

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
I	S1M1	Differential Calculus, Trigonometry and Matrices	6	5	Tamil and English

**UNIT I:** Successive Differentiation – Leibnitz’s Theorem and its Applications- Maxima and Minima of Two Variables.

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

**UNIT III:**Expansion for  $\sin n\theta$ ,  $\cos n\theta$ ,  $\tan n\theta$  - Expansion for  $\sin^n\theta$  and  $\cos^n\theta$ - Expansion of  $\sin\theta$ ,  $\cos\theta$  and  $\tan\theta$  in powers of  $\theta$ .

**UNIT IV:**Hyperbolic functions – Relations between hyperbolic functions and circular trigonometry functions – Inverse hyperbolic functions – Logarithm of complex number.

**UNIT V:** Matrices: Symmetric, Skew – Symmetric matrices-Hermitian and Skew-Hermitian matrices – Unitary matrices – Orthogonal matrices –Eigen values and Eigen vectors – Cayley –Hamilton theorem - verification of Cayley-Hamilton theorem.

### **Text Books**

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

UNIT I: Chapter 3 (Full) & Chapter 7 (Sec 4)

UNIT II: Chapter 10 (Sec 2.1 – 2.6)

2. Trigonometry, S. Narayanan and T. K. Manickavachagom Pillay, S. Viswanathan PVT. LTD.

UNIT III: Chapter 3 (Full)

UNIT IV: Chapter 4 (Full) & Chapter 5 (Sec 5)

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

UNIT V: Chapter 2 (Sec 6.1 – 6.3, 9.1, 16, 16.3)

### **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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
II	S2M2	Classical Algebra	6	5	Tamil and English

**UNIT I:** Binomial Theorem (Statement only) Binomial: Application of the Binomial Theorem to the Summation of Series – Approximate Values - Exponential and logarithmic series: Exponential Limit - Exponential Theorem (Statement only) – Summation – Logarithmic series (Statement only) – Modification of the Logarithmic series – Problems using the Different Forms of Logarithmic series.

**UNIT II:** General summation of series including successive difference and recurring series.

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

### Text Book

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

UNIT I: Chapter 3 (Sec 10, 14) & Chapter 4 (Sec 1 – 3, 5 - 7)

UNIT II: Chapter 5 (Sec 2 - 7)

UNIT III: Chapter 6 (Sec 9 - 14)

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

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

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
I & II	S2M3	Integral Calculus and Analytical Geometry 3D	3	5	Tamil and English

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

**UNIT II:** Multiple integrals: Double integrals – Evaluation of 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 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 – 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.

### Text books

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

UNIT I: Chapter 1 (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)

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
III	S3M4	Differential Equations and Laplace Transforms	6	5	Tamil and English

**UNIT I:** Ordinary Differential equations – Particular integral of second and higher order Differential Equations with constant coefficients – Linear equations with variable coefficients.

**UNIT II:** Exact differential equations – First order and higher degree equations – Variation of parameters.

**UNIT III:** Partial Differential Equations: Formations of Partial Differential Equations – General, Particular and Singular integral - Four standard types – Lagrange's equation – Charpit's equation (simple problems).

**UNIT IV:** Partial Differential Equations of the second order homogeneous equations with constant coefficient – particular integral of  $F(D, D')z = f(x, y)$ , where  $f(x, y)$  is of the form  $e^{ax+by}$ ,  $\sin(ax + by)$ ,  $\cos(ax + by)$ ,  $F(x, y)$  and  $F(x, y)e^{ax+by}$ .

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

### Text Books

1. Calculus (Volume III), S. Narayanan and T. K. Manickavachagom Pillay, S. Viswanathan PVT. LTD, (2004).

UNIT I: Chapter 2 (Sec 1 – 4 & 8)

UNIT II: Chapter 1 (Sec 3- 5) & Chapter 2 (Sec 10)

UNIT III: Chapter 4 (Sec 1- 3, 5 - 7)

UNIT V: Chapter 5 (Sec 1, 2, 4 - 9)

2. Engineering Mathematics – III, M.K. Venkatraman, The National Publishing Company, Chennai.

UNIT IV: Chapter -2 (Sec 13 - 19)

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
IV	S4M5	Numerical Analysis	6	5	Tamil and English

**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 - Central differences - symbolic relations - Newton's formula for interpolation - Central Difference Interpolation formula – Gauss's, Stirling's and Bessel's Formulae - Interpolation with unevenly spaced points - Lagrange's Interpolation formula.

**UNIT III:** Numerical differentiation: Computing first and second derivatives - Numerical integration: Trapezoidal rule and Simpson's 1/3 and 3/8 rules.

**UNIT IV:** Solution of linear systems: Gaussian elimination Method - Gaussian Jordan Method - Iterative methods: Gauss Jacobi and Gauss Seidal Methods. Numerical solutions of Ordinary differential equations:Taylor's series method – Picardsmethod of successive approximations – Euler's method- Modified Euler's method.

**UNIT V:**Numerical solution of ordinary differential equations: Runge- Kutta method of second, third and fourth order – Predictor - Corrector Methods - Adams- Moulton method and Milne's method.

### **Text Book**

Introductory Methods of Numerical Analysis, S.S. Sastry, Prentice Hall of India Pvt. Ltd, New Delhi, Third Edition (2003).

UNIT I:Chapter 2 (Sec 2.2 - 2.5)

UNITII:Chapter 3 (Sec 3.3, 3.6, 3.7(3.7.1- 3.7.3), 3.9.1)

UNIT III:Chapter 5 (Sec 5.2, 5.4(5.4.1 - 5.4.3))

UNIT IV:Chapter 6 (Sec 6.3.2, 6.4) & Chapter 7 (Sec 7.2- 7.4)

UNIT V:Chapter 7 (Sec 7.5&7.6)

### **Reference**

P. Kandasamy, K. Thilagavathy and K. Gunavathy, Numerical Methods, S.Chand& Company Ltd, New Delhi.

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
III & IV	S4M6	Vector Analysis and Fourier Series	3	5	Tamil and English

**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 –Laplacian operator –simple problems.

**UNIT II:** Vector integration: Tangential line integral –Conservative force field –scalar potential- Work done by force - Surface integral- Volume integral – simple problems.

**UNIT III:** Gauss Divergence Theorem – Stoke’s Theorem- Green’s Theorem – Simple problems and Verification of the theorems.

**UNIT IV:** Fourier series: Definition - Fourier series expansion of periodic functions with period  $2\pi$ – Use of Odd and Even functions in Fourier Series.

**UNIT V:** Half range Fourier Cosine Series – Definition and problems – Half range Fourier Sine series – Definition and problems – Change of interval.

### Text Books

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

UNIT I: Chapter 4 (Sec 1, 2, 6 – 11)

UNIT II: Chapter 6 (Sec 1 - 5)

UNIT III: Chapter 6 (Sec 6 - 10)

2. Calculus (Volume III), S. Narayanan and T. K. Manickavachagom Pillay, S. Viswanathan PVT. LTD, (2004).

UNIT IV: Chapter 6 (Sec 1 - 3)

UNIT V: Chapter 6 (Sec 4 - 6)

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
V	S5M7	Abstract Algebra	5	5	Tamil and English

**UNIT I:** Group Theory: Subgroup – A Counting Principle – Normal subgroups and Quotient groups.

**UNIT II:** Group Theory: Homomorphisms – Automorphisms.

**UNIT III:** Group Theory: Caley’s Theorem – Permutation groups.

**UNIT IV:** Ring Theory: Definition and Examples of Rings – Some Special Classes of Rings – Homomorphisms – Ideal and Quotient Rings – More Ideal and Quotient Rings – The Field of Quotients of an Integral Domain.

**UNIT V:** Vector Spaces: Elementary Basic Concepts – Linear Independence and Bases – Dual Spaces – Inner Product Spaces.

### **Text Book**

Topics in Algebra, I. N .Herstein, John Wiley & Sons, 2<sup>nd</sup> Edition.

UNIT I: Chapter 2 (Sec 2.4 – 2.6)

UNIT II: Chapter 2 (Sec 2.7 – 2.8)

UNIT III: Chapter 2 (Sec 2.9 – 2.10)

UNIT IV: Chapter 3 (Sec 3.1 – 3.6)

UNIT V: Chapter 4 (Sec 4.1 – 4.4)

### **Reference**

Algebra, S.Lang, 3<sup>rd</sup> Edition, Springer (India), 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)

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
V	S5M8	Real Analysis	5	4	Tamil and English

**UNIT I:** Equivalence: Countability – Definition of sequence and subsequence – Limit of a sequence – Convergent sequences – Divergent sequences – Bounded sequences – Monotone Sequences – Operations on convergent sequences – Cauchy sequences.

**UNIT II:** Convergence and Divergence: Series with nonnegative terms – Alternating series – Conditional convergence and absolute convergence – Tests for absolute convergence.

**UNIT III:** Limit of a function on the real line – Metric spaces – Limits in metric spaces – Functions continuous at a point on the real line – Functions continuous on a metric space – Open set – Closed set.

**UNIT IV:** Sets of measure zero – Definition of the Riemann integral – Existence of the Riemann integral – Properties of the Riemann integral.

**UNIT V:** Derivatives – Rolles' Theorem – The laws of mean – Fundamental theorems of calculus – Taylor's theorem.

### Text Book

Methods of Real Analysis, Richard R. Goldberg, Oxford & IBH Publishing Co. PVT. LTD, New Delhi.

UNIT I: Chapter 1 (Sec 1.5, 1.7) & Chapter 2 (Sec 2.1 - 2.7 & 2.10)

UNIT II: Chapter 3 (Sec 3.1 – 3.4 & 3.6)

UNIT III: Chapter 4 (Sec 4.1 – 4.3) & Chapter 5 (Sec 5.1 & 5.3 - 5.5)

UNIT IV: Chapter 7 (Sec 7.1 – 7.4)

UNIT V: Chapter 7 (Sec 7.5 – 7.8) & Chapter 8 (Sec 8.5)

### Reference

Mathematical Analysis, Tom Apostol, Addison –Wesley Publishing company, London, 1971

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
V	S5M9	Statics	5	4	Tamil and English

**UNIT I:** Forces Acting at a Point: Parallelogram Law, Triangle Law – Polygon of Forces – Lami's Theorem – Resolution of a Force.

**UNIT II:** Parallel Forces and Moments: Parallel Forces – Unlike Parallel Forces – Moments– Couple.

**UNIT III:** Equation of Three Forces Acting on a Rigid Body – Necessary and Sufficient conditions (Equation only)–Coplanar Forces – Equation to the Line of Action of the Resultant.

**UNIT IV:** Friction – Laws of Friction – Equation of a Particle on an Inclined Plane– Problems on Friction.

**UNIT V:** Equilibrium of Strings: Catenary – Geometrical Properties – Simple Problems – Suspension Bridge.

### Text Book

Statics, M. K. Venkataraman, Agasthiyar Publications, 2002

UNIT I: Chapter 2 (Sec 2.1-2.12, 2.15)

Unit II: Chapter 3 (Sec 3.1 -3.13) & Chapter 4 (Sec 4.1 – 4.10)

Unit III: Chapter 5 (Sec 5.1 – 5.6) & Chapter 6 (Sec 6.1 – 6.3, 6.6 - 6.10)

Unit IV: Chapter 7 (Sec 7.1 - 7.8, 7.10 - 7.12)

Unit V: Chapter 11 (Sec 11.1- 11.6, 11.9)

### Reference

Mechanics (Vector Treatment), P. Duraipandiyar, S. Chand & Co., June 1997 Edition.

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
V	S5MEL1A	Fundamentals of Programming in C	4	4	Tamil and English

**UNIT I:** Introduction – Basic structure of C programming – Executing a C program – Character – C tokens – Key words and of variables – Assigning value to variables – Symbolic constants – All operators .(Related simple programs)

**UNIT II:** Arithmetic expression – Evaluation of expression – Precedence of arithmetic operators – some computational problems – Type conversion in expression – Mathematical function – Reading a character – Writing a character – Formatted input – Formatted output – Declaring and initializing string variable – Reading string from terminal – writing string to screen – comparison of two strings – string handling functions.(Related simple programs)

**UNIT III:** Decision making with IF statement – simple IF statement – IF...ELSE LADDER – Switch statement – The? : Operator – GOTO statement – While statement – Do statement – FOR Statement.

**UNIT IV:** Arrays: One dimensional arrays – Two dimensional arrays – Initializing two dimensional arrays – Multi dimensional arrays– User defined function: Need for user defined functions –A multi function program – The form of C function – Return values and their types calling functions – first three category of functions – Recursion.

**UNIT V:** Structure: Structure definition – Giving value to members structure initialization – comparison of structure variables – Arrays of structures – Arrays within structure – Structure within structure – File management: Introduction – Defining and opening of file – Closing a file – Input /Output operation on files.

### **Text Book**

Programming in ANSI C, E. Balagurusamy, Tata McGraw – Hill publishing company Ltd, New Delhi, Second Edition.

UNIT I: Chapter I (Sec 1.2, 1.4-1.6), Chapter II (Sec 2.2 - 2.10) & Chapter III (Sec 3.2 - 3.6)

UNITII:Chapter III (Sec 3.10-3.16), Chapter IV (Sec 4.2- 4.5) & Chapter V(Sec 8.2, 8.4, 8.7, 8.8)

UNITIII:Chapter V (Sec 5.2 - 5.9) & Chapter VI (Sec 6.2 - 6.4)

UNITIV:Chapter VII (Sec 7.2 - 7.5) & Chapter IX (Sec 9.2 - 9.10, 9.13)

UNIT V:Chapter X (Sec 10.2 - 10.8) & Chapter XII (Sec 12.1 - 12.4)

### 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 question from each unit)

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

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
V	S5MEL1B	Mathematical Modeling	4	4	Tamil and English

**UNIT I:** Mathematical modeling through ordinary differential equations of first order – Linear growth and Decay models – Non-linear growth and Decay models – Compartment models – Dynamics problems – Geometrical problems.

**UNIT II:** Mathematical modeling through systems of ordinary differential equations of first order – Population dynamics – Epidemic – Compartment models – Economics – Medicine, arms rays, battles and international trade - Dynamics.

**UNIT III:** Mathematical modeling through ordinary differential equations of second order: Planetary motions – Circular motions and motion of satellites – Mathematical modeling through linear differential equations of second order –Miscellaneous mathematical models.

**UNIT IV:** Mathematical modeling through difference equations: Simple models – Basic theory of linear difference equations with constant co-efficient – Economics and finance – Population dynamics and genetics – Probability theory.

**UNIT V:** Mathematical modeling through graphs: solutions that can be modeled through graphs – Mathematical modeling in terms of directed graphs, Signed graphs, Weighted digraphs and Unoriented graphs.

**TextBook :**

1. J.N. Kapoor, Mathematical Modeling, Wiley Eastern Limited, New Delhi, 1988

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).

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
V	S5MEL1C	Formal Languages and Automata Theory	4	4	Tamil and English

**UNIT I:** Finite Automata - Deterministic Finite Automata - Nondeterministic Finite Automata - Application.

**UNIT II:** Regular Expressions - Finite Automata and Regular Expressions - Applications of Regular Expressions - Algebraic Laws for Regular Expressions.

**UNIT III:** Pumping lemma for regular sets – Closure properties of regular sets – Decision algorithms for regular sets – Equivalence and Minimization of Automata.

**UNIT IV:** Context-free grammars – Parse trees – Applications of Context-free grammars – Ambiguity in grammars and languages.

**UNIT V:** Pushdown Automata – Languages of a PDA – Equivalence of PDA's and CFG's – Deterministic PDA.

### Text Book

John E. Hopcroft and Jeffrey D. Ullman, Introduction to Automata Theory, Languages and Computation, Narosa Publishing House, New Delhi, (1995).

UNIT I: Chapter 2 (Sec 2.1 - 2.4)

UNIT II: Chapter 3 (Sec 3.1 - 3.4)

UNIT III: Chapter 4 (Sec 4.1 - 4.4)

UNIT IV: Chapter 5 (Sec 5.1 - 5.4)

UNIT V: Chapter 6 (Sec 6.1 - 6.4)

### References

1. Rani Siromoney, Formal Languages and Automata, The Christian Literature Society, Madras (1984).
2. Bernard Kolman, Robert C. Busby and Sharon Cutler Ross, Discrete Mathematical Structures, Prentice-Hall of India Learning Private Ltd, New Delhi, Sixth Edition, (2009).
3. Kamala Krithivasan, Introduction to Formal Languages, Automata Theory and Computation, Dorling Kindersley (India) Pvt. Ltd. (2011).

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
V	S5MEL2A	Mathematics for Competitive Examinations	4	4	Tamil and English

**UNIT I:**Simplification – Square Roots & Cube Roots – Average –ProblemonNumbers and ages.

**UNIT II:** Percentage – Profitand loss –Ratio and Proportion – Chain rule.

**UNIT III:**Time and work – Time and Distance – Problems on Trains – Boats and Streams.

**UNIT IV:** Simple Interest – Compound Interest –Logarithms.

**UNIT V:** Area, Volume & Surface Areas, Calendar.

### Text Book

R.S. Aggarwal, Quantitative Aptitude, S. Chand & Company Ltd, 7<sup>TH</sup> Fully Revised Edition(2008).

Unit I:Chapters: 4 – 8

UnitII: Chapters: 10-12 & 14

Unit III: Chapters:15, 17-19

UnitIV: Chapters: 21-23

UnitV: Chapters: 24, 25 & 27

### References:

1. R.S. Aggarwal, Arithmetic (Subjective and Objective) for Competitive Examinations, S. Chand and Company Ltd (2004).
2. R.S. Aggarwal, Objective Arithmetic, S. Chand & Company 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).

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
V	S5MEL2B	Discrete Mathematics	4	4	Tamil and English

**UNIT I:MathematicalLogic:** Introduction – Statements and Notations – Connectives – Logical capabilities of programming languages – Conditional and Bi-conditional – well-formed formulae – Tautology and Equivalence formulae.

**UNIT II:Tautology and Normal Forms:** Duality Law – Tautological Implications – Formulae with distinct truth tables – Functionally complete sets of connectives – Other connectives – Normal forms – Disjunctive and Conjunctive Normal forms.

**UNIT III:Theory of Inference for Statement Calculus:** Introduction – Validity using truth tables – Rules of Inference – Consistency of premises – Indirect method of proof – Automatic theorem proving – Predicates – The statement Function - Variables and quantifiers .

**UNIT IV:Predicate Formulae:** Predicate formulae – Free and Bound variables – Universe of Discourse – Inference Theory of the predicate calculus – Valid formulas and Equivalences – Some valid formulas over finite Universes – Special valid formulas Involving quantifiers – Theory of inference for the predicate calculus –Formulas Involving more than one quantifier.

**UNIT V:Functions and Recursion:** Definition and Introduction – Composition of functions – Inverse functions – Recursive functions - sets and predicates.

### Text Book

J.P.Tremblay, R.Manohar, Discrete Mathematical Structures with Applications to Computer Science.

Unit I: Chapter 1 (Sec 1.1, 1.2 (1.2.1-1.2.9))

Unit II: Chapter 1 (Sec 1.2 (1.2.10-1.2.14), 1.3 (1.3.1-1.3.5))

Unit III: Chapter 1 (Sec 1.4 (1.4.1-1.4.4), 1.5 (1.5.1 & 1.5.2) )

Unit IV: Chapter 1 (Sec 1.5 (1.5.3-1.5.5), 1.6)

Unit V: Chapter 2 (Sec 2.4 (2.4.1-2.4.3), 2.6.1)

### Reference

C.L.Liu, Elements of Discrete Mathematics, Tata McGraw-Hill Publishing company Limited, New Delhi, Second Edition.

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
V	S5MEL2C	Fuzzy Sets and FuzzyLogic	4	4	Tamil and English

**UNIT I:** Crisp Sets and Fuzzy Sets: Introduction-Crisp sets: An over view- Fuzzy Sets: Basic Types - Basic concepts of Fuzzy sets – Additional Properties of  $\alpha$ -cuts – Representations of Fuzzy Sets.

**UNIT II:** Operations on Fuzzy Sets: Types of operations – Fuzzy Compliments – Fuzzy Intersections: t-norms – Fuzzy Unions: t-conorms – Combinations of Operations – Aggregation Operations.

**UNIT III:** Fuzzy Arithmetic: Fuzzy Numbers – Linguistic Variables - Arithmetic Operations on Intervals – Arithmetic Operations on Fuzzy Numbers – Lattice of Fuzzy Numbers – Fuzzy Equations.

**UNIT IV:** Fuzzy Relations: Crisp and Fuzzy relations – Projection and Cylindric Extensions – Binary Fuzzy Relations – Binary Relations on a single set – Fuzzy Equivalence Relations – Fuzzy Compatibility Relations-Orderings – Morphism.

**UNIT V:** Fuzzy Relational Equations: General Discussion – Problem Partitioning - Solution Methods – Fuzzy Relation Equations Based on:  $\text{Sup-}i$  Compositions –  $\text{Inf-}\omega_i$  Compositions.

### Text Book

1. George J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic-Theory and Applications, Prentice-Hall of India Private Limited (2012).

UNIT I: Chapter 1 (Sec. 1.1-1.4) & Chapter 2 (Sec. 2.1 & 2.2)

UNIT II: Chapter 3 (Sec. 3.1-3.6)

UNIT III: Chapter 4 (Sec. 4.1-4.6)

UNIT IV: Chapter 5 (Sec. 5.1-5.8)

UNIT V: Chapter 6 (Sec. 6.1-6.5)

### Reference

George J. Klir and Tina A. Folger, Fuzzy Sets, Uncertainty and Information, Prentice-Hall of India Private Limited-Fourth printing-June 1995.

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
VI	S6M10	Complex Analysis	5	5	Tamil and English

**UNIT I :** Analytic Functions: Functions of a Complex variable – Limits –Theorems on limit – Continuous Functions – Differentiability – The Cauchy-Riemann Equations – Analytic Functions-Harmonic Functions.

**UNIT II:** Bilinear Transformations: Elementary Transformations –Bilinear Transformations-Cross Ratio – Fixedpoints of Bilinear Transformations –Some Special Bilinear Transformations.

**UNIT III:**Complex Integration: Definite integral - Cauchy's Theorem - Cauchy's Integral Formula - Higher Derivatives.

**UNIT IV:**Series Expansions: Taylor's Series – Laurent's Series – Zeros of an Analytic Function.

**UNIT V:** Calculus of Residues: Singularities – Residues- Cauchy's Residues Theorem – Problems.

### **Text Book**

S.Arumugam, A.Thangapandi Isaac and A.Somasundaram, Complex Analysis, Scitech Publication, Chennai.

UNIT I:Chapter2 (Sec 2.1 - 2.8)

UNIT II:Chapter3 (Sec 3.1 - 3.5)

UNIT III:Chapter 6 (Sec 6.1 - 6.4)

UNIT IV:Chapter7 (Sec7.1 - 7.3)

UNIT V:Chapters7 and 8 (Sec7.4 , 8.1&8.2)

### 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)

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
VI	S6M11	Operations Research	5	5	Tamil and English

**UNIT I:** Mathematical Formulation of linear programming problems - Graphical method – simplex method – Big - M method – Two phase simplex method.

**UNIT II:** Transportation Problems: Introduction –Finding initial Basic feasible solution (North West Corner Rule, Least Cost Method, Vogel’s Approximation Method) – optimal solution (Modified Distribution Method) – Degeneracy in Transportation Problems – Assignment Problems: Introduction –HungrainAlgorithm – problems - Travelling salesman problem.

**UNIT III:** Network Scheduling by PERT/CPM:CPM: Introduction – Network and Basic components – Rules of Network construction – Time calculations in network – Critical Path Method –PERT calculations.

**UNIT IV:** Sequencing Problems:Introduction – problems with n jobs and 2 machines – problems with 2 jobs and n machines.

**UNIT V:** Replacement Problems:Introduction – Replacement of Equipment – Deteriorates gradually – Replacement of Equipment that fails suddenly.

### **Text Book**

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

UNIT I:Chapter 2 (Sec 2.1 - 2.4) &Chapter 3(Sec 3.1&3.2)& Chapter 4 (Sec 4.3& 4.4)

UNITII:Chapter: 10(Sec 10.1, 10.2, 10.8 -10.10, 10.12& 10.13) &  
Chapter 11 (Sect 11.1 - 11.3& 11.7)

UNITIII:Chapter 25(Sec 25.1 – 25.8)

UNITIV:Chapter 12 (Sec 12.1 – 12.6)

UNIT V:Chapter18 (Sec 18.1 –18.3)

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
VI	S6M12	Dynamics	5	5	Tamil and English

**UNIT I:** Kinematics: Velocity – Acceleration –Relative Velocity –Angular velocity – Motion in a straight line under uniform acceleration.

**UNIT II:**CentralOrbit:Radial and transverse components of velocity and acceleration – Central force – Differential equation to a central orbit in polarco-ordinates –Pedal equations – Given the central orbit - Law of force – Related problems .

**UNIT III:** Simple Harmonic motion:Amplitude and periodic time – Composition of two simple harmonic motions - Load suspended by an elastic string.

**UNIT IV:** Projectile: Path of a projectile – Greatest height – range –time of flight – Range on an inclined plane – Maximum range.

**UNIT V:**Collision of elastic bodies: Impact of a sphere on a plane – Direct and Oblique Impact of two smooth spheres – Loss of Kinetic energy.

### Text Book

Dynamics, M. K. Venkataraman, Agasthiyar Book Depot, 1990

UNIT I:Chapter 3 (Sec 3.3, 3.9 – 3.15, 3.17, 3.22)

UNITII:Chapter 11 (Sec 11.2, 11.5 – 11.9, 11.11 – 11.13)

UNITIII:Chapter 10 (Sec 10.1 – 10.9)

UNITIV:Chapter 6 (Sec6.1 – 6.10, 6.12)

UNIT V:Chapter 8 (Sec 8.1 – 8.8)

### References

1. Mechanics (Vector Treatment),P.Duraipandiyan, S . Chand & Co., June 1997 Edition.
2. Dynamics, A. V. Dharmapadham, S. Viswanathan Publishers, 1981

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
VI	S6M13	Analytic Number Theory	5	4	Tamil and English

**UNIT I:** The Fundamental Theorem of Arithmetic: Introduction – Divisibility – Greatest common divisor – Prime numbers – The Euclidean algorithm – The greatest common divisor of more than two numbers.

**UNIT II:** Arithmetical Functions and Dirichlet Multiplication: Introduction – The Mobius function  $\mu(n)$  – The Euler totient function  $\phi(n)$  – Multiplicative functions.

**UNIT III:** Congruencies: Definition and basic Properties of Congruencies – Residue classes and complete residue systems – Linear congruencies – Reduced residue systems and the Euler – Fermat Theorem – Polynomial congruencies modulo  $p$  - Lagrange's theorem – Applications of Lagrange's theorem – Simultaneous Linear Congruences - The Chinese remainder theorem.

**UNIT IV:** Quadratic Residues and the Quadratic Reciprocity Law: Quadratic residues – Legendre's symbol and its properties – Evaluation of  $(-1/P)$  and  $(2/P)$  – Gauss lemma – The quadratic reciprocity law – Applications of the reciprocity law.

**UNIT V:** Diophantine Equations: The Jacobi symbol – Applications to Diophantine equations – Gauss sums and the quadratic reciprocity law.

### Text Book

Tom M. Apostol, Introduction to Analytic Number Theory, Narosa Publishing House.

UNIT I: Chapter I (Sec 1.1 - 1.5, 1.7 & 1.8)

UNIT II: Chapter II (Sec 2.1 - 2.5 & 2.9)

UNIT III: Chapter V (Sec 5.1 - 5.7)

UNIT IV: Chapter IX (Sec 9.1 - 9.6)

UNIT V: Chapter IX (Sec 9.7 - 9.9)

### Reference

A Course in Number Theory and Cryptography, Neal Koblitz, Springer, Second Edition.

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
VI	S6MEL3A	Graph Theory	4	4	Tamil and English

**UNIT I:** Graphs and Subgraphs: Introduction - The Konigsberg Bridge problem – Definitions and Examples – Degrees – Subgraphs – Isomorphism.

**UNIT II:** Independent sets and coverings – Intersection Graphs and line graphs – matrix representation of graphs – Operations on graphs – Degree sequences – Graphic sequences.

**UNIT III:** Connectedness: Introduction – Walks, Trails and Paths – Connectedness and Components – Blocks- Connectivity.

**UNIT IV:** Eulerian, Hamiltonian Graphs and Trees: Introduction – Eulerian graphs – Hamiltonian graphs – Characterization of Trees.

**UNIT V:** Planarity: Introduction – Definition and Properties- Characterization of planar graphs.

### Text Book

Invitation to Graph theory, S.Arumugam and S.Ramachandran, ScitechPublications(India)Pvt.Ltd.

UNIT I: Chapter 1 (Sec 1.0, 1.1) & Chapter 2 (Sec 2.0 - 2.4)

UNIT II: Chapter 2 (Sec 2.6-2.9)&Chapter 3 (Sec 3.1 - 3.2)

UNIT III: Chapter 4 (Sec 4.0 - 4.4)

UNIT IV: Chapter 5 (Sec 5.0 - 5.2) & Chapter 6 (Sec 6.0 - 6.1)

UNIT V: Chapter 8 (Sec 8.0 - 8.1)

### Reference

Graph Theory, NarsinghDeo, PHI Pvt. Ltd., New Delhi (2002).

### 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)

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
VI	S6MEL3B	Astronomy	4	4	Tamil and English

**UNIT I :**Celestial sphere and diurnal motion – Celestial coordinates – Sidereal time.

**UNIT II:** Morning and evening stars – Circumpolar stars - Zones of earth - Perpetual day - Twilight.

**UNIT III:** Refraction – Laws of refraction – Tangent formula - Horizontal refraction - Geocentric parallax – Horizontal parallax.

**UNIT IV:**Kepler’s laws - Anomalies – Kepler’s equation - Calendar.

**UNIT V:** Moon - Sidereal and synodic months – Elongation – Phase of moon – Eclipses - Umbra and penumbra – Lunar and solar eclipses – Maximum and minimum number of eclipses in a year.

### **Text Book**

S. Kumaravel and SusheelaKumaravel, Astronomy, Prentice-Hall (2000).

UNIT I: Chapter II(Sec39 – 76)

UNIT II: Chapter III (Sec 80 – 83, 87 – 89, 111 – 116)

UNIT III: Chapter IV (Sec 117 – 128), Chapter V (Sec 135 – 144)

UNIT IV: Chapter VI (Sec 146 – 149, 156 – 159), Chapter VII (Sec 175 – 179)

UNIT V: Chapter XII (Sec 229 – 241), Chapter XIII (Sec 256 – 263, 267, 268, 271 – 275)

### **References**

1. W.M. Smart, Textbook on Spherical Astronomy, Cambridge University Press (1999).
2. Barlow, Elementary Mathematical Astronomy, Barlow Prentice-Hall (1983).

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
VI	S6MEL3C	Coding Theory	4	4	Tamil and English

**UNIT I:** Error detection, correction and decoding: Communication channels – Maximum Likelihood decoding.

**UNIT II:** Hamming distance – Nearest neighbour / minimum distance decoding – Distance of a code.

**UNIT III:** Finite Fields: Finite fields – Polynomial rings – Structure of finite fields - Minimal Polynomials.

**UNIT IV:** Linear codes: Vector spaces over finite fields - Linear Codes - Hamming weight – Bases for linear codes.

**UNIT V:** Generator matrix and parity - Check matrix – Equivalence of linear codes – Encoding with a linear code – Decoding of linear codes – Cosets – Nearest neighbour decoding for linear codes – Syndrome decoding.

### Text Book

San Ling and Chaoping Xing, Coding Theory: A first course, Cambridge University Press (2004).

UNIT I: Chapter 2 (Sec 2.1 – 2.2)

UNIT II: Chapter 2 (Sec 2.3 – 2.5)

UNIT III: Chapter 3

UNIT IV: Chapter 4 (Sec 4.1 – 4.4)

UNIT V: Chapter 4 (Sec 4.5 – 4.8)

### References

1. D.G. Hoffman et al, Coding Theory and Cryptography – The Essentials, Marcel Dekker INC., Second Edition, (2000).
2. J.H. Van Lint, Introduction to Coding Theory, Springer, (1998).

### 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)

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
V	S5MELO1	Graph Theory (Non-Major Elective for Physics Major)	4	3	Tamil and English

**UNIT I:** Graphs and Sub-graphs: Introduction-The Konigsberg Bridge problems – Definitions and Examples – Degrees – subgraphs– Isomorphism.

**UNITII:**IndependentSets,Coveringsand Degree Sequences: Independent sets and coverings- Intersection Graphs and Line Graphs - Matrices – Operations on graphs – Degree sequences – Graphic sequences.

**UNIT III:**Connectedness: Introduction – Walks,trails and paths – Connectedness and components – Blocks - Connectivity.

**UNIT IV:**Eulerian, Hamiltonian Graphs and Trees: Introduction – Eulerian graphs – Hamiltonian graphs.

**UNIT V:**Planarity: Introduction – Definition and properties - Characterization of planar graphs – Thickness, Crossing and Outer Planarity.

### Text Book

Invitation to Graph theory, S.Arumugam, S.Ramachandran,  
ScitechPublications(India)Pvt.Ltd

UNIT I:Chapter 1& 2 (Sec1.0 - 2.4)

UNITII:Chapter 2& 3 (Sec 2.7- 2.9, 3.1 & 3.2)

UNITIII:Chapter 4(Sec4.0 - 4.4)

UNITIV:Chapter 5(Sec 5.0 - 5.2,)

UNIT V:Chapter 8(Sec 8.0- 8.3)

### Reference

Graph Theory, NarsinghDeo, PHI Pvt. Ltd., New Delhi (2002).

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours / Week	No. of Credits	Medium of Instruction
VI	S6MELO2	Mathematics for Chemists (Non-Major Elective for Chemistry Major)	4	3	Tamil and English

**UNIT I:** Transportation Problems: Introduction – Finding initial Basic feasible solution North West Corner Rule, Least Cost Method, Vogel’s Approximation Method – simple problems.

**UNIT II:** Assignment Problems: Introduction – Hungarian Algorithm – problems - Travelling salesman problem.

**UNIT III:** Critical Path Method (CPM): Introduction – Network and Basic components – Rules of Network construction – Time calculations in network – Critical Path Method.

**UNIT IV:** Correlation and Regression: Properties – Rank correlation- Regression lines- properties – simple problems.

**UNIT V:** Finite Differences: Forward Differences, Backward Differences - Newton’s Formula for Interpolation - Lagrange’s Interpolation Formula – Simple Problems

### Text Books

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

Unit I: Chapter: 10 (Sec 10.1 & 10.2, 10.8 - 10.10 )

Unit II: Chapter 11 (Sect 11.1 - 11.3 & 11.7)

Unit III: Chapter 25 (Sec 25.1 – 25.7)

2. Fundamentals of Mathematics Statistics, S.C. Gupta and V.K. Kapoor, Sultan Chand, Eleventh Edition (2010).

Unit IV: Chapter 10 (Sec 10.4 , 10.7) & Chapter 11 (Sec 11.2, 11.2.1-11.2.3)

3. Introductory Methods of Numerical Analysis, S.S. Sastry, Prentice Hall of India Pvt. Ltd., New Delhi, Third edition (2010)

Unit V: Chapter 3 (Sec 3.3, 3.3.1, 3.3.2, 3.6, 3.9, 3.9.1)

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
I	S1ASM1	Differential Calculus, Differential Equations and Algebra (Allied Paper For Statistics Major)	4	4	English

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

**UNIT II:** Ordinary Differential Equations: Particular integral of second order Differential Equations with constant coefficients.

**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.

### Text Books

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

UNIT I: Chapter 3 ( Full)

2. Calculus (Volume III), S. Narayanan and T. K. Manickavachagom Pillay, S. Viswanathan PVT. LTD, (2004).

UNIT II: Chapter 2 (Sec 1 – 4)

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

UNIT III: Chapter 3 (Sec 10&14) & Chapter 4 (Sec 2& 3)

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

UNIT IV: Chapter 2 (Sec 6.1 – 6.3, 9.1)

UNIT V: Chapter 2 (Sec 16, 16.3)

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
II	S2ASM2	Vector Calculus, Laplace Transforms and Fourier Series (Allied Paper For Statistics Major)	4	4	English

**UNIT 1:** 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:** Laplace Transforms: Properties – Simple problems - Inverse Laplace Transforms- Problems –Solution of Ordinary Differential Equations using Laplace Transforms.

**UNIT IV:** Fourier series- Definition - Fourier Series expansion of periodic functions with Period  $2\pi$ – Use of Odd and Even functions in Fourier Series.

**UNIT V:** Half range Fourier Cosine Series – definition and problems – Half range Fourier Sine series – Definition and problems.

### Text Books

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. Calculus (Volume III), S. Narayanan and T. K. Manickavachagom Pillay, S. Viswanathan PVT. LTD, (2004).

UNIT III: Chapter 5 (Sec 1, 2, 4 - 9)

UNIT IV: Chapter 6 (Sec 1 - 3)

UNIT V: Chapter 6 (Sec 4, 5)

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
I & II	S2ASM3	Integral Calculus, Analytical Geometry 3D (Allied Paper For Statistics Major)	3	4	English

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

**UNIT II:**Multiple integrals: 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 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.

**Text Book:**

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

UNIT I: Chapter 2 (Sec 11& 12)

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

2. Analytical geometry (Three Dimensions), T. K. ManickavachagomPillay and T. Natarajan, S. ViswanathanPVT. LTD, (2006).

UNIT III: Chapter 2 (Sec 1 – 9)

UNITIV:Chapter 3 (Sec 1 – 4, 7& 8)

UNIT V:Chapter 4 (Sec 1 – 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 question from each unit)

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

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours / Week	No. of Credits	Medium of Instruction
I	S1AM1	Differential Calculus and Algebra (Allied Paper For Physics and Chemistry Major)	4	4	Tamil and English

**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 – Evolute.

**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.

#### **Text Books**

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

UNIT I: Chapter 3 (Full)

UNIT II: Chapter 10 (Sec 2.1 – 2.6)

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

UNIT III: Chapter 3 (Sec 10,14) & Chapter 4 (Sec 2, 3)

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

UNIT IV: Chapter 2 (Sec 6.1 – 6.3, 9.1)

UNIT V: Chapter 2 (Sec 16, 16.3)

#### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
II	S2AM2	Vector Calculus and Analytical Geometry 3D (Allied Paper For Physics and Chemistry Major)	4	4	Tamil and English

**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 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.

### Text Books

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. 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)

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
I & II	S2AM3	Integral Calculus, Differential Equations, Laplace Transforms and Fourier Series (Allied Paper For Physics and Chemistry Major)	3	4	Tamil and English

**UNIT I:** Definite integrals: Properties – problems - Integration by parts – problems. Multiple integrals: Double integrals – Simple problems (Change the order of integration excluded) – Triple integrals - Simple problems.

**UNIT II:** Ordinary Differential Equations: Particular integral of second order Differential Equations with constant coefficients.

**UNIT III:** Laplace Transforms: Properties – Simple problems - Inverse Laplace Transforms- Problems – Solution of Ordinary Differential Equations using Laplace Transforms.

**UNIT IV:** Fourier series- Definition - Fourier Series expansion of periodic functions with Period  $2\pi$ – Use of Odd and Even functions in Fourier Series.

**UNIT V:** Half range Fourier Cosine Series – definition and problems – Half range Fourier Sine series – Definition and problems.

### Text Books

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

UNIT I: Chapter 2 (Sec 11, 12) & Chapter 5 (Sec 1, 2.1, 2.2, 4)

2. Calculus (Volume III), S. Narayanan and T. K. Manickavachagom Pillay, S. Viswanathan PVT. LTD, (2004).

UNIT II: Chapter 2 (Sec 1 – 4)

UNIT III: Chapter 5 (Sec 1, 2, 4 - 9)

UNIT IV: Chapter 6 (Sec 1 - 3)

UNIT V: Chapter 6 (Sec 4, 5)

### 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
I	S1ACSM1	Numerical Methods and Operations Research (Allied Paper for Computer Science Major)	4	4	English

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

**UNIT II:** Numerical differentiation: Computing first and second derivatives - Numerical integration: Trapezoidal rule - Simpson's 1/3 and 3/8 rules.

**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.

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

**UNIT V:** Transportation Problems: Introduction - Finding initial Basic feasible solution (North West Corner Rule, Least Cost Method, Vogel's Approximation Method) - Optimal solution (Modified Distribution Method) - Degeneracy in Transportation Problems.

**Text Book:**

1. Introductory Methods of Numerical Analysis, S.S. Sastry, Prentice Hall of India Pvt. Ltd, New Delhi, Third Edition (2003).

UNIT I: Chapter 2 (Sec 2.2 - 2.5)

UNIT II: Chapter 5 (Sec 5.2, 5.4(5.4.1 - 5.4.3))

UNIT III: Chapter 6 (Sec 6.3.2, 6.4) & Chapter VII (Sec 7.2- 7.4)

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

UNIT IV: Chapter 2 (Sec 2.1- 2.4) & Chapter 3 (Sec 3.1 & 3.2) Chapter 11 (Sec 11.1, 11.2, 11.3, 11.7)

UNIT V: Chapter: 10 (Sec 10.1, 10.2, 10.8, 10.9, 10.10, 10.12, 10.13)

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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
II	S2ACSM2	Integral Calculus, Vector Calculus, Laplace Transforms and Fourier Series (Allied Paper For Computer Science Major)	4	4	English

**UNIT I:**Definite integrals: Properties – problems - Integration by parts – Problems. Multiple integrals: Double integrals – Simple problems (Change the order of integration excluded) – Triple integrals - Simple problems.

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

**UNIT IV:**Laplace Transforms: Properties – Simple problems - 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  $2\pi$ .

### Text Books

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

UNIT I: Chapter 2 (Sec 11, 12)& Chapter 5 (Sec 1, 2.1, 2.2, 4)

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

UNIT II: Chapter 4 (Sec 1, 2, 6 – 10)

UNIT III: Chapter 6 (Sec 6& 9)

3. Calculus (Volume III), S. Narayanan and T. K. Manickavachagom Pillay, S. Viswanathan PVT. LTD, (2004).

UNIT IV: Chapter 5 (Sec 1,2,4 - 9)

UNIT V:Chapter 6 (Sec 1 - 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)

Signature of the HOD

Semester	Subject Code	Title of the Paper	Hours/ Week	No. of Credits	Medium of Instruction
I & II	S2ACSM3	Probability and Statistics (Allied Paper For Computer Science Major)	3	4	English

**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.

**UNIT IV:**Binomial Distribution – Moments – Moment generating function – Poisson Distribution – Moments – Moment generating function – Normal Distribution - Moment generating function.

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

### **Text Book**

Fundamentals of Mathematics Statistics, S.C. Gupta and V.K. Kapoor, Sultan Chand, Eleventh Edition (2010).

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 (Sec 7.1)

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)

Signature of the HOD