# GOVERNMENT ARTS COLLEGE (AUTONOMOUS)
## COIMBATORE-641 018
## POST GRADUATE AND RESEARCH DEPARTMENT OF MATHEMATICS
## BS.c., MATHEMATICS
## SCHEME OF EXAMINATION (2015 – 2016 ONWARDS)

| Sem | Part | Subject | Hours | Exam (Hrs) | SE | CA | Total | SE- Min | TPM | No. of Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| I | I | Tamil Paper-I | 6 | 3 | 75 | 25 | 100 | 30 | 40 | 3 |
| | II | English Paper I | 6 | 3 | 75 | 25 | 100 | 30 | 40 | 3 |
| | III | Core-I: Basic Mathematics-I | 8 | 3 | 75 | 25 | 100 | 30 | 40 | 5 |
| | | Allied-I: Numerical Analysis | 8 | 3 | 75 | 25 | 100 | 30 | 40 | 5 |
| | IV | Environmental Studies | 2 | 3 | 75 | 25 | 100 | 30 | 40 | 2 |
| II | I | Tamil Paper-II | 6 | 3 | 75 | 25 | 100 | 30 | 40 | 3 |
| | II | English Paper II | 6 | 3 | 75 | 25 | 100 | 30 | 40 | 3 |
| | III | Core-II: Basic Mathematics-II | 8 | 3 | 75 | 25 | 100 | 30 | 40 | 5 |
| | | Allied-II: Discrete Mathematical Structure | 8 | 3 | 75 | 25 | 100 | 30 | 40 | 5 |
| | IV | Value Education | 2 | 3 | 75 | 25 | 100 | 30 | 40 | 2 |
| III | I | Tamil Paper-III | 6 | 3 | 75 | 25 | 100 | 30 | 40 | 3 |
| | II | English Paper III | 6 | 3 | 75 | 25 | 100 | 30 | 40 | 3 |
| | III | Core-III: Basic Mathematics-III | 6 | 3 | 75 | 25 | 100 | 30 | 40 | 5 |
| | | Allied-III: Physics-I(Theory) | 6 | 3 | 60 | 15 | 75 | 24 | 30 | 3 |
| | | Allied-III: Physics-I(Practical) | 2 | | | | | | | |
| | IV | Skill Based Elective-I: Optimization Techniques-I | 4 | 3 | 75 | 25 | 100 | 30 | 40 | 3 |
| IV | I | Tamil Paper-IV | 6 | 3 | 75 | 25 | 100 | 30 | 40 | 3 |
| | II | English Paper IV | 6 | 3 | 75 | 25 | 100 | 30 | 40 | 3 |
| | III | Core-IV: Abstract Algebra | 6 | 3 | 75 | 25 | 100 | 30 | 40 | 5 |
| | | Allied-IV: Physics-II(Theory) | 6 | 3 | 60 | 15 | 75 | 24 | 30 | 3 |
| | | Allied-IV: Physics-II(Practical) | 2 | 3 | 30 | 20 | 50 | 12 | 20 | 4 |
| | IV | Skill Based Elective-II: Optimization Technique-II | 4 | 3 | 75 | 25 | 100 | 30 | 40 | 3 |
| | V | Extension Activities NSS/NCC/YRC/P. ED | | | | | | | | 1 |
| | III | Core-V: Linear Algebra | 6 | 3 | 75 | 25 | 100 | 30 | 40 | 5 |
| | III | Core-VI: Real Analysis-I | 5 | 3 | 75 | 25 | 100 | 30 | 40 | 5 |
| | III | Core-VII: Statics | 5 | 3 | 75 | 25 | 100 | 30 | 40 | 5 |

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| V | III | Core-VIII: Mathematical Statistics-I | 5 | 3 | 75 | 25 | 100 | 30 | 40 | 5 |
| | IV | Skill Based Elective III: C Programming | 4 | 3 | 75 | 25 | 100 | 30 | 40 | 3 |
| | | Non-Major Elective-I: Arithmetic for All-I | 3 | 3 | 75 | 25 | 100 | 30 | 40 | 2 |
| | | **PROJECT** | 2 | | | | | | | |
| VI | III | Core- IX: Real Analysis-II | 6 | 3 | 75 | 25 | 100 | 30 | 40 | 5 |
| | | Core- X: Dynamics | 5 | 3 | 75 | 25 | 100 | 30 | 40 | 5 |
| | | Core- XI: Complex Analysis | 5 | 3 | 75 | 25 | 100 | 30 | 40 | 5 |
| | | Core- XII: Mathematical Statistics-II | 5 | 3 | 75 | 25 | 100 | 30 | 40 | 5 |
| | IV | Skill Based Elective-IV: LATEX | 4 | 3 | 75 | 25 | 100 | 30 | 40 | 3 |
| | | Non-Major Elective-II: Arithmetic for All-II | 3 | 3 | 75 | 25 | 100 | 30 | 40 | 2 |
| | | **PROJECT** | **2** | | | | | | | **15** |

**TOTAL CREDITS: 140**

Sem: SEMESTER                   Exam (Hrs): EXAMINATION (HOURS)

SE: SEMESTER EXAMINATION                CA: CONTINUOUS ASSESSMENT

SE-Min: SEMESTER EXAMINATION MINIMUM

TPM:  TOTAL PASSING MINIMUM

**SEMESTER I**                                                **CORE PAPER I**

<div align="center">

**Subject Code:**

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# BASIC MATHEMATICS – I

## UNIT I

**Theory of Equations:** Imaginary roots - Irrational roots –- Relations between the roots and coefficients of equations – Symmetric functions of the roots – Reciprocal equations - Transformation in general - Multiple roots.

(Chapter 6 : Sections : 9, 10, 11, 12, 16, 21, 26 )

## UNIT II

**Differential Calculus:** Leibnitz formula on successive differentiation – Problems.

**Curvature:** Radius of curvature in Cartesian and polar coordinates – Pedal equations – Evolutes - involutes – problems.

(Chapter 3 : Sections : 2.1 ;  Chapter 10 : Sections : 2.1 to 2.7 )

## UNIT III

**Multiple Integrals:**

Double integral :  – Definition – Evaluation - Double integral in polar coordinates.

Triple integral.

Jacobians – Two important results regarding Jacobians – Change of variables in case of two variables - Change of variables in case of three variables - Transformations from Cartesian to polar coordinates - Transformations from Cartesian to spherical coordinates - problems.

(Chapter 5 : Sections : 2.1 2.2, 3.1,  4 ;  Chapter 6 : Sections : 1.1, 1.2,  2.1 to 2.4 )

## UNIT IV

**Beta – Gamma Functions:** Definition – Recurrence formula for Gamma functions - Properties of beta functions - Relation between beta and gamma functions – Various deductions – problems.

(Chapter 7 : Sections : 2.1, 2.3 , 3 ,4, 5 )

## UNIT V

**Trigonometry:** Expansion of $\cos n\theta$, $\sin n\theta$, $\tan n\theta$, $\sin^n \theta$, $\cos^n \theta$ - Expansion of $\cos n\theta$, $\sin n\theta$ in powers of $\theta$ - Limit problems – Hyperbolic and inverse hyperbolic functions – Logarithm of complex numbers.

(Chapter 3 : Sections : 1, 2, 3, 4, 5 ; Chapter 4 ( Full Chapter ) ; Chapter 5 : Section 5 )

### TEXT BOOKS:

1. **ALGEBRA – Volume I**, T. K. Manicavachagom Pillay and others, S. Viswanathan Printers and Publisher Private Limited, 2008.
2. **CALCULUS – VOLUME I**, T. K. Manicavachagom Pillay and Others, S. Viswanathan Printers and Publisher Private Limited, 2009.
3. **CALCULUS – VOLUME II**, T. K. Manicavachagom Pillay and Others, S. Viswanathan Printers and Publisher Private Limited, 2008.
4. **TRIGONOMETRY**, S. Narayanan and Others, S. Viswanathan Printers and Publisher Private Limited, 1994.

### REFERENCE BOOKS:

1. **DIFFERENTIAL CALCULUS**, Shanthi Narayanan, Shayambal Charitable Trust, 1987.
2. **INTEGRAL CALCULUS**, Shanthi Narayanan, S. Chand and Company, 1987.

**SEMESTER I**                                      **ALLIED PAPER I**

                                                    **Subject Code:**

# NUMERICAL ANALYSIS

## UNIT I

**Solution of transcendental equations and algebraic equations:** Bisection method – Iteration method – Newton Raphson method.

**Solution of simultaneous linear algebraic equations:** Gauss elimination and Gauss Jordan methods – Gauss Jacobi and Gauss Seidal methods.

(Chapter 3: Sections :  2, 3,  5 ; Chapter 4: Sections : 2,  6)

## UNIT II

**Finite difference operators:** Operators $\Delta$, $\nabla$, $\delta$, $\mu$ and $E$  - Properties of these operators and relation between them.

**Interpolation (for equal intervals):** Newton's forward and Newton's backward interpolation formulae.

(Chapter 5: Sections : 2 to 8,  10, 14, 15, 16, 18 ; Chapter 6 : Sections : 1,3,4)

## UNIT III

**Central difference interpolation formulae:** Gauss's forward interpolation formula, Gauss's backward interpolation formula, Stirling's interpolation formula and Bessel's interpolation formula.

(Chapter 7: Sections : 1 – 6)

## UNIT IV

**Interpolation (for unequal intervals):** Divided difference operator – Properties of these operators – Newton's divided difference formula – Lagrange's formula and inverse interpolation.

(Chapter 8: Sections : 1 – 4, 9)

## UNIT V

**Numerical Differentiation:** Newton's forward difference formula and backward difference formula to compute the derivative – Derivative using Stirling's formula.

**Numerical Integration:** Trapezoidal rule – Simpson's one third and three eighth rule.

(Chapter 9: Sections : 1 – 4, 7, 8, 10)

## TEXT BOOK:

**NUMERICAL METHODS IN SCIENCE AND ENGINEERING**, M. K. Venkatraman, The National Publishing Company, Second Edition(revised), 1987.

## REFERENCE BOOKS:

1. **NUMERICAL METHODS**, P. Kandasamy, K. Thilagavathy and K. Gunavathy, "Numerical Methods", S. Chand and Company Limited, New Delhi, Revised Edition 2005.

2. **INTRODUCTORY METHODS OF NUMERICAL ANALYSIS**, S. S. Sastry, Prentice Hall Publishing India Private Limited, New Delhi, Third Edition, 2003.

**SEMESTER II**                                          **CORE PAPER II**

# BASIC MATHEMATICS – II

## UNIT I

**Polar Equations and Sphere:** Polar equations of a conic – Equation of chord, tangent and normal – Simple problems – Standard equation of a sphere – Results based on the properties of a sphere – Tangent plane to a sphere – Equation of a circle – Equations $S + \lambda P = 0$ and $S + \lambda S' = 0$ - Problems.

(Chapter 9 : Sections : 99 to 102 ;  Chapter 5 : Sections : 5.2, to 5.4, 5.6, 5.7 )

## UNIT II

**Cone and Cylinder:** Equation of a cone – Cone whose vertex is at the origin – Quadric cone with vertex at the origin – Equation of a cylinder – Right circular cylinder – Problems.

(Chapter 6 : Sections : 6.2 to 6.4, 6.6, 6.7)

## UNIT III

**Vector Calculus:** Differentiation of vector function – Vector differential operator – Gradient – Divergence - Curl identities.

(Chapter 5( Full chapter ) ; Chapter 7 : Sections : 7.4, 7.7 )

## UNIT IV

**Vector Calculus:** Line, surface and volume integrals – Green's theorem – Stokes theorem and Gauss Divergence theorem – Problems.

(Chapter 8( Full chapter )  ; Chapter 9 : Sections : 9.2, 9.6,  9.7 )

## UNIT V

**Laplace Transforms:** Laplace transforms of standard functions – Some general theorems – Inverse Laplace transform – Application to first order and second order differential equations with constant and variables coefficients and simultaneous linear differential equation – Problems.

(Chapter 5 : Sections : 1,2,4,6,8,9,10)

## TEXT BOOKS:

1. **ANALYTICAL GEOMETRY OF TWO DIMENSIONS**, T. K. Manicavachagom Pillay and Others, S. Viswanathan Publishers, 2007. ( For unit I )

2. **ANALYTICAL GEOMETRY OF THREE DIMENSIONS**, P. Duraipandian and Laxmi Duraipandian, Emerald Publishers, Reprint 1995. ( For unit I , II )

3. **VECTOR ANALYSIS**, P. Duraipandian and Laxmi Duraipandian, Emerald Publishers. ( For units III , IV)
4. **CALCULUS VOLUME III**, T. K. Manicavachagom Pillay and Others, S. Viswanathan Publishers, 2007. ( For unit V )

| SEMESTER II | ALLIED PAPER II |
|---|---|

**Subject Code:**

# DISCRETE MATHEMATICAL STRUCTURES

## UNIT I

**Mathematical Logic:** Connectives – Negation – Conjunction – Disjunction – Conditional and Biconditional – Well-formed Formulas – Tautologies – Equivalence of Formulas – Duality law – Tautological implication – Functionally Complete set of Connectives – Other Connectives – Normal forms – Disjunctive and Conjunctive normal forms – Principal Disjunctive and Principal Conjunctive normal forms.

(Chapter 1: Sections : 1.1 to 1.3)

## UNIT II

**Theory of inference and predicate calculus:** Rules of Inference – Consistency of Premises and Indirect Method of Proof – The Predicate Calculus – Predicates, The Statement functions, Variables and Quantifiers – Free and Bound Variables, Inference Theory of the Predicate Calculus.

(Chapter 1: Sections : 1.4 to 1.6)

## UNIT III

**Graph Theory:** Basic definitions-degree of vertex-some special simple graphs-Matrix represcentation of graphs-Trees-Spannaing trees- Minimum spanning trees-Rooted and Binary trees-Binary tree- Tree Traversal – Expression Trees – Problems

(Chapter 7)

## UNIT IV

**Lattices:** Lattices as partially ordered sets – Definition and Examples – Some Properties of Lattices – Lattices as Algebraic Systems – Sub Lattices, Direct Product and Homomorphism – Some Special Lattices.

(Chapter 4: Sections : 4.1)

## UNIT V

**Formal Languages and Automata:** Phrase-Structure Grammear- Types of Phrase Structure Grammar- Backus – Naur Form- Finite state machine-input and output strings for FSM – Finite state Automata- Problems

(Chapter 8)

## TEXT BOOKS:

1. **DISCRETE MATHEMATICAL STRUCTURES WITH APPLICATIONS TO COMPUTER SCIENCE**, J. P. Tremblay, R. Manohar, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1997. (Units I,II,IV)

2. **DISCRETE MATHEMATICS WITH GRAPH THEORY AND COMBINATORICS**, T. Veerarajan, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2007. (Units III, V)

**SEMESTER III**                                            **CORE PAPER III**

# BASIC MATHEMATICS – III

## UNIT I

**Ordinary Differential Equations:** Exact differential equations – Equations of the first order, but of higher degree – Equations reducible to the linear homogeneous equation – simultaneous differential equations – Problems.

(Chapter 1: Sections: 3.1 – 3.3, 4, 5, 6.1, 6.2 and 7.1 – 7.3; Chapter 2: Section 9; Chapter 3: Sections: 1 – 4)

## UNIT II

**Partial Differential Equations:** Formation of PDE – Four standard types – Lagrange's equation – Charpit's method (only problems) – Problems.

(Chapter 4: Sections: 1 – 7)

## UNIT III

**Special Function:** Bessel functions – Bessel's differential equation-Recurrence formula – Problems.

(Chapter 7: Sections: 3, 3.1, 4-7)

## UNIT IV

**Fourier series:** Expansion of periodic functions of period $2\pi$ - Expansion of even and odd functions – Half range sine and cosine series – Problems.

(Chapter 6: Sections: 1 , 2, 3, 4, 5.1, 5.2 )

## UNIT V

**Fourier Transforms:** Complex Fourier Transforms and its inversion formula – Fourier sine transforms – Fourier cosine transforms – Properties of Fourier transforms – Simple problems – Convolution theorem for Fourier transforms – Parseval's identity – Simple problems.

(Chapter 6: Sections: 9.2, 10, 11.1, 11.2, 12, 13, 14, 14.1, 15)

## TEXT BOOK:

**CALCULUS VOLUME III**, S. Narayanan and T. K. Manicavachagom Pillai, S. Viswanathan Printers and Publisher Private Limited, 2007.

## REFERENCE BOOKS:

1. **DIFFERENTIAL EQUATION**, S. Narayanan and T. K. Manicavachagom Pillai, S. Viswanathan Printers and Publisher Private Limited.
2. **SPECIAL FUNCTION WITH APPLICATION**, A. Saran, S. D. Sharm and T. N. Trivedi.
3. **ENGINEERING MATHEMATICS**, A. Singaravelu, Meenakshi Agencies, Chennai.

**SEMESTER III**                    **SKILL BASED ELECTIVE I**

**Subject Code:**

# OPTIMIZATION TECHNIQUES – I

## UNIT I

**Linear Programming Problem:** Mathematical formulation of the problem – Graphical solution – Some exceptional cases, Slack, Surplus variables – Simplex method.

(Chapter 2: Sections: 2.1 – 2.4, Chapter 3: Sections: 3.1 -3.5, Chapter 4: Section: 4.3)

## UNIT II

**Linear Programming Problem:** Use of artificial variables – Big M method – Two phase method.

**Duality:** General primal – Dual pair – Formulating dual problem – Solving dual and finding the solution of the primal – Dual Simplex method.

(Chapter 4: Section: 4.4, Chapter 5: Sections: 5.1 -5.4, 5.7, 5.9)

## UNIT III

**Transportation Problem:** General structure of the problem – Basic solutions – Loops in transportation tables – Transportation algorithm [MODI method].

**Assignment Problem:** Mathematical formulation of the problem – Hungarian assignment method.

(Chapter 10: Sections: 10.8 – 10.10, 10.12, 10.13, Chapter 11: Sections: 11.1 – 11.3)

## UNIT IV

**Inventory Control:** The inventory decisions – Costs associated with inventory – Factors affecting inventory control – Economic Order Quantity (EOQ) – Deterministic inventory problems with shortages and without shortages – EOQ problems with price breaks. (No derivations of the formulas required)

(Chapter 19: Sections: 19.1 -19.12)

## UNIT V

**Queuing Theory:** Queuing system – Elements of Queuing system – Classification of Queuing models – Transient and steady states – (M/M/I):($\infty$/FIFO), (M/M/I):(N/FIFO); models - Birth – Death process – (M/M/C):($\infty$/FIFO) models. (No derivation of the formula's required)

(Chapter 21: Sections: 21.1 -21.3, 21.7 – 21.9)

## TEXT BOOK:

**OPERATIONS RESEARCH**, Kanti Swarup, P. K. Gupta and Man Mohan, "Operations Research", Sultan Chand and Sons, New Delhi, Fourteenth Edition, Reprint 2009.

## REFERENCE BOOK:

**OPERATIONS RESEARCH**, Hamdy A. Taha, Macmillan Publishing Company, Eighth Edition, 2007.

**SEMESTER IV**                                    **CORE PAPER IV**

**Subject code:**

# ABSTRACT ALGEBRA

## UNIT I

**Group Theory:** Definition of a Group – Some examples of Groups – Some preliminary lemmas – Subgroups.

## UNIT II

**Group Theory:** A counting principle – Normal Subgroups and Quotient Groups – Homomorphism.

## UNIT III

**Group Theory:** Automorphisms, Cayley's theorem – Permutation Groups.

## UNIT IV

**Ring Theory:** Definition and examples of Rings – Some special classes of Rings – Homomorphism – Ideals and Quotient Rings.

## UNIT V

**Ring Theory:** More Ideals and Quotient Rings – The field of Quotients of an integral domain – Euclidean Rings – A particular Euclidean Ring.

## TEXT BOOK:

**TOPICS IN ALGEBRA**,  N. Herstein, Wiley Eastern Limited, Second Edition, 2010.

(Chapter  2: Sections: 2.1 – 2.10; Chapter 3: Sections: 3.1 -3.8)

## REFERENCE BOOK:

1. **A FIRST COURSE IN ABSTRACT ALGEBRA**, John B Farleigh, Narosa Publishing House, New Delhi.
2. **MODERN ALGEBRA, ARUMUGAM**, S and Isaac, A. T, Scitech Publication (India) Pvt. Ltd, Chennai – 600 017.
3. **MODERN ALGEBRA**, Manickkavasagam Pillai, Volume I, II, S. Viswanathan Publishers Pvt. Ltd.

**SEMESTER IV**                              **SKILL BASED ELECTIVE II**

**Subject Code:**

# OPTIMIZATION TECHNIQUES – II

## UNIT I

**Sequencing:** Problem of sequencing – Basic terms used in sequencing – Processing n jobs and two machines – Processing n jobs and three machines – Processing n jobs and m machines – Processing two jobs and m machines.

(Chapter 12: Sections: 12.1 – 12.6)

## UNIT II

**Game Theory:** Introduction – Two person zero sum games – Basic terms – The Maximin – Minimax principle – Games without saddle points – Mixed strategies – Dominance property – Graphical solution of $2 \times n$ games and $m \times 2$ games.

(Chapter 17: Sections: 17.1 – 17.7)

## UNIT III

**Integer Programming:** Gomory's all I.P.P method – Construction of Gomory's constraints – Fractional cut method - All Integer LPP – Mixed Integer.

(Chapter 7: Sections 7.1 – 7.6)

## UNIT IV

**Replacement Problem:** Introduction – Replacement of equipment/asset that deteriorates gradually – Replacement of equipment that fails suddenly – Recruitment and promotion problem.

(Chapter 18: Sections: 18.1 – 18.4)

## UNIT V

**Network Scheduling by PERT/CPM :** Introduction – Network basic components – Logical sequencing – Rules of Network – Construction – Concurrent activities – Critical path analysis – Probability considerations in PERT – Distinction between PERT and CPM.

(Chapter 25: Sections: 25.1 – 25.8)

## TEXT BOOK:

**OPERATIONS RESEARCH**. Kanti Swarup, P. K. Gupta and Man Mohan, Sultan Chand and Sons, New Delhi, Fourteenth Edition, Reprint 2009.

## REFERENCE BOOK:

**OPERATIONS RESEARCH,** Hamdy A. Taha, Macmillan Publishing Company, Eighth Edition, 2007.

**SEMESTER V**                    **CORE PAPER V**

**Subject Code:**

# LINEAR ALGEBRA

## UNIT I

Matrices: Algebra of Matrics, Types of Matrices – The inverse of a Matrix - Characteristic equation and Cayley Hamilton theorem Statement and proof– Eigen values and Eigen vectors – Problems

(Chapter 7: Section: 7.1, 7.2, 7.3, 7.7, 7.8)

## UNIT II

**Vector spaces:** Elementary basic concepts – Linear independence and bases.

(Chapter 4: Sections: 4.1, 4.2)

## UNIT III

**Vector Spaces:** Dual spaces – Inner product spaces.

(Chapter 4: Sections: 4.3, 4.4)

## UNIT IV

**Linear Transformation:** Algebra of linear transformations – Characteristic roots.

(Chapter 6: Sections: 6.1, 6.2)

## UNIT V

**Linear Transformation:** Matrices, Canonical forms: Triangular forms.

(Chapter 6: Sections: 6.3, 6.4)

## TEXT BOOKS:

1. **MODERN ALGEBRA**, Arumugam S Issac,  A. T SciTech Publications (India) Private Limited Eighth Edition, Reprint 2007. (For Unit I)
2. **TOPICS IN ALGEBRA**, I. N. Herstein, Vikas Publishers House Private Limited, Second Edition, Reprint 2009. (For Units II, III, IV, V)

## REFERENCE BOOK:

**A TEXT BOOK IN MODERN ALGEBRA**, R. S. Aggarwal, S. Chand and Company Limited, New Delhi, Second Edition, 1979.

**SEMESTER V**                                   **CORE PAPER VI**

# REAL ANALYSIS – I

## UNIT I

**The Real and Complex Number System:** Introduction-The field axioms – The order axioms – Geometric representation of real numbers – Intervals – Integers – The unique factorization theorem for integers – Rational numbers – Irrational numbers – Upper bounds, maximum element, least upper bound (supremum) – The completeness axiom – Some properties of the supremum; Properties of the integers deduced from the completeness axiom – The Archimedean property of the real number system – Rational numbers with finite decimal representation – Finite decimal approximation to real numbers – Infinite decimal representation of real numbers – Absolute values and the triangle inequality – The Cauchy-Schwarz inequality – Plus and minus infinity and the extended real number system $R^*$.

(Chapter 1: Sections: 1.1 – 1.20)

## UNIT II

**Basic Notions of Set Theory:** Introduction - Notations – Ordered pairs – Cartesian product of two sets – Relations and functions – Further terminology concerning functions – One-to-one functions and inverses – Composite functions – Sequences – Similar (equinumerous) sets – Finite and Infinite sets – Countable and Uncountable sets – Uncountability of the real number system – Set algebra – Countable collection of countable sets.

(Chapter 2: Sections: 2.1 – 2.15)

## UNIT III

**Elements of point set topology:** Introduction - Euclidean space $R^n$ - Open balls and open sets in $R^n$ - The structure of open sets in $R^1$ - Closed sets – Adherent points – Accumulation points – Closed sets and Adherent points – The Bolzano – Weierstrass theorem – The Cantors intersection theorem.

(Chapter 3: Sections: 3.1 – 3.9)

## UNIT IV

**Elements of point set topology:** The Lindelof covering theorem – The Heine-Borel covering theorem – Compactness in $R^n$ - Metric spaces – Point set topology in metric spaces – Compact subsets of a metric space – Boundary of a set.

(Chapter 3: Sections: 3.10 – 3.16)

## UNIT V

**Limits and Continuity:** Introduction - Convergent sequences in a metric space – Cauchy sequences – Complete metric spaces – Limit of a function – Limit of vector – valued functions – Continuous functions – Continuity of composite functions – Examples of continuous functions.

(Chapter 4: Sections: 4.1 – 4.5, 4.7 – 4.9, 4.11)

## TEXT BOOK:

**MATHEMATICAL ANALYSIS**, T. M. Apostol, Narosa Publishing Company, Second Editon, 2002.

## REFERENCE BOOK:

**PRINCIPLES OF MATHEMATICAL ANALYSIS**, Walter Rudin, McGraw Hill, 1976.

**SEMESTER V**                               **CORE PAPER VII**

**Subject Code:**

# STATICS

## UNIT I

**Parallel Forces and Moment:** Resultant of parallel forces – Moment of a force – Varigon's theorem – Moment of a force about an axis – Simple problems.

**Couples:** Equilibrium of two couples – Equivalence of two couples – Resultant of coplanar couples – Simple problems.

(Chapter III: Sections: 1 – 4, 7 – 12, 14; Chapter IV: Sections: 1 – 3, 6 – 10)

## UNIT II

**Equilibrium of Three forces acting on a Rigid Body:** Three coplanar forces theorem – Conditions of equilibrium – Simple problems.

**Coplanar Forces:** Reduction of coplanar forces – Conditions for a system of forces to reduce to a single force or to a couple – Equation to the line of action of the resultant – Conditions of equilibrium of a system of coplanar forces – Simple problems.

(Chapter V: Sections 1 – 3; Chapter VI: Sections: 1 – 5, 8 – 10)

## UNIT III

**Friction:** Statical, Dynamical and Limiting friction – Equilibrium of a body on a rough inclined plane – Problems on friction.

(Chapter VII: Sections: 1 – 12)

## UNIT IV

**Center of Gravity:** CG of a rod, Rectangular lamina, Uniform triangular lamina, Quadrilateral lamina.

**CG by Integration:** CG of uniform circular arc – Sector of a circle – Solid semi sphere – Hollow sphere – CG of a compound body.

(Chapter VIII: Sections: 3, 6, 8, 9, 11, 12, 18, 19)

## UNIT V

**Equilibrium of String:** Equation of a common catenary – Tension at any point – Approximation to the shape of the catenary – Parabolic catenary- Suspension bridges – Simple problems.

(Chapter XI: Sections: 1 -5, 7 – 9)

## TEXT BOOK:

**STATICS**, Dr. M. K. Venkataraman, Agasthiar Publications, Twelfth Edition, 2007.

## REFERENCE BOOK:

**MECHANICS,** P. Duraipandian, Laxmi Duraipandian, Muthamizh Jayapragasam, S. Chand and Company Limited, Sixth Edition, 2006.

**SEMESTER V**                                      **CORE PAPER VIII**

**Subject Code:**

# MATHEMATICAL STATISTICS – I

## UNIT I

**Theory of Probability:** Axioms of Probability – Generalized Addition theorem – Conditional Probability –Independent events – Multiplication theorem – Baye's theorem.

(Chapter III: Sections: 3.8 – 3.14; Chapter IV: Section: 4.2)

## UNIT II

**Random Variables:** The concept of random variable – The Distribution function – Discrete type and Continuous type – Two dimensional random variables – Marginal distribution – Conditional distributions – Independence of random variables.

**Mathematical Expectation:** Mathematical Expectation – Moments of random variable – Skewness, Kurtosis, covariance

(Chapter V: Sections: 5.1 – 5.5, Chapter VI: Sections: 6.1-6.6)

## UNIT III

Moment generating function -Cumulants– Characteristic function- Chebyshev's inequality-Weak law of large numbers-Borel cantelli lemma-Probability generating function

(Chapter VII: Sections: 7.1- 7.3, 7.5, 7.7.1, 7.8 and 7.9)

## UNIT IV

**Some Probability Distributions:** Bernoulli's scheme – Binomial, Poisson, Normal, Uniform, Beta and Gamma distribution.

(Chapter VIII: Sections: 8.1 -8.5; Chapter IX: Sections: 9.1 – 9.3,  9.5 – 9.7)

## UNIT V

**Correlation and Regression:** Pearson's coefficient of correlation and regression – Partial and multiple correlation and regression of three variables only.

(Chapter X: Sections: 10.2, 10.4; Chapter XI: Sections: 11.1, 11.2.1 – 11.2.3, 11.4; Chapter XII: Sections: 12.4, 12.5, 12.7, 12.8)

## TEXT BOOK:

**FUNDAMENTALS OF MATHEMATICAL STATISTICS**, V. K. Kapoor and S. C. Gupta, Sultan Chand & Sons, New Delhi, Eleventh Edition, 2002.

## REFERENCE BOOK:

**INTRODUCTION TO MATHEMATICAL STATISTICS**, R. V. Hogg and T. V. Craig, Amerind Publishing Company Private Limited, New Delhi, Third Edition, 1970.

**SEMESTER V**                                    **SKILL BASED ELECTIVE III**

**Subject Code:**

# C PROGRAMMING

## UNIT I

**Constants, Variables and Data Types:** Introduction – Character set – C Tokens – Keywords and Identifiers – Constants – Variables – Data types – Declaration of variables – Declaration of storage class – Assigning values to variables – Defining symbolic constants.

**Operations and Expressions:** Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise, Special operators – Arithmetic expressions – Evaluation of expressions – Precedence of arithmetic operators – Type conversion in expressions – Operator precedence and associativity.

(Chapter 2: Sections: 2.1 – 2.11; Chapter 3: Sections: 3.1 – 3.12, 3.14 -3.15)

## UNIT II

**Managing Input and Output Operations:** Reading a character – Writing a character – Formatted input – Formatted output.

Decision Making and Branching: Decision making with IF statement – Simple IF statement – The IF…ELSE statement – Nesting of IF…ELSE statements – The ELSE - IF Ladder – The Switch statement – The ?: operator – The GOTO statement.

(Chapter 4: Sections: 4.1 – 4.5; Chapter 5: Sections: 5.1 -5.9)

## UNIT III

**Decision Making and Looping:** The WHILE statement – The Do statement – The FOR statement – Jumps in LOOPS.

**Arrays:** one dimensional array – Declaration of one dimensional array – Initialization of one dimensional arrays – Two dimensional arrays – Initializing two dimensional arrays – Multidimensional arrays.

(Chapter 6: Sections: 6.1 – 6.5; Chapter 7: Sections: 7.1 -7.7)

## UNIT IV

**User-defined functions:** Need for user-defined functions – A multifunction program – Elements of user-defined functions – Definition of functions – Return values and their types – Function calls – Function declaration – Category of functions – No arguments and no return values – Arguments but no return values – Arguments with return values – No arguments but returns a value – Functions that return multiple values – Nesting of functions – Recursion – Passing arrays to functions.

(Chapter 9: Sections 9.1 – 9.17)

## UNIT V

**Structures:** Defining a structure – Declaring structure variables – Accessing structure members – Structure Initialization – Copying and comparing structure variables – Operations on individual members – Arrays of structures – Arrays within structures – Structures within structures.

(Chapter 10: Sections: 10.1 – 10.10)

## TEXT BOOK:

**PROGRAMMING IN ANSI C**, E. Balagurusamy, Tata Mc-Graw Hill Publishing Company Limited, New Delhi, Fourth Edition, 2008.

## REFERENCE BOOK:

**THE SPIRIT OF C, An Introduction to Modern Programming**, Henry Mullish and Herbert L. Cooper, Jaico Publishing House, 1999.

**SEMESTER V**                                    **NON MAJOR ELECTIVE**

**Subject Code:**

# ARITHMETIC FOR ALL – I

## UNIT I

Numbers – H.C.F and L.C.M of Numbers – Decimal Fractions – Simplification.

(Sections: 1 – 3)

## UNIT II

Simplification, Square Roots and Cube Roots – Average (Sections: 4 – 6)

## UNIT III

Problems on Numbers – Problems on Ages, Surds and Indices (Sections: 7 – 9)

## UNIT IV

 Percentage – Profit and Loss – Ratio and Proportion (Sections: 10 – 12)

## UNIT V

Partnership – Chain Rule – Time and work.

(Sections: 13 – 15)

## TEXT BOOK:

**QUANTITATIVE APTITUDE**, R. S. Agarwal, ( For Competitive Examinations ), 7th Revised edition  S. Chand and Company Limited, Ram Nagar, New Delhi -110055.

**SEMESTER VI**                  **CORE PAPER IX**

**Subject Code:**

# REAL ANALYSIS – II

## UNIT I

**The concept of continuity:** Continuity and inverse images of open or closed sets – Functions continuous on compact sets – Topological mappings (homeomorphisms) – Bolzano's theorem – Connectedness – Components of a metric space.

(Chapter 4: Sections: 4.12 – 4.17)

## UNIT II

**Uniform continuity:** Uniform continuity- Uniform continuity and compact sets – Fixed point theorem for contraction – discontinuities of real-valued function – Monotonic functions.

**Derivation:** Introduction- Definition of derivative – Derivatives and continuity – Algebra of derivatives – The chain rule – one-sided derivatives and infinite derivatives – Functions with non-zero derivative – Zero derivatives and local extrema.

(Chapter 4: Sections: 4. 19 – 4.23; Chapter 5: Sections: 5.1 – 5.8)

## UNIT III

**Theorems on derivatives:** Rolle's Theorem – The Mean- Value theorem for derivatives – Intermediate-value theorem for derivatives – Taylor's formula with remainder – Derivatives of vector – valued functions – Partial derivatives.

(Chapter 5: Sections: 5.9 – 5.14)

## UNIT IV

**Function of Bounded Variation:** Introduction - Properties of monotonic functions – Functions of bounded variation – Total variation – Additive property of total variation – Total variation on $[a, x]$ as a function of $x$ - Functions of bounded variation expressed as the difference of increasing functions – Continuous functions of bounded variation.

(Chapter 6: Sections: 6.1 – 6.8)

## UNIT V

**The Riemann – Stieltjes Integral:** Introduction- Notation – The definition of Riemann-Stieltjes integral – Linear properties – Integration by parts – Change of variables in a Reimann-Stieltjes Integral – Reduction to a Riemann Integral.

(Chapter 7: Sections: 7.1 – 7.7)

## TEXT BOOK:

**MATHEMATICAL ANALYSIS**, T. M. Apostol, Addison Wesely Publisher, Second Edition, 2002.

## REFERENCE BOOK:

**PRINCIPLES OF MATHEMATICAL ANALYSIS**, Walter Ruldin, McGraw Hill, 1976.

**SEMESTER VI**                                                            **CORE PAPER X**

**Subject Code:**


# DYNAMICS


## UNIT I

**Projectiles:** Path of projectile – Horizontal projection of a particle from a point at a certain height – Maximum horizontal range.

(Chapter VI: Sections: 6.1 – 6.7)


## UNIT II

**Collision of Elastic Bodies:** Fundamental laws of impact – Impact of a sphere on a fixed smooth plane – Direct impact of two smooth spheres – Loss of kinetic energy – Oblique impact of two smooth spheres – Loss of kinetic energy – Simple problems.

(Chapter VIII: Sections: 8.1 -8.8)


## UNIT III

**Simple Harmonic Motion:** SHM in a straight line – Simple problems – Composition of two SHM of the same period in the same straight line in two perpendicular directions – Simple pendulum – Equivalent simple pendulum – Seconds pendulum – Loss or gain in the number of oscillations made by a pendulum – Simple problems.

(Chapter X: Sections: 10.1, 10.2, 10.6, 10.7)

## UNIT IV

**Central forces:** Radial, transverse components of velocity and acceleration – differential equation of central orbit – Pedal equation to the central orbit – Two fold problems in the central orbit.

(Chapter XI: Sections: 11.1 -11.6, 11.8, 11.11)

## UNIT V

**Moment of Inertia:** Theorem on parallel axes – Perpendicular axes – M.I. of uniform rod – rectangular lamina – Circular ring – Circular disc – Elliptic lamina – Solid sphere – Hollow cone – Triangular lamina.

(Chapter XII: Sections: 12.1 -12.4)

**TEXT BOOK:**

**DYNAMICS**, Dr. M. K. Venkataraman, Agasthiar Publications, Eleventh Edition, 2006.

## REFERENCE BOOK:

**MECHANICS**, P. Duraipandian, Laxmi Duraipandian, Muthamizh Jayapragasam, S. Chand and Company Limited, Sixth Edition, 2006.

**SEMESTER VI**                                    **CORE PAPER XI**

# COMPLEX ANALYSIS

## UNIT I

**Analytic Functions:** Complex function – Limit of function – Continuity of a function – Uniform continuity – Differentiability and analyticity of a function – Necessary condition for differentiability – Sufficient condition for differentiability – Problems.

(Chapter 4 : Sections 4.1 to 4.7)

## UNIT II

C. R. Equation in polar co-ordinates - Harmonic Function – Conformal mapping.

**Bilinear Transformations:** Transformation $W = z^2$, $W = e^z$, $W = \sin z$, $W = \cos z$ .

(Chapter 4 : Sections 4.8 ; Chapter 6 :  6.12 ; Chapter 7 : to 7.4 to 7.8)

## UNIT III

**Complex Integration:** Simple rectifiable positively oriented curves – Simple integrals using definition – Definite integrals – Interior and exterior of a closed curve – Simply connected region – Cauchy-Goursat's theorem (without proof) Integrals along an arc joining two points – Problems.

(Chapter 8 : Sections 8.1, 8.3 to 8.8)

## UNIT IV

Cauchy's integral formula – Cauchy's formula for derivative – Cauchy's formula for higher derivatives (statement only)  – Morera's theorem – Problems.

**Taylors and Laurent's series:** Taylor's series – Zeros of an analytic function – Laurent's series.

(Chapter 8 : Section 8.9 ; Chapter 9 : Sections  9.1 to 9.3 )

## UNIT V

Singular points and types of singularities. Residues – Calculus of residues – Problems.

(Chapter 9 : Sections  9.5 to 9.13 ; Chapter 10 : Sections 10.1, 10.2 )

## TEXT BOOK:

**COMPLEX ANALYSIS**, P. Duraipandian and Laxmi Duraipandian, D. Muhilan – Emerald Publisher, Second Edition, 1984.

## REFERENCE BOOK:

**THE ELEMENTS OF COMPLEX ANALYSIS**, B. Choudhary, Wiley Eastern Limited.

**SEMESTER VI**                                    **CORE PAPER XII**

<div align="center">

**Subject Code:**

# MATHEMATICAL STATISTICS – II

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## UNIT I

**Exact Sampling distributions:** Functions of random variables leading to $t$, $\chi^2$ and $F$ distribution- Applications of $\chi^2$ distribution.

(Chapter 15: Sections: 15.1 – 15.3, 15.6; Chapter 16: Sections: 16.1, 16.2: 16.2.1 – 16.2.5, 16.5)

## UNIT II

**Theory of Estimation:** Parametric estimation – Estimator – Characteristic of a good estimator – Cramer-Rao inequality.

(Chapter 17: Sections: 17.1 – 17.3)

## UNIT III

**Methods of Estimations:** Methods of estimations – Method of moments and method of maximum likelihood – Properties of maximum likelihood-confidence interval and confidence limts.

(Chapter 17: Sections: 17.6.1 – 17.6.3, 17.7)

## UNIT IV

**Testing of Hypothesis:** Test of significance – Null Hypothesis – Type I and Type II errors – Critical region – Exact test based on normal $t, \chi^2$ and $F$ distribution with regard to mean, proportions – Variance and standard deviation – Pearsonian test by contingency table and goodness of fit.

(Chapter 14: Sections: 14.4, 14.5, 14.7, 14.8.1 -14.8.4; Chapter 15: Sections: 15.6.1 -15.6.4; Chapter 16: Sections: 16.3.1 – 16.3.4, 16.6.1)

## UNIT V

**Statistical Quality Control:** Meaning, Causes of variation – Assignable causes – Non Assignable causes – Process control and product control – Control chart for variables – Construction of $\overline{X}$ & R chart – Control chart of attributes – p- chart – np- chart – c- chart.

(Chapter 1: Sections: 1.1 -1.7.3)

## TEXT BOOK:

1. **FUNDAMENTALS OF MATHEMATICAL STATISTICS**, V. K. Kapoor and S. C. Gupta, Sultan Chand and Sons, New Delhi, Eleventh Edition, 2002. (For Units I, II, III and IV)
2. **FUNDAMENTALS OF APPLIED STATISTICS**, V. K. Kapoor and S. C. Gupta, Sultan Chand and Sons, New Delhi, Third Edition, 1987. (For Unit V)

## REFERENCE BOOK:

**INTRODUCTION TO MATHEMATICAL STATISTICS**, R. V. Hogg and T.V. Craig, Amerind Publishing Company Private Limited, New Delhi, Third Edition, 1970.

**SEMESTER VI**                     **SKILL BASED ELECTIVE IV**

**Subject Code:**

# LATEX

## UNIT I

**Text, Symbols and Commands:** Command names and arguments – Environments – Declarations – Lengths – Special characters.

(Chapter 2: Sections: 2.1 – 2.5)

## UNIT II

Fine-tuning text – Word division.

**Document Layout and Organization:** Document class – Page style – Parts of the document – Table of contents.

(Chapter 2: Sections: 2.6 – 2.7; Chapter 3: Sections: 3.1 – 3.4)

## UNIT III

**Displayed Text:** Changing font – Centering and indenting – Lists – Theorem – like declarations – Tables – Printing literal text – Footnotes and marginal notes – Comments within text.

(Chapter 4: Sections: 4.1 – 4.3, 4.5, 4.8.1, 4.8.2, 4.9 – 4.11)

## UNIT IV

**Mathematical Formulas:** Mathematical environments – Main elements of math mode – Mathematical symbols.

(Chapter 5: Sections: 5.1 – 5.3)

## UNIT V

Additional elements – Fine-tuning mathematics.

(Chapter 5: Sections: 5.4, 5.5)

## TEXT BOOK:

> **A GUIDE TO LATEX**, Helmut Kopka and Patrick W. Daly,  Addison-Wesley, Fourth Edition.

## REFERENCE BOOK:

> **GETTING STARTED WITH LATEX**, David R. Wilkins, Second Edition.

**SEMESTER VI**                    **NON MAJOR ELECTIVE**

**Subject Code:**

# ARITHMETIC FOR ALL – II

## UNIT I

Pipes and cisterm – Time and distance – Problems on trains (Sections: 16 – 18)

## UNIT II

Problems on Boats and Streams – Alligation or mixture – Simple Interest.(Sections: 19 – 21)

## UNIT III

Compound Interest – Logarithms – Area. (Sections: 22 – 24)

## UNIT IV

Volume and Surface areas – Races and games of skill – Calendar. (Sections: 25 – 27)

## UNIT V

Clocks – Stocks and shares – True Discount. (Sections: 28, 29 and 32)

## TEXT BOOK:

**QUANTITATIVE APTITUDE (FOR COMPETITIVE EXAMINATIONS)**, 7th Revised Edition, R. S. Agarwal,  Chand and Company Limited, Ram Nagar, New Delhi – 110055.

**SEMESTER I**                                **ALLIED PAPER I**

# ALLIED MATHEMATICS – I
# B.Sc (PHYSICS & CHEMISTRY)

## UNIT I

**Theory of Equations:** Relations between the roots and coefficient of equation – Irrational roots – Imaginary roots – Reciprocal equation – Horner's method and Newton's method for finding approximate roots – problems.

(Chapter 6: Sections: 1 – 11, 16, 28.4, 30)

## UNIT II

**Matrix Theory:** Characteristic Equation – Eigen values – Eigen vectors (Diagonalising not included) – Simple problems – Cayley Hamilton theorem (proof not needed) – Problems based on this theorem.

(Chapter 2: Section: 16)

## UNIT III

**Differential Calculus: Curvature:** Radius of curvature in Cartesian and polar coordinates – Centre and circle of curvature – Involutes and Evolutes.

(Chapter 10: Sections: 2.1 – 2.6)

## UNIT IV

**Sphere:** Standard equation of a sphere – Results based on properties of a sphere – Tangent plane to a sphere – Equation of a circle – Problems. (Chapter IV)

## UNIT V

**Trigonometry:** Expansions of $\cos n\theta$, $\sin n\theta$, $\tan n\theta$, $\cos^n \theta$, $\sin^n \theta$ - Expansions of $\cos n\theta$, $\sin n\theta$ in powers of $\theta$ - Hyperbolic and inverse hyperbolic function.

(Chapter III, IV )

## TEXT BOOKS:

1. **ALGEBRA VOLUME I**, T. K. Manicavachagom Pillay and Others, S. Viswanathan Printers and Publisher Private Limited, 2008. (For Unit I)
2. **ALGEBRA VOLUME II**, T. K. Manicavachagom Pillay and Others, S. Viswanathan Printers and Publisher Privated Limited, 2008. (For Unit II)
3. **CALCULUS VOLUME**, T. K. Manicavachagom Pillay and Others, S. Viswanathan Printers and Publisher Private Limited, 2008. (For Unit III)
4. **ANALYTICAL GEOMETRY – Three Dimension**, T. K. Manicavachagom Pillay, S. Viswanathan Printers and Publisher Private Limited, 2006. (For Unit IV)
5. **TRIGONOMETRY**, T. K. Manicavachagom Pillay and Others, S. Viswanathan Printers and Publisher Private Limited, Tenth Edition, 2007. (For Unit V)

## REFERENCE BOOK:

**ALLIED MATHEMATICS**, Dr. P. R. Vittal, Margham Publications, Chennai, 1998.

**SEMESTER I**                                          **ALLIED PAPER I**

<div align="center">

**Subject Code:**

# MATHEMATICS FOR STATISTICS – I

# B. Sc (STATISTICS)

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## UNIT I

**Set Theory:** Definition – Examples – Venn diagram – Set operations – Laws and properties of sets – Number of elements – Problems (Chapter 3: Sections: 1 – 8).

## UNIT II

**Matrices:** Definition – Different types of matrices with examples – Matrix operations – Solving system of linear equations – Problems (Chapter 4: Sections: 1 – 7),

## UNIT III

**Determinants:** Determinants and its properties – Cramers rule - Inverse of a matrix – Rank of matrix - Problems (Chapter 4: Sections 8 – 10).

## UNIT IV

**Differential Calculus:** Derivatives of standard functions from first principle – Rules of differentiations – Product rule – Quotient rule - Problems (Chapters 6: Sections 1- 4).

## UNIT V

Chains rule – Differentiation of Implicit functions – Successive differentiation - Problems

(Chapter 6: Sections: 4 – 8)

## TEXT BOOK:

**BUSINESS MATHEMATICS AND STATISTICS**, P. A. Navaneetham, Jai Publishers, Trichy, 2008.

## REFERENCE BOOK:

**ANCILLARY MATHEMATICS**, P. R. Vital, Margam Publishers, Chennai, 1998.

**SEMESTER II**                                          **ALLIED PAPER II**

**Subject Code:**

# ALLIED MATHEMATICS – II

# B. Sc (PHYSICS & CHEMISTRY)

## UNIT I

**Integral Calculus:** Double and Triple integrals (change the order of integration not included) – Simple problems – Recurrence formula for Gamma function – Relation between Beta and Gamma function – Problems.

(Chapter 5: Sections: 2.1, 2.2, 4; Chapter 7: Sections: 2.1 – 4)

## UNIT II

**Ordinary Differential Equation:** Equation of first order but not of first degree – Homogeneous linear equations – Problems.

(Chapter 1: Sections: 5 – 7)

## UNIT III

**Partial Differential Equation:** Formation – Four standard types – Lagrange's equation – Problems.

(Chapter 4: Sections: 5.1 – 5.4, 6)

## UNIT IV

**Laplace Transforms:** Laplace transform of standard functions – Some general theorem – Inverse Laplace transform – Application to first order and second order differential equation with constant coefficients – Problems.

(Chapter 5: Sections: 1 – 8)

## UNIT V

**Fourier series:** Expansion of periodic function with period $2\pi$ - Expansion of even and odd function – Half range sine and cosine series.

(Chapter 6: Sections: 1 – 5)

## TEXT BOOKS:

1. **CALCULUS VOLUME II**, T. K. Manicavachagom Pillay and Others, S. Viswanathan Printers and Publisher Private Limited, 2008. (For Unit I)
2. **CALCULUS VOLUME III**, T. K. Manicavachagom Pillay and Others, S. Viswanathan Printers and Publisher Private Limited, 2008. (For Units II, III, IV and V)

## REFERENCES:

1. **DIFFERENTIAL EQUATIONS**, S. Narayanan and Others, S. Viswanathan Printers and Publishers, Ninth Edition, 2007.
2. **ENGINEERING MATHEMATICS VOLUME III**, A. Singaravelu, Meenakshi Agencies, Fifth Edition, Chennai, 2005.
3. **ALLIED MATHEMATICS**, Dr. P. R. Vittal, Margham Publications, Chennai, 1998.

SEMESTER II                                    ALLIED PAPER II

# MATHEMATICS FOR STATISTICS – II

# B. Sc (STATISTICS)

## UNIT I

**Integral Calculus:** Infinite integrals – standard forms – Determination of c – Definite integrals – Problems (Chapter 8: Sections 1 – 4)

## UNIT II

**Methods of Integration:** Method of Partial fraction – Method of Integration by parts – Problems (Chapters 8: Sections 5 – 8)

## UNIT III

**Sets and Functions:** Sets and elements – Operation on sets – Functions – Real valued functions – Equivalence, Countability – Problems (Chapter 1: Sections: 1.1 – 1.5).

## UNIT IV

**Sequences of Real numbers:** Real numbers – Least upper bounds – Sequence – Subsequence – Convergent sequence – Divergent sequence – Bounded sequence – Monotone sequence – Problems (Chapter 1: Sections: 1.6 – 1.7; Chapter 2: Sections: 2.1 – 2.6).

## UNIT V

**Operations on Sequence:** Operation on convergent sequence- operation on divergent sequence – Limit Superior – Limit inferior (definitions only) Cauchy's sequence– Problems.

(Chapter 2: Sections: 2.7 – 2.10)

## TEXT BOOK:

1. **BUSINESS MATHEMATICS AND STATISTICS**, Navanitham, P. A, Jai Publisher, Trichy, 2008.
   (For Units I and II)
2. **METHODS OF REAL ANALYSIS**, Richard R. Goldberg,  Oxford and IBH Publishing Company Private Limited, New Delhi, 1970. (For Units III, IV and V)

**SEMESTER II**                                    **ALLIED PAPER**

**Subject Code:**

# DISCRETE MATHEMATICS
# B. Sc (COMPUTER SCIENCE)

## UNIT I

**Mathematical Logic:** Propositions and Logical Operators – Truth table – Tautology – Contradiction – Equivalence and Implication – Normal forms (DNF, CNF, PDNF and PCNF).

(Chapter I: Sections: 1.1 – 1.3)

## UNIT II

**Inference Theory:** Inference theory for statement calculus – Predicates – Quantifiers – Variables – Free and bound variables – Inference theory for predicate calculus.

(Chapter II: Sections: 1.4 – 1.6)

## UNIT III

**Basic Set Theory:** Basic definitions – Venn diagrams and set operations – Laws of set theory – Principle of inclusion and exclusion – Relations – Properties of relations – Matrices of relations – Functions – Injective, surjective and bijective functions.

(Chapter III: Sections: 2.1, 2.3 and 2.4)

## UNIT IV

**Formal Languages and Automata:** Languages – Operations on languages – Regular expressions and regular languages – Grammar – Types of grammar – Finite state machine – Finite state automata.

(Chapter IV: Section: 3.3; Chapter VI: Sections: 6.1, 6.2)

## UNIT V

**Graph Theory:** Basic terminology – Types of graphs – Paths, cycle and connectivity – Representation of graphs in computer memory – Trees – Properties of tress – Binary trees – Traversing binary tress – Computer representation of general trees.

(Chapter V: Sections: 5.1, 5.2)

## TEXT BOOK:

1. **DISCRETE MATHEMATICAL STRUCTURES WITH APPLICATIONS TO COMPUTER SCIENCE**, J. P. Tremblay and R. Manohar, Mc Graw Hill International Edition, 1997. (For Unit I, Unit II, Unit III and Unit V)
2. **DISCRETE MATHEMATICS**, Dr. M. K. Venkataraman, Dr. N. Sridharan and N. Chandarsekaran, The National Publishing Company, Chennai, 2002. (For Unit IV)

SEMESTER III                                    ALLIED PAPER

Subject Code:

# OPERATIONS RESEARCH

# B. Sc (COMPUTER SCIENCE)

## UNIT I

**Linear Programming Problem:** Formulation of L.P.P – Graphical solutions of L.P.P – Canonical and standard forms of L.P.P – Simplex method. Duality in L.P.P – Formulation of dual- Duality and Simplex Method- Dual Simplex Method.

(Chapter 2: Sections: 2.1 – 2.4; Chapter 3: Sections: 3.1 -3.5; Chapter 4: Sections: 4.1 -4.3; Chapter 5: Sections: 5.1 – 5.4, 5.7, 5.9)

## UNIT II

**Game Theory:** Two person zero sum game – The Maximin – Minimax principle – Problems. Solution of $2 \times 2$ rectangular games – Domination property - $(2 \times n)$ and $(m \times 2)$ graphical method- Dominance property – Problems.

(Chapter 17: Sections: 17.1 – 17.7)

## UNIT III

**The Transportation Problems:** Basic feasible solution by L.C.M – NWC – VAM – Optimum solutions (MODI Mehtod) – Unbalanced transportation problems. The Assignment problems – Assignment algorithm – Optimum solutions (Hngarian Method) – Unbalanced assignment problems.

(Chapter 10: Sections: 10.1 – 10.13; Chapter 11: Sections: 11.1 – 11.4)

## UNIT IV

**Inventory control:** Types of inventories – Inventory costs – EOQ problem with no shortages – Production problem with no shortages – EOQ with shortages – Production problem with shortages – EOQ with price breaks.

(Chapter 19: Sections: 19.1 – 19.12)

## UNIT V

**Network Scheduling by PERT/CPM :** Introduction – Network basic components – Logical sequencing – Rules of Network – Construction – Concurrent activities – Critical path analysis – Probability considerations in PERT – Distinction between PERT and CPM.

(Chapter 25: Sections: 25.1 – 25.8)

## TEXT BOOKS:

1. **OPERATIONS RESEARCH**, Kandiswarup, P. K. Gupta, Man Mohan, S. Chand & Sons Educational Publications, New Delhi, Fourteenth Revised Edition, Reprint 2009.
2. **PROBLEMS IN OPERATIONS RESEARCH**, P. K. Gupta, Man Mohan, S. Chand and Sons Educational Publications, Eleventh Edition, Reprint 2007.

## REFERENCE BOOKS:

1. **OPERATIONS RESEARCH – An Introduction**, Hamdy A. Taha, Pearson Education, Reprint 2009.
2. **PROBLEMS IN OPERATIONS RESEARCH**, P. K. Gupta and D. S. Hira, S. Chand and Company Limited, Third Edition, Reprint 2000.
3. **OPERATIONS RESEARCH THEORY AND APPLICATIONS**, J. K. Sharma, Macmillan India Limited, Second Edition, Reprint 2002.

**SEMESTER I**                                                    **ALLIED PAPER I**

# MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE

# B. Sc (INFORMATION TECHNOLOGY)

## UNIT I

Matrices – Introduction – Determinants – Inverse of a matrix – Rank of a matrix – Eigen values - Problems

## UNIT II

**Set Theory:** Introduction – Set and its elements – Set description – Types of sets – Venn Euler diagrams – Set operations and laws of set theory – Fundamental product – Partition of Sets – minsets – Algebra of sets and duality – Inclusion and exclusion principle.

## UNIT III

**Mathematical Logic:** Introduction – propositional calculus – Basic logical operations – Tautology – Contradiction – Argument method of proof – Predicate calculus.

## UNIT IV

**Relations :** Binary relations – Set operations - relations – Types of relation – Partial order relation – Equivalence relation – Composition of relations – Functions – Types of Functions – Invertible Functions – Composition of Functions.

## UNIT V

**Graph Theory:** Basic terminology – Types of graphs – Paths, cycle and connectivity – Representation of graphs in computer memory – Trees – Properties of tress – Binary trees – Traversing binary tress – Computer representation of general trees.

## TEXT BOOKS:

**1. ENGINEERING MATHEMATICS VOL II –** Dr. M.K. Venkatraman **-** NPC ( Unit I )

**2. DISCRETE MATHEMATICS**, J. K. Sharma, Second Edition – 2005, Macmillan India Ltd.

## REFERENCE BOOKS:

**1. DISCRETE MATHEMATICAL STRUCTURES WITH APPLICATIONS TO**

   **COMPUTER SCIENCE –** J.P.TREMBLAY and R.MANOHAR, McGraw Hill International

   edition.

**2. DISCRETE MATHEMATICS –** Dr. M.K. Venkatraman, Dr. N.Sridharan,

   N.Chandrasekaran **- -** NPC, Chennai.

**SEMESTER III**                                      **ALLIED PAPER**

# BUSINESS MATHEMATICS

# B. Com

## UNIT I

**Matrices and Determinants:** Definition – Different types of matrices with examples – Matrix operations – Solving system of linear equations – Inverse of a matrix – Rank of matrix – Determinants and its properties – Cramer's rule – Problems. (Chapter 4: Sections: 1 – 12)

## UNIT II

**NUMERICAL METHODS**

Difference table - Interpolation and Extrapolation **-** Newton's forward interpolation formula – Newton's backward interpolation formula – Gauss forward and backward interpolation formula. (Problems only)

(Chapter 5: Sections: 5.1 – 5.3; Chapter 6: Sections: 6.1 – 6.3; Chapter 7: Sections: 7.1 – 7.4)

## UNIT III

**NUMERICAL METHODS**

Difference table for unequal intervals – Newton's, Lagrange interpolation formula – Inverse interpolation formula, Lagrange's method only.

(Chapter 8: Sections: 8.1 – 8.5, 8.7)

## UNIT IV

**OPERATIONS RESEARCH**

Mathematical formulation of the linear programming problem – Graphical solution – Simplex method – Simple problems using slack variable.

(Chapter 2: Sections: 2.1 – 2.4; Chapter 3: Sections: 3.1 – 3.3; Chapter 4: Section: 4.3)

## UNIT V

**OPERATIONS RESEARCH**

Transportation problem – Assignment problem and special cases in assignment problem – Simple problems.

(Chapter 10: Sections: 10.8 – 10.9; Chapter 11: Sections: 11.1 – 11.4)

## TEXT BOOKS:

1. **BUSINESS MATHEMATICS AND STATISTICS**,  P. A. Navaneetham, Jai Publishers, Trichy, 2008. (For Unit I)
2. **NUMERICAL METHODS**, P. Kandasamy, K. Thilagavathy and K. Gunavathy, S. Chand and Company Limited, 1999. (For Units II and III)
3. **OPERATIONS RESEARCH**, V. Kanti Swarup, P. K. Gupta and Man Mohan, Sultan Chand and Sons, New Delhi, Fourteenth Edition, Reprint 2009. (For Units IV and V)

## REFERENCE BOOKS:

1. **NUMERICAL METHODS IN SCIENCE AND ENGINEERING**, M. K. Venkatraman, The National Publishing Company, Fourth Edition, 1998.
2. **PROBLEMS IN OPERATIONS RESEARCH**, P. K. Gupta and Manmohan, Sultan Chand and Sons, New Delhi, Reprint 2007.