PERIYAR UNIVERSITY
SALEM – 11

M.Sc., (CA) Syllabus for candidates admitted from the academic year 2008 – 2009 and thereafter under Choice Based Credit System (CBCS)

[Semester Pattern with Continuous Internal Assessment]

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6.	**Thiru. R. V. M. Rengarajan,** **Lecturer in Mathematics,** **Sengundar Arts & Science College,** **Tiruchengode – 637 205.**	**Member**
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PERIYAR UNIVERSITY, SALEM – 11

FACULTY OF SCIENCE

M.SC., DEGREE COURSE

(SEMESTER SYSTEM)

BRANCH – I(C): MATHEMATICS (Computer Applications)

(Choice Based Credit System)

REGULATIONS AND SYLLABUS

(with effect from 2008-2009 onwards)

1. Objectives of the course:

Mathematics to-day is penetrating all fields of human endeavor and it is necessary to train the students to scope with the advanced developments in various fields of Mathematics. The objectives of this application oriented post-graduate course are the following:

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

(b) To orient the students in the application aspects of computer in solving mathematical problems.

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 (Computer Applications) 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 (Computer Applications) shall consist of two academic years divided into four semesters. Each semester consists of 90 working days.

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.

M.Sc Mathematics (CA)

(For the candidate admitted from the year 2008 onwards)

Sem	Core Course	PaperCode	Core Course	Hrs	Credit	Marks		
						CIE	EA	Total
I	I	P08MACA01	Algebra	6	5	25	75	100
	II	P08MACA02	Real Analysis	6	5	25	75	100
	III	P08MACA03	Differential Equations	6	5	25	75	100
	IV	P08MACA04	Discrete Mathematics	6	5	25	75	100
	V	P08MACA05	Principles of Programming and Information Technology	6	5	25	75	100
II	VI	P08MACA06	Numerical Analysis	6	5	25	75	100
	VII	P08MACA07	Complex Analysis	6	5	25	75	100
	VIII	P08MACA08	Mathematical Statistics	6	5	25	75	100
	IX	P08MACA09	C++ Programming and Data Structure	6	5	25	75	100
	X	P08MACAP01	C++ Programming and data structures Practical	4	4	40	60	100
III	XI	P08MACA10	General Topology	6	5	25	75	100
	XII	P08MACA11	Differential Geometry	6	5	25	75	100
	XIII	P08MACA12	Optimization Techniques	6	5	25	75	100
	XIV	P08MACA13	Graph Theory	6	5	25	75	100
	XV	P08MACA14	Functional Analysis	6	5	25	75	100
IV	XVI	P08MACA15	Measure Theory and Integrations	6	5	25	75	100
	XVII	P08MACA16	Java Programming	6	5	25	75	100
	XVIII	P08MACAP02	Java Programming Practical	6	4	40	60	100
	XIX		Elective (To be chosen from the list)	6	5	25	75	100
	XX	P08MACA03	Project	6	6		100	100
			Total		90			2000

Sem	PaperCode	Elective
	P08MACAE01	Fuzzy sets and their applications
	P08MACAE02	Number Theory
	P08MACAE03	Database Technology
	P08MACAE04	Fluid Dynamics

5. Examinations:

The examination shall be of **THREE HOURS** duration for each paper at the end of each semester. The candidate failing in any subject(s) will be permitted to appear for each failed subjects(s) in the subsequent examination.

Practical examinations for PG course should be conducted at the end of the even semester only.

At the end of fourth semester viva-voce will be conducted on the basis of the Dissertation/ Project report submitted by the student. The viva-voce will be conducted by one internal and one external examiner.

6. Question paper pattern:

Question paper pattern for Theory Examination

Time: Three Hours Maximum Marks: 75

Part – A (5x5 = 25 Marks)

Answer **ALL** questions

Two questions from each unit with internal choice

Part – B (5 x 10 = 50 Marks)

Answer **ALL** questions.

Two questions from each unit with internal choice

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Question paper pattern from Practical Examination

Time: 3 Hours Maximum Marks: 100

Passing Minimum: 50 Marks (Aggregate of examination and Record)

Practical Examination: 60 Marks

CIA: 40 Marks

(No passing minimum for records)

There will be one question with or without subsections to be asked for the practical examination. Every question should be chosen from the question bank prepared by the examiner(s). Every fourth student should get a new question i.e. each question may be used for at most three students.

7. Dissertation:

(a) Topic:

The topic of the dissertation shall be assigned to the candidate before the beginning of third semester and a copy of the same should be submitted to the University for approval.

(b) No. of copies of project/dissertation;

The students should prepare three copies of dissertation and submit the same for the evaluation by Examiners. After evaluation one copy is to be retained in the college library and one copy is to be submitted to the University (Registrar) and one copy can be held by the student.

Format to be followed:

The formats/certificate for project/dissertation to be submitted by the students is given below:

Format for the preparation of project work:

(a) Title page

(b) Bonafide Certificate

(c) Acknowledgement

(d) Table of contents

CONTENTS

Chapter No.	TITLE	Page No.
1.	Introduction	
2.	Title of the Chapters	
3.	Conclusion	
4.	References	

Format of the Title Page:

TITLE OF THE PROJECT/DISSERTATION

Project/Dissertation Submitted in part fulfillment of the requirement for the Degree of Master of Science in MATHEMATICS to the Periyar University, Salem – 636 011

By

Student's Name :

Register Number :

College :

Year :

Format of the Certificate:

CERTIFICATE

This is to certify that the dissertation entitled …….. submitted in part fulfillment of the requirement of the degree of Master of Science in Mathematics (Computer Applications) to the Periyar University, Salem is a record of bonafide research work carried out by …… under my supervision and guidance and that no part of the dissertation has been submitted for the award of any degree, diploma, fellowship or other similar titles or prizes and that the work has not been published in part or full in any scientific or popular journals or magazines

Date:

Place: Signature of the Guide

Signature of the Head of the Department

Guidelines for approval of PG guides for guiding students in their research for submitting project / dissertation:

A person seeking for recognition, as guide should have:

(a) A Ph.D. degree or M.Phil/ M.A. / M.Sc., degree with first class / second class and

(b) Should have 3 years of active teaching / research experience

8. Passing Minimum

The candidate shall be declared to have passed the examination if the candidate secures not less than 50% marks (i.e. 38 marks) in the University examination in each paper and not less than 50% marks (i.e. 12 marks) in the Continuous Internal Assessment

For the Practical paper, a minimum of 50 marks out of 100 marks in the University examination and the record notebook taken together is necessary for a pass. There is no passing minimum for the record notebook. However submission of record notebook is a must.

For the Project work and viva-voce a candidate should secure 50% of the marks for pass. The candidate should attend viva-voce examination to secure a pass in that paper.

Candidate who does not obtain the required minimum marks for a pass in a paper Project Report 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 candidate 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 the **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 eight semesters.

11. Commencement of this Regulation:

These regulations shall take effect from the academic year 2008-09, that is, for students who are admitted to the first year of the course during the academic year 2008-09 and thereafter.

12. Transitory Provision:

Candidates who were admitted to the PG course of study before 2008-2009 shall be permitted to appear for the examinations under those regulations for a period of three years, that is, up to and inclusive of the examination of April / May 2011. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

CORE COURSE – I P08MACA01

Algebra

Unit I:

Another counting principle, Sylows theorem, Direct product, Finite abelian groups(Chapter 2 Sections 2.11 to 2.14)

Unit II:

Ring theory: Polynomial rings – rings over rational field; rings over commutative ring(Chapter 3 Sections3.9 to 3.11)

Unit III:

Vector spaces and modules vectorspaces – Dual spaces – Inner product spaces; modules. (Chapter 4 Sections 4.3 to 4.5)

Unit IV:

Field theory: Extension field – roots of polynomials; more about roots(Chapter 5 Sections 5.1, 5.3 and 5 .5)

Unit V:

Galois Theory: Elements of Galois theory – Solvability by radicals. Galois groups over the rational (Chapter 5 Section 5.6, 5.7 and 5.8)

Text book:

I.N Herstein : Topics in Algebra 2nd Edition John Wiley and Sons New York 2003.

Reference:

1.S.Lang Algebra 3rd Edition Addison Wesley, Mass 1993.

2. John B.Fraleigh – A first course in abstract Algebra - Addison Wesley Mass 1982.

3. M.Artin Algebra Prentice Hall of India New Delhi 1991.

CORE COURSE – II P08MACA02

Real Analysis

Unit I:

Functions of bounded variations: Introduction, Properties of monotonic functions, functions of bounded variation, Total Variation, Additive property of total variation, Total variation on [a,x], Functions of b.v. expressed as the difference of increasing functions. Continuous function of b.v(6.1 to 6.8)

Unit II:

The Riemann-Stieltjes Integral: Introduction Notation, The definition of R.S Integral, Linear properties, Integration by points, change of variable in R.S Integral, Reduction of a R.I, Euler's Summation formula, Monotonically increasing integrations, upper and lower integrals, additive and linearity property of upper and lower integral, Riemarri's Condtion (7.1 to 7.13)

Unit III:

Sequence of functions: Power series, Multiplication of power series, The substations theorem, The Taylor's series generated by a function, Bensteiri's Theorem, The binomial series, Abel's limit theorem, Tauber's Theorem (9.14 to 9.16 ; 9.19 to 9.23)

Unit IV:

The Lebergue Integral: Introduction, The integral of a step function, Monotonic sequence of step functions, Upper functions and their integrals, The class of L.I function on a general interval, Basic properties of L.I Lebergue Integration and sets of measure zero. The Levi motor convergence theorems, The Lebessgue Dominated convergence Theorem (10.1 to 10.4 ; 10.6 to 10.10)

Unit V:

Fourier Series and Fourier Integrals: Introduction Orthogonal System of functions, The theorem on best approximation, The F.S of a fum relative to an orthonormal system. Properties of F.C, The Riesz Fircher theorem The Rieman-Lebergue lemma, The Dirichlet intergns, An integral representation for the partial sums of F.S Riemann's localization theorem, Ceraro summabiltity of F.S Consequences of Fejor's theorem, the Weiostrass approximation theorem (11.1 to 11.2 except 11.7, 11.12)

Text Book

Tom M. Apostal, Mathematical Analysis 2nd edition Narason Publishing House Delhi, Bombay, Madras.

Reference Book

R.Goldberg, Methods of Real Analysis Oxford & IBH Publishing Co. Pvt Ltd New Delhi & Kolkata.

CORE COURSE – III P08MACA03

Differential Equations

Unit I:

General Solution of Homogeneous Equation:

The general solution of the Homogenous Equation – The use of known solution to find another – The method of variation of parameter – Power series solutions. (Chapter 3 : Sections 15,16,17,19) (Chapter 5: Sections 26,27)

Unit II:

Power Series Solutions:

Regular – Singular Points – Gauss's Hyper geometric equation – The point at infinity – Legendre Polynomial – Bessel functions – Properties of Legendre's Polynomials – Bessel Functions. (Chapter 5 : Sections 28-31) (Chapter 6 : Sections 32-35)

Unit III:

Existence and Uniqueness:

Linear systems of first order equations – Homogenous equations with constant coefficients – The exact and uniqueness of solutions of initial value problem for first order ordinary differential equation. The method of successive approximations – Picard's theorem. (Chapter 7 : Sections 37-38) (Chapter 11: Sections 55,56)

Unit IV:

First order partial differential equations:

Partial differential equations of first order in two independent variables – Formulation – Solution – Integral surfaces passing through a curve – Surfaces orthogonal to a given system – Compactibility – Classification of solutions of first order equation – Solutions of non –linear equation – Charpits Method – Jacobi Method.

(Chapter 1 : Sections 1.1 – 1.9)

Unit V:

Second Order Partial Differential Equations:

Origin of second order partial differential equations – Linear partial differential equations – Method of solving of second order partial differential equations – Canonical forms – Adjoint operator.(Chapter 2 : Sections 2.1 - 2.6)

Text Books:

1. G.F.Simmons – Differential Equations with Application and Historical Notes – TataMcGraw Hill, New Delhi,1984. (For Units I to III)
2. J.N. Sharma and K.Singh, Partial Differential Equations for Engineers and Scientist, Narosha Publishing House, New Delhi, 2000 (For Units IV and V)

References:

1. I.N. Sneddon, Elements of Partial Differential Equations, McGraw Hill, New Delhi,1983.
2. Shepley L.Ross, Differential Equations, John Wiley & Sons, New York,1984.
3. D. Somasundaram, Ordinary Differential Equations, Narosa Publishing House, Chennai – 2002.

CORE COURSE – IV P08MACA04

Discrete Mathematics

Unit I:

Theory of inference:

Consistency of premises validity using truth table – Consistency of premises – Predicates – 15e statement function, Variables and quantifiers – Predicate formulae – Free and bound variables – Theory of inference for the predicate calculus (Chapter 1: Sections 1- 4.1, 1 - 4.2, 1 - 5.1, 1 - 5.2,1 - 5.3, 1 - 5.4, 1 - 6.4)

Unit II:

Set Theory:

Functions – Definition and introduction – Composition of functions – Inverse functions – Binary and n-ary Operations – Characteristic function of a set – Hashing functions – Peuno axioms and mathematical induction – Cardinality. (Chapter 2: 2 - 4.1, 2 - 4.2, 2 – 4.3, 2 – 4.4,2 – 4.5, 2 – 4.6, 2 – 5.1, 2 – 5.2)

Unit III:

Algebraic Structures:

Groups: Definition and Examples – Subgroups and homomorphism - Cosets and Lagrange's Theorem – Normal subgroups – Algebraic systems with Two Binary Operations.(Chapter 3 : Sections 3 – 5.1, 3 – 5.2, 3 – 5.3, 3 – 5.4, 3 – 5.5)

Unit IV:

Lattices and Boolean algebra:

Lattices as Algebraic Systems – Sub lattices, direct product and homomorphism – Boolean Algebra Definition and examples – Sub Algebra. Direct Product and homomorphism – Boolean functions, Boolean forms and free Boolean Algebras – Values of Boolean expression and Boolean functions. (Chapter 4: Sections 4 – 1.3, 4 – 1.4, 4 – 2.2, 4 – 3.4, 4 – 3.2)

Unit V:

Graph Theory:

Basic definitions – Paths – Rechability and Connectedness – Matrix representation of Graphs – Trees – Finite state machine: Introductory special circuits – Equivalence of finite state machines (Chapter 5: 5 – 1.1, 5 - 1.2, 5 – 1.3, 5 – 1.4)(Chapter 4: Sections 4 – 6.1, 4 – 6.2)

Text Book:

1. J.P. Trembley and R.Manohar, Discrete Mathematical Structures applications to Computer Science Tata McGraw Hills New Delhi, 1997.

References:

1. James C.Abbott, Sets, Lattices and Boolean algebra, Allya and Bacon Boston, 1969.
2. H.G.Flegg Boolean Algebra and its applications. John Wiley and Sons Inc. NewYork, 1974.

CORE COURSE – V P08MACA05

Principles of Programming and Information Technology

Unit I:

Constants – Variables – Data Types – Operators – Declaration – I/O – Decision making – Branching and Looping – Arrays – Strings.

Unit II:

The C Pre Processor – Pointers – Functions – Files.

Unit III:

Components of Computers – types of Computer – Memory types and devices – Processors – High level languages – Translators. Software: Definition – Types of Software tools. Operating System : Definition – Needs of Operating System – History of Operating System – Classification of Operating System. Software Engineering: Definition – Need for Software Engineering – Testing – Types.

Unit IV:

Data Communication and networking : Types of Communication – Need of network – Transmission media – Network Topologies – LAN Transmission Control – Protocol/Internet Protocol (E-Mail HTML, Web Page, WWW, FTP). Multimedia – Definition – Software Engineering Component – Hardware Component – Application.

Unit V:

WAP – WAP Transmission model – Application. Blue tooth – Application. GPS – Application – Data mining – E Commerce – Fuzzy System.(Basic Concepts Only)

References:

1. Ansi C – E Balagurusamy.
2. Introduction to IT – ITL Education Solution Ltd.
3. Computer Science and Information Technology – S. Khandare
4. Fundamentals of Computer Science – R. Rajaraman.
5. Computer Network – Andrew Techenbaum
6. Multimedia – Making it work toy Vaughan
7. Software Engineering – Roger Pressman.
8. Information Technology – Leon and Leon.

CORE COURSE – VI P08MACA06

Numerical Analysis

Unit I :

Numerical Solutions to ordinary differential equation:

Numerical solutions to ordinary differential equation – 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 – Predictor – Corrector methods – Milne's method – Adam – Bashforth method (Chapter 11: Sections 11.1 to 11.6 and Sections 11.8 to 11.20)

Unit II :

Picard and Euler Methods:

Picard's Method of successive approximations – Picard's method for simultaneous first order differential equations – Picard's method for simultaneous second order differential equations – Euler's Method – Improved Euler's method – Modified Euler's Method. (Chapter 11: Sections 11.7 to 11.12)

Unit III :

Runge – Kutta Method:

Runge's method – Runge-Kutta methods – Higher order Runge-Kutta methods- Runge-Kutta methods for simultaneous first order differential equations – Runge-Kutta methods for simultaneous second order differential equations. (Chapter 11: Sections 11.13 to 11.17)

Unit IV :

Numerical solutions to partial differential equations:

Introduction Difference Quotients – Geometrical representation of partial differential quotients – Classifications of partial differential equations – Elliptic equation – Solution to Laplace's equation by Liebmann's iteration process. (Chapter 12: Sections 12.1 to 12.6)

Unit V :

Numerical Solutions to partial differential equations (contd.)

Poisson equation – its solution – Parabolic equations – Bender – Schmidt method – Crank – Nicholson method – Hyperbolic equation – Solution to partial differential equation by Relaxation method. (Chapter 12: Sections 12.7 to 12.10)

Text Book:

V.N Vedamurthy and Ch. S.N.Iyengar; Numerical Methods, Vikas Publishing House Pvt Ltd., 1998.

CORE COURSE – VII P08MACA07

Complex Analysis

Unit I:

Power series expansions:

Weiestrass's theorem – The Taylor series – The Laurent's series, partial fractions – Infinite products – Canonical products. (Chapter 5 : Sections 1 and 2.1,2.2, & 2.3)

Unit II:

Entire functions:

Jenson's formula – Hadamards theorem Normal Families: Equicontinuity – Normality and compactness – Arzela's theorem – familier of analytic functions – The classical definition (Chapter 5 : Sections 3 and 5)

Unit III:

Conformal mapping:

The Riemann mappping theorem, conformal mapping of polygons. A closure look at harmonic functions.(Chapter 6 : Sections 1,2 & 3)

Unit IV:

Elliptic functions :

Simply periodic functions, Representation by exponentials – The Fourier development – Functions of finite order. Doubly periodic functions : The period module – Unimodular transformation the canonical basis – General properties of elliptic functions (Chapter 7 : Sections 1 & 2)

Unit V:

The Weiestrass's theorem :

The Weiestrass's function – The functions (z) and $\sigma(z)$. The differential equation – Problems (Chapter 7 : Sections 3.1,3.2,& 3.3)

Text book:

L.V.Ahlfors, Complex Analysis, 3rd Edition, McGraw Hill Indian Edition, New Delhi, 1979.

Reference:

1. J.B.Conway, Functions of one complex variable, Narosa publishing house, New Delhi, 1980
2. S. Ponnusamy, Foundations of Complex Analysis , Narosa Publishing house, New Delhi , 2004.

CORE COURSE – VIII P08MACA08

Mathematical Statistics

Unit I:

Probability and Random Variables:

Probability – Axioms – Combinatorics, Probability on finite sample spaces – Conditional probability and Baye's theorem - Independence of events – Random variables – Probability distribution of a random variable – Discrete and continuous random variables – Function of a random variable. (Chapter 1: Sections 1.3 to 1.6 and Chapter 2: Sections 2.2 to 2.5)

Unit II:

Moments and Generating Functions:

Moments of a distribution function – Generating functions – Some moment inequalities. (Chapter 3: Sections 3.2 to 3.4)

Unit III:

Multiple Random Variables:

Multiple random variables – Independent random variables – Functions of several random variables. (Chapter 4: Sections 4.2 to 4.4)

Unit IV:

Multiple Random Variables (Contd.):

Covariance, Correlation and moments – Conditional expectation – Some discrete distributions – Some continuous distributions. (Chapter 4: Sections 4.5 and 4.6 and Chapter 5: Sections 5.2 to 5.3)

Unit V:

Limit Theorems:

Modes of convergence – Weak law of large numbers – Strong law of large numbers – Central limit theorems. (Chapter 6: Sections 6.2 to 6.4 and 6.6)

Text Book:

V.K. Rohatgi and Statistics, John Wiley Pvt. Singapore, 2001.

Reference:

1. G.G. Roussas, A First Course in Mathematical Statistics, Addition Wesley Publ. Co. Mass, 1973.
2. M. Fisz, Probability Theory and Mathematical Statistics, John Wiley, New York, 1963.
3. E.J. Dudewisg and S.N. Mishra, Modern Mathematical Statistics, John Wiley, New York, 1988.

CORE COURSE – IX P08MACA09

Programming in C++ and Data Structures

Unit I:

Principles of OOP – Tokens – Expressions, Control Structures – Functions – Classes and Objects – Constructors and Destructors.

Unit II:

Operator overloading and type conversion – Inheritance – Pointers, Virtual Functions and Polymorphism – Managing console I/O Operations – Working with files.

Unit III:

Definitions of a Data Structure – Primitive and composite data types – Arrays – Operations on Arrays – Application stock – Infix – Postfix – Conversion – Recursive maze problem.

Unit IV:

Queues – Operations on Queues – Application – Circular Queues – Single linked list – Operations – Applications – Representation of a polynomial – Polynomial addition – Doubly linked list – Operations – Applications – Ordering of books in library.

Unit V:

Trees – Graphs – Binary Trees – Conversion of Forest Binary Trees – Tree Traversals – Graph definition – Types of Graphs – Hashing – Tables and Hashing function – Transversal short path – Dijikstra's Algorithm.

Text Books:

E. Balagurusamy, Object Oriented Programming in C++, Tata McGraw Hill Publishing co. Ltd., New Delhi, 1999.(For Units I and II).

E. Horowitz and Sahani, Fundamentals of Computer Algorithm, CBS Publishers, New Delhi, 1984. (For Units III, IV, and V)

References:

1. S.B. Lipman and J.Lafer, C++ Primer, Addition Wesley, Mass., 1998.
2. L. Sarat, Data Processing Logic, McGraw Hill, Singapore, 1985.
3. D. Ravichandran, Object Oriented Programming with C++, Tata McGraw Hill Publishing Co.Ltd., New Delhi, 1998.

CORE COURSE – X P08MACAP01

Practical in C++

1. **Arrays**
   - 1.1. Operations on Arrays
   - 1.2. Linear Search
   - 1.3. Binary Search
2. **Sorting**
   - 2.1. Bubble Sort
   - 2.2. Selection Sort
   - 2.3. Insertion Sort
   - 2.4. Shell Sort
   - 2.5. Quick Sort
   - 2.6. Heap Sort
3. **Stacks and Queues**
   - 3.1. Operations on Stack
   - 3.2. Operations on Queue
   - 3.3. Operations on Priority Queue
   - 3.4. Operations on Circular Queue
4. **Linked Lists**
   - 4.1. Singly Linked List
   - 4.2. Doubly Linked List
   - 4.3. Double-ended List
5. **Recursion**
   - 5.1. Towers of Honoi
   - 5.2. Merge Sort
6. **Binary Tree Traversal**

Text Books:

1. E. Balagurusamy, Object Oriented Programming in C++, Tata McGraw Hill Publishing co. Ltd., New Delhi, 1999
2. E. Horowitz and Sahani, Fundamentals of Computer Algorithm, CBS Publishers, New Delhi, 1984

References:

1. S.B. Lipman and J.Lafer, C++ Primer, Addition Wesley, Mass., 1998.
2. L. Sarat, Data Processing Logic, McGraw Hill, Singapore, 1985.
3. D. Ravichandran, Object Oriented Programming with C++, Tata McGraw Hill Publishing Co.Ltd., New Delhi, 1998.

CORE COURSE – XI P08MACA10

Topology

Unit I:

Topological spaces:

Topological spaces - Basic for a topology – The order topology - The product topology on XxY – The subspace topology – Closed sets and limit points. (Chapter 2: sections 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: Sections 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 Urysohns lemma – The Urysohns metrization theorem – The Tietz extension theorem. (Chapter 4: Sections 30 to 35)

Text Book:

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

References:

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.

CORE COURSE – XII P08MACA11

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 oscuating plane – Principle normal and binormal – Curvature and torsion – Behaviour 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 and osculating sphere – Locus of centre of spherical curvature – Tangent surfaces – Involutes and Evolutes – Intrinsic equations of space curves – Fundamental Existence Theorem – Helices.
(Chapter 1 : Sections 1.10 to 1.13 and 1.16 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 surfaces – Tangent plane and surface normal – The general surfaces 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 equations – 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 Bonnet 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

References:

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.

CORE COURSE – XIII P08MACA12

Optimization Techniques

Unit I:

Integer linear programming:

Introduction – Illustrative applications integer programming solution algorithms: Branch and Bound (B & B) algorithm – zero – One implicit enumeration algorithm – Cutting plane Algorithm. (Sections 9.1,9.2,9.3.1.,9.3.2,9.3.3)

Unit II:

Deterministic dynamic programming:

Introduction – Recursive nature of computations in DP – Forward and backward recursion – Selected DP applications cargo – Loading model – Work force size model – Equipment replacement model – Investment model – Inventory models. (Sections 10.1,10.2,10.3,10.4.1,10.4.2,10.4.3,10.4.4,10.4.5)

Unit III:

Decision analysis and games:

Decision environment – Decision making under certainty (Analytical Hierarchy approach) Decision making under risk – Expected value criterion – Variations of the expected value criterion – Decision under uncertainty Game theory – optimal solution of two – Person Zero – Sum games – Solution of mixed strategy games (Sections 14.1,14.2,114.3.1,14.3.2,14.4,14.5.1,14.5.2)

Unit IV:

Simulation modeling:

What is simulation – Monte carlo simulation – Types of simulation – Elements of discrete event simulation – Generic definition of events – Sampling from probability distributions. Methods for gathering statistical observations – Sub interval method – Replication method – Regenerative (Cycle) method – Simulation languages (Sections 18.1,18.2,18.3,18.4.1,18.4.2,18.5,18.6,18.7.1,18.7.2,18.7.3,18.8)

Unit V:

Nonlinear programming algorithms:

Unconstrained non linear algorithms – Direct search method – Gradient method Constrained algorithms: Separable programming – Quadratic programming – Geometric programming – Stochastic programming – Linear combinations method – SUMT algorithm (Sections : 21.1.1, 21.1.2, 21.2.1, 21.2.2, 21.2.3, 21.2.4, 21.2.5, 21.2.6)

Text Book:

Operations Research An Introduction 6th edison by Hamdy A. Taha, University of Arkansas Fayetteville.

Reference:

1. F.S. Hillier and G.J. Lieberman Introduction to Operation Research 4th edition, Mc Graw Hill Book Company, New York, 1989.
2. Philips D.T.Ravindra A. and Solbery.J. Operations Research, Principles and Practice John Wiley and Sons, New York.
3. B.E.Gillett, Operations research – A Computer Oriented Algorithmic Approach,TMH Edition, New Delhi, 1976.

CORE COURSE – XIV P08MACA13

Graph Theory

Unit I:

Graphs and Subgraphs:

Graphs and simple graphs – Graph isomorphism – Incidence and Adjacency Matrices – Subgraphs – Vertex degrees – Paths and connection – Cycles – Application – The shortest path problem.(Chapter 1 : Sections 1.1 to 1.8)

Unit II:

Trees and Connectivity:

Trees – Cut edges and bonds – Cut vertices – Cayley's formula - Application – Connector problem – Connectivity – Blocks – Application – Reliable Communication Networks. (Chapter 2: Sections 2.1 to 2.5 and Chapter 3: Sections 3.1 to 3.3)

Unit III:

Euler Tours and Matchings:

Euler Tours – Hamilton cycles – Application – Chinese Postman Problem – Traveling salesman problem - Matchings – Matching and coverings in Bipartite Graphs – Perfect Matchings – Applications – Personal Assignment Problem – Optimal Assignment Problem. (Chapter 4: Sections 4.1 to 4.4 and Chapter 5: Sections 5.1 to 5.5)

Unit IV:

Edge Colouring and Independent sets:

Edge Colouring – Edge Chromatic Number – Vizings Theorem – Application – Timetabling Problem – Independents sets – Ramsey's Theorem – Turan's Theorem.
(Chapter 6: Sections 6.1 to 6.3 and Chapter 7: Sections 7.1 to 7.3)

Unit V:

Vertex Colourings:

Vertex Colourings – Chromatic Number – Brook Theorem – Hajos conjecture – Chromatic Polynomials – Girth and Chromatic Number – A storage problem.
(Chapter 8 : Sections 8.1 to 8.6)

Text Book:

J.A.Bondy and U.S.R. Murty, Graph Theory with Applications, North Holland, New York, 1982.

References:

1. Narasing Deo, Graph Theory with Application to Engineering and Computer Science, Prentice Hall of India, New Delhi. 2003.
2. F. Harary, Graph Theory, Addison – Wesely Pub. Co. The Mass. 1969.
3. L. R.. Foulds, Graph Theory Application, Narosa Publ. House, Chennai, 1933.

CORE COURSE – XV P08MACA14

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 : Sections 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:

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

References:

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.

CORE COURSE – XVI P08MACA15

Measure Theory and Integration

Unit I:

Lebesgue Measure:

Lebesgue Measure – Introduction – Outer measure – Measurable sets and Lebesgue measure – Measurable functions – Little Woods' Three Principle. (Chapter 3: Sections 1 to 3, 5 and 6)

Unit II:

Lebesgue Integral:

Lebesgue integral – The Riemann integral – Lebesgue integral of bounded functions over a set of finite measure – The integral of a nonnegative function – The general Lebesgue integral.(Chapter 4: Sections 1 to 4)

Unit III:

Differentiation and Integration:

Differentiation and Integration – Differentiation of monotone functions – Functions of bounded variation – Differentiation of an integral – Absolute continuity. (Chapter 5: Sections 1 to 4)

Unit IV :

General Measure and Integration:

General Measure and Integration – Measure spaces – Measurable functions – integration – Signed Measure – The Radon – Nikodym theorem. (Chapter 11: Sections 1 to 3, 5 and 6)

Unit V:

Measure and Outer Measure

Measure and outer measure – outer measure and measurability – The Extension theorem – Product measures. (Chapter 12: Sections 1, 2 and 4)

Text Book:

H.L.Royden, Real Analysis, Mc Millian Publ. Co. New York 1993.

Reference:

1. G. de Barra, Measure Theory and integration, Wiley Eastern Ltd, 1981.
2. P.K. Jain and V.P. Gupta, Lebesgue Measure and Integration, New Age Int. (P) Ltd., NewDelhi, 2000.
3. Walter Rudin, Real and Complex Analysis, Tata McGraw Hill Publ. Co. Ltd., New Delhi, 1966.

CORE COURSE – XVII P08MACA16

Java Programming

Unit I:

Java Tokens – Java statements – Constants – Variables – Data types.

[Chapters 3 and 4]

Unit II:

Operators – Expressions – Decision making and Branching [Chapters 5,6, and 7]

Unit III:

Classes – Objects – Methods – Arrays – Strings – Vectors – Multiple Inheritance [Chapter 8,9 and 10]

Unit IV:

Multithreaded Programming – Managing errors and Exceptions. [Chapters 12 and 13]

Unit V:

Applet Programming. [Chapter 14]

Text Book:

E. Balagurusamy, Programming with Java – A primer, Tata McGraw Hill Publishing Company Limited, New Delhi, 1998.

References:

1. Mitchell Waite and Robert Lafore, Data Structures and Algorithms in Java, Techmedia (Indian Edition), New Delhi, 1999.
2. Adam Drozdek, Data Structures and Algorithms in Java, (Brown/Cole), Vikas Publishing House, New Delhi, 2001.

CORE COURSE – XVIII P08MACAP02

Practical in Java

Section 1. Classes, Objects, Inheritance, Interface

1. Write a program that randomly fills a 3 by 4 array and prints the largest and smallest values in the array.
2. Design a class to represent a bank Account, Include the following members:

Data Members:	Methods:
1. Name of the Depositor	1. To assign initial values.
2. Account Number	2. To deposit an amount.
3. Type of account	3. To withdraw an amount after checking the balance
4. Balance	4. To display the name and balance.

   Write a Java program for handling 10 customers.

3. Java lacks a complex datatype. Write a complex class that represents a single Complex number and includes methods for all the usual operation, i.e.: addition, subtraction, multiplication, and division.
4. Create a class called Publication. Create class Tape and class Book from Publication. Describe properties for subclasses. Create an array of publication references to hold combination of books and tapes.
5. Assume that the test results of a batch of students are stored in 3 different classes. ClassStudent stores the Roll number. Class test stores the marks obtained in two subjects and Class Result contains the total marks. The Class Result can inherit the details of marks and Roll Number of students. The Weightage is stored in a separate interface Sports. Implement the above multiple inheritance problem by using interface.

   Section 2. Exception Handling, Multithreading and Packages

6. Write a Java program to handle different types of exceptions using try, catch and finally statements.
7. Write a Java program to implement the behavior of threads.
   a. To create and run threads.
   b. To suspend and stop threads
   c. To move a thread from one state to another
   d. By assigning a priority for each thread.

8. Create two Threads subclasses, one with a sun() that starts up, captures the handle of the second Thread object and then calls wait(). The other class run() should call notifyall() for the first Thread after some number of seconds have passed, so that the first thread after some seconds have passed, so the first thread after some number of seconds have passed, so that the first thread can print out a message.
9. Create a thread to copy the contents of one file to another file. Write a program to implement this thread. Create multiple threads within the program to do multiple file copies.
10. Create three classes Protection, Derived and SamePackage all in same package. Class Protection is a base class for the class Derived and SamePackage is a seperate class. Class Protection has three variables each of type private, protected and public. Write a program that shows the legal protection modes of all the different variables.

Section 3. Applet Programming

11. Write an applet to draw the following shapes:
    a. Cone
    b. Cylinder
    c. Cube
    d. Square inside a circle
    e. Circle inside a square
12. Design applet to display bar chart for the following table, which shows the annual turnover of XYZ Company during the period 1997 to 2000.

Year	: 1997 1998 1999 2000
Turnover (in Crore)	: 110 150 100 180

13. Creating a Java applet, which finds palindromes in sentences. Your applet will have two input controls; one input will be a text field for entering sentences, the other input will be a text field or scroll bar for selecting the minimum length a palindrome to be shown. Your applet will output the first 10 palindromes it finds in the sentence.
14. Write a program which displays a text message coming down the screen by moving left to right and modify the above program instead of text moving from left to right it moves top to bottom.

15. Create a thread in an applet that draws an image and makes it move along the screen.

Section 4: Awt Forms Design Using Frames

16. Create a frame with two text fields and three buttons (Cut, Copy & Paste). Data entered in the first text field should response, according to the buttons clicked.
17. Create a frame that contains 3 text fields and four buttons for basic arithmetic operations. You have to enter two numbers in first two text fields. On clicking the respective button that answer should be displayed in the last text field.
18. Create a frame with check box group containing Rectangle, Circle, Triangle, Square. If the particular value is true then the corresponding shape should be displayed.
19. Using AWT create a frame, which contains four-text field name, age, sex and qualification lay out using the flow layouted manager. Run the program and give the values of all text fields in the command line. Initially all the values of text field should be blank. On clicking the click button all the text fields should contain the command line inputs.
20. A car company called Maruthi is selling four models of cars. They are shown below

Code	**Car Model**	**Price**
800	Maruthi 800	Rs 2.14 Lakhs
1000	Maruthi 1000	Rs 3.72 Lakhs
Esteem	Maruthi Esteem	Rs 3.69 Lakhs
Zen	Maruthi Zen	Rs 3.91 Lakhs

Design a frame with 4 buttons called 800,1000,Esteem, Zen. When we click a button the details of a particular model must appeared in an exclusive background color, text color and font.

Section-5: Networking, Socket and Servlets Programming

21. Practice with client-Servers and IO: Modify Data Server to watch for “Send Text” request read a file from to “Send Data” for the “Send Text” request read a file from disk and send it back to the client. Add a button to Data Client interface that sends the text request when pushed. Display the text returned by the server in the DataClient Text area.

22. Write a Java program to implement client-server communication using Datagram Socket.
23. Write a program to display the address and name of local machine using Factory Methods.
24. Write a java program to implement Cookies using getCookies(), getName() and getValue() methods.
25. Create a server that asks for a password, the opens a file and sends the file over the network connection. Create a client that connects to this server, gives the appropriate password, then captures and saves the file. Test the pair of programs on your machine using the local host (the local loop back IP address 127.0.0.1 produced by calling InetAddress.getByName (null).

ELECTIVE– I P08MACAE01

Fuzzy Sets and Their Applications

Unit I:

Fuzzy sets:

Fuzzy sets – Basic types – Basic concepts - Characteristics – Significance of the paradigm shift – Additional properties of α - Cuts (Chapter 1: Sections 1.3 to 1.5 and Chapter 2: Sections 2.1)

Unit II:

Fuzzy Sets Versus CRISP Sets:

Representation of Fuzzy sets – Extension principle of Fuzzy sets – Operation on Fuzzy Sets – Types of Operation – Fuzzy complements. (Chapter 2: Sections 2.2 to 2.3 and Chapter 3: Sections 3.1 to 3.2)

Unit III:

Operations on Fuzzy Sets:

Fuzzy intersection – t-norms, Fuzzy unions – t conorms – Combinations of operations – Aggregation operations. (Chapter 3: Sections 3.3 to 3.6)

Unit IV:

Fuzzy Arithmetic:

Fuzzy numbers – Linguistic variables – Arithmetic operation on intervals – Lattice of Fuzzy numbers. (Chapter 4: Sections 4.1 to 4.4)

Unit V:

Constructing Fuzzy Sets:

Methods of construction: An overview – Direct methods with one expert – Direct method with multiple experts – indirect method with multiple experts and one expert – Construction from sample data. (Chapter 10: Sections 10.1 to 10.7)

Text Book:

G.J. Klir, and Bo Yuan, Fuzzy Sets and fuzzy Logic: Theory and Applications, Prentice Hall of India Ltd., New Delhi, 2005.

References:

1. H.J. Zimmermann, Fuzzy Set Theory and its Applications, Allied Publishers, Chennai, 1996.
2. A.Kaufman, Introduction to the Theory of Fuzzy Subsets, Academic Press, New York, 1975.
3. V.Novak, Fuzzy Sets and Their Applications, Adam Hilger, Bristol, 1969.

ELECTIVE– II P08MACAE02

Number Theory

Unit I:

Divisibility and Congruence:

Divisibility – Primes - Congruence's – Solutions of Congruence's – Congruence's of Degree one. (Chapter 1: Sections 1.1 to 1.3 and Chapter 2: Sections: 2.1 to 2.3)

Unit II:

Congruence:

The function $\phi(n)$ – Congruence of higher degree – Prime power moduli – Prime modulus – Congruence's of degree two, prime modulus – power Residues. (Chapter 2: Sections 2.4 to 2.9)

Unit III:

Quadratic reciprocity:

Quadratic residues – Quadratic reciprocity – The Jacobi symbol – Greatest Integer function. (Chapter 3: Sections 3.1 to 3.3 and Chapter 4: Section 4.1)

Unit IV:

Some Functions of Number Theory:

Arithmetic functions –The Mobius inverse formula – The multiplication of arithmetic functions. (Chapter 4: Sections 4.2 to 4.4)

Unit V:

Some Diaphantine equations:

The equation $ax + by = c$ – positive solutions – Other linear equations – The equation $x^2 + y^2 = z^2$- The equation $x^4 + y^4 = z^4$ Sums of four and five squares – Waring's problem – Sum of fourth powers – Sum of Two squares. (Chapter 5: Sections 5.1 to 5.10)

Text Book:

1. Niven and H.S Zuckerman, An Introduction to the Theory of Numbers, 3rd edition, Wiley Eastern Ltd., New Delhi, 1989.

References:

1. D.M. Burton, Elementary Number Theory, Universal Book Stall, New Delhi 2001.
2. K.Ireland and M.Rosen, A Classical Introduction to Modern Number Theory, Springer Verlag, New York, 1972.
3. T.M Apostol, Introduction to Analytic Number Theory Narosa Publication, House Chennai, 1980.

ELECTIVE– III P08MACAE03

Database Technology

Unit I:

Introduction DBS Application: DBS Vs File System – View of Data – Data models – Database Languages – Database User and Administrators – Transaction Management – DBS Structure – E-R Model: Basic Concepts – Constraints – Keys – Design Issues – E-R Diagram – E-R Features – Design of E-R Database Schema.

Unit II:

Relational Database Design: First Normal Form – Functional Dependencies – Decomposition – Properties of Decomposition – Boyce-Codd Normal Form – Third Normal Form – Fourth Normal Form.

Database – Tablespaces – Redo Logs – Control files – Programs – Database support processes Memory structure – Oracle instance, Database Objects – Tables – Views – Indexes – Synonyms – Grants – Roles.

Unit III:

SQL – Two types of SQL statements – SQL *Plus: Getting in – Number data type – Character data type – Date data type – Converting from one column type to another – Update, Delete and Alter – Joining two tables together – Formatting the output.

Unit IV:

PL/SQL: Character set – Variables – Common data types – PL/SQL components – Cursors – Compilation errors – Code examples. Snapshots – Functionality.

Triggers: Required system and table privileges – Types of triggers – Trigger syntax – combining trigger types –setting inserted values – Maintaining duplicated data – Customizing error conditions – Naming triggers – Enabling and disabling triggers – Replacing triggers – Dropping triggers.

Unit V:

Procedures: Required system and table privileges – Executing procedures – Procedures vs. function – procedures vs. packages – create procedure and function syntax – Remote table reference – Debugging – Customizing error conditions – naming – Create package syntax – Initializing packages – Viewing source code – Compiling, Replacing and Dropping.

Oracle Reports: Designer – Object navigator – Setting preferences – Files – Designer components – Sample reports

Text Books:

1. Database System Concepts, 4th Edition – Silberschatz, Korth, Sudarshan (Unit I & II)
2. Oracle: A beginner's Guide by Michael Abbey & Michael J.Corey (TMH) (Unit III, IV & V)

References:

1. Essential Oracle 7 by Tom Leurs (PHI)
2. Oracle 2nd Edition – unleashed – Techmedia.

ELECTIVE– IV P08MACAE04

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 II:

Equation of Motion of a fluid:

Pressure at a point in a fluid at rest – Pressure at a point in a moving fluid – Condition at a boundary of two invicid immersible 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 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 incompressible 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 Dynamic, CBS Publication New Delhi, 1985.

References:

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., New Delhi, 1976.
3. R.K. Rathy, An Introduction to Fluid Dynamics, IBH Publ. Comp. New Delhi, 1976.