John Wiley and Sons, Inc., 2002.
2. G.B. Thomas and R.L. Finney, *Calculus*, Pearson Education, 2010.
3. M.J. Strauss, G.L. Bradley and K. J. Smith, *Calculus*, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.

Semester – I			
Part IV - Skill Enhancement Course I - Quantitative Aptitude I			
Code : 24UMASE1	Hrs/week : 2	Hrs/Semester : 30	Credits : 2

Objectives:

1. To enable students to comprehend and apply mathematical concepts such as square roots, cube roots, time, etc.
2. To develop problem-solving skills for competitive exams and real-world applications.

Course outcomes

Co No	Upon completion of this course, students will be able to	Cognitive Level
Co-1	recall and recognize definitions and formulas related to the mathematical concepts	K1
Co-2	demonstrate an understanding of the principles and concepts behind the mathematical topics.	K2
Co-3	apply mathematical principles to solve problems related to the covered concepts	K3
Co-4	analyze and evaluate different mathematical problems to determine effective problem-solving strategies.	K4
Co-5	improve speed and accuracy in numerical calculations using shortcut methods, essential for efficient problem-solving within time constraints.	K5

Relation Matrix

Course Outcomes	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)				
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5
CO-1	3	2	2	2	1	2	2	2	2	2
CO-2	3	3	3	2	1	3	3	2	3	3
CO-3	2	3	3	2	1	3	3	3	3	3
CO-4	2	2	3	3	2	3	2	2	3	3
CO-5	2	2	3	2	3	2	2	1	2	2
Ave.	2.4	2.4	2.8	2.2	1.6	2.6	2.4	2	2.6	2.6

Semester – I			
Part IV - Skill Enhancement Course I - Quantitative Aptitude I			
Code : 23UMASE1	Hrs/week : 2	Hrs/Semester : 30	Credits : 2

Unit I

Numbers - Square roots & cube roots

(Chapters 1& 5, pages 1-24, 96-122)

Unit II

Time & Distance - Polygons

(Chapters 17 & 25, 343-360, pages 478-484)

Unit III

Problems on Numbers - Problems on Ages

(Chapters 7 & 8, pages 143-163)

Unit IV

True Discount - Banker's Discount - Calendar

(Chapters 26, 27 & 29, pages 485-493, 500-503)

Unit V

Simplification - Average.

(Chapters 4 & 6, 68-95, pages 123-142)

Text Book

Agarwal R.S., *Arithmetic Subjective and Objective for Competitive Examinations*, S.Chand and Company Ltd. , Ram Nagar, New Delhi – 55, Revised Edition 2011.

SEMESTER – II			
Core III Analytical Geometry of Three Dimensions			
Course Code : 24UMAC21	Hrs / Week: 4	Hrs / Semester: 60	Credits: 3

Objectives:

- Develop students' skills in solving 3D geometry problems involving direction cosines, plane equations, and sphere properties.
- Enable students to grasp complex spatial configurations in 3D geometry, improving their ability to interpret and analyze geometric scenarios effectively.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	CL
CO-1	Understand and apply fundamental concepts of three-dimensional geometry, including direction cosines, equations of planes and lines, and sphere properties	K1
CO-2	Apply geometric principles to analyze and solve problems involving angles, distances, and intersections in three-dimensional space.	K2
CO-3	Evaluate conditions for perpendicularity and parallelism between lines and planes, enhancing problem-solving skills in geometry	K3
CO-4	Analyze complex geometric configurations, such as coplanar lines and tetrahedron volumes, to develop advanced problem-solving abilities.	K4
CO-5	Synthesize mathematical concepts to interpret intersections of geometric objects in three-dimensional space, fostering critical thinking skills.	K5

Relation Matrix

Course Outcomes	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)				
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5
CO-1	2	1	1	1	1	3	2	1	3	2
CO-2	1	2	1	1	1	2	2	1	2	2
CO-3	1	1	2	1	1	1	3	1	1	1
CO-4	1	1	1	2	1	1	2	2	2	1
CO-5	1	1	1	1	1	1	1	1	1	3
Ave.	1.2	1.2	1.2	1.2	1.6	1.6	2	1.2	1.8	1.8

SEMESTER – II			
Part III Core III - Analytical Geometry of Three Dimensions			
Course Code : 24UMAC21	Hrs / Week: 4	Hrs / Semester: 60	Credits: 3

Unit I

Direction cosines - direction ratios - angle between the lines – condition for perpendicularity and parallelism.

(Chapter 1, Sec 1 – 10, pages 1 – 23)

Unit II

Equation of planes - normal form - intercept form - angle between two planes

(Chapter 2, Sec 1 – 11, pages 24-45)

Unit III

Straight line- symmetrical form - plane and the straight line- angle between two planes - image of a point - image of line.

(Chapter 3, Sec 1 – 6, pages 46-61)

Unit IV

Skew lines - shortest distance between two lines - coplanar lines - volume of tetrahedron.

(Chapter 3, Sec 7 - 11, pages 61 - 91)

Unit V

Sphere - plane section of sphere - tangent line - intersection of two spheres - intersection of a plane with sphere.

(Chapter 4, Sec 1 – 8, pages 92 - 114)

Text Book

Manicavachagam Pillay T. K. and Natarajan T., Analytical Geometry of 3D, S.Viswanathan (Printers&Publishers) Pvt. Ltd, Reprint 2017.

Books for Reference

1. Arumugam S. and Thangapandi Isaac A., Analytical Geometry of 3D and Vector Calculus, New Gamma Publishing House, January 2006.
2. Arup Mukherjee and Naba Kumar Bej., Analytical Geometry of Two and Three Dimensions, Books and Allied (P) Ltd., Kolkata, November 2010.

SEMESTER – II			
Part III Core IV INTEGRAL CALCULUS			
Course Code: 23UMAC22	Hrs / Week: 4	Hrs / Semester: 60	Credits: 3

Objectives:

- To gain knowledge on integration and its geometrical applications, double, triple integrals and improper integrals.
- To acquire knowledge about Beta and Gamma functions and their applications.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	Cognitive Level
CO-1	Describe the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae.	K1
CO-2	Estimate double and triple integrals and problems using change of order of integration	K2
CO-3	Solve multiple integrals and to find the areas of curved surfaces and volumes of solids of revolution.	K3
CO-4	Examine beta and gamma functions and use them in solving problems of integration.	K4
CO-5	Explain Geometric and Physical applications of integral calculus.	K5

PSO Relation Matrix–Table

Course Outcomes	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)				
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5
CO-1	3	2	1	1	1	1	2	3	1	1
CO-2	3	2	1	1	1	3	2	1	1	1
CO-3	3	2	3	1	1	3	2	1	1	1
CO-4	3	2	3	1	1	3	2	1	1	1
CO-5	3	1	3	2	1	3	2	1	1	1
Ave.	3	1.8	2.2	1.2	1	2.6	2	1.4	1	1

SEMESTER – II			
Part III Core IV INTEGRAL CALCULUS			
Course Code: 23UMAC22	Hrs / Week: 4	Hrs / Semester: 60	Credits: 3

UNIT I

Reduction formulae -Types, integration of product of powers of algebraic and trigonometric functions, integration of product of powers of algebraic and logarithmic functions - Bernoulli's formula.

(Chapter 1, Sec 13.1 - 15.1, Pages: 79 - 100)

UNIT II

Geometric and Physical Applications of Integral calculus: Area under Plane curve: Cartesian coordinates – Area of a closed curve – Areas in polar coordinates – Approximate integration: Trapezoidal rule – Simpson's rule.

(Chapter 2, Sec 1.1 – 2.2, Pages:112-131)

UNIT III

Multiple Integrals - definition of double integrals - evaluation of double integrals – double integrals in polar coordinates - Triple integrals –applications of multiple integrals.

(Chapter 5, Sec 1 – 4, Pages:203 -222)

UNIT IV

Change of variables – Jacobian – change variables in case of two variables - change variables in case of three variables – transformation from Cartesian to polar coordinates - transformation from Cartesian to spherical polar coordinates.

(Chapter 6, Sec 1.1 – 2.4, Pages:251-267)

UNIT V

Beta and Gamma functions – Application of Beta and Gamma Functions in evaluation of Double and Triple Integrals, Improper Integrals.

(Chapter 7, Sec 2.1 – 6, Pages:278 - 300)

Text Book

1. S.Narayanan and T.K.Manicavachagom Pillay, *Calculus*, Vol II,S.Viswanathan (Printers & Publishers) PVT. LTD. (Edition-2015).

Reference Books

1. S. Arumugam & A. Thangapandi Issac, *Calculus*, New Gamma Publishing House, Palayamkottai. (2011).
2. H. Anton, I. Birens and S. Davis, *Calculus*, John Wiley and Sons, Inc., 2002.
3. G.B. Thomas and R.L. Finney, *Calculus*, Pearson Education, 2010. M.J. Strauss, G.L. Bradley and K. J. Smith, *Calculus*, 3rd Ed., Dorling Kindersley (India) P. Ltd.(Pearson Education), Delhi, 2007.

Semester – II			
Part IV Skill Enhancement Course II - Quantitative Aptitude II			
Course Code: 23UMASE2	Hrs/week :2	Hrs/Semester : 30	Credits :2

Objectives:

- To bring out the mental ability and skill of the students
- To train the students for competitive and professional examinations

Course outcomes

Co No	Upon completion of this course, students will be able to	Cognitive Level
Co-1	Recall and recognize essential mathematical concepts and formulas.	K1
Co-2	Demonstrate understanding of mathematical principles and their application in problem-solving.	K2
Co-3	Apply problem-solving strategies to solve practical mathematical problems.	K3
Co-4	Analyze and evaluate mathematical problems to determine effective problem-solving strategies.	K4
Co-5	Develop new problem-solving techniques for real-world mathematical applications.	K5

Relation Matrix

Course Outcomes	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)				
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5
CO-1	3	2	2	2	1	2	2	2	2	2
CO-2	3	3	3	2	1	3	3	2	3	3
CO-3	2	3	3	2	1	3	3	3	3	3
CO-4	2	2	3	3	2	3	2	3	3	3
CO-5	2	2	3	3	3	2	2	1	2	2
Ave.	2.4	2.4	2.8	2.4	1.6	2.6	2.4	2.2	2.6	2.6

Semester – II			
Part IV Skill Enhancement Course II - Quantitative Aptitude II			
Course Code :23UMASE2	Hrs/week :2	Hrs/Semester : 30	Credits :2

Unit I

Percentage– Time and Work

(Chapters 10&15, pages 179-218, 309-330)

Unit II

Ratio and Proportion-Chain Rule

(Chapters 12& 14, Pages 248-276, 291-398)

Unit III

Problems on Trains – Boats and Streams

(Chapters 18 &19, Pages 361-381)

Unit IV

Profit and Loss-Alligation or Mixture

(Chapters 11 &20 , Pages 219-247, 382-387)

Unit V

Line Graphs-Pie charts - Bar Diagrams

(Chapters 33,34 &35, Pages 525-549)

Text Book

Aggarwal R.S., Arithmetic Subjective and Objective for Competitive Examinations, S.Chand and Company Ltd. , Ram Nagar, New Delhi - 55. Revised Edition 2014.

Reference Books

1. Aggarwal R.S., Quantitative Aptitude,S.Chand and Company Ltd. , Ram Nagar, New Delhi.
2. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Tata McGraw-Hill Publishing Company Ltd., New Delhi.

SEMESTER – I			
Part III Generic Elective - Mathematics – I			
Code : 24UMAE11	Hrs / Week: 6	Hrs / Semester: 90	Credits: 4

Objectives:

- To help physical science students to achieve their goals and to develop their mathematical skills.
- To help students to appreciate the uses of derivatives and integrals in day today life and solve real life problems

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	Cognitive Level
CO-1	recall and demonstrate the fundamental concepts in the theory of equations, including the formation of equations, the relation between roots and coefficients, and the manipulation of reciprocal equations.	K1
CO-2	understand the transformation of equations, methods for obtaining approximate solutions (such as Newton's method and Homer's method), and the principles underlying these techniques.	K2
CO-3	apply matrix algebra concepts, including the formation of characteristic equations, determination of eigenvalues and eigenvectors, and application of Cayley Hamilton theorem to solve simple problems.	K3
CO-4	analyze differential equations of first order with higher degrees, understand solvable equations for various variables (p, x, y), and recognizing and solving partial differential equations in their four standard forms.	K4
CO-5	create solutions using Laplace transformation, demonstrate an understanding of the process and apply the inverse Laplace transformation to revert transformed equations back to their original forms.	K5

Relation Matrix

Course Outcomes	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)				
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5
CO-1	3	2	1	2	2	1	2	3	2	2
CO-2	2	2	2	2	3	2	3	2	2	3
CO-3	3	2	2	2	2	2	2	2	2	3
CO-4	3	3	2	2	2	2	3	3	2	2
CO-5	2	2	2	2	2	2	2	2	2	3
Ave.	2.6	2.2	1.8	2.0	2.2	1.8	2.4	2.4	2	2.6

SEMESTER – I			
Part III Generic Elective - Mathematics – I			
Code : 24UMAE11	Hrs / Week: 6	Hrs / Semester: 90	Credits: 4

Unit I

Theory of equations - Formation of equations - -Reciprocal equations.

Unit II

Transformation of equations -Approximate solutions to equations-Newton's method and Homer's method

Unit III

Matrices-Characteristic equation of a matrix-Eigen values and Eigen vectors-Cayley Hamilton theorem and simple Problems.

Unit IV

Differential equation of first order but of higher degree - Equations solvable for p,x,y- Partial differential equations – Formations – Four Standard forms.

Unit V

Laplace transformation-Inverse Laplace transformation.

Text Book

1. S. Arumugam&Issac, Allied Mathematics, New Gamma Publishing House (2012), Palayamkottai.

Reference Books

1. Narayanan S., Kandaswamy P., Hanumantha Rao R., ManicavachagomPillay T.K., Ancillary Mathematics Vol. - I, S.Viswanathan (Printers & Publishers), Pvt., Ltd., 2010
2. Narayanan S., Kandaswamy P., Hanumantha Rao R., ManicavachagomPillay T.K., Ancillary Mathematics Vol. - II, S.Viswanathan (Printers & Publishers), Pvt., Ltd., 2010.

SEMESTER – II			
Part III Generic Elective - Mathematics - II			
Code : 24UMAE21	Hrs / Week: 6	Hrs / Semester: 90	Credits: 4

Objectives:

- To know the concepts of vector differentiation and vector integration.
- To help students to appreciate the uses of derivatives and integrals in day today life and solve real life problems.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	Cognitive Level
CO-1	recall and list the fundamental concepts of vector differentiation, including the definitions and properties of gradient, divergence, and curl.	K1
CO-2	demonstrate a clear understanding of the principles underlying the evaluation of double and triple integrals, illustrating the relationships between variables and integrals.	K2
CO-3	apply vector integration techniques to solve problems involving line, surface, and volume integrals, showcasing their ability to use these concepts in practical scenarios.	K3
CO-4	analyse and interpreting the implications of Green's, Stoke's, and Divergence theorems (without proof), solving problems that require the application of these theorems.	K4
CO-5	create solutions utilizing Fourier series, demonstrating an ability to identify even and odd functions, and construct half-range Fourier series from given functions.	K5

Relation Matrix

Course Outcomes	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)				
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5
CO-1	3	2	1	2	2	1	2	3	2	2
CO-2	2	2	2	2	3	2	3	2	2	3
CO-3	3	2	2	2	2	2	2	2	2	3
CO-4	3	3	2	2	2	2	3	3	2	2
CO-5	2	2	2	2	2	2	2	2	2	3
Ave.	2.6	2.2	1.8	2.0	2.2	1.8	2.4	2.4	2	2.6

SEMESTER – II			
Part III Generic Elective - Mathematics - II			
Code : 24UMAE21	Hrs/week : 6	Hrs/Sem : 90	Credits : 4

UNIT I

Vector differentiation–Gradient–Divergence and curl.

UNIT II

Evaluation of double and triple integrals

UNIT III

Vector integration–Line, surface and volume integrals.

UNIT IV

Green's, Stoke's and Divergence theorems(without proof)– simple problems.

UNIT V

Fourier series–Even and odd functions–Half range Fourier series.

Text Book

1. S. Arumugam&Issac, Allied Mathematics, New Gamma Publishing House (2012), Palayamkottai.

Reference Books

1. Narayanan S., Kandaswamy P., Hanumantha Rao R., ManicavachagomPillay T.K., **Ancillary Mathematics Vol. - I**, S.Viswanathan (Printers & Publishers), Pvt., Ltd., 2010
2. Narayanan S., Kandaswamy P., Hanumantha Rao R., ManicavachagomPillay T.K., **Ancillary Mathematics Vol. - II**, S.Viswanathan (Printers & Publishers), Pvt., Ltd., 2010.