BHARATHIAR UNIVERSITY, COIMBATORE
Br. I. (b). M Sc Mathematics with Computer Applications
& Compulsory Diploma in Computational Software
(The Curriculum is offered by the University Department under CBCS Pasttern)
(with effect from 2008-2009)

Eligibility for Admission to the Course

A candidate who has passed the Degree Examination **in B.Sc. (Mathematics) or B. Sc. (Mathematics with Computer Applications)** of this University or an examination of some other University accepted by the syndicate as equivalent thereto shall be eligible for admission to the Master Degree of this University.

Subject code	Semester	Course title	Exam				Credit
			Dur.Hrs	CIA	Marks	Total Marks	
MATBC1	I	Algebra	3	40	60	100	4
MATBC2	I	Analysis	3	40	60	100	4
MATBC3	I	Differential Equations	3	40	60	100	4
MATBE1	I	Numerical Methods	3	40	60	100	4
	I	Supportive	2	20	30	50	2
MATBC4	II	Discrete Mathematics	3	40	60	100	4
MATBC5	II	Fluid Dynamics	3	40	60	100	4
MATBC6	II	Programming Languages	3	40	60	100	4
MATBE2	II	Computational Mathematics (Practical Only)	3	40	60	100	4
	II	Supportive	2	20	30	50	2
MATBC7	III	Operations Research	3	40	60	100	4
MATBC8	III	Data Structures	3	40	60	100	4
MATBC9	III	Data Structure (Lab)	3	40	60	100	4
MATBE3	III	Java programming (Theory and Practical)	3	40	60	100*	4
	III	Supportive	2	20	30	50	2
MATBC10	IV	Mathematical Methods	3	40	60	100	4
MATBE4	IV	Data warehousing	3	40	60	100	4
MATB P	IV	Project Work	-	-	-	250#	10

* Theory - 60 marks; Practical - 40 marks
# Project report - 200 marks; Viva-voce – 50 marks

Compulsory Diploma in Computational Software

Paper I	Matlab (Theory – 60 marks and Practical – 40marks)	100
Paper II	Mathematica (Theory – 60 marks and Practical – 40 marks)	100
Paper III	Visual Basic (Theory – 60 marks and Practical – 40 marks)	100
Paper IV	Oracle (Theory – 60 marks and Practical – 40 marks)	100

MATBC1 – ALGEBRA

UNIT-I: Group Theory: Direct products- Group Action on a Set: Isotropy Subgroups- Orbits- Counting Theorems- p-Groups- The Sylow Theorems.

UNIT-II: Applications of the Sylow Theory: Applications to p-Groups and the Class Equation- Further Applications.

Ring Theory: Ring of Polynomials: Polynomials in an Inderterminate- The Equation Homomorphisms- Factorization of Polynomials over a Field.

UNIT-III: Field Theory: Extension Fields - Algebraic and Transcendental Elements- Irreducible polynomial over F-Simple Extension- Algebraic Extensions: Finite Extensions- Structure of Finite Fields.

UNIT-IV: Automorphisms of Fields - Conjugation Isomorphisms- Automorphisms and Fixed Fields- The Frobenius Automorphism- Splitting Fields.

UNIT-V: Separable Extensions- Galois Theory: Normal Extensions- The Main Theorem- Illustrations of Galois Theory: Symmetric Functions.

Treatment As In: "A First Course in Abstract Algebra" by J.B.Fraleigh, Fifth Edition, Addition Wesly Longman, Inc, Reading Massachusetts, 1999.

UNIT-I: Chapter 2, Section: 2.4 (Direct Product only)
Chapter 3, Sections: 3.6, 3.7
UNIT-II: Chapter 4, Section: 4.3, Chapter 5, Sections: 5.5, 5.6
UNIT-III: Chapter 8, Sections: 8.1, 8.3 (Finite Extensions Only), 8.5
UNIT-IV: Chapter 9, Sections: 9.1, 9.3
UNIT-V: Chapter 9, Sections: 9.4, 9.6, 9.7 (Symmetric Functions only)

Reference Books:

1. I.N.Herstein, Topics in Algebra, Blaisdell, New York, 1964
2. M.Artin, Algebra, Prentice-Hall of India, New Delhi, 1991

MATBC2: ANALYSIS

RIEMANN STILTJES INTEGRAL:

Unit-I. Definition and Existence of the Integral – properties of the integral – Integration and differentiation – Integration of vector valued function – rectifiable curves

Unit-II. Uniform convergence and continuity – uniform convergence and integration - uniform convergence and differentiation – equicontinuous families of functions – The Stone Weirstrass theorem

FUNCTIONS OF SEVERAL VARIABLES

Unit-III. Linear transformation – contraction principle – Inverse function theorem – Implicit function theorem – determinants – derivatives of higher order – differentiation of integrals

LEBESGUE MEASURE:

Unit-IV. Outer measure – Measurable sets and Lebesgue measure – Measurable functions – Littlewood's Theorem.

Unit-V. The Lebesgue integral of bounded functions over a set of finite measure – integral of a non – negative function – General Lebesgue Integral – convergence in measure.

Text Books:

1. For Unit-I to III relevant chapters from: Principles of Mathematical Analysis by W. Rudin, McGraw Hill, New York, 1976

2. For Unit-IV and V relevant chapters from: Real Analysis by H.L. Roydon, Third Edition, Macmillan, New York, 1988.

MATBC3: DIFFERENTIAL EQUATIONS

Unit-I. Linear Equations with constant coefficients – Second order Homogeneous equations – Initial value problems – Linear dependence and independence Wronskian and a formula for Wronskian – Non Homogeneous equation of order two.

Unit-II. Homogeneous and Non – Homogeneous Equations of order n – Initial value problems – Annihilator Method to solve a non – homogeneous equation – Algebra of constant coefficients operators.

Unit-III. Linear Equations with variable coefficients - Initial value problems – Existence and Uniqueness Theorems – Solutions to a non – homogeneous equation – Wronskian and Linear dependence – reduction of the order of a homogeneous equation - Homogeneous equation with analytic coefficients – The Legendre equation.

Unit IV: Nonlinear Partial Differential Equations of the first order – Cauchy's method of characteristics – Compatible systems of first order equations – Charpit's method- Special types of First order equations – Jacobi's method.

Unit V: Partial Differential Equations of Second order – The origin of Second-order Equations – Linear Partial Differential Equations with constant coefficients – Equations with variable coefficients – Characteristics curves of second – order equations- Characteristics of equations in three variables.

Text Books:

1. For Unit I-III: An Introduction to Ordinary Differential Equations by E.A.Coddington, Prentice Hall of India Ltd.

2. For Unit IV-V: Elements of Partial Differential Equations by IAN N. SNEDDON, McGraw- Hill Book Company

MATBE1: NUMERICAL METHODS

Unit I

Solution of Nonlinear Equations: Newton's method – Convergence of Newton's method – Bairstow"s Method for quadratic factors. Numerical Differentiation and Integration: Derivatives from Differences tables – Higher order derivatives – Divided difference, Central-Difference formulas – Composite formula of Trapezoidal rule – Romberg integration – Simpson's rules.

Unit II

Solution of System of Equations: The Elimination method – Gauss and Gauss Jordan methods – LU Decomposition method – Matrix inversion by Gauss-Jordan method – Methods of Iteration – Jacobi and Gauss Seidal Iteration – Relaxation method – Systems of Nonlinear equations.

Unit III

Solution of Ordinary Differential Equations: Taylor series method – Euler and Modified Euler methods – Rungekutta methods – Multistep methods – Milne's method – Adams Moulton method.

Unit IV

Boundary Value Problems and Characteristic Value Problems: The shooting method – solution through a set of equations – Derivative boundary conditions – Characteristic value problems – Eigen values of a matrix by Iteration – The power method.

Unit V

Numerical Solution of Partial Differential Equations: (Solutions of Elliptic, Parabolic and Hyperbolic partial differential equations) Representation as a difference equation – Laplace's equation on a rectangular region – Iterative methods for Laplace equation – The Poisson equation – Derivative boundary conditions – Solving the equation for time-dependent heat flow (i) The Explicit method (ii) The Crank Nicolson method – solving the wave equation by Finite Differences.

Treatment As In:

Applied Numerical Analysis' by C.F.Gerald and P.O.Wheatley, Fifth Edition, Addison Wesley, (1998).

Reference Books:

1. S.C. Chapra and P.C. Raymond: Numerical Methods for Engineers, Tata McGraw Hill, New Delhi, (2000)
2. R.L. Burden and J. Douglas Faires: Numerical Analysis, P.W.S.Kent Publishing Company, Boston (1989), Fourth Edition.
3. S.S. Sastry: Introductory methods of Numerical Analysis, Prentice Hall of India, New Delhi, (1998).
4. P. Kandasamy et al.: Numerical Methods, S. Chand & Company Ltd., New Delhi (2003).

MATBC4: DISCRETE MATHEMATICS

Unit I: Logic

Propositions – Logical Connectives - Compound statements – Conditional and Biconditional Propositions – Truth tables – Tautologies and Contradictions – Logical equivalence and implications – Demorgan's Law – Normal forms – PDNF and PCNF – Predicate Calculus – Free and bound variables – Quantifiers – Universe of discourse – Theory of inference – Rules of universal specification and generalization – Arguments – Validity of Arguments.

Unit II: Set Theory

Basic concepts – Notations – Algebra of sets – The power sets – Ordered pairs and Cartesian products – Relation and its types – Properties – Relational Matrix and the graph of relation – Partitions –Equivalence elations – Poset – Hasse diagram – Lattices and their properties – Sublattice –Boolean Algebra – Homomorphism.

Unit III: Functions

Definitions of functions and its Classification – Types – Examples – Composition of functions – Inverse functions – Binary and n-ary operations – Characteristic function of a set – Hashing functions – Recursive functions – Permutation functions.

Unit IV: Graph Theory

Graph Theory: Introduction – Basic terminology – Representation of graphs – connectivity – Eulerian and Hamiltonian graphs – Planar graphs- Directed graphs-Application of Graphs. Trees: Binary tree – traversals of a binary tree – Expansion trees.

Unit V: Grammars and Languages

Definitions – Types of Grammars – Productions – Regular Grammar and Languages – Finite state Automata (FSA) – Deterministic and Non-Deterministic FSA – Conversion of NDFSA to DFSA.

Books For Study:

1. Trembley J.P and Manohar.R , "Discrete Mathematical Structures With applications to Computer Science", Tata Mc Graw- Hill Pub. Co. Ltd, New Delhi, 2003.
2. Ralph. P.Grimmaldi, "Discrete and Combinatorial Mathematics An applied introduction", Fourth edition, Perarson Education, Asia, Delhi, 2002..
3. Hopgaff and Ullman,"Introduction to Automata Theory, "Languages and Computation", Pearson Edition, Asia, Delhi.
4. Doerr Alar and Levasseur Kenneth, 'Applied discrete structures for computer sciences', Gal Gotia publications Pvt. Ltd. (2002).

MATBC5: FLUID DYNAMICS

Unit-I:
Introductory Notions- Velocity- Stream Lines and Path Lines- Stream Tubes and Filaments- Fluid Body- Density- Pressure. Differentiation following the Fluid- Equation of continuity- Boundary conditions- Kinematical and physical- Rate of change of linear momentum- Equation of motion of an inviscid fluid.

Unit-II:
Euler's momentum Theorem- Conservative forces- Bernoulli's theorem in steady motion- energy equation for inviscid fluid- circulation- Kelvin's theorem- vortex motion- Helmholtz equation.

Unit-III:
Two Dimensional Motion- Two Dimensional Functions- Complex Potential Basic singularities- source- sink- Vortex- doublet- Circle theorem. Flow past a Circular cylinder with circulation- Blasius Theorem- Lift force (Magnus effect). Irrotational Motion in Three Dimensions- Spherical Harmonics- Axially Symmetric Field- Stokes's Stream Function- Motion of a Sphere.

Unit-IV:
Viscous flows- Navier – stokes equations- some exact solutions of Navier Stokes equations- Flow between parallel flat plates- Couette flow- Plane Poiseuille flow- Steady flow in pipes: Flow through a pipe- The Hagen Poiseuille flow.

Unit-V:
Laminar Boundary Layer in incompressible flow: Boundary Layer concept- Boundary Layer equations- Boundary Layer along a flat plate- The Blasius solution- Shearing stress and boundary layer thickness- Displacement thickness, momentum thickness- Momentum integral theorem for the boundary layer- The Von Karman Integral relation, The Von Karman Integral relation by momentum law.

Text Books:

1. For Units I and II: Theoretical Hydrodynamics' by L.M.Milne Thomson, Macmillan Company, V Edition (1968).

2. For Unit III: Modern Fluid Dynamics' Vol-I by N.Curle and H.J.Davies, D Van Nostrand Company Ltd., London (1968).

3. For Units IV and V: Foundations of Fluid Mechanics' by S.W.Yuan, Prentice- Hall (1976).

MATBC6: PROGRAMMING LANGUAGES

Unit I:

Principles of object-Oriented Programming: Software crisis – Software evolution – A look at procedure-oriented Programming – Object-oriented Programming Paradigm – Basic Concept of Object-Oriented Programming – Benefits of OOP – Object-Oriented languages – Applications of OOP.

Unit II:

Tokens, Expressions and Control structure: Introduction – Tokens – Keywords – Identifiers and constants – basic data types – User defined data types - Derived data types – Symbolic constants – Type compactability – Declaration of variables – Dynamic insulation of variables – Reference variables – operations in C++ - Scope resolution operator – member Dereferencing operators – memory management operators – Manipulators – type cast operator – expressions and their types – Special assignment expressions – implicit conversions – operator over loading – operator precedence – Control structures.

Unit III:

Functions in C++: Introduction – The main function – Function prototyping – call by reference – return by reference inline functions – default arguments – constant arguments – function over loading – friend and virtual functions – Math library functions Managing Console I/O operations: Introduction – C++ streams – C++ stream classes – Unformatted I/O operations - Formatted I/O operations – Managing output with manipulators.

Unit IV:

Classes and Objects: Introduction – C Structures Revisited – Specifying a class – Defining Member Functions – A C++ Program with class – Making an outside Function Inline – Nesting of Member Functions – Private Member Functions – Arrays within a class – Memory Allocation for Objects – Static Data Members – Static Member Functions – Arrays of Objects – Objects as Function Arguments – Friendly functions – Returning Objects – Constant Member Functions. Constructors and Destructors: Introduction – Constructors – Parameterized Constructors – Multiple Constructors in a class – Constructors with Default Arguments – Dynamic Initializations of Objects – Copy Constructor – Constructing Two dimensional arrays – Constant Objects – Destructors.

Unit V:

Operators Overloading and Type Conversions: Introduction – Defining Operator Overloading – Overloading Unary Operators – Overloading Binary Operators – Overloading Binary Operators Using Friends – manipulating of strings Using Operators – Rules of Overloading Operators.

Inheritance: Extending Classes: Introduction – Defining Derived Classes – Single inheritance – Making a Private Member Inheritable – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Virtual Base Classes – Abstract Classes – Constructors in Derived Classes – Member Classes: Nesting of Classes.

Treatment As In:

Object – Oriented Programming with C++ by E. Balaguruswamy, Tata McGraw-Hill Publishing Company limited, 1999.

Unit I : 1.1 – 1.8
Unit II : 3.1 – 3.24
Unit III : 4.1 – 4.11 and 10.1 – 10.6
Unit IV : 5.1 – 5.17, 6.1 – 6.7 and 6.9 – 6.11
Unit V : 7.1 – 7.7 and 8.1 – 8.12

MATBE2: COMPUTATIONAL MATHEMATICS (PRACTICAL ONLY)

Implementing the Algorithm studied in MATBE 1

MATBC7: OPERATIONS RESEARCH

Unit I:

Introduction to L.P. – Graphical L.P. Solution – Sensitivity analysis – Simplex Method – L.P. solution space in equation form – Transition from graphical to algebra solution – The simplex method – artificial starting solution – Special cases in simplex method applications. Duality – Primal and Dual – relationships – additional simplex algorithm for L.P.

Unit II:

Advanced Linear Programming – Generalized simplex Tableau in matrix form – Decomposition algorithm – Matrix definition of dual problem – optimal dual solution.

Unit III:

Integer L.P. and Dynamic Programming – Integer Programming – Integer Programming algorithm – Gomory cutting plane algorithm – Branch and Bound algorithm - Solution of the Traveling salesperson problem – Deterministic Dynamic programming – Recursive nature of computation in D.P. – Forward and Backward recursion.

Unit IV:

Classical optimization Theory – unconstraint problems – Necessary and sufficient conditions – The Newton-Raphson method – constrained problems – Equality constraints (Jacobi method and Lagrangian method).

Unit V:

Non-linear programming – unconstrained algorithms Direct search method – Gradient method – constraint algorithms – Separable programming – Quadartic programming.

Contents and Treatment As In:

Hamdy A Taha, Operations Research (Seventh Edition) – Prentice Hall of India Private Limited, New Delhi (2004).

Unit-I: Chapter 2: 2.2, 2.3, omit 2.2.3 and 2.3.3.
Chapter 3: 3.1 – 3.5, omit 3.3.3.
Chapter 4: 4.2 and 4.4
Unit-II: Chapter 7: 7.1.2, 7.4 and 7.5
Unit-III: Chapter 9: 9.2 and 9.3, omit 9.2.2 and 9.2.4.
Chapter 10: 10.1 and 10.2
Unit-IV: Chapter 20: 20.1, 20.12, 20.2.1.
Unit-V: Chapter 21: 21.1, 21.2.1, 21.2.2.

MATBC8: DATA STRUCTURES

Unit I: INTRODUCTION & ARRAYS

Introduction: Overview - SPARKS - How to Create Programs - How to Analyze Programs. Arrays: Axiomatization - Ordered Lists - Sparse Matrices - Representation of Arrays.

Unit II: STACKS, QUEUES & LINKED LISTS

Stacks and Queues: Fundamentals - A Mazing Problem - Evaluation of Expressions - Multiple Stacks and Queues. Linked Lists : Singly Linked Lists - Linked Stacks and Queues - Polynomial Addition - Doubly Linked Lists and Dynamic Storage Management.

Unit III: TREES

Basic Terminology - Binary Trees - Binary Tree Representations - Binary Tree Traversal - More on Binary Trees - Threaded Binary Trees - Representation of Binary Trees - Applications of Trees - Counting Binary Trees.

Unit IV: SORTING

Internal Sorting : Searching - Insertion sort - Quick sort - 2-way Merge sort - Heap sort. External Sorting : Storage Devices - Sorting with Disks.

Unit V: GRAPHS & FILES

Graphs : Terminology and Representations - Traversals, Connected Components and Spanning Trees - Shortest paths and Transitive Closure - Activity Networks, Topological Sort and Critical Paths. Files : Files, Queries and Sequential Organizations - Hashed Indexes - File Organizations: Sequential Organizations - Random organizations.

Treatment As In:

Ellis Horowitz, Sartaj Sahni, 'Fundamentals of Data Structures' , Galgotia Book Source P.Ltd., New Delhi,, 2003.

Reference Books:

1. Kruse R.L., Leung BP.Tondo C.L, Data structures and program design in C,PHI,1995.
2. Tanenbaum A.S, Langram Y., Augestein M.J., Data structures using C, PHI, 1992.
3. Jean Paul tremblay, Paul G.Sorenson, An Introduction to data structures with Application, Tata McGraw Hill,1995.

MATBC9-DATA STRUCTURE (LAB)

Implementing the Algorithm studied in MATBC8

MATBE3: JAVA PROGRAMMING (Theory and Practical)

Unit-I

Basic concepts of object oriented programming – benefits & applications of oop. JAVA evolution: java features – java and c – java and C++ - java and internet Overview of JAVA language: introduction- implementation of java program – creating, compiling, running the program , JVM .

Unit – II

Data Types – operators and Expressions – Branching: Decision making with if statement, if…else statement, nesting if…else statements, the else if ladder, switch statement. Looping: The while statement, do statement, for statement- additional features of for loop: nesting of for loops; jumps in loops – jumping out of a loop; skipping a part of loop; labeled loops

Unit – III

Classes and Objects: Introduction; adding variables, creating and adding methods, constructors, overloading; Inheritance – defining a subclass, multilevel inheritance, hierarchical inheritance, overriding methods, visibility control, rules of thumb.

Unit – IV

Packages – Multithreaded Programming: creating threads, extending the thread class-implementing the run() method, starting new thread, stopping and blocking a thread- life cycle of a thread – new born state, running state, blocked state, dead state.

Unit -V

Applet: Basics – Architecture – Passing parameters to Applets – Skeleton – simple Applet – AWT.

Reference Books:

1. The JAVA Programming Language by Ken Arnold, James Gosslings.
2. The Complete Guide to JAVA Database Programming by Matthew siple,TMH
3. Programming with JAVA a Primer – E.Balagurusamy,TMH
4. JAVA For you by Koparkar,TMH
5. The Complete Reference - Java 2.0, Herbert Schildt, Fourth Edition, TATA McGraw Hill.

MATBC10: MATHEMATICAL METHODS

Unit-I: FOURIER TRANSFORMS: Fourier Transforms – Defn. Inversion theorem – Fourier cosine transforms - Fourier sine transforms – Fourier transforms of derivatives - Fourier transforms of some simple functions - Fourier transforms of rational functions – The convolution integral – convolution theorem – Parseval's relation for Fourier transforms – solution of PDE by
Fourier transform.
Laplace's Equation in Half plane
Laplace's Equation in an infinite strip
The Linear diffusion equation on a semi-infinite line
The two-dimensional diffusion equation.

Unit-II: HANKEL TRANSFORMS: Definition – Elementary properties of Hankel Transforms - Hankel Transforms of Derivatives of functions - Hankel Transforms of some elementary functions - The Parseval relation for Hankel transforms – Relation between Fourier and Hankel transforms – Application to PDE.
Axisymmetric Dirichlet problem for a half – space.
Axisymmetric Dirichlet problem for a thick plate

Unit-III: INTEGRAL EQUATIONS: Types of Integral equations – Equation with separable kernel - Fredholm Alternative Approximate method – Volterra integral equations – Classical Fredholm theory – Fredholm's First, Second, Third theorems.

Unit-IV: Application of Integral equation to ordinary differential equation – initial value problems – Boundary value problems – singular integral equations – Abel Integral equation

Unit-V: CALCULUS OF VARIATIONS: Variation and its properties – Euler's equation – Functionals of the integral forms Functional dependent on higher order derivatives – functionals dependent on the functions of several independent variables – variational problems in parametric form.

Text Books:

1. For Unit I and II: The Use of Integral Transforms by I.N.Sneddon, Tata Mc Graw Hill, New Delhi, 1974.
2. For Unit III and IV: Linear Integral Equations Theory and Technique by R.P.Kanwal, Academic Press, New York, 1971.
3. For Unit V: Differential Equations and Calculus of Variations – by L.Elsgolts, Mir Publishers, Moscow, 1970.

MATBE4-DATA WAREHOUSING

Unit I
Introduction – Delivery process – System processes – Process architecture.

Unit II
Database Schema – Partitioning strategy – Aggregations – Data Marting.

Unit III
Metadata – System and Data warehouse process managers - Hardware architecture – Physical layout.

Unit IV
Security – Backup recovery – Service level agreement – Operating the data warehouse.

Unit V
Capacity planning – Tuning the Data warehouse – Testing the Data warehouse – Data warehouse futures.

BOOK FOR STUDY :

1. “Data warehousing in the real world”, Sam Anahory, Dennis murray, Pearson education, 2003

DIPLOMA PAPER – I

MATLAB (Theory-60 marks and Practical-40 marks)

Unit – I

Introduction - Basics of MATLAB, Input – Output, File types – Platform dependence – General commands.

Unit – II

Interactive Computation: Matrices and Vectors – Matrix and Array operations – Creating and Using *Inline* functions – Using Built-in Functions and On-line Help – Saving and loading data – Plotting simple graphs.

Unit – III

Programming in MATLAB: Scripts and Functions – Script files – Functions files- Language specific features – Advanced Data objects.

Unit – IV

Applications – Linear Algebra - Solving a linear system – Finding Eigen values and Eigen vectors – Matrix Factorizations.

Unit – V

Applications – Data Analysis and Statistics – Numerical Integration – ordinary differential equations – Nonlinear Algebraic Equations.

Treatment As In:

RUDRA PRATAP, Getting Started with MATLAB – A Quick Introduction for Scientists and Engineers, Oxford University Press, 2003.

Reference Books:

1. William John Palm, Introduction to Matlab 7 for Engineers, McGraw-Hill Professional, 2005.

2. Dolores M. Etter, David C. Kuncicky, Introduction to MATLAB 7, Prentice Hall, 2004

LAB LIST

1. Plotting a function.
2. Polar plot.
3. Addition of two matrices.
4. Finding the determinant of a matrix.
5. Finding Eigen values and Eigen vectors of a matrix.
6. Straight line fit.
7. Exponential curve fitting.
8. Solving a first-order linear ODE.
9. Solving a second-order nonlinear ODE.
10. Solving nonlinear algebra equations.

DIPLOMA PAPER – II

MATHEMATICA (Theory-60 marks and Practical-40 marks)

Unit -I

Running mathematica – Numerical calculations – Building Up calculations – Using the Mathematica system.

Unit -III

Algebraic calculations – systematic computation – values of symbols – transforming Algebraic expressions – simplifying Algebraic expressions – putting expression into different forms – simplifying with assumption – symbolic mathematics – sums and products – relation and logical operators – solving equations – Inequalities – differential equations – power series – limits – Integral transforms – recurrence equations – mathematical notation and note books.

Unit -III

Numerical Mathematics: Basic operations – Numerical sums, product and integrals - Numerical equation solving – Numerical differential equations – Numerical optimization – Manipulating numerical data – Statistics.

Functions and Programs: Defining functions – functions as procedures – Repetitive operations – Transformation rules for functions – Lists – Collecting objects together – Making tables of values – Vectors and matrices – Getting pieces of lists – Testing and searching list elements – adding, removing and modifying list elements – combining lists – rearranging lists – ordering in lists.

Unit –IV

Graphics: Basic plotting – options – Redrawing and combining plots – manipulating options – Three-dimensional surface plots – converting between types of Graphics.

Unit -V

Input and output in Notebooks: Entering Greek letters – Two dimensional inputs - editing and evaluating two – dimensional expressions – entering formulas – entering tables and matrices – subscripts, bars and other modifiers – Non-English characters and key boards – other mathematical Notation – Forms of input and output – mixing text and formulation - displaying and printing mathematica notebooks.

Treatment As In:

Stephen Wolfram, **The Mathematica Book**, Fifth Edition, Wolfram Media Inc., 2003

DIPLOMA PAPER – III
VISUAL BASIC (Theory – 60marks and Practical- 40 marks)

Unit – I
Visual basic fundamentals – Data types, constants and variables – Conditional statements – Loops – Arrays.

Unit – II
Strings and Typecasting – Intrinsic controls – Visual basic menus – Forms and dialog boxes.

Unit – III
Handling keyboard and mouse input – Time and timers - Subroutines and functions.

Unit – IV
Visual basic Database programming – Data environment – DAO,RDO,ADO,ADO.

Unit – V
Building interfaces from the database – Data reports – Making reports.

Reference Books:

1. Visual Basic 6 programming Bible, Eric A. Smith, Valor Whisler and Hanic marquis, Comdex Computer publishing, First edition, 1998.
2. Using Visual Basic 6, Bob Reselman, Wayne Pruchniak A.Peasley Eric A. Smith, Prentice Hall of India.

DIPLOMA PAPER – IV
ORACLE (Theory – 60marks and Practical- 40 marks)

Unit – I
ORACLE 8.0 – Data types – Basic parts of SQL, DDL, DML, and TCL.

Unit – II
String functions – Group value functions – Single value functions – Data functions and views.

Unit – III
Indexes – Sequences – Sub queries – Reports in SQL PLUS.
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Unit – IV
Introduction to PL/SQL – PL/SQL Block – Exception handling.

Unit – V
Triggers – Procedures – Cursors.

Book For Study:

1. ORACLE 8 The Complete Reference, George Koch Kevin Loney, TATA McGraw Hill.