

BHARATHIAR UNIVERSITY, COIMBATORE
Br. I. (b). M.Sc. Mathematics (CA)
(The curriculum is offered by the University Department under CBCS Pattern)
(with effect from 2014-15 Batch onwards)

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 there to shall be eligible for admission to the **Master Degree in Mathematics (CA)** of this University.

SCHEME OF EXAMINATIONS

Sem	Subject Code	Title of the paper	Class Hrs	University Exam			Credit
				CIA	Ext	Total Marks	
I	MATBC1	Algebra	5	25	75	100	4
	MATBC2	Analysis	5	25	75	100	4
	MATBC3	Differential Equations	5	25	75	100	4
	MATBC4	Numerical Methods	5	25	75	100	4
	MATBE1	Programming Languages	5	25	75	100	4
	Supportive-I		2	12	38	50	2
II	MATBC5	Discrete Mathematics and Mathematical Modelling	5	25	75	100	4
	MATBC6	Fluid Dynamics	5	25	75	100	4
	MATBC7	Mechanics	5	25	75	100	4
	MATBC8	*MatLab(Theory and Practical)	3T+4P	25	75	100	4
	MATBE2	*Java Programming (Theory and Practical)	3T+4P	25	75	100	4
	Supportive-II		2	12	38	50	2
III	MATBC9	Operations Research	5	25	75	100	4
	MATBC10	Data Structures (Theory and Lab)	5	25	75	100	4
	MATBC11	Computational Mathematics (Practical only)	5	25	75	100	4
	MATBC12	Topology	5	25	75	100	4
	MATBE3	*Mathematica (Theory and Practical)	3T+4P	25	75	100	4
	Supportive-III		2	12	38	50	2

Sem	Subject Code	Title of the paper	Class Hrs	University Exam			Credit
				CIA	Ext	Total Marks	
IV	MATBC13	Mathematical Methods	5	25	75	100	4
	MATBC14	*Oracle (Theory and Practical)	3T+4P	25	75	100	4
	MATBE4	Data warehousing (or) Fundamentals of Actuarial Mathematics	5	25	75	100	4
	MATBP	Project Work	----	----	----	300**	12

Total Marks: 2250

Credits :90

*** Papers have Theory and Practical Examinations,**

Theory-60 marks; Practical-40 marks

****Project Report-240 marks; Viva Voce-60 marks**

Supportive Courses for other Department Students

- 1. Numerical Methods (Odd Semester)**
- 2. Differential Equations (Even Semester)**

NOTE :

The revised syllabus for the papers, **Discrete Mathematics & Mathematical Modelling, Mechanics, Java Programming and Data Structures** for M.Sc. Mathematics with C.A. degree programme for the candidates admitted from the academic year 2014-15 are furnished below. There is no change in remaining papers.

MATBC 5 - DISCRETE MATHEMATICS AND MATHEMATICAL MODELLING

UNIT I: 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.

UNIT II: 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-III: Matchings

Matchings- Matchings and Coverings in Bipartite Graphs- Perfect matchings. Applications: The Personnel and Assignment problem- The optimal Assignment problem

UNIT- IV: Dimensional Analysis and Scale

Principles of Mathematical Modelling-Some methods of Mathematical Modelling- Dimensions & Units- Dimensional Homogeneity-Dimensional Analysis- Deterministic dimensional Analysis- System of units- Problems. : Abstraction and scale- Size and shape: Geometric scaling- Size and function I: Birds and flight- Consequences of choosing a scale- Problems

UNIT-V: Traffic Models

Freeway Traffic- Macroscopic traffic flow models- Microscopic traffic models- Problems.

TEXTBOOKS:

For UNIT I & II

Trembley J.P and Manohar.R, “Discrete Mathematical Structures With applications to Computer Science“, Tata Mc Graw- Hill Pub.Co. Ltd, New Delhi, 2003.

For UNIT III

J.A.Bondy and U.S.R.Murty “Graph Theory with Applications”,The Macmillan Press Ltd, First Edition 1976(Some Revision 1977)
Chapter-5(Section 5.1 to 5.5)

For UNIT IV & V

Dym, Clive L.Principles of Mathematical Modeling. 2nd ed. USA: Academic Press, 2006.
Chapter-1(Sections 1.1 to 1.3)
Chapter- 2(Sections 2.1 to 2.5, 2.8)
Chapter-3(Sections 3.1 to 3.3,3.6,3.9)

MATBC 7 - MECHANICS

Unit-I: INTRODUCTORY CONCEPTS

Mechanical system – Generalized coordinates – Constraints – Virtual work – Energy and momentum.

Unit-II: LAGRANGE'S EQUATIONS

Derivations of Lagrange's equations: Derivations of Lagrange's equations – Examples – Integrals of motion.

Unit-III: HAMILTON'S EQUATIONS

Hamilton's principle – Hamilton's equations.

Unit-IV: HAMILTON – JACOBI THEORY

Hamilton's principal function – Hamilton – Jacobi equation – Separability.

Unit-V: CANONICAL TRANSFORMATIONS

Differential forms and generating functions – Lagrange and Poisson brackets.

Text Book:

“*Classical Dynamics*” by **D.T.Greenwood**, Prentice Hall of India Pvt.Ltd, New Delhi, 1979.

Unit-I: Chapter 1.

Unit-II: Chapter 2: Sections: 2.1 - 2.3.

Unit-III: Chapter 4: Sections: 4.1 - 4.2.

Unit-IV: Chapter 5.

Unit-V: Chapter 6: Sections: 6.1 - 6.3

References:

- F.Gantmacher, Lectures in Analytic Mechanics, MIR Publishers, Moscow,1975
- I.M.Gelfand and S.V.Fomin, Calculus of Variations, Prentice Hall
- S.L.Lonely, An elementary Treatise on Statics, Kalyani Publishers, New Delhi, 1979

MATBE2: JAVA PROGRAMMING
(Theory 60 and Practical 40)

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 – Strings, Arrays– 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

UNIT V

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

Books for Study:

1. The JAVA Programming Language by Ken Arnold, James Goslings.
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.

JAVA PROGRAMMING (PRACTICAL)

1. Mathematical Operations
2. Matrix Manipulation
3. Student Mark list using Multilevel Inheritance
4. Employee details using Multiple Inheritance
5. Packages
6. Constructors
7. Thread
8. Thread using runnable interface
9. Applet
10. Displaying different shapes using Applets

MATBC10: DATA STRUCTURES (THEORY &LAB)

UNIT I: INTRODUCTION & ARRAYS

Introduction: Overview - SPARKS -Arrays: Axiomatization - Ordered Lists - Representation of Arrays.

UNIT II: STACKS, QUEUES & LINKED LISTS

Stacks and Queues: Fundamentals - Evaluation of Expressions - Multiple Stacks and Queues. Linked Lists : Singly Linked Lists - Doubly Linked Lists and Dynamic Storage Management.

UNIT III: TREES

Basic Terminology - Binary Trees - Binary Tree Representations - Binary Tree Traversal - 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 - Files : Files, Queries and Sequential Organizations - File Organizations: Sequential Organizations - Random organizations.

Text Book:

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.

MATBC10: DATA STRUCTURES (LAB)

LAB LIST

1. Transpose of a Matrix
2. Sparse Matrix using array
3. Stack using array
4. Queue using array
5. Evaluation of infix to postfix expressions
6. Singly Linked Operations
7. Linear Search
8. Insertion Sort
9. Quick Sort
10. Heap Sort
11. File Operations.