PERIYAR UNIVERSITY

SALEM – 636 011.

PRIDE Syllabus

NON-SEMESTER PATTERN

M.Sc. Branch-I : Mathematics

(Candidates admitted from 2007-2008 onwards)

PERIYAR UNIVERSITY, SALEM-11

M.Sc. Degree Course

(Non-Semester Pattern)

Branch-I : MATHEMATICS

FACULTY OF SCIENCE

REGULATIONS AND SYLLABUS

(With effect from 2007-2008 onwards)

1. Objectives of the Course

Mathematics to-day is penetrating all fields of human endeavor and therefore it is necessary to prepare the students to cope with the advanced developments in various fields of Mathematics. The objectives of this course are the following:

(a) To import knowledge in advanced concepts and applications in various fields of Mathematics.

(b) To provide wide choice of elective subjects with updated and new areas in various branches of Mathematics to meet the needs of all students.

2. Eligibility for Admission

A candidate who has passed B.Sc. Mathematics / B.Sc. Mathematics (Computer Applications) degree of this University or any of the above degree of any other University accepted by the Syndicate as equivalent thereto, subject to such condition as may be prescribed therefore shall be permitted to appear and qualify for the Master of Science (M.Sc.,) Degree Examination in Mathematics of this University after a course of study of two academic years.

3. Duration of the Course

The course of study of Master of Science in Mathematics shall consist of two academic years.

4. Course of Study

The course of study shall comprise instruction in the following subjects according to the syllabus and books prescribed from time to time.

S. No.	Pap er	Paper Code	Title of the Paper
I Year			
1	I	07PMA01	Algebra
2	II	07PMA02	Analysis
3	III	07PMA03	Differential Equations
4	IV	07PMA04	General Topology
5	V	07PMAZ01	Mechanics (or)

	Optional	07PMAZ02	Fluid Dynamics
II Year			
6	VI	07PMA05	Complex Analysis
7	VII	07PMA06	Mathematical Statistics
8	VIII	07PMA07	Functional Analysis
9	IX Optional	07PMAZ03	Differential Geometry (or)
		07PMAZ04	Difference Equation
10	X Optional	07PMAZ05	Discrete Mathematics & Graph Theory (or)
		07PMAZ06	Numerical Methods

5. Examinations

The examination shall be of three hours duration for each paper at the end of each year. The candidate failing in any subject(s) will be permitted to appear for each failed subject(s) in the subsequent examination.

6. Scheme of Examination

The scheme of examination shall be as follows:

First year

S. No.	Paper	Title of the Paper	Dura-tion	Marks
1	I	Algebra	3 Hrs	100
2	II	Analysis	3 Hrs	100
3	III	Differential Equations	3 Hrs	100
4	IV	General Topology	3 Hrs	100
5	V Optional	Mechanics (or)	3 Hrs	100
		Fluid Dynamics		

Second year

S. No.	Paper	Title of the Paper	Dura-tion	Marks
6	VI	Complex Analysis	3 Hrs	100
7	VII	Mathematical Statistics	3 Hrs	100
8	VIII	Functional Analysis	3 Hrs	100
9	IX Optional	Differential Geometry (or)	3 Hrs	100
		Difference Equation		
10	X Optional	Discrete Mathematics & Graph Theory (or)	3 Hrs	100
		Numerical Methods		

7. Question Paper Pattern

Question Paper Pattern

Time : 3 Hours Maximum Marks : 100

Part – A (5 x 5 = 25 Marks)

Answer ALL Questions

- Two questions from each unit with internal choice.

Part – B (5 x 15 = 75 Marks)

Answer ALL Questions

- Two questions from each unit with internal choice.

8. Passing Minimum

The candidate shall be declared to have passed the examination if the candidate secures not less than 50% marks in the University Examination in each paper.

Candidate who does not obtain the required minimum marks for a pass in a paper shall be required to appear and pass the same at a subsequent appearance.

9. Classification of Successful Candidates

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed the examination in **First Class**.

All other successful candidates shall be declared to have passed in the **Second Class**.

Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed the examination in **First Class with Distinction** provided they pass all the examinations prescribed for the course at the first appearance.

Candidates who pass all the examinations prescribed for the course in the first instance and within a period of two academic years from the year of admission to the course only are eligible for **University Ranking**.

10. Maximum Duration for the completion of the PG Programme

The maximum duration for completion of the PG Programme shall not exceed four years.

11. Commencement of this Regulation

These regulations shall take effect from the academic year 2007-08 that is, for students who are admitted to the first year of the course during the academic year 2007-08 and thereafter.

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Paper-I : 07PMA01

ALGEBRA

Unit-I

Group Theory

Definition of Group – Some examples of Groups – Some Preliminary Lemmas – Subgroups – A Counting principle Normal Subgroups and Quotient groups – Homomorphism – Automorphisms – Cayley's Theorem – Permutation groups.

Unit-II

Ring Theory

Definition and examples of Rings – Some special classes of rings - Homomorphism – Ideals and Quotient Rings – More ideals and Quotient rings – A particular Euclidean Ring – Polynomial Rings – Polynomial over the rational fields – Polynomial Rings over Commutative Rings.

Unit III

Vector Spaces and Modules

Elementary basic concepts – Linear Independence and bases – Dual Spaces – Inner Product Spaces – Modules.

Unit IV

Fields

Extension Fields – Roots of Polynomials – more about roots – The elements of Galois Theory – Solubility by radicals - Galois Groups over the rational - The algebra of Linear Transformations – Characteristic Roots – Matrices – Canonical Forms – Triangular form in Nilpotent Transformation.

Unit V

Canonical Forms

A decomposition of Jordan form – Canonical forms – Rational Canonical forms – Hermitian, Unitary and Normal Transformations – Real Quadratic forms.

Text Book

Content and Treatment as in the Book I.N. Herstein – Topics in Algebra, 2nd Edition, John Wiley & Sons, New York, 2003.

Reference Books

(1) Algebra by Michael Artin, Prentice Hal of India, New Delhi, 1991.

(2) Lectures in Abstract Algebra Volumes I, II and III by N.Jacobson, D.Van Nostrand Co., New York, 1976.

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Paper-II : 07PMA02

ANALYSIS

Unit-I

Derivation

Definition of Derivative – Derivatives and Continuity – Algebra of Derivatives – Chain Rule – One sided derivatives and Infinite derivatives – Function with non-Zero derivative – Zero derivatives and local extrema – Roll's Theorem. The Mean Value Theorem for derivatives – Intermediate Value Theorem for derivatives – Taylor's formula with remainder.

Functions of Bounded Variations

Introduction – Properties of Monotonic functions – Functions of bounded variations – Total Variation – Addition Property of total Variations – Total Variation on [a, x] as a function of x – Function of bounded variation expressed as the difference of increasing functions – continuous function of bounded variation.

Unit-II

The Riemann Stieltje's Integral

Introduction – Notation – The definition of Riemann Stieltjes' Integral – Linear properties – Integration by parts – Change of variable in a Riemann Stieltjes' integral – Reduction to a Riemann Integral – Step Function as Integrators – Reduction to a Reimann Integral to finite sum – Eulers' Summation Formula – Monotonically increasing Integrators – Upper and Lower Integrals – Additive and Linearity properties of Upper and Lower Integrals – Riemann's Condition – Comparison Theorems – Integrators of bounded variation – Necessary and sufficient conditions for existence of Riemann Stieltges Integrals – Mean Value Theorem for Riemann Stieltje's Integrals – The Integral as a function of interval – 2nd Fundamental Theorem of Integral Calculus – Change of variable in a Riemann Integral – Second Mean Value Theorem for Riemann Integrals.

Unit-III

Sequences of Functions

Point wise Convergence of sequences of functions – Examples of sequences real valued functions – Definition of uniform Convergence – uniform Convergence and continuity – The Cauchy condition for uniform Convergence – Uniform Convergence of Infinite Series of function – Uniform Convergence and Riemann Stieltje's Integration – The Taylor's Series generated by a function – Bernstein's Theorem – The Bionomial Series – Abel's Limit Theorem – Tauber's Theorem.

Unit-IV

Measure Theory

Inner Measure – Out Measure – Measurable Set – Measurable Function – properties of Measurable function – Little woods' three principles – The Lebesgue Integral of a bounded function over a set of finite measure – The Integral of a non-negative function – The general Lebesgue Integral.

Unit-V

Differentiation and Integration

Differentiation of monotonic function – Functions of bounded variation – Differentiation of an Integral – Absolute continuity – Infinite products – Products and Series of partial fractions for Trigonometric functions – Gamma function.

Text Books

(1) Mathematical Analysis by Tom Apostol
Narosa Publishing House, 1987.
(2) Real Analysis by H.L. Royden

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Paper – III : O7PMA03

DIFFERENTIAL EQUATIONS

Unit-I

Linear Equations with Constant Coefficients

Non-homogeneous equations of order two – Homogeneous and non-homogeneous equations of order n – Initial value problem – Annihilater method to solve a non-homogeneous equation.

Chapter 2 Sections 6 to 11

Unit-II

Linear Equations with Variable Coefficients

Initial value problems for homogeneous equations – solutions of homogeneous equations – Wornskian and Linear independence – Reduction of the order of homogeneous equation.

Chapter 3 Sections 1 to 5

Unit-III

Elliptic Differential Equations

Elliptic Differential equations – Occurrence of Laplace and Poisson equations – Boundary Value Problems –

Separation of variable method – Laplace equation in cylindrical – Spherical coordinates – Dirichlet and Neuman problems for circle – Sphere.

Chapter 3 Sections 3.1 to 3.9

Unit-IV

Parabolic Differential Equations

Parabolic Differential Equations – Occurrence of the diffusion equation – Boundary conditions – Separation of variable method – Diffusion equation is cylindrical – Spherical coordinates.

Chapter 4 Sections 4.1 to 4.5

Unit-V

Hyperbolic Differential Equations

Hyperbolic Differential Equations – Occurrence of Wave equation – One-dimensional Wave equation – Reduction to Canmical form – 'D' Alembertz solution – Separation of variable method – Periodic solutions – Cylindrical spherical coordinates.

Chapter 5 Sections 5.1 to 5.6

Text Books

(1) E.A.Codington, An introduction to Ordinary Differential Equations, Prentice Hall of India, New Delhi, 1994.

(2) J.N.Sharma and K.Singh, Partial Differential Equations for Engineers and Scientists, Narosa Publication House, Chennai, 2001.

Books for Reference

(1) D.Somasundaram, Ordinary Differential Equations, Narosa Publication House, Chennai – 2002.

(2) I.N.Sneddon, Elements of Partial Differential Equations, Mc Graw Hill, New York, 1964.

(3) K.Sankar Rao, Introduction to Partial Differential Equations, Prentice Hall of India, New Delhi, 1995.

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Paper – IV : 07PMA04

GENERAL TOPOLOGY

Unit–I

Topological Spaces

Topological Spaces – Basis for a Topology – The Order Topology, the product topology on XxY, the subspace topology, closed sets and limit points.

Chapter 2 Section 12 to 17

Unit–II

Continuous Functions

Continuous Functions, the product topology, the metric topology.

Chapter 2 Sections 18 to 21

Unit–III

Connectedness

Connected Spaces, Connected Subspaces of the real line, Components and Local Connectedness.

Chapter 3 Section 23 to 25

Unit-IV

Compactness

Compact spaces -compact subspace of the real line -limit point compactness-local compactness.

Chapter 3 Sections 26 to 29

Unit-V

Countability and Separation Axioms

The Countability Axioms - The separation axioms - Normal spaces -The Urysohn Lemma - The Urysohn metrization theorem -The Tietze extension theorem.

Chapter 4 Sections 30 to 35

Text Book:

James R. Munkres -Topology, 2nd edition, Prentice Hall of India Ltd., New Delhi, 2005.

Books for Supplementary Reading and Reference:

(1) J.Dugundji, Topology, Prentice Hall of India, New Delhi, 1975.
(2) G.F.Simmons, Introduction to Topology and Modern Analysis, McGraw Hill Book Co., New York, 1963.
(3) S.T.Hu, Elements of General Topology, Holden Day Inc. New York, 1965.

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Paper – V : 07PMAZ01 (Optional)

MECHANICS

Unit - I

Mechanical Systems

The Mechanical System - Generalized co-ordinates - Constraints - Virtual work - Energy and Momentum.

Chapter 1 Sections 1.1 to 1.5

Unit - II

Lagrange's Equation

Lagrange's Equation - Derivation of Lagrange's equation - Examples - Integrals of Motion

Chapter 2 Sections 2.1 to 2.3

Unit – III

Hamilton's Equation

Hamilton's Equation - Hamiltons Principle - Hamilton's Equation - Other Variational Principle.

Chapter 4 Sections 4.1 to 4.3

Unit - IV

Hamilton - Jacobi Theory

Hamilton – Jacobi Theory - Hamilton Principle function - Hamilton - Jacobi equation - Separability.

Chapter 5 Sections 5.1 to 5.3

Unit – V

Canonical Transformation

Canonical Transformation - Differential forms and generating functions - Special transformations - Lagrange and Poisson brackets.

Chapter 6: Sections 6.1 to 6.3

Text Book

D.Greenwood, Classical Dynamics, Prentice Hall of India, New Delhi, 1985.

Books for Supplementary Reading and Reference

(1) H.Goldstein, Classical Mechanics, Narosa Publishing House, New Delhi, 2001.
(2) J.L.Synge and B.A.Griffth, Principles of Mechanics, McGraw Hill Book Co., New York, 1970.
(3) N.C.Rane and P.S.C. Joag, Classical Mechanics, Tata McGraw Hill, New Delhi, 1991.

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Paper – V : 07PMAZ02 (Optional)

FLUID DYNAMICS

Unit-I

Kinematics of Fluids in Motion

Real fluids and ideal fluids - Velocity of a fluid at a point, Stream lines – Path lines – Steady and unsteady flows, velocity potential - The velocity vector - Local and particle rates of changes - Equations of continuity - Examples.

Chapter 2 Sections: 2.1 to 2.8

Unit-ll

Equation of Motion of a fluid

Pressure at a point in a fluid at rest - Pressure at a point in a moving fluid - Conditions at a boundary of two invicid immiscible fluids, Euler's equation of motion – Discussion of the case of steady motion under conservative body forces.

Chapter 3 Sections: 3.1 to 3.7

Unit – III

Some three dimensional flows

Introduction - Sources – Sinks and doublets - Images in a rigid infinite plane - Axis symmetric flows - Stokes stream function.

Chapter 4 Sections: 4.1 to 4.3 and 4.5

Unit - IV

Some two dimensional flows

Two dimensional flows - Meaning of two dimensional flow - Use of cylindrical polar co-ordinates - The stream function - complex potential for two dimensional - Irrational incomprehensible flow - complex velocity potential for standard two dimensional flows - Examples.

Chapter 5 Sections: 5.1 to 5.6

Unit –V

Viscous flows

Viscous flows - Stress components in a real fluid – Relation between Cartesian components of stress - Translation motion of fluid elements - The rate of strain quadric and principle stresses - Further properties of the rate of strain quadric - Stress analysis in fluid motion - Relation between stress and rate of strain - The coefficients of viscosity and

Laminar flow - The Navier-Stokes equations of motion of a viscous fluid.

Chapter 8 Sections: 8.1 to 8.9

Text Book

F.Chorlton, Text Book of Fluid Dynamics, CBS Publications, New Delhi, 1985.

Books for Supplementary Reading and Reference

(1) G.K.Batchaelor, An Introduction to Fluid Mechanics, Foundation Books, New Delhi, 1994.
(2) S.W.Yuan, Foundations of Fluid mechanics, Prentice Hall of India Pvt. Ltd., NewDelhi 1976.
(3) R.K.Rathy, An Introduction to Fluid Dynamics, IBH Publishing Company New Delhi, 1976.

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Paper – VI : 07PMA05

COMPLEX ANALYSIS

Unit-I

Introduction to Complex Plane

Arithmetic of the Complex Numbers – Geometry of Complex plane – Extended Complex plane and the Stereographic Projection – Topology of the Complex plane – One point compactification and the Riemann Sphere – Analysis in the Complex Domain – Sequence and Series.

Chapter 1 Sections 1.4 to 1.10

Unit – II

Elementary Properties of Analytic Functions

Introduction to the concept of an analytic function, Power Series, Linear fractional Transformations – Exponential and Trigonometric Functions

Chapter 2 Sections 2.1 to 2.4

Unit – III

Conformal Mappings

Definition and properties of Conformal Mappings, Elementary Conformal Mappings, Physical applications of

conformal mappings – Single valued Branches for multi-valued functions.

Chapter 3 Sections 3.1 to 3.4

Unit – IV

Complex Integral Calculus

Basic definition and properties of Complex Integration – Cauchy's Theorem - General form of Cauchy's Theorem – Cauchy's Integral Formula and its applications.

Chapter 4 Sections 4.1 to 4.4

Unit – V

Complex Integral Calculus (Contd.)

Singularities – Calculus of residues - Computation of integrals - Harmonic Functions.

Chapter 4 Sections 4.5 to 4.8

Text Book

"Complex Analysis", 2nd Edition, V.Karunakaran, Narosa Publishers, New Delhi.

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Paper – VII : 07PMA06

MATHEMATICAL STATISTICS

Unit - I

Probability

Introduction – Sample space - Probability axioms – Combinatorics: Probability on Finite sample spaces - Conditional Probability and Baye's Theorem - Independence of events.

Unit - II

Random Variables and their Probability Distribution

Introduction - Random variables - Probability distribution of a random variable - Discrete and continuous random variables - Function of a random variable.

Unit – III

Moments and Generating Functions

Introduction - Moments of a Distribution Function - Generating functions - Some moment inequalities.

Unit – IV

Multiple Random Variables

Introduction - Multiple random variables - Independent random variables - Functions of several random variables - Covariance, Correlation and Moments - Conditional expectation – Order Statistics and their distributions.

Unit – V

Limit Theorem

Introduction - Modes of Convergence - Weak Law of large numbers – Strong Law of large numbers - Limiting Moment Generating Functions – Central Limit Theorem.

Text Book

An Introduction to Probability and Statistics by Vijay K. Rohatgi and A.K. Md. Ehsanes Saleh.

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Paper – VIII : 07PMA07

FUNCTIONAL ANALYSIS

Unit - I

Banach Spaces

Banach spaces - Definition and examples - Continuous linear transformations - Hahn Banach Theorem.

Chapter 9 Sections 46 to 48

Unit - II

Banach Spaces and Hilbert Spaces

The natural embedding of N in N** - Open mapping theorem - Conjugate of an operator - Hilbert Space - Definition and properties.

Chapter 9 Sections 49 to 51, Chapter 10: Section 52

Unit – III

Hilbert Spaces

Orthogonal Complements - Orthonormal sets - Conjugate space H* - Adjust of an operator.

Chapter 10 Sections 53 to 56

Unit – IV

Operations on Hilbert Spaces

Self adjoint operator - Normal and Unitary Operators Projections.

Chapter 10 Sections 57 to 59

Unit - V

Banach Algebras

Banach Algebras - Definition and examples - Regular and simple elements - Topological divisors of zero - Spectrum - The formula for the spectral radius -The radical and semi-Simplicity.

Chapter 12 Sections 64 to 69

Text Book

G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw Hill Inter. Book Co., New York 1963.

Books for Supplementary Reading and Reference:

(1) W.Rudin, Functional Analysis, Tata McGraw Hill Publ. Co., New Delhi, 1973.
(2) H.C.Goffman and G.Fedrick, First Course in Functional Analysis, Prentice Hall of India, New Delhi, 1987.
(3) D.Somasundaram, Functional Analysis, S.Viswanathan Pvt. Ltd., Chennai, 1994.

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Paper – IX : 07PMAZ03 (Optional)

DIFFERENTIAL GEOMETRY

Unit – I

Theory of Space Curves

Theory of space curves - Representation of space curves - Unique parametric representation of a space curve - Arc-length - Tangent and osculating plane - Principal normal and binomial - Curvature and torsion - Behavior of a curve near one of its points - The curvature and torsion of a curve as the intersection of two surfaces.

Chapter 1 Sections 1.1 to 1.9

Unit - II

Theory of Space Curves (Contd.)

Contact between curves and surfaces - Osculating circle - Osculating sphere - Locus of center of spherical curvature - Tangent surfaces - Involutes and Evolutes - Intrinsic equations of space curves - Fundamental Existence Theorem - Helices.

Chapter I Sections 1.10 to 1.18

Unit - III

Local Intrinsic properties of Surface

Definition of a Surface - Nature of points on a surface - Representation of a surface - Curves on surface - Tangent plane and surface normal - The general surface of revolution - Helicoids - Metric on a surface - Direction Coefficients on a surface.

Chapter 2 Sections 2.1 to 2.10

Unit - IV

Local Intrinsic properties of surface and Geodesic on a surface

Families of curves - Orthogonal trajectories - Double family of curves - Isometric correspondence - Intrinsic properties - Geodesics and their differential equations - Canonical geodesic equation - Geodesics on surface of revolution.

Chapter 2 Sections 2.11 to 2.15 and
Chapter 3 Sections 3.1 to 3.4

Unit - V

Geodesic on a Surface

Normal property of Geodesics - Differential equations of geodesics using normal property - Existence theorems - Geodesic parallels - Geodesic curvature - Gauss Bonnett Theorems - Gaussian curvature - Surface of Constant curvature.

Chapter 3 Sections 3.5 to 3.8 and Sections 3.10 to 3.13

Text Book

D.Somasundaram, Differential Geometry, Narosa Publ. House, Chennai, 2005.

Books for Supplementary Reading and Reference

(1) T.Willmore, An Introduction to Differential Geometry, Clarendan Press, Oxford, 1959.
(2) D.T.Struik, Lectures on Classical Differential Geometry, Addison -Wesely, Mass. 1950.
(3) J.A.Thorpe, Elementary Topics in Differential Geometry, Springer - Verlag, New York, 1979.

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Paper – IX : 07PMAZ04 (Optional)

DIFFERENCE EQUATIONS

Unit – I

Difference Calculus

Difference operator - Summation - Generating function - Approximate summation.

Chapter 2 Sections 2.1 to 2.3

Unit – II

Linear Difference Equations

First order equations -General results for linear equations.
Chapter 3 Sections 3.1 to 3.2

Unit – III

Linear Difference Equations (Contd.)

Equations with constant coefficients - Equations with variable coefficients -Z -transform.

Chapter 3 Sections 3.3 , 3.5 and 3.7

Unit – IV

Stability Theory

Initial value problems for linear systems - Stability of linear systems – Phase plane Analysis for Linear Systems.

Chapter 4 Sections 4.1 to 4.3

Unit – V

Asymptotic Methods

Introduction - Asymptotic Analysis of Sums – Linear equations.

Chapter 5 Sections 5.1 to 5.3

Text Book

W.G. Kelley and A.C.Peterson, Difference Equations, Academic Press, New York, 1991.

Books for Supplementary Reading and Reference

(1) S.N.Elaydi, An Introduction to Difference Equations, Springer - Verlag, New York, 1995.
(2) R.Mickens, Difference Equations, Van Nostrand Reinhold, New York, 1990.
(3) R.P.Agarwal, Difference Equations and Inequalities, Marcel Dekker, New York, 1992.

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Paper – X : 07PMAZ05 (Optional)

DISCRETE MATHEMATICS AND GRAPH THEORY

Unit - I

Mathematical Logic

Connectives – Negation – Conjunction – Disjunction - Statement formula and Truth tables – Condition and bi-conditional well formed formulas – Tautologies - Equivalence of formulas - Duality law – Normal Form – Disjunction Normal Form - Conjunctive Normal Form - Principal Disjunctive Normal Form - Principal Conjunctive Normal Form.

Unit – II

Theory of Inference

Validity using truth table - The Predicate Calculus – Predicates - Statement function Variables and Quantities - Inference Theory of predicate calculus - Valid formula and Equivalence.

Unit - III

Lattice and Boolean Algebra

Lattices and Partially Ordered Sets - Definition and Examples - Some Properties of Lattice - Lattices as Algebra system - Sub lattices - Direct Product and Homomorphism - Boolean Algebra - Definition and Example – Sub-Algebra - Direct Product and Homomorphism - Boolean functions - Boolean forms and Free Boolean Algebra - Values of Boolean Expression and Boolean function.

Unit – IV

Graphs and Paths

Graphs and Simple graphs - Graph Isomorphism - lncidency and Adjacency Matrices - Subgraphs - Vertex degree - Paths and connection - Cycles - Application - The Short path problem.

Unit – V

Trees and Connectivity

Trees - Cut edges and bonds - Cut vertices - Cayley's form - Application - Connector Problem - Connectivity - B1ock - Application - Reliable Communication Networks.

Text Books

(1) J.P.Trembley and R.Manohar, Discrete Mathematical Structures with applications to Comp. Science.

(2) Narasing Deo, Graph Theory with applications to Engineering and Computer Science, Practice Hall of India, New Delhi, 2003.

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Paper – X : 07PMAZ06 (Optional)

NUMERICAL METHODS

Unit I

Numerical Analysis, System of Equations and Unconstraint Optimization, Strepest descent, Newton's method, Fixed point elevation and relaxation method, uniform approximation by polynomials, data fitting, Orthogonal polynomials, least square approximation by polynomials.
Chapter 5 Section 5.1 – 5.3
Chapter 6 Section 6.1 – 6.4 of S.D. Cont & C.D. Boor

Unit – II

Introduction - Power series solution - Pointwise method - Solution by Taylor's series - Taylor's series method for simultaneous first order differential equations - Taylor's series method for higher order differential equations – Picards method for simultaneous first order differential equations – Picards Method for simultaneous second order differential equations.
Chapter 11 Sections 11.1 to 11.9 of Vedamurthy & Iyengar

Unit - III

Euler's Method, improved Euler's method, modified Euler's Method – Runge Method Runge -Kutta Method, Higher order Runge-Kutta methods - Runge-Kutta methods for simultaneous first order differential equations - Runge- Kutta methods fo-r simultaneous second order differential equations.
Chapter 11: Sections 11.10 to 11.20

Unit IV

Numerical solutions to partial differential equations - Introduction Difference Quotients - Geometrical representation of partial difference quotients – Classifi-cations of partial difference equations - Elliptic equation
Chapter 12 Sections 12.1 to 12.5

Unit – V

Solution of Laplace's Equation by Liebmann's interaction process, Poisson equation - its solution - Parabolic equation – Hyperbolic Equation, Solution to partial differential equations by Relaxation method.
Chapter 12 Sections 12.6 to 12.10

Text Books

(1) Elementary Numerical Analysis – An Algorithmic approach – S.D.Coute & C.D.Boor, International Student Edition, McGraw Hill International Book Co.
(2) Numerical Methods – Dr. V.N.Vedamurthy and N.Ch. S.N. Iyengar; Vikas Publishing House Pvt Ltd., 1998.