

**RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS),  
THANJAVUR-5**

**PG AND RESEARCH DEPARTMENT OF MATHEMATICS**

**Minutes of the Board of Studies Meeting**

**Date: 05.01.2021**

**Time: 2:00 PM**

**Venue: Room No.:62, Staff Room, Department of Mathematics**

**Resolutions Passed**

The committee completely revised syllabus for UG, PG and M.Phil., Mathematics courses and passed the following resolutions.

1. To rectify the new theory paper entitled “Advanced Mathematics” instead of the theory paper “Stochastic processes and Graph Theory” for M.Phil., Students from 2018-19 onwards.
2. To rectify the revised syllabus of the Non-Major Elective Theory paper entitled “Graph Theory” for III year B.Sc., physics students as specified in the enclosure.
3. Resolved to follow the content of the remaining papers as it is.

**MEMBERS PRESENT**

1. Dr. S. CHANDRASEKARAN (University Representative)
2. Dr. C. DURAIRAJAN (Subject Expert)
3. Dr. Ke. SATHAPPAN (Subject Expert)
4. Dr. G. NIRMALA (Alumini)



**Dr.S.Chandrasekaran**  
Associate Professor and Head  
PG & Research Department of Mathematics  
Research Advisor(9606/Maths/R.A/9.5.12/Bharathidasan)  
Khadir Mohideen College, Adirampattinam-614 701

5. Dr. A. SAIVARAJAN (Chairman)
6. Prof. V. RAJAM Assistant Professor
7. Dr. K. ELANGO VAN Assistant Professor
8. Dr. P.GOMATHISUNDARI Assistant Professor
9. Prof. K. RATHIKA Assistant Professor
10. Prof. SUGANTHI MARIYAPPAN Assistant Professor
11. Dr. N. RAJESH Assistant Professor
12. Prof. K.S.KRISHNA MOHAN Assistant Professor
13. Dr. K. MUTHU GURU PAKKIAM Assistant Professor
14. Dr. B. MOHAMED HARIF Assistant Professor
15. Dr. P. SENTHIL KUMAR Assistant Professor
16. Dr. R. THANGAPPAN Assistant Professor
17. Dr. S. SHANMUGA PRIYA Assistant Professor
18. Dr. S. ANBALAGAN Assistant Professor

*Sanjay 05/10/2021*

*5/11/21*

*P. G. S. Sundari*

*G. H. Rajan*

*5/11/21*

*K. M. G. Pakkiam*

*(Signature)*

*5/11/21*

*5-11-21*

*05/10/21*

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 1:** Theory of equations: Imaginary roots occur in pairs – Irrational roots occur in pairs - Relation between the roots and coefficients – Symmetric functions – Sum of the  $r^{th}$  powers of the roots.

**UNIT II:** Transformation of equations –Diminishing, increasing, multiplying the roots - forming the equations with the given roots.

**UNIT III:** Reciprocal equations - Descartes rule of signs.

**UNIT IV:** Binomial and Exponential series: Summation and approximation of the series.

**UNIT V:** Logarithmic series: Summation and approximation of the series.

### Text Book

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

Unit I: Chapter 6 (Sec 9 - 14)

Unit II: Chapter 6 (Sec 15, 17, 18, 20)

Unit III: Chapter 6 (Sec 16, 24)

Unit IV: Chapter 3 (Sec 10, 14) & Chapter 4 (Sec 2, 3)

Unit V: Chapter 4 (Sec 5 - 9)

### 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)

### 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
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 – 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.

### Text books

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

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)

### 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 and four standard types – Lagranges 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 - Picards method 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. Numerical solution of Partial Differential Equations: Finite Difference Approximations to Derivatives- Laplace's Equation-Jacobi's Method , Gauss-Seidel Method, successive over relaxation method- Alternating Direction Implicit 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)

Unit II: 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 VII (Sec 7.2 - 7.4)

Unit V: Chapter 7 (Sec 7.5, 7.6) & Chapter VIII (Sec 8.2, 8.3)

### Reference

Numerical Methods, P.Kandasamy, K.Thilagavathy and K.Gunavathy, 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	Absrtact 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 and Equilibrium: Forces – Resultant of two forces – Three forces related to a triangle – Equilibrium of a particle under three or more forces.

**UNIT II:** Forces on a rigid body: Moment – Equivalent Systems of forces – Parallel forces – Varignon's Theorem – Forces along a Triangle – Couples: Equilibrium of a rigid body under three coplanar forces – Reduction of coplanar forces into a force and a couple.

**UNIT III:** Friction: Laws of Friction – Coefficient of Friction - Angle and Cone of Friction – Limiting equilibrium of a particle on a rough inclined plane - Tilting of a body – Simple Problems.

**UNIT IV:** Virtual Work: Principles of Virtual Work – Applied to a body or a system of bodies in equilibrium – Equation of Virtual Work – Simple Problems.

**UNIT V:** Strings: Equilibrium of Strings under gravity – Common Catenary – Suspension bridge.

### Text Book

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

Unit I: Chapter 2 & Chapter 3 (Sec 3.1)

Unit II: Chapter 4 (Sec 4.1 , 4.3 – 4.9) & Chapter 5 (Sec 5.1)

Unit III: Chapter 2 (Sec 2.1) , Chapter 3 (Sec 3.2) & Chapter 5 (Sec 5.2)

Unit IV: Chapter 8

Unit V: Chapter 9

### Reference

Statics, M. K. Venkataraman, Agasthiyar Publications, 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
V	S5MEL1A	Fundamentals of Programming in C	5	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)

Unit II: 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)

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

Unit IV: 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	RR5MEL2B	Discrete Mathematics	4	4	Tamil and English

**UNIT I:** Mathematical Logic: Introduction – Statements and Notations – Connectives – Logical capabilities of programming languages – Conditional and Biconditional – 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**

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

Unit I: Page no. 1 to 30

Unit II: Page no. 31 to 40 & 50 to 60

Unit III: Page no. 65 to 85

Unit IV: Page no. 86 to 103

Unit V: Page no. 192 to 204 & 232 to 241

### **Reference**

Elements of Discrete Mathematics, C.L.Liu, 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
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 – Fixed points 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**

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

Unit I: Chapter 2 (Sec 2.1 - 2.8)

Unit II: Chapter 3 (Sec 3.1 - 3.5)

Unit III: Chapter 6 (Sec 6.1 - 6.4)

Unit IV: Chapter 7 (Sec 7.1 - 7.3)

Unit V : Chapters 7 and 8 (Sec 7.4 , 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	4	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 – Hungarian Algorithm – 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)

Unit II: Chapter: 10(Sec 10.1, 10.2, 10.8, 10.9, 10.10, 10.12, 10.13) & Chapter 11 (Sect 11.1, 11.2, 11.3, 11.7)

Unit III: Chapter 25(Sec 25.1 – 25.8)

Unit IV: Chapter 12 (Sec 12.1 – 12.6)

Unit V: Chapter 18 (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	4	Tamil and English

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

**UNIT II:** Central Orbit: Radial and transverse components of velocity and acceleration – Central force – differential equation to a central orbit in polar co-ordinates – pedal equations – Given the central orbit , to find the law of force – Related problems .

**UNIT III:** Simple Harmonic motion : Amplitude and periodic time – Composition of two simple harmonic motions - Load suspended by a 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 (Sections 3.3, 3.9 – 3.15, 3.17, 3.22)

Unit II: Chapter 11 (Sections 11.2, 11.5 – 11.9, 11.11 – 11.13)

Unit III: Chapter 10 (Sections 10.1 – 10.9)

Unit IV: Chapter 6 (Sections 6.1 – 6.10, 6.12)

Unit V: Chapter 8 (Sections 8.1 – 8.8)

### References

1. Mechanics (Vector Treatment), P.Duraipandiyar, 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	S6MEL3C	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

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

Unit I: Chapter I: 1.1 to 1.5, 1.7, 1.8

Unit II: Chapter II: 2.1 to 2.5, 2.9

Unit III: Chapter V: 5.1 to 5.7

Unit IV: Chapter IX: 9.1 to 9.6

Unit V: Chapter IX: 9.7, 9.8, 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, Scitech Publications(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, Narsingh Deo, 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

# SYLLABUS

for

## NONMAJOR ELECTIVE PAPERS

(PHYSICS & CHEMISTRY MAJOR)

(For students admitted from 2018-2019 onwards)

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	4	Tamil and English

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

Signature of the HOD

**UNIT II:** Independent Sets and Coverings – Intersection Graphs and Line Graphs – Matrices – Operations on Graphs.

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

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

**UNIT V:** Trees: Introduction – Characterisation of Trees – Planarity: Introduction – definition and properties.

### Text Book

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

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

Unit II: Chapter – 2 sec:(2.6 to 2.9)

Unit III: Chapter – 4 Sec:(4.0 to 4.2, 4.4)

Unit IV: Chapter 5 Sec:(5.0 to 5.2,)

Unit V: Chapter : 6 and 8 Sec:(6.0 to 6.2) Sec:(8.0 to 8.1)

### Reference

Graph Theory, Narsingh Deo, 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	S6MELO2	Numerical Methods (Non-Major Elective for Chemistry Major)	4	4	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.

Signature of the HOD

**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 Book**

1. Operations Research, Kantiswarup, P.K. Gupta, Man Mohan Sultan Chand & Sons Educational Publishers New Delhi (2007).
2. Fundamentals of Mathematics Statistics, S.C. Gupta and V.K. Kapoor, Sultan Chand, Eleventh Edition (2010).
3. Introductory Methods of Numerical Analysis, S.S. Sastry, Prentice Hall of India Pvt. Ltd, New Delhi, Third Edition (2003).

Unit I: Chapter: 10(Sec 10.1, 10.2, 10.8, 10.9, 10.10 )

Unit II : Chapter 11 (Sect 11.1, 11.2, 11.3, 11.7)

Unit III: Chapter 25 (Sec 25.1 – 25.7)

Unit IV: Chapter 10 (Sec 10.4 , 10.7)

Chapter 11 (Sec 11.2 , 11.2.1 ,11.2.2, 11.2.3)

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)

# SYLLABUS

for

## ALLIED MATHEMATICS PAPERS

(PHYSICS, CHEMISTRY, STATISTICS & COMPUTER  
SCIENCE MAJOR)

(For students admitted from 2018-2019 onwards)

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	RR2ASM2	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	RR2ASM3	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 books

1. Calculus (Volume II), S. Narayanan and T. K. Manickavachagom Pillay, 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. 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	RR1AM1	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)

Semester	Subject Code	Title of the Paper	Hours/Week	No. of Credits	Medium of Instruction
II	RR2AM2	Vector Calculus and Analytical Geometry 3D (Allied Paper For Physics and Chemistry Major)	4	4	Tamil and 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:** 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 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)

Signature of the HOD

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
I & II	RR2AM3	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	RR1ACSM1	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 and 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 Books

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 (Sect 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	RR2ACSM2	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	RR2ACSM3	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 – Mean and Variance – Moment generating function – Poisson Distribution – Mean and Variance – Moment generating function – Limiting case of Binomial Distribution – Normal Distribution – Mean and Variance – 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 8.4.1, 8.4.6, 8.4.7, 8.5, 8.5.2, 8.5.5) & Chapter 9 (Sec 9.2.5)

Unit V: Chapter 10 (Sec 10.4, 10.7) & Chapter 11 (Sec 11.2, 11.2.1, 11.2.2, 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