BHARATHIAR UNIVERSITY, COIMBATORE:641 046
Br. I. (b). M.Sc. Mathematics (C.A.)
The curriculum is offered by the University Department under CBCS Pattern.

(For the candidates admitted from the academic year 2015-16 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 (C.A.)** of this University.

SCHEME OF EXAMINATIONS (CBCS PATTERN)

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	Offered from other Departments	2	12	38	50	2
II	MATBC5	Discrete Mathematics	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	Offered from other Departments	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	Offered from other Departments	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	***Elective	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

*** **Choose one Elective paper among the list of the following Electives:**

1. **Data warehousing**

2. **Fuzzy sets and Fuzzy logic**

3. **Fundamentals of Actuarial Mathematics**

4. **Magnetohydrodynamics**

Only **two choice will be provided** to the Students.

SUPPORTIVE COURSES OFFERED FOR OTHER DEPARTMENT STUDENTS

1. **Numerical Methods (Odd Semester)**

2. **Differential Equations (Even Semester)**

NOTE :

The revised syllabus for the papers, **Discrete Mathematics and Elective papers** for the candidates admitted from the academic year 2015-16 are furnished below. There is no change in remaining papers. The syllabi for the **Discrete Mathematics and Elective papers** are also provided below.

MATBC5: DISCRETE MATHEMATICS

UNIT I: 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 relations – Poset-Hasse diagram – Lattices and their properties – Sublattice – Boolean Algebra – Homomorphism.

UNIT II: 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 III: 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 IV: 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 V: 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.

Text Book

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

Reference Books

1) Ralph.P.Grimmaldi, **"Discrete and Combinatorial Mathematics - An Introduction"**, Fourth edition, Perarson Education, Asia, Delhi, 2002.

2) Hopgaff and Ullman, Introduction to Automata Theory, **"Languages and Computation",** Pearson Edition, Asia, Delhi.

3) Doerr Alar and Levasseur Kenneth, "**Applied discrete structures for Computer Science**", Gal Gotia publications Pvt. Ltd. (2002).

ELECTIVE PAPER I -   DATA WAREHOUSING

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

UNIT II
Database Schema – Partitioning strategy – Aggregations – Data Marting – OLAP in Data Warehousing.

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 – Data Warehousing Vs Data mining.

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

TextBooks
1) **"Data warehousing in the real world**", Sam Anahory, Dennis murray, Pearson education, 2003.
2) "**Data Ware Housing Fundamentals**", Paulraj Ponniah, John Wiley, 2010.

ELECTIVE PAPER II -   FUZZY SETS AND FUZZY LOGIC

UNIT I CRISP SETS AND FUZZY SETS
Crisp Sets, Fuzzy Sets (basic types), Fuzzy Sets (basic concepts); Representation of fuzzy sets; Decompositions theorems; Extension principle for fuzzy sets. Operations on fuzzy sets (Fuzzy compliment, Intersection and union); Combinations of operations.

UNIT II FUZZY RELATIONS
Crisp and fuzzy relations; Projections; Binary fuzzy relations; Binary relations on a single set; Fuzzy equivalence relations; Fuzzy compatibility relations; Fuzzy ordering relations; Fuzzymorphism; Sup-i compositions of binary fuzzy relations; Inf-w_i compositions of fuzzy relations.

UNIT III FUZZY MEASURES
Possibility theory, Fuzzy measure, Evidence theory, possibility theory, Fuzzy sets and possibility theory.

UNIT IV FUZZY LOGIC   AND UNCERTAINITY
Fuzzy logic, Classical logic, Multivalued logic, Fuzzy propositions, Fuzzy quantifiers, inference from conditional fuzzy propositions, Uncertainity based Information: Information and Uncertainty, Non specificity of Crisp sets, Non specificity of Fuzzy sets.

UNIT-V APPLICATIONS
Natural, life and Social Sciences - Engineering - Medicine - Management and decision making – Computer Sciences-System Science-Other Applications.

TEXT BOOKS

1) **For Unit I to IV:**
   George J. Klir and Bo Yuan**,"Fuzzy Sets and Fuzzy Logic"**, Prentice Hall of India, 1988.
2) **For Unit V:**
   George J. Klir and Tina A. Folger, "**Fuzzy Sets, Uncertainty and Information**", Prentice-Hall of India Private Limited-Fourth printing-June 1995

REFERENCE BOOKS
H.J. Zimmerman, "**Fuzzy Set Theory and Its Applications**", Kluwer Academic Publishers.

ELECTIVE PAPER III - FUNDAMENTALS OF ACTUARIAL MATHEMATICS

UNIT I
 Annuities Certain- present Values- Amounts - Deferred Annuities –Perpetuities - Present Value of an Immediate Annuity Certain – Accumulated Value of Annuity – Relation between Sn and an – Present Value of Deferred Annuity Certain – Accumulated Value of a term of n-years – Perpetuity – Present Value of an Immediate Perpetuity of 1p.a. – Present Value of a Perpetuity due of 1 p.a. – Deferred Perpetuity with Deferment Period of m years – Mortality Table – The Probabilities of Survival and Death.

UNIT II
 Life Insurance Premiums – General considerations - Assurance Benefits – Pure Endowment Assurance – Endowment Assurance – Temporary Assurance or Term Assurance - Whole Life Assurance – Pure Endowment Assurance – Endowment Assurance – Double Endowment Assurance – Increasing Temporary Assurance – Increasing Whole Life Assurance – Commutation Functions Dx, Cx, Mx and Rx – Expressions for Present Values of Assurance Benefits in terms of Commutation Functions – Fixed Term (Marriage) Endowment – Educational Annuity Plan.

UNIT III
 Life Annuities and Temporary Annuities – Commutation Functions Nx – To Find the Present Value of an Annuity Due of Re.1 p.a. for Life – Temporary Immediate Life Annuity – Expression for ax : n – Deferred Temporary Life Annuity – Variable Life Annuity – Increasing Life Annuity – Commutation Function Sx – Increasing Temporary Life Annuity – Tables of Life Annuity and Temporary Life Annuity – Variations in the Present Values of Annuities – Life Annuities Payable at Frequent Intervals.

UNIT IV
 Net Premiums for Assurance Plans – Natural Premiums – Level Annual Premium – Symbols for Level Annual Premium under Various Assurance Plans – Mathematical Expressions for level Annual Premium under Level Annual Premium under Various Plans for Sum Assure of Re. 1 – Net Premiums – Consequences of charging level Premium – Consequences of withdrawals – Net Premiums for Annuity Plans – Immediate Annuities – Deferred Annuities.

UNIT V
 Premium Conversion tables – Single Premium Conversion tables – Annual Premium Conversion Tables – Policy Values – Two kinds of Policy values – Policy value in symbols – Calculation of Policy Value for Unit Sum Assure – Numerical Example : Retrospective Method and Comparison with Prospective Value – Derivative of Theoretical Expressions for Policy Value, tVx by the Retrospective Method and Prospective Method – Other Expressions for Policy Value – Surrender Values – Paid up Policies – Alteration of Policy Contracts.

Text Book
    "Mathematical Basis of Life Insurance"   By Insurance Institute of India.

ELECTIVE PAPER IV - MAGNETOHYDRODYNAMICS

Unit I:
Electromagnetism – Fundamental Laws – Electrostatic Energy – Electrodynamics – Ampere's Law – Lorentz force on a moving charge – Magnetostatic Energy – Faraday's Law of Induction – Poynting stresses – Electromagnetic Equations with respect to moving axes – boundary conditions of electric and magnetic fields

Unit II:
Kinematics of fluid motion – equation of continuity – Stress tensor – Navierstokes equations – boundary condition – Velocity Magneto fluid dynamic equations – MHD approximation – equation of Magnetic diffusion in a moving conducting medium – Magnetic Reynolds number

Unit III:
Alfven's theorem Law of isorotation - Magneto hydrostatics – Force-free field – Alfven waves in incompressible MHD

Unit IV:
Incompressible viscous flows in the presence of magnetic field – Hartmann Flow – Unsteady Hartmann flow – Magnetofluid dynamic pipe flow

Unit V:
Stability – Instability of linear pinch – Sausage and flute types – Method of small oscillations – gravitational instability

TextBooks
1) Crammer K.R. and Pai S.I, **"Magneto Fluid Dynamics for Engineers and Applied Physicists**", McGraw Hill, 1973.
2) Ferraro, VCA and Plumpton: **"Introduction to Magneto Fluid Dynamics",** Oxford, 1966.