

**RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS),
THANJAVUR-613 005**

**PG AND RESEARCH
DEPARTMENT OF MATHEMATICS**



FOR

B.Sc., and M.Sc., COURSES

(Applicable to the Students admitted from the academic year 2022-23)

SYLLABUS

FOR

B. Sc. MATHEMATICS

(Applicable to the Students admitted from the academic year 2022-23)



RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS), THANJAVUR -613005

B. SC., MATHEMATICS COURSE STRUCTURE

(for the candidates admitted from the academic year 2022-2023 onwards)

Sem	Part	Course	Subject Code	Title of the Paper	In Hr s.	Credit	Exam. Hrs.	Marks		Total
								Int.	Ext.	
I	I	LT	A1T1	Part I Tamil-I	6	3	3	25	75	100
	II	LE	A1E1	Part II English-I	6	3	3	25	75	100
	III	CC1	A1MA1	Differential Calculus and Trigonometry	6	5	3	25	75	100
	III	CC2	A2MA2	Integral Calculus and Analytical Geometry of 3D	3	-	-	-	-	-
	III	Allied 1	A1AST1/ A1ACH1	Allied Chemistry-I / Allied Statistics-I	4	4	3	25	75	100
	III	Allied 2	A2ASTP/A2 A2AHP	Allied Chemistry Practical / Allied Statistics Practical	3	-	-	-	-	-
	IV	VE	A1VE	Value Education	2	2	3	25	75	100
Total					30	17				500
II	I	LT	A2T2	Part I Tamil-II	6	3	3	25	75	100
	II	LE	A2E2	Part II English-II	6	3	3	25	75	100
	III	CC2	A2MA2	Integral Calculus and Analytical Geometry of 3D	3	5	3	25	75	100
	III	CC3	A2MA3	Theory of Equations and Matrices	6	4	3	25	75	100
	III	Allied 2	A2ASTP/ A2AHP	Allied Chemistry Practical / Allied Statistics Practical	3	4	3	40	60	100
	III	Allied 3	A2AST2/ A2ACH2	Allied Chemistry-II / Allied Statistics-II	4	4	3	25	75	100
	IV	ES	A2ES	Environmental Studies	2	2	3	25	75	100
Total					30	25				700



RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS), THANJAVUR -613005
DEPARTMENT OF MATHEMATICS ALLIED PAPERS
(for the candidates admitted from the academic year 2022-2023 onwards)

For PHYSICS & CHEMISTRY Major Students

Sem.	Part	Course	Subject Code	Title of the Paper	In Hrs.	Credit	Exam. Hrs.	Marks		Total
								Int.	Ext.	
I	III	Allied 1	A1AM1	Allied Paper 1 – Classical Algebra and Integral Calculus	4	4	3	25	75	100
I&II	III	Allied 2	A2AM2	Allied Paper 2 – Vector Analysis and Analytical Geometry	3	2	-	-	-	-
Total					7	6				100
II	III	Allied 2	A2AM2	Allied Paper 2 – Vector Analysis and Analytical Geometry	3	2	3	25	75	100
	III	Allied 3	A2AM3	Allied Paper 3 – Differential Calculus, Laplace Transforms and Fourier Series	4	4	3	25	75	100
Total					7	6				200

For STATISTICS Major Students

Sem.	Part	Course	Subject Code	Title of the Paper	In Hrs.	Credit	Exam. Hrs.	Marks		Total
								Int.	Ext.	
I	III	Allied 1	A1ASM1	Allied Paper 1 – Differential Calculus and Algebra	4	4	3	25	75	100
I&II	III	Allied 2	A1ASM2	Allied Paper 2 – Integral Calculus and Analytical Geometry	3	2	-	-	-	-
Total					7	6				100
II	III	Allied 2	A1ASM2	Allied Paper 2 – Integral Calculus and Analytical Geometry	3	2	3	25	75	100
	III	Allied 3	A1ASM3	Allied Paper 3 – Vector Analysis, ODE and Laplace Transforms	4	4	3	25	75	100
Total					7	6				200

For COMPUTER SCIENCE Major Students

Sem.	Part	Course	Subject Code	Title of the Paper	In Hrs.	Credit	Exam. Hrs.	Marks		Total
								Int.	Ext.	
I	III	Allied 1	A1ACSM1	Allied Paper 1 – Numerical Methods and Operations Research	4	4	3	25	75	100
I&II	III	Allied 2	A1ACSM2	Allied Paper 2 – Probability and Statistics	3	2	-	-	-	-
Total					7	6				100
II	III	Allied 1	A1ACSM2	Allied Paper 2 – Probability and Statistics	3	2	3	25	75	100
	III	Allied 2	A1ACSM3	Allied Paper 3 – Classical Algebra, Differential Calculus and ODE	4	4	3	25	75	100
Total					7	6				200

(For students admitted from 2022- 2023)

Semester	Subject Code	Title of the paper	Hours/ Week	No. Of credits	Medium of Instructions
I	A1MA1	DIFFERENTIAL CALCULUS AND TRIGONOMETRY	6	5	Tamil & English

Aim

The study of calculus is normally aimed at giving the mathematical sophistication to relate to such more advanced work.

Course Objectives

The goal of this course is for students to gain proficiency in calculus computations Trigonometric functions representation in various forms.

Course Outcomes

Students will acquire knowledge about the basics of differentiation and its application as well as the notation of curvature, evolutes, involutes and polar co-ordinates, the expansions of Trigonometric Functions and Hyperbolic expansions.

UNIT I

Successive differentiation-nth derivative – Standard results – Trigonometrical Transformation – Formation of Equations using derivatives – Leibnitz theorem and its applications.

UNIT II

Curvature – circle, radius and centre of curvature – Cartesian formula for radius of curvature – Co-ordinates of the centre of curvature - Evolute and Involute – radius of curvature and centre of curvature in polar co-ordinates – p-r equation.

UNIT III

Expansions of powers of $\sin(nx)$, $\cos(nx)$, $\tan(nx)$ – Expansions of $\sin^n x$, $\cos^n x$ – Expansion of $\sin(x)$, $\cos(x)$, $\tan(x)$ in powers of x .

UNIT IV

Hyperbolic Functions – Relation between hyperbolic and circular functions – Inverse hyperbolic functions.

UNIT V

Logarithm of a complex number – Summation of Trigonometric series – Difference method – Angles in arithmetic progression method – Gregory's Series


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(For students admitted from 2022- 2023)

Books for Study

[1]. T.K. Manicavachagam Pillai & others, Differential Calculus, S.V. Publications, Chennai - 1985, Revised Edition.

UNIT I: Chapter 3 sections 1.1 To 1.6.2.1 and 2.2

UNIT II: Chapter 10 sections 2.1 to 2.7.

[2]. S.Arumugam & others, Trigonometry, New Gamma Publications – 1985 Revised Edition.

UNIT III: Chapter 1 sections 1.2 to 1.4

UNIT IV: Chapter 2 sections 2.1 &2.2 .

UNIT V: Chapter 3 & Chapter 4 Sections 4.1 , 4.2 & 4.4 .

Books for Reference

[1]. S. Arumugam and Issac, Calculus, Volume I, New Gamma Publishing House, 1991.

[2]. S. Narayanan, T.K. Manichavasagam Pillai, Trigonometry, S. Viswanathan, Pvt. Limited and Vijay Nicole Imprints, Pvt. Ltd, 2004.

Question Paper Pattern

Maximum Marks: 75

Examination Duration: 3 Hours

Part A: $10 \times 2 = 20$ (Two Questions from each unit)

Part B: $5 \times 5 = 25$ (Either / Or type – One question from each unit)

Part C: $3 \times 10 = 30$ (Three out of Five - One question from each unit)



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(For students admitted from 2022- 2023)

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
I & II	A2MA2	Integral Calculus and Analytical Geometry 3D	6	5	Tamil and English

Aim

This Course aims to give knowledge of Integration and Analytical Geometry 3D

Course Objectives

Knowledge gained about Integration and Analytical Geometry 3D. Students have better understanding in the above mentioned Topics

Course Outcomes

- Recognize the concept of the Integral and their Properties
- Apply the domain knowledge for Beta and Gamma function and their properties
- Analyzed the varies definition of plane, Straight line and Sphere their related problems

UNIT I: Definite integrals: Properties – problems - Integration by parts –problems – Reduction formula.

UNIT II: Multiple integrals: Double integrals – change the order of integration – triple integrals – Beta and Gamma functions – properties - Integration using Beta and Gamma functions.

UNIT III: Plane: standard equation of the plane – intercept form – Normal form – Plane passing through the given points - angle between the planes – Plane through line of intersection of two planes.

UNIT IV: Straight line: Equation of a straight line in symmetrical form – Equation of a straight line passing through two given points - Coplanar lines – Equation of the Coplanar lines – Shortest distance between two skew lines – Equation of shortest distance.

UNIT V: Sphere: Standard equation – length of the tangent from any point – Plane section of a sphere - Sphere passing through a given circle – intersection of two spheres –Equation of the tangent plane to the sphere.

Books for Study

1. Calculus (Volume II), S. Narayanan and T. K. Manickavachagom Pillay, S. Viswanathan PVT.LTD, (2006).



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(For students admitted from 2022- 2023)

Unit I: Chapter 2 (Sec. 11 - 13)

Unit II: Chapter 5 (Sec. 1, 2.1, 2.2, 4) & Chapter 7 (Sec. 2.1 -2.3, 3, 4, 5)

2. Analytical geometry (Three Dimensions), T. K. Manickavachagom Pillay and T. Natarajan, S. Viswanathan, PVT. LTD, (2006).

Unit III: Chapter 2 (Sec 1 – 9)

Unit IV: Chapter 3 (Sec 1 – 4, 7, 8)

Unit V: Chapter 4 (Sec 1 – 8)

Books for Reference

1. Engineering Mathematics – I, M.K.Venkatraman, The National Publishing Company, Chennai.
2. Calculus Volume - II, S. Narayanan, T.K. Manichavasagam Pillai, S.V. Publications, Chennai.

Question Paper Pattern

Maximum Marks: 75

Examination Duration : 3 Hours

Part A: $10 \times 2 = 20$ (Two questions from each unit)

Part B: $5 \times 5 = 25$ (Either/Or type – One question from each unit)

Part C: $3 \times 10 = 30$ (Three out of Five – One question from each unit)



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(For students admitted from 2022- 2023)

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
II	A2MA3	Theory of Equations and Matrices	6	4	Tamil and English

Aim

This Course aims to give knowledge of the basic principles of Theory of equations and Matrices.

Course Objectives

To analyze the relation between roots and coefficients of the polynomial equations and basic concepts of matrices.

Course Outcomes

Knowledge gained about Theory of equations and Matrices. Students have better understanding in the above mentioned Topics.

UNIT I : Theory of equations: Imaginary roots occur in pairs – Irrational roots occur in pairs - Relation between the roots and coefficients – Symmetric functions – Sum of the powers of the roots of an equation – Newton’s theorem on the sum of the powers of the roots.

UNIT II : Transformation of equations – Reciprocal roots - Diminishing, increasing, multiplying the roots- Form the quotient and remainder when a polynomial is divided by a polynomial – Removal of terms.

UNIT III : Form an equation whose roots are any powers of the roots of a given equations – Descartes rule of signs – Rolle’s theorem.

UNIT IV : Matrices: Special types of matrices - Symmetric, Skew – Symmetric matrices- Hermitian and Skew-Hermitian matrices – Unitary matrices – Orthogonal matrices – Rank of a matrix.

UNIT V : Eigen values and Eigen vectors – Diagonalising the matrix - Cayley –Hamilton theorem - verification of Cayley-Hamilton theorem.

Books for Study

1. Algebra (Volume I), T. K. Manickavachagom Pillay, T. Natarajan and K.S. Ganapathy, S. Viswanathan, PVT. LTD, (2004).



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UNIT I: Chapter 6 (Sec 9 - 14)

UNIT II: Chapter 6 (Sec 15, 16, 17, 18,19)

UNIT III: Chapter 6 (Sec 20, 24, 25)

2. Algebra (Volume II), T. K. Manickavachagom Pillay, T. Natarajan and K.S. Ganapathy,
S. Viswanathan, PVT. LTD.

UNIT IV: Chapter 2 (Page no.: 59 -99)

UNIT V : Chapter 2 (Page no.: 110 -122)

Question Paper Pattern

Maximum Marks: 75

Examination Duration : 3 Hours

Part A: $10 \times 2 = 20$ (Two questions from each unit)

Part B: $5 \times 5 = 25$ (Either/Or type – One question from each unit)

Part C: $3 \times 10 = 30$ (Three out of Five – One question from each unit)



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Semester	Subject Code	Title of the Paper	Hours /Week	No. of Credits	Medium of Instruction
I	A1AM1	Allied Paper – I Classical Algebra and Integral Calculus (For Physics and Chemistry Major)	4	4	Tamil and English

Aim

- To study Binomial, Exponential series which helps to find the expanded value of the algebraic expression.
- Matrices represent linear maps and allow explicit computations in linear algebra.
- To study various types of integration and definite integrals.

Course Objectives

- To train a complete treatment of integral calculus and algebraic concepts (series and matrices) and techniques for a firm understanding of the proofs.
- To make ability to apply the results to the related problems.

Course Outcomes

- On the successful completion of the course, Students will be able to productively discuss about the series and matrices concepts of Algebra.
- Students will be able to understand and solve various types of integrations and definite integral problems.

UNIT I: Binomial and Exponential Series: Summation and Approximation of the series.

UNIT II: Matrices: Symmetric, Skew–Symmetric matrices–Hermitian and Skew –Hermitian matrices – Unitary Matrices–Orthogonal matrices– Problems.

UNIT III: Matrices: Eigen values and Eigen vectors – Cayley – Hamilton theorem (Proof excluded)–Verification of Cayley–Hamilton theorem.

UNIT IV: Evaluation of integrals of types

$$\begin{array}{lll} 1) \int \frac{dx}{ax^2 + bx + c} & 2) \int \frac{px + q}{ax^2 + bx + c} dx & 3) \int \frac{dx}{\sqrt{ax^2 + bx + c}} \\ 4) \int \frac{px + q}{\sqrt{ax^2 + bx + c}} dx & & 5) \int \frac{dx}{a + b \cos x} \end{array}$$

UNIT V: Definite integrals: Properties–problems–Integration by parts–problems–Reduction formula for $I_n = \int x^n e^{ax} dx$, $I_n = \int x^n \sin ax dx$, $I_n = \int x^n \cos ax dx$, $I_n = \int \sin^n x dx$, $I_n = \int \cos^n x dx$ (simple problems)



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Books for Study

1. Algebra (Volume I), T. K. Manickavachagom Pillay, T. Natarajan and K.S. Ganapathy, S.Viswanathan PVT.LTD, (2015).
UNIT I : Chapter3(Sec 10, 14) & Chapter 4 (Sec 2,3)
2. Algebra (Volume II), T. K. Manickavachagom Pillay, T. Natarajan and K.S. Ganapathy, S.Viswanathan, PVT.LTD, (2015).
UNIT II : Chapter2(Sec 6.1 –6.3,9.1)
UNIT III : Chapter2(Sec 16,16.3)
3. Calculus (Volume II), S. Narayanan and T. K. Manickavachagom Pillay, S. Viswanathan PVT.LTD, (2016).
UNIT IV : Chapter 1 (Sec7.3(i,ii), 8(i,ii),9)
UNIT V : Chapter 1 (Sec 11,12 & 13.1 – 13.4)

Question Paper Pattern

Maximum Marks: 75

Examination Duration: 3Hours

Part A: $10 \times 2 = 20$ (Two questions from each unit)

Part B: $5 \times 5 = 25$ (Either / or type – One questions from each unit)

Part C: $3 \times 10 = 30$ (Three out of Five – One questions from each unit)



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Semester	Subject Code	Title of the Paper	Hours / Week	No. of Credits	Medium of Instruction
I & II	A2AM2	Allied Paper – II Vector Analysis and Analytical Geometry (For Physics and Chemistry Major)	3	4	Tamil and English

Aim

- To deals with quantities that have both magnitude and direction.
- To describe a moving object's displacement or velocity, vector differentiation and vector integration concepts.
- To deals with modelling of some geometrical objects, such as lines, points and curves and so on.
- To establish the correspondence between the algebraic equations and the geometric curves.

Course Objectives

- To teach the concepts of Vector differentiation, Vector integration and its applications and Analytical geometry of three dimensions for a firm understanding of the subjects.
- To make ability to apply it in scientific concepts.

Course Outcomes

- On the successful completion of the course, students will be able to generate the detailed solutions of the vector differentiation and verification of Gauss divergence and Stoke's theorems.
- Students will be able to discuss the plane, straight line and sphere concepts of analytical geometry of three dimensions which was more helpful in scientific concepts.

UNIT I: Vector differentiation: Velocity and acceleration- Vector and scalar fields –Gradient of a vector – Directional derivative – divergence and curl of a vector –Solenoidal and Irrotational vectors.

UNIT II: Gauss Divergence Theorem – Stoke's Theorem- Simple problems - Verification of the above theorems (Proof excluded).

UNIT III: Plane: Standard equation of the plane – Intercept form – Normal form – Plane passing through the given points -Angle between the planes – Plane through the line of

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intersection of two planes.

UNIT IV: Straight line: Equation of a straight line in symmetrical form – Equation of a straight line passing through two given points - Coplanar lines – Equation of the Coplanar lines–Shortest distance between two skew lines– Equation of shortest distance.

UNIT V: Sphere: Standard equation – Length of the tangent from any point – Plane section of a sphere - Sphere passing through a given circle – Intersection of two spheres –Equation of the tangent plane to the sphere.

Books for Study

1. Vector Algebra and Analysis, S.Narayanan and T.K.Manickavachagom Pillay, S.Viswanathan, PVT. LTD.

UNIT I : Chapter 4 (Sec 1,2,6 – 10)

UNIT II : Chapter 6 (Sec 6&9)

2. Analytical Geometry (Three Dimensions), T. K. Manickavachagom Pillay and T.Natarajan, S. ViswanathanPVT.LTD, (2015).

UNIT III : Chapter 2 (Sec. 1 –9)

UNIT IV : Chapter 3 (Sec. 1 –4,7 & 8)

UNIT V : Chapter 4 (Sec. 1 –8)

Question Paper Pattern

Maximum Marks: 75


Examination Duration:3Hours

Part A:10 ×2=20 (Two questions from each unit)

Part B:5×5=25 (Either/or type–One question from each unit)

Part C: 3×10=30 (Three out of Five –One question from each unit)


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Semester	Subject Code	Title of the Paper	Hours /Week	No. of Credits	Medium of Instruction
II	A2AM3	Allied Paper – III Differential Calculus, Laplace Transforms and Fourier series (For Physics and Chemistry Major)	4	4	Tamil and English

Aim

- To study derivative of a function, related notations such as differential and their applications.
- To transform ODE into algebraic equations by using Laplace transforms.
- The Fourier series allows us to model any arbitrary periodic signal with a combination of sines and cosines.

Course Objectives

- To provide the mathematical foundation to understand and apply the principles of calculus .
- To develop the necessary skills to solve problems and understand scientific concepts.

Course Outcomes:

- On the successful completion of the course, students will be able to generate solutions of successive differentiation and curvature oriented problems.
- Students will be able to derive the solutions of Laplace transforms and Fourier series.

UNIT I: Successive differentiation– Leibnitz’s theorem (Proof excluded) and its applications.

UNIT II: Curvature – Radius of Curvature in Cartesian and Polar Co-ordinates–Centre of Curvature.

UNIT III: Laplace Transform-Definition- $L(e^{at})$, $L(\cos(at))$, $L(\sin(at))$, $L(t^n)$, where n is a positive integer, Basic theorems in Laplace Transforms(formula only) – $L[e^{\pm st} \cos bt]$, $L[e^{\pm st} \sin bt]$, $L[e^{\pm st} f(t)]$ - $L[f(t)]$, $L[f'(t)]$, $L[f''(t)]$

UNIT IV: Inverse Laplace Transforms-Problems–Solution of Ordinary Differential Equations using Laplace Transforms.

UNIT V: Fourier series- Definition - Fourier Series expansion of periodic functions with Period 2π – Use of Odd and Even functions in Fourier Series.



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Books for Study

1. Calculus (Volume I), S. Narayanan and T. K. Manickavachagom Pillay, S. Viswanathan , PVT., LTD(2013).

UNIT I : Chapter 3 (Sec. 1.1 – 1.6, 2.1 – 2.2)

UNIT II : Chapter 10 (Sec. 2.1–2.4, 2.6)

2. Calculus (Volume III), S. Narayanan and T. K. Manickavachagom Pillay, S. Viswanathan, PVT. LTD, (2014).

UNIT III : Chapter 5 (Sec. 1,2,4,5)

UNITI V : Chapter 5 (Sec. 6,7,8)

UNIT V: Chapter 6 (Sec. 1-3)

Question Paper Pattern

Maximum Marks: 75

Examination Duration:3Hours

PartA: $10 \times 2 = 20$ (Two questions from each unit)

PartB: $5 \times 5 = 25$ (Either/Or type–One question from each unit)

Part C: $3 \times 10 = 30$ (Three out of Five –One question from each unit)

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Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
I	A1ASM1	Allied Paper – I Differential Calculus and Algebra (For Statistics Major)	4	4	English

Aim

- To study derivative of a function, related notations such as differential and their applications.
- To study Binomial, Exponential series which helps to find the expanded value of the algebraic expression.
- Matrices represent linear maps and allow explicit computations in linear algebra.

Course Objectives

- To provide the mathematical foundation to understand and apply the principles of differential calculus.
- To train a complete treatment of , Binomial and exponential series, matrices concepts and techniques necessary for a firm understanding of the proofs.
- To make ability to apply the results to related problems.

Course Outcomes

- On the successful completion of the course, students will be able to generate solutions of successive differentiation and curvature oriented problems.
- Students will be able to productively discuss about the series and matrices concepts of Algebra.

UNIT I: Successive differentiation– Leibnitz’s theorem (Proof excluded) and its applications.

UNIT II: Curvature–Radius of Curvature in Cartesian and Polar Co-ordinates– Centre of Curvature.

UNIT III: Binomial and Exponential Series: Summation and Approximation of the Series.

UNIT IV: Matrices: Symmetric, skew–Symmetric matrices–Hermitian and skew–Hermitian matrices – Unitary Matrices–Orthogonal matrices– Problems.

UNIT V: Matrices: Eigen values and Eigen vectors – Cayley –Hamilton theorem (Proof excluded) –Verification of Cayley–Hamilton theorem.



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Books for Study

1. Calculus (Volume I), S. Narayanan and T. K. Manickavachagom Pillay, S. Viswanathan, PVT., LTD(2013).
UNIT I: Chapter 3 (Sec. 1.1 – 1.6, 2.1 -2.2)
UNIT II : Chapter10 (Sec. 2.1–2.4, 2.6)
2. Algebra (Volume I),T. K. Manickavachagom Pillay, T. Natarajan and K.S. Ganapathy, S.Viswanathan PVT.LTD, (2015).

UNIT III: Chapter 3 (Sec. 10&14) & Chapter 4 (Sec. 2 & 3)
3. Algebra (Volume II),T. K. Manickavachagom Pillay, T. Natarajan and K.S. Ganapathy, S.Viswanathan, PVT.LTD,(2015)
UNIT IV: Chapter 2 (Sec. 6.1 –6.3, 9.1)
UNITV: Chapter 2 (Sec.16, 16.3)

Question Paper Pattern


Maximum Marks: 75

Examination Duration: 3Hours

PartA: $10 \times 2 = 20$ (Two questions from each unit)

Part B: $5 \times 5 = 25$ (Either / or type – One questions from each unit)

Part C: $3 \times 10 = 30$ (Three out of Five – One questions from each unit)


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(For students admitted from 2022- 2023)

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
I&II	A2ASM2	Allied Paper – II Integral Calculus and Analytical Geometry (For Statistics Major)	3	4	Tamil and English

Aim

In Integral calculus to study two linear operators that are related and calculations involving double triple integrals.

- .To deals with modelling of some geometrical objects, such as lines, points and curves and so on.
- To establish the correspondence between the algebraic equations and the geometric curves.

Course Objectives:

- To teach the concepts of Integral calculus and Analytical geometry of three dimensions for a firm understanding of the subjects.
- To make ability to apply it in scientific concepts.

Course Outcomes:

- On the successful completion of the course, students will be able to generate the detailed solutions of the definite integrals and multiple integrals.
- Students will be able to discuss the plane, straight line and sphere concepts of analytical geometry of three dimensions which was more helpful in scientific concepts.

UNIT I: Definite integrals: Properties – problems – Integration by parts – problems – Reduction formula for $I_n = \int x^n e^{ax} dx$, $I_n = \int x^n \sin ax dx$, $I_n = \int x^n \cos ax dx$, $I_n = \int \sin^n x dx$, $I_n = \int \cos^n x dx$ (simple problems)

UNIT II: Multiple integrals: Double integrals – Evaluation of double integrals – simple problems (Change the order of integration excluded) – Triple integrals – simple problems.

UNIT III: Plane: Standard equation of the plane – Intercept form – Normal form – Plane passing through the given points – Angle between the planes – Plane through the line of intersection of two planes.

UNIT IV: Straight line: Equation of a straight line in symmetrical form – Equation of a straight line passing through two given points – Coplanar lines – Equation of the Coplanar lines – Shortest distance between two skew lines –



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Equation of shortest distance.

UNIT V: Sphere: Standard equation – Length of the tangent from any point – Plane section of a sphere - Sphere passing through a given circle – Intersection of two spheres –Equation of the tangent plane to the sphere.

Books for Study

1. Calculus (Volume II), S. Narayanan and T. K. Manickavachagom Pillay, S. ViswanathanPVT.LTD, (2017).

UNIT I: Chapter 1 (Sec. 11,12 & 13.1 – 13.4)

UNIT II: Chapter 5 (Sec.1, 2.1,2.2,4)

2. Analytical Geometry (Three Dimensions), T. K. Manickavachagom Pillay and T.Natarajan, S. ViswanathanPVT.LTD, (2015).

UNIT III : Chapter 2 (Sec. 1 –9)

UNITIV : Chapter 3 (Sec. 1 –4,7&8)

UNITV : Chapter 4 (Sec. 1 –8)

Question Paper Pattern

Maximum Marks: 75

Examination Duration: 3Hours

Part A: $10 \times 2 = 20$ (Two questions from each unit)

Part B: $5 \times 5 = 25$ (Either/or type – One question from each unit)

Part C: $3 \times 10 = 30$ (Three out of Five – One question from each unit)



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(For students admitted from 2022- 2023)

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
II	A2ASM3	Allied Paper – III Vector Analysis, ODE and Laplace Transforms (For Statistics Major)	4	4	English

Aim

- To deals with quantities that have both magnitude and direction.
- To describe ordinary differential equations problems.
- Laplace transform helps to transform ODE into algebraic equations.

Course Objectives

- To provide a needful treatment of Vector differentiation and Vector integration and its applications.
- To train calculus concepts such as ODE and Laplace transformations for a firm understanding of the concepts
- To make ability to apply the results in the related problems.

Course Outcomes

- On the successful completion of the course, students will be able to generate the solutions of vector differentiation and verification of Gauss divergence and Stoke's theorem problems.
- Also able to productively solve the ODE and Laplace transformations Problems.

UNIT I: Vector differentiation: Velocity and acceleration- Vector and scalar fields –Gradient of a vector-Directional derivative–divergence and curl of a vector– Solenoidal and Irrotational vectors.

UNIT II: Gauss Divergence Theorem – Stoke's Theorem- Simple problems - Verification of the above theorems (Proof excluded).

UNIT III: Ordinary differential equations: Particular integral of second and higher order differential equations with constant coefficients.

UNIT IV: Laplace Transform-Definition- $L(e^{at})$, $L(\cos(at))$, $L(\sin(at))$, $L(t^n)$, where n is a positive integer, Basic theorems in Laplace Transforms (formula only) – $L[e^{\pm st} \cos bt]$, $L[e^{\pm st} \sin bt]$, $L[e^{\pm st} f(t)]$ - $L[f(t)]$, $L[f'(t)]$, $L[f''(t)]$

UNIT V: Inverse Laplace Transforms-Problems–Solution of Ordinary Differential Equations using Laplace Transforms.



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Books for Study

1. Vector Algebra and Analysis, S.Narayananand T.K.Manickavachagom Pillay, S.Viswanathan, PVT. LTD.

UNIT I : Chapter 4 (Sec 1,2,6 – 10)

UNIT II : Chapter 6 (Sec 6,9)

2. Calculus (Volume III), S. Narayanan and T. K. Manickavachagom Pillay, S. Viswanathan, PVT. LTD,(2019).

UNIT III : Chapter 2 (Sec. 1,2,3,4)

UNIT IV : Chapter 5 (Sec. 1,2,4,5)

UNIT V : Chapter 5 (Sec. 6,7,8)

Question Paper Pattern

Maximum Marks: 75

Examination Duration:3 Hours

Part A: $10 \times 2 = 20$ (Two questions from each unit)

Part B: $5 \times 5 = 25$ (Either / Or type–One questions from each unit)

Part C: $3 \times 10 = 30$ (Three out of Five –One questions from each unit)



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(For students admitted from 2022- 2023)

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
I	A1ACSM1	Allied Paper – I Numerical Methods and Operations Research (Allied Paper for Computer Science Major)	4	4	English

Aim

- To solve numerical problems by using the tool numerical method.
- To solve problems by step-wise repeated and iterative solution methods which would otherwise be tedious or unsolvable by hand calculations.
- Operations research deals with problems, formulation, solutions and finally appropriate decision making.

Course Objectives

- To obtain approximate solutions of Mathematical problems using numerical methods, Finite difference problems and the solution of linear systems.
- To generate ideas of operations research such as linear programming problems and transportation problems.

Course Outcomes

- On the successful completion of the course students will be able to write detailed solutions of algebraic and transcendental equations using Bisection – Iteration – False Position and Newton Raphson Methods and Finite difference problems.
- Also students will be able to solve the solution of linear system problems, linear programming problems and transportation problems.

UNIT I: Solutions of algebraic and transcendental equation: Bisection Method – Iteration Method-Method of False position-Newton -Raphson Method.

UNIT II: Finite differences: Forward differences - Backward differences - Newton's Formulae for Interpolation (Problems Only) - Interpolation with Unevenly spaced points: Lagrange's interpolation Formula.

UNIT III: Solution of linear systems: Gaussian elimination Method - Iterative methods: Gauss Seidal Methods. Numerical solutions of Ordinary differential equations: Taylor's series method–Euler's method (only).

UNIT IV: Mathematical Formulation of linear programming problems-Graphical method-Assignment Problems: Introduction – Hungarian Algorithm – problems -Travelling salesman problem.



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UNIT V: Transportation Problems: Introduction –Finding initial Basic feasible solution (North West Corner Rule, Least Cost Method, Vogel’s Approximation Method).

Books for Study

1. Introductory Methods of Numerical Analysis, S.S.Sastry, Prentice Hall of India Pvt. Ltd, New Delhi, (2022).

UNIT I : Chapter 2 (Sec. 2.2 -2.5)

UNITII : Chapter 3(Sec. (3.3.1,3.3.2, 3.6,3.9.1)

UNITIII : Chapter 7 (Sec. 7.5.1, 7.5.2, 7.6) & Chapter 8 (Sec. 8.2,8.4)

2. Operations Research, Kantiswarup, P.K. Gupta, Man Mohan Sultan Chand & Sons Educational Publishers New Delhi(2007).

UNITI V : Chapter 2 (Sec. 2.1-2.4) & Chapter 3 (Sec3.1 & 3.2) Chapter 11 (Sec. 11.1,11.2,11.3,11.7)

UNITV : Chapter 10 (Sec10.1,10.2, 10.8,10.9)

Question Paper Pattern

Maximum Marks: 75

Examination Duration:3Hours

Part A: $10 \times 2 = 20$ (Two questions from each unit)

Part B: $5 \times 5 = 25$ (Either/or type–One question from each unit)

Part C: $3 \times 10 = 30$ (Three out of Five –One question from each unit)



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(For students admitted from 2022- 2023)

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
I & II	A2ACSM2	Allied Paper – II Probability and Statistics (For Computer Science Major)	3	4	English

Aim

- To make a general understanding of probability and its notations like events, random variables, distribution functions, moment generating functions.
- To develop problem solving skills for basic probability type questions.
- To analyze the statistical data and draw a conclusion from data.

Course Objectives

- To teach a thorough basic ideas of probability and statistics for a good understanding of subjects.
- To make ability to the direct application of the theorems and results.

Course Outcomes

- On the successful completion of the course, students will be able to productively discuss about Probability theory, Random variables, Mathematical expectation and Binomial, Poisson and Normal distributions.
- Also students will be able to generate solutions to unfamiliar problems.

UNIT 1: Probability - Definition– Sample space – Independent Events – Addition theorem – Conditional Probability – Multiplication theorem– Baye’s theorem–Simple problems.

UNIT II: Random Variables–Distribution functions–Probability Mass Function–Probability density function– Two dimensional random variables– Simple problems.


UNIT III: Mathematical Expectation – Simple problems – Moment generating functions – Simple problems.

UNITIV: Binomial Distribution–Moments–Moment generating function–Poisson distribution – Moments – Moment generating function – Normal Distribution – Moment generating function.

UNIT V: Correlation and Regression- Properties – Rank correlation – Regression Lines – Properties– Simple problems.

Book for Study

Fundamentals of Mathematics Statistics, S.C. Gupta and V.K. Kapoor, Sultan Chand, Eleventh Edition (2019).


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UNIT I : Chapter 3(Sec. 3.8 – 3.13)

UNIT II : Chapter 5(Sec. 5.1-5.5)

UNIT III : Chapter 6 (Sec. 6.1–6.6) & Chapter 7 (Sec7.1)

UNIT IV : Chapter 8 (Sec. 8.4,8.4.1,8.4.6, 8.5,8.5.2, 8.5.5) & Chapter 9 (Sec. 9.2,9.2.5)

UNIT V : Chapter 10 (Sec. 10.4 & 10.7) & Chapter 11 (Sec. 11.2, 11.2.1-11.2.3)

Question Paper Pattern

Maximum Marks: 75

Examination Duration: 3 Hours

Part A : $10 \times 2 = 20$ (Two questions from each unit)

Part B : $5 \times 5 = 25$ (Either/or type–One question from each unit)

Part C : $3 \times 10 = 30$ (Three out of Five –One question from each unit)



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Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
II	A2ACSM3	Allied Paper – III Classical Algebra, Differential Calculus and ODE (For Computer Science Major)	4	4	English

Aim

- To demonstrate the techniques to solve polynomial equations.
- To study derivative of a function related notations such as differential and their applications.
- To study the solutions of ordinary differential equations.

Course Objectives

- To provide a knowledge of Classical Algebra, differential calculus and ordinary differential equations for a firm understanding of these subjects.
- To create ability to direct application of these results to the related problems.

Course outcomes

- On the successful completion of the course students will be able to generate solutions of problems in theory of equations.
- Also able to productively discuss about the successive differentiation, curvature and ordinary differential equations related problems.

UNIT 1 : Transformation of equations–Reciprocal roots–Diminishing, increasing, multiplying the roots- Form the quotient and remainder when a polynomial is divided by a polynomial – Removal of terms.

UNIT II : Form an equation whose roots are any powers of the roots of a given equations – Descartes rule of signs–Rolles’ theorem.

UNIT III : Successive differentiation– Leibnitz’s theorem (Proof excluded) and its applications.

UNIT IV : Curvature –Radius of Curvature in Cartesian and Polar Co-ordinates–Centre of Curvature.

UNIT V : Ordinary Differential Equations: Particular integral of second and higher order differential equations with constant coefficients.

Books for Study

1. Algebra (Volume I), T.K.Manickavachagom Pillay, T. Natarajan and K.S.Ganapathy, S.Viswanathan PVT.LTD, (2013).

UNIT I : Chapter 6 (Sec. 15, 16,17,18,19), UNIT II : Chapter 6 (Sec. 20, 24,25)



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2. Calculus (Volume I), S. Narayanan and T. K. Manickavachagom Pillay, S. Viswanathan PVT., LTD (2009).

UNIT III: Chapter 3 (Sec. 1.1 – 1.6, 2.1 -2.2)

UNIT IV : Chapter 10 (Sec. 2.1 – 2.4, 2.6)

3. Calculus (Volume III), S. Narayanan and T. K. Manickavachagom Pillay, S.Viswanathan, PVT. LTD, (2019).

UNIT V : Chapter 2 (Sec . 1, 2, 3, 4)

Question Paper Pattern

Maximum Marks: 75

Examination Duration:3 Hours

Part A : $10 \times 2 = 20$ (Two questions from each unit)

Part B : $5 \times 5 = 25$ (Either/or type–One questions from each unit)

Part C : $3 \times 10 = 30$ (Three out of Five –One questions from each unit)


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