BHARATHIAR UNIVERSITY, COIMBATORE.
M. Sc MATHEMATICS DEGREE COURSE (AFFILIATED COLLEGES)
(Effective from the academic Year 2014-2015)
SCHEME OF EXAMINATIONS – CBCS PATTERN

Sem.	Study Components	Course title	Ins. hrs/ week	Examinations				Credit
				Dur.Hrs	CIA	Marks	Total Marks	
I	Paper 1	Algebra	7	3	25	75	100	4
	Paper 2	Real Analysis	7	3	25	75	100	4
	Paper 3	Ordinary Differential Equations	6	3	25	75	100	4
	Paper 4	Numerical Methods	6	3	25	75	100	4
	Elect. Paper I		4	3	25	75	100	4
II	Paper 5	Complex Analysis	6	3	25	75	100	4
	Paper 6	Partial Differential Equations	7	3	25	75	100	4
	Paper 7	Mechanics	7	3	25	75	100	4
	Paper 8	Operations Research	6	3	25	75	100	4
	Elect. Paper II		4	3	25	75	100	4
III	Paper 9	Topology	7	3	25	75	100	4
	Paper 10	Fluid Dynamics	7	3	25	75	100	4
	Paper 11	Mathematical Statistics	6	3	25	75	100	4
	Paper 12	Graph Theory	6	3	25	75	100	4
	Elect. Paper III		4	3	25	75	100	4
IV	Paper 13	Functional Analysis	7	3	25	75	100	4
	Paper 14	Mathematical Methods	7	3	25	75	100	4
	Paper 15	Computer Programming (C++ Theory)	4	3	25	75	100	4
	Practical	Computer Programming (C++ Practical)	2	3	40	60	100	4
	Paper 16	Number Theory	6	3	25	75	100	4
	Elect. Paper IV		4	3	25	75	100	4
	Project						150*	6
		Total					2250	90

*** For Project report – 120 marks, Viva-voce – 30 marks.**

LIST OF ELECTIVES

1.Latex
2.Matlab
3. Mathematica
4.Magnetohydro Dynamics
5.Control Theory
6.Differential Geometry
7.Fuzzy Logic and Fuzzy Sets
8.Cryptography
9. Neural Networks
10.Stochastic Differential Equations

Note :

The syllabus for the above papers (except Real Analysis, Mathematical Statistics papers and Computer Programming C++ Practical) be the same as prescribed for the academic year 2010-11. For the Elective Paper Latex reference book is added. The Syllabus for the Real Analysis, Mathematical Statistics papers and Computer Programming C++ Practical are furnished below:

PAPER II: REAL ANALYSIS

UNIT I:

RIEMANN STILTJES INTEGRAL:

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

UNIT III:

FUNCTIONS OF SEVERAL VARIABLES:

Linear transformation – contraction principle – Inverse function theorem – Implicit function theorem.

UNIT IV:

LEBESGUE MEASURE:

Outer measure – Measurable sets and Lebesgue measure – Measurable functions – Littlewood's Theorem

UNIT V:

LEBESGUE INTEGRAL:

The Lebesgue integral of bounded functions over a set of finite measure – integral of a non – negative function – General Lebesgue Integral.

Treatment as in:
Principles of Mathematical Analysis by W. Rudin, McGraw Hill, New York, 1976.
Unit I & II : Chapter 6 & 7.
Unit III : Chapter 9 (Pages 204 to 227)

Treatment as in: Real Analysis by H.L. Roydon, Third Edition, Macmillan, New York, 1988.
Unit IV : Chapter 3 (except Section – 4)
Unit V : Chapter 4 (Sections 2, 3 & 4 only)

References:

1. R.G.Bartle, Elements of Real Analysis, 2nd Edition, John Wily and Sons, New York, 1976.
2. W.Rudin, Real and Complex Analysis, 3rd Edition, McGraw-Hill, New York, 1986.

PAPER XI: MATHEMATICAL STATISTICS

Unit I:

Random Events – Preliminary remarks – random events and operations performed on them – the system of axioms of the theory of probability – conditional probability – Bayes theorem – Independent Events – Random variables – the concept of a random variable – the distribution function – random variables of the discrete type and the continuous type – functions of random variables – Multidimensional random variables – marginal distributions – conditional distributions – Independent random variables – Parameters of the distributions of a random variable – expected values – moments – the Chebyshev inequality – absolute moments.

Unit II: Characteristic functions – Properties of characteristic functions – the characteristic function and moments – semi-invariants – the characteristic function of the sum of independent random variables – Determination of the distribution function of multidimensional random vectors – probability – generating functions – some probability distributions - One point and two point distributions – the Bernoulli scheme. The binomial distribution. The generalized binomial distributions and the Poisson distributions.

Unit III: Some probability distributions – the uniform distribution - the normal distribution – the gamma distribution – the Cauchy and Laplace distributions – Limit theorems – preliminary remarks – Stochastic convergence – Bernoulli's law of large numbers - the convergence of a sequence of distribution functions – the Levy-Cramer theorem – The de Moivre Laplace theorem – the Lindeberg-Levy theorem.

Unit IV: Sample moments and their functions – the notion of a sample – the notion of a Statistic – the distribution of the arithmetic mean of independent normally distributed random variables – the χ^2 distribution – the distribution of the statistic ($\overline{X}$,S) – student's t-distribution – Significance tests – the concept of a statistical test – parametric tests for small samples – parametric tests for large samples – the χ^2 test-independent tests by contingency tables.

Unit V: The theory of Estimation – preliminary notions – Consistent estimates – unbiased estimates – the sufficiency of an estimate – the efficiency of an estimates – Asymptotically most efficient estimates – methods of finding estimates – confidence intervals – Theory of Hypothesis testing – preliminary remarks – the power function and the OC function.

Treatment as in:

Probability Theory and Mathematical Statistics by Marek Fisz, John Wiley, 1980.

Chapter : 1 (except section 1.4)
Chapter : 2
Chapter : 3 (except sections 3.5 to 3.8)
Chapter : 4
Chapter : 5 (except sections 5.3, 5.4, 5.11, 5.12 5.13)
Chapter : 6 (except section 6.5, 6.9, 6.10, 6.11 6.12, 6.13, 6.14)
Chapter : 9 (except section 9.7 to 9.13)
Chapter : 12 (except section 12.5 & 12.6)
Chapter : 13 (except section 13.9)

Chapter : 16 (except section 16.3 to 16.7)

2. C++ PRACTICAL

1. DISTANCE CONVERSION PROBLEM:

Create two classes DM and DB which store the value of distances. DM store the value of distances. DM stores distances in meters and centimeters in DB in feet and inches. Write a Program that can create the values of the class objects and add one object DM with another object DB.

Use a friend function to carry out addition operation. The object that stores the result may be DM object or DB object depending on the units in which results are required.

The display should be in the order of meter and centimeter and feet or inches depending on the order of display.

2. OVERLOADING OBJECTS:

Create a class FLOAT that contains one float data member overload all the four arithmetic operators so that operate on the objects of FLOAT.

3. OVERLOADING CONVERSIONS:

Design a class polar which describes a pant in a plane using polar Co-ordinates radius and angle. A point in polar Co-ordinates is as shown below.

Use the overloader + operator to add two objects of polar. Note that we cannot add polar values of two points directly. This requires first the conversion.

Points into rectangular Co-ordinates and finally converting the result into polar Co-ordinates.

You need to use following trigonometric formulas.

*X= r * cos (a);* *Y= r * sin (a);* a= $\tan^{-1}\left(Y/X\right)$; r = *sqrt (X * X +Y * Y);*

4. OVRELOADING MATRIX:

Create a class MAT of size M*N. Define all possible matrix operations for MAT type objects. Verify the identity.

*(A-B)^2 = A^2+B^2 – 2*A*B*

5. AREA COMPUTATION USING DERIVED CLASS:

Area of rectangle = *X*Y*

Area of triangle = ½ * *X* * *Y*

6. VECTOR PROBLEM:

Define a class for vector containing scalar values. Apply overloading concepts for vector addition, Multiplication of a vector by a scalar quantity, replace the values in a position vector.

7. INHERITANCE

Create three classes alpha, beta and gamma, each containing one data member. The class gamma should be inherited from both alpha and beta. Use a constructor function in the

class gamma to assign values to the data members of all the classes. Write a program to print the data members of all the three classes.

ELECTIVE PAPER – 1 : LATEX

Unit I:
Text formatting, TEX and its offspring, What's different in LATEX 2ϵ, Distinguishing LATEX 2ϵ , Basics of a LATEX file.

Unit II:
Commands and Environments–Command names and arguments, Environments, Declarations, Lengths, Special Characters, Fragile Commands, Exercises.

Unit III:
Document Layout and Organization – Document class, Page style, Parts of the document, Table of contents, Fine – Tuning text, Word division.

Displayed Text - Changing font, Centering and indenting, Lists, Generalized lists, Theorem–like declarations, Tabulator stops, Boxes.

Unit IV:
Tables, Printing literal text, Footnotes and marginal notes. Drawing pictures with LATEX.

Unit V:
Mathematical Formulas – Mathematical environments, Main elements of math mode, Mathematical symbols, Additional elements, Fine–tuning mathematics.

Treatment as in:
A Guide to LATEX by H. Kopka and P.W. Daly, Third Edition, Addison – Wesley, London, 1999.

Unit I : Chapter 1 : Sections : 1.1-1.3, 1.4.1, 1.5.
Unit II : Chapter 2 : Sections : 2.1-2.7.
Unit III : Chapter 3 : Sections : 3.1-3.6, 4.1-4.7
Unit IV : Chapter 4 : Sections : 4.8-4.10, 6.1.
Unit V : Chapter 5: Sections : 5.1-5.5.

REFERENCE BOOK:
Fundamentals of Latex for Mathematicians, Physicists and Engineers
By
Velusamy Kavitha and Mani Mallika Arjunan
LAP LAMBERT Academy Publishing, Germany, 2013.