PSGR KRISHNAMMAL COLLEGE FOR WOMEN

College with Potential for Excellence

(An Autonomous Institution, Affiliated to Bharathiar University)
(Reaccredited with 'A' Grade by NAAC, An ISO 9001:2008 Certified Institution)
Peelamedu, Coimbatore-641004

DEPARTMENT OF MATHEMATICS (PG)

CHOICE BASED CREDIT SYSTEM

MASTER OF MATHEMATICS (M.Sc MATHEMATICS)

2015 - 2017

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DEPARTMENT OF MATHEMATICS (PG)

2015-2017

Subject Code	Title of the paper	Hours per Week	Duration Of Exam	Examination Marks			Credits
				CA	ESE	Total	
SEMESTER I							
MTH1501	Algebra	6	3 hrs	40	60	100	4
MTH1402	Real Analysis	6	3 hrs	40	60	100	4
MTH1403	Ordinary Differential equations	6	3 hrs	40	60	100	4
MTH15E1 MTH15E2	Elective I Numerical Methods (or) Elective I Graph Theory	6	3 hrs	40	60	100	4
MTH1405	Mathematical Statistics	6	3 hrs	40	60	100	4
SEMESTER II							
MTH1406	Complex Analysis	6	3 hrs	40	60	100	4
MTH1407	Partial Differential Equations	5	3 hrs	40	60	100	4
MTH1408	Mechanics	6	3 hrs	40	60	100	4
MTH14E3 MTH14E4	Elective II Matlab Theory (or) Elective II Java Programming	3	3 hrs	40	60	100	4
MTH14P2 MTH14P4	Elective II Matlab Practical (or) Elective II - Java Practical	2	3 hrs	20	30	50	2
MTH1410	Control theory	4	3 hrs	40	60	100	4
MCM11A3	IDC-Financial And Management Accounting	5	3 hrs	-	100	100	5
SEMESTER III							
MTH1411	Topology	6	3 hrs	40	60	100	4
MTH1412	Fluid Dynamics	6	3 hrs	40	60	100	4

MTH1423	Basics of Cryptography	6	3 hrs	40	60	100	4
MTH08S1	Research Methodology	2	3 hrs	-	100	100	2
MTH15E5 MTH14E6	Elective III C++ Theory (or) Elective III Visual Programming	4	3 hrs	40	60	100	4
MTH14P1 MTH15P3	Elective III C ++ practical (or) Elective III Visual Programming Practical	2	3 hrs	20	30	50	2
	Library	2	-	-	-	-	-
	Seminar	2	-	-	-	-	-
SEMESTER IV							
MTH1414	Functional Analysis	6	3 hrs	40	60	100	4
MTH1415	Mathematical Methods	6	3 hrs	40	60	100	4
MTH15E7 MTH15E8	Elective IV Mathematical Modelling (or) Elective IV Mathematical Programming	5	3 hrs	40	60	100	4
MTH1413	Operations research	6	3 hrs	40	60	100	4
MTH14P ROJ	Project	7	3hrs	20	80	100	7
MTH1321 MTH1322	Advanced Level Course- Linear difference equations (or) Advanced Level Course- Advanced computing techniques	--	3 hrs	25	75	100	5
	Total					2200+100	90+5

QUESTION PATTERN

TIME: 3 hrs **MAX MARKS: 60**

SECTION A

5 questions (5 x 6 = 30 marks)

(5 questions out of 7)

SECTION B

5 Questions (4 x 12 = 48 marks)

(4 questions out of 7)

SECTION C

2 Question (2x 11 = 22 marks)

(Compulsory Question)

(The examination will be conducted for a maximum of 100 marks which will be converted into 60 marks)

QUESTION PATTERN

(ADVANCED LEARNER COURSE)

TIME: 3 hrs **MAX MARKS: 75**

SECTION A

5 Questions (5 x 5 = 25 marks)

(5 Questions out of 8)

SECTION B

5 Questions (5 x 10 = 50 marks)

(5 Questions out of 8)

SEMESTER I

ALGEBRA (MTH1501)

Credits: 4 **Total Duration: 86 Hrs**

Objective

To develop the capability among students for handling abstract concepts and to provide the students with experience in axiomatic mathematics while keeping in close touch with the computational aspects of the subject.

Unit I **(16 Hrs)**

Group Theory: Another Counting principle - Sylow's theorem - Application of Sylow's theorem - Direct products (Internal & External).

Unit II **(15 Hrs)**

Ring Theory: Ideals and quotient rings - prime & primary ideal - maximal ideal - Polynomial rings over the rational field - unique factorization domain.

Unit III **(17 Hrs)**

Modules - Fields: Extension fields - Roots of polynomials - More about roots.

Unit IV **(19 Hrs)**

Fields: Elements of Galois Theory - Solvability by radicals.

Unit V **(19 Hrs)**

Hermitian, Unitary and Norrmal transformations –Real quadratic forms.

***--------*: self study**

Text Book

S. No	**Author**	**Title of the book**	**Publishers**	**Year of Publication**
1.	I.N. Herstein	Topics in Algebra	2nd edition, John Wiley & Sons (ASIA) Pvt Ltd, Singapore	2011

	Unit I : Chapter 2 – 2.11,2.12,2.13 Unit II : Chapter 3 – 3.4, 3.5, 3.10,3.11 Unit III: Chapter 5 – 5.1, 5.3,5.5 Unit IV: Chapter 5 – 5.6, 5.7 Unit V : Chapter 6 – 6.10,6.11

Reference Books

S. No	**Author**	**Title of the book**	**Publishers**	**Year of Publication**
1.	Lang Serge	Algebra	Addison-Wesley	2002
2.	P. B. Bhattacharya, S. K. Jain and S. R. Noyapal	Basic Abstract Algebra	Cambridge University	2009
3.	Rao & Bhimsankaran	Linear Algebra	Hindustan book	2000
4.	Serge Lang	Linear Algebra	Addison-Wesley	2004
5.	S. Kumaresan	Linear Algebra	Prentice Hall	2000
6.	T. W. Hungerford	Algebra	Springer	2000

SEMESTER I

REAL ANALYSIS (MTH1402)

Credits: 4 **Total Duration: 86 Hrs**

Objective

To make the students understand the concept and notions of pure mathematics in a logical fashion.

Unit I **(17 Hrs)**

Riemann Stieltjes Integral: Definition and Existence of the integral - *Properties of the integral* - Integration and differentiation - Integration of vector valued function - Rectifiable curves.

Unit II **(17 Hrs)**

Uniform convergence and continuity - Uniform convergence and integration - Uniform convergence and differentiation - equicontinuous families of functions - The Stone Weierstrass theorem.

Unit III **(18 Hrs)**

Functions Of Several Variables: Linear transformation - Contraction principle - Inverse function theorem - Implicit function theorem- Determinants - Derivatives of higher order - Differentiation of integrals.

Unit IV **(17 Hrs)**

Lebesgue Measure: Outer measure - Measurable sets and Lebesgue measure - Measurable functions - The Little wood's theorem.

Unit V **(17 Hrs)**

The Lebesgue Integral: The Lebesgue integral of a bounded function over a set of finite measure - Integral of a non-negative function - General Lebesgue integral - Convergence in measure.

***------*: Self Study**

Text Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	H.L.Royden	Real Analysis	3rd edition, Macmillan, New York.	2010
	UNIT IV: Chapter 3 – Sections: 1 – 3, 5 – 6 UNIT V : Chapter 4 – Sections: 1 – 5			
2.	W.Rudin	Principles of Mathematical Analysis	McGraw Hill, NewYork	2013
	UNIT I : Chapter 6 – Sections: 6.1 – 6.27 UNIT II : Chapter 7 – Sections: 7.1 – 7.26 UNITIII : Chapter 9 – Sections: 9.1 – 9.8, 9.22– 9.28, 9.33 – 9.42			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
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

SEMESTER I

ORDINARY DIFFERENTIAL EQUATIONS (MTH1403)

Credit: 4 **Total Duration: 86 Hrs**

Objective

Differential equations arise for many problems in oscillations of mechanical and electrical systems- bending of beams- conduction of heat- velocity of chemical reactions etc.- and as such play a very important role in all modern scientific and engineering studies.

Unit I **(16 hrs)**

Second order linear equations with ordinary points - Legendre equation and Legendre polynomials - Second order equations with regular singular points - Bessel equation.

Unit II **(16 hrs)**

Systems of first order equation - Existence and uniqueness theorem - Fundamental matrix.

Unit III **(17 hrs)**

Non-homogeneous linear systems - Linear systems with constant co-efficient -
* Linear systems with periodic co-efficients *.

Unit IV **(18 hrs)**

Successive approximation - Picard's theorem - non-uniqueness of solutions - continuation and dependence on initial conditions - Existence of solutions in the large - existence and uniqueness of solutions of systems.

Unit V **(19 hrs)**

Fundamental results - Sturm's comparison theorem - Elementary linear oscillations- Comparison theorem of Hille-Winter oscillations of X" + A(t) X = 0 - Elementary non-linear oscillations.

-------: Self Study

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	S.G. Deo and V.Raghavendra	Ordinary Differential Equations and Stability Theory	Tata Mc Graw Hill publishing Company (P) Ltd	New Delhi,2002
	Unit I : Chapter 3 - Section 3.2 - 3.5 Unit II : Chapter 4 - Section 4.1 - 4.4 Unit III: Chapter 4 - Section 4.5 - 4.7 Unit IV: Chapter 5 - Section 5.3 - 5.8 Unit V : Chapter 6 - Section 6.1 - 6.6			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	D.W.Jordan and P.Smith	Non linear Ordinary Differential Equations	Clerendon Press, Oxford	2007
2.	E.A. Coddington and N.Levinson	Theory of Ordinary Differential Equations	Tata McGraw-Hill	1984

SEMESTER I

ELECTIVE 1 - NUMERICAL METHODS (MTH15E1)

Credit: 4 **Total Duration: 86 Hrs**

Objective

To enable the students to learn the different approaches of problem solving in the numerical methods and improve the calculating ability of the students.

Unit I **(16 hrs)**

Solution of non-linear equations: Newton's method - convergence of Newton's method- Bairstow method for quadratic factors - Numerical Differentiation And Integration: Derivatives from differentiation table-higher order derivatives - divided difference - central difference formulas - composite formula of trapezoidal rule - Romberg's integration - Simpson's rules.

Unit II **(16 hrs)**

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 non-linear equations.

Unit III **(17 hrs)**

Solution of ordinary differential equations: Taylor series method - Euler and modified Euler's methods - Runge-kutta methods - multistep methods - Milne's method - Adam's Moulton method.

Unit IV **(18 hrs)**

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 **(19 hrs)**

Numerical solution of partial differential equations: solutions of elliptic, parabolic and hyperbolic partial differential equations - Representation as a difference equation - Laplace equation - the Poisson equation - Derivative boundary conditions - Solving the equation for

time - dependent heat flow (1) The Explicit method (2) The Crank Nicolson method - solving the wave equation by finite differences.

------: Self Study

List of problems with coding in C++

1. Gauss –Jordan method
2. Inverse of a matrix
3. Solution of one dimensional heat Conduction equation by (i) explicit and (ii) Crank – Nicolson implicit method
4. Solution of Laplace equation
5. Solution of Poisson equation
6. Solution of one dimensional wave equation

Text Book

S. No	**Author**	**Title of the book**	**Publishers**	**Year of Publication**
1.	C.F.Gerald and P.O Wheatley	Applied Numerical Analysis	Fifth edition, Addition Wesley	1998
	Unit I : Chapter 1: Sections: 1.4- 1.8, 1.11 Chapter 4: Sections: 4.2, 4.3, 4.6, 4.7. Unit II : Chapter 2: Sections: 2.3 - 2.5, 2.7, 2.10 - 2.12. Unit III : Chapter 5: Sections: 5.2 - 5.7. Unit IV : Chapter 6: Sections: 6.1 - 6.3, 6.6, 6.7. Unit V : Chapter 7: Sections: 7.3 - 7.7, Chapter 8: Sections: 8.1 - 8.3 Chapter 9: Section : 9.2.			

Reference Books

S. No	**Author**	**Title of the book**	**Publishers**	**Year of Publication**
1.	M.K.Venkatraman	Numerical Methods in Science and Engineering	Prentice-Hall, Fifth Edition	1999
2.	P.Kandasamy	Numerical Methods	S.Chand and company	2003

			limited, NewDelhi	
3.	R.L.Burden and J.Douglas Faires	Numerical Analysis	6^{th} edition P.W.S.Kent Publishing Company,Boston	1997
4.	S.C. Chapra and P.C.Raymond	Numerical methods for Engineers	Tata McGrawHill, NewDelhi	2000
5.	S.S.Sastry	Introductory Methods to Numerical Analysis	Prentice Hall of India, NewDelhi	1998

SEMESTER I

ELECTIVE I - GRAPH THEORY (MTH14E2)

Objective

To solve the electrical network, diatomic molecules, switching network problems, etc., Graph theory finds its application both in pure and applied mathematics.

Credits: 4 **Total Duration: 56 Hrs**

Unit I **(11 hrs)**

Graphs, Subgraphs And Trees: Graphs and simple graphs – Graph isomorphism – The incidence and adjacency matrices – Subgraphs – Vertex degrees – Paths and connection cycles. Trees- Cut edges and Bonds – Cut vertices – Cayley's formula.

Unit II **(11 hrs)**

Connectivity, Euler Tours And Hamilton Cycles: Connectivity – Blocks- Euler tours – Hamilton cycles.

Unit III **(11 hrs)**

Matchings And Edge Colourings: Matchings – Matchings coverings in bipartite graphs – Perfect matching – Edge chromatic number – Vizings theorem.

Unit IV **(11 hrs)**

Independent Sets, Cliques And Vertex Colourings: Independent sets- Ramsey's theorem- Chromatic number – Brook's theorem – Hajos conjecture theorem – Chromatic polynomials – Girth and chromatic number.

Unit V **(12 hrs)**

Planar Graphs And Directed Graphs: Plane and planar graphs – Dual graphs – Euler's formula- bridges – Kuratowski's theorem (proof omitted) – The five colour theorem and the four colour conjecture – Non-Hamiltonian planar graphs – Directed graphs – Directed paths – Directed cycles.

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	J.A. bondy and U.S.R. Murty	Graph Theory with Applications	Elsevier Publishing Co., Inc., New York	1976
	Unit I : Sections 1.1 to 1.7 & 2.1 to 2.4. Unit II : Sections 3.1 to 3.2 & 4.1 to 4.2 Unit III : Sections 5.1 to 5.3 & 6.1 to 6.2 Unit IV : Sections 7.1 to 7.2 & 8.1 to 8.5 Unit V : Sections 9.1 to 9.7 & 10.1 to 10.3			

Reference Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	NarSinghDeo	Graph Theory for Computer Science and Engineers	PHI, India	2004

SEMESTER I

MATHEMATICAL STATISTICS (MTH1405)

Credits: 4 **Total Duration: 86 Hrs**

Objective

To enable the students to learn the different aspects of statistics that provides them a systematic knowledge to analyze,organize,present and interpret any information effectively.

Unit I **(16 Hrs)**

The concept of random variables - The distribution function- Random variables of the discrete type and the continuous type - Functions of the random variables- Multidimensional random variables - marginal distributions - Conditional distributions- Independent random variables - parameters of the distribution of the random variable- Expected values – Moments – The Chebyshev inequality - Absolute moments. Characteristic functions: Properties of characteristic function - characteristic function & moments - semi-invariants - the characteristic function of the sum of independent random variables.

Unit II **(17 Hrs)**

Probability generating functions -*One point and two point distribution*- Bernoulli scheme - The Binomial distributions - The Poisson scheme - The generalized binomial distribution - The Poisson distribution - Geometric distribution - Negative Binomial distribution - Derivation of moments using Probability Generating Function - Uniform distribution - Exponential distribution.

Unit III **(19 Hrs)**

Normal distribution - Gamma distribution - Beta distribution - Cauchy and Laplace distributions - Limit theorems - Preliminary remarks - Stochastic convergence - Bernoulli's law of large numbers - The convergence of a sequence of distribution functions - Levy Cramer theorem - De-Moivre Laplace theorem - Lindberg Levy theorem.

Unit IV **(17 Hrs)**

Sample moments and their functions - The notion of the sample - The notion of a statistic - The distribution of the arithmetic mean of independent normally distributed random variables - The chi square distribution - The distribution of the statistic (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 chi square test- Independence test by contingency tables.

Unit V **(17 Hrs)**

Theory of estimation - Preliminary notions – Consistent – unbiased - sufficient and efficient estimates - asymptotically most efficient estimates - methods of finding estimates - Confidence intervals - Theory of hypothesis testing - Preliminary remarks - The power functions and OC functions.

***------*:** Self Study

Text Book

S. No	**Author**	**Title of the book**	**Publishers**	**Year of Publication**
1.	Marek Fisz	Probability Theory and Mathematical Statistics	Robert E. Krieger Publisher	1980
	Unit I : Chapter 2 : 2.1-2.8, Chapter 3: 3.1-3.5, Chapter 4: 4.1- 4.4 Unit II : Chapter 5 : 5.1-5.7. Unit III: Chapter 5 : 5.8-5.10, Chapter 6: 6.1-6.8 Unit IV: Chapter 9 : 9.1-9.6 Unit V : Chapter 12:12.1-12.4, Chapter 13: 13.1-13.3, Chapter16: 16.1-16.4			

Reference Books

S. No	**Author**	**Title of the book**	**Publishers**	**Year of Publication**
1.	Feller	Mathematical Statistics	Prentice Hall, New Delhi	1968
2.	S.C.Gupta and V.K.Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand & Sons, New Delhi	2007

SEMESTER II

COMPLEX ANALYSIS (MTH1406)

Credits: 4 **Total Duration: 86 Hrs**

Objective

To enable the students to learn the detailed aspects of the analysis in the complex field.

Unit I **(16Hrs)**

Introduction to the concept of analytic function: Limits and continuity - Analytic functions- Polynomials - Rational functions - Conformality: Arcs and closed Curves - Analytic functions in regions - Conformal Mapping - Length and Area - *Linear Transformations: The Linear group - The Cross-ratio* - Elementary Riemann Surfaces.

Unit II **(17 Hrs)**

Complex integration: Line integrals Rectifiable Arcs - Line Integrals as Functions of Arcs- Cauchy's theorem for a rectangle - Cauchy's theorem in a disk - Cauchy's integral formula: The index of a point with respect to a closed curve - The integer formula - Higher derivatives - Removable singularities - Taylor's Theorem - Zeros and Poles - The local mapping - The Maximum Principle - chains and cycles.

Unit III **(17 Hrs)**

The Calculus of Residues: The Residue theorem - The Argument principle - Evaluation of definite integrals - Harmonic functions: The Definitions and basic Properties - Mean value property - Poisson's Formula.

Unit IV **(17 Hrs)**

Series and Product Developments: Weierstrass theorem - The Taylor Series - The Laurent Series - Partial fractions and Factorization: Partial Fractions - Infinite Products - Canonical Products.

Unit V **(19 Hrs)**

The Riemann Mapping Theorem - Statement and Proof- Boundary Behavior - Use of the reflection principle - Analytic arcs - Conformal mapping of Polygons: The Behavior at an angle - the Schwarz - Christoffel Formula - Mapping on a rectangle.

***-------*: Self Study**

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	L.V.Ahlfors	Complex Analysis	Mc Graw Hill, NewYork	2013
	Unit I : Chapter - 2 Sections 1.1-1.4 Chapter - 3 Sections 2.1-2.4- 3.1-3.2 and 3.4 Unit II : Chapter - 4 Sections 1.1-1.5, 2.1-2.3, 3.1-3.4 and 4.1 Unit III: Chapter - 4 Sections 5.1-5.3, 6.1-6.3 Unit IV: Chapter - 5 Sections 1.1-1.3, 2.1-2.3 Unit V : Chapter - 6 Sections 1.1-1.4, 2.1-2.3			

Reference Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	S. Ponnusamy	Foundations of Complex Analysis	Narosa Publisher	2003

SEMESTER II

PARTIAL DIFFERENTIAL EQUATIONS (MTH1407)

Credits: 4 **Total Duration: 71 Hrs**

Objective

To present the elements of the theory of partial differential equation which will enable the students to find solution of partial differential equation of practical application.

Unit I **(15 Hrs)**

Nonlinear Partial Differential Equations of the first order - Cauchy's method of Characteristics - Compatible System of First order equations - Charpit's method - * Special types of First Order equations * - Jacobi's method.

Unit II **(14 Hrs)**

Partial Differential Equations of second order - The origin of Second - order Equations - Linear Partial Differential Equations with constant coefficients – Equations with variable coefficients.

Unit III **(14 Hrs)**

The solution of Linear Hyperbolic Equations - Separation of variables- The Method of integral transforms- Non linear Equation of the second order.

Unit IV **(14 Hrs)**

Laplace's equation - The occurrence of Laplace's Equation in Physics - Elementary solution of Laplace's Equation - Families of Equipotential surfaces - Boundary value problems - Separation of variables - Problems with axial symmetry.

Unit V **(14 Hrs)**

The wave Equation - The occurrence of wave equation in physics - Elementary solution of the one-dimensional wave equation - Vibrating Membranes: Application of the calculus of variations - Three dimensional problems.

The diffusion equations: Elementary solutions of the diffusion Equation - Separation of variables - the use of Integral transforms.

***-------* : Self Study**

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Ian N.Sneddon	Elements of Partial Differential Equations	McGraw-Hill International Edition	2006
	Unit I : Chapter 2 Sections 7,8,9,10,11 and 13 Unit II : Chapter 3 Sections 1, 4, 5 and 6 Unit III: Chapter 3 Sections 8,9,10 and 11 Unit IV: Chapter 4 Sections 1, 2,3,4,5 and 6 Unit V : Chapter 5 Sections 1, 2, 4 and 5, Chapter 6 Sections 3, 4 and 5			

Reference Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Tyn Myint.U	Partial Differential Equations of Mathematical Physics	Elsevier Science Ltd	1980

SEMESTER II

MECHANICS (MTH1408)

Credits: 4 **Total Duration: 86 Hrs**

Objective

To enable the students to tackle practical problems and apply the techniques to attain a solution.

UNIT I **(18 hrs)**

Introductory concepts: Mechanical system - generalized coordinates – constraints - virtual work - energy and momentum.

UNIT II **(17 hrs)**

Lagrange's equations: Derivations of Lagrange's equations – examples - integrals of motion.

UNIT III **(17 hrs)**

Hamilton's equations: Hamilton's principles - Hamilton's equations - other variational principles.

UNIT IV **(17 hrs)**

Hamilton – Jacobi theory: Hamilton's principle function - Hamilton - Jacobi equation - *Separability*.

UNIT V **(17 hrs)**

Canonical transformations: Differential forms and generating functions - Lagrange and Poisson brackets.

***------*:** Self Study

Text Book

S. No	**Author**	**Title of the book**	**Publishers**	**Year of Publication**
1.	Donald T.Greenwood	Classical Dynamics	Dover Publications	1997
	UNIT I : Chapter 1 UNIT II : Chapter 2: Sections 2.1-2.3. UNIT III : Chapter 4: Sections: 4.1-4.3. UNIT IV : Chapter 5 UNIT V : Chapter 6: Sections: 6.1-6.3.			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	F.Gantmacher	Lectures in Analytic Mechanics	MIR Publishers, Moscow	1975
2.	H.Goldstein	Classical Mechanics	2nd Edition, Narosa Publishing House, New Delhi	2001
3.	I.M. Gelfand and S.V.Fomin	Calculus of Variations	Prentice Hall	2000
4.	S.L.Loney	An Elementary Treatise on Statics	Kalyani Publishers, New Delhi	1979

SEMESTER II

ELECTIVE II - MATLAB THEORY (MTH14E3)

Credits: 4 **Total Duration: 58 Hrs**

Objective

MATLAB is a tool for doing numerical computations with matrices, vectors and digital signal processing. The best way to learn MATLAB is to work through some examples at the computer.

Unit I **(11 Hrs)**

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

Unit II **(12 Hrs)**

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 **(13 Hrs)**

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

Unit IV **(11 Hrs)**

Applications - Linear Algebra - Curve fitting and interpolation - Data analysis and Statistics - Numerical Integration - Ordinary differential equations - Nonlinear Algebraic Equations.

Unit V **(11 Hrs)**

Graphics: Basic 2D plots - Using subplot to layout multiple graphs - 3D Plots - Handle graphics - Saving and Printing graphs - Errors.

*** ---------*: Self Study**

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Rudra Pratap	Getting Started with MATLAB 7– A Quick introduction for Scientists and Engineers	Oxford University Press	2003
	Unit I : Chapter 1 – Sections 1.1 and 1.6 Unit II : Chapter 3 – Sections 3.1, 3.2,3.5, 3.6, 3.7and 3.8 Unit III : Chapter 4 – Sections 4.1, 4.2, 4.3and 4.4 Unit IV : Chapter 5 – Sections 5.1, 5.2, 5.3, 5.4,5.5and 5.6 Unit V : Chapter 6 – Sections 6.1, 6.2, 6.3, 6.4, 6.6 and 7			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Dolores M. Etter, David C. Kuncicky	Introduction to MATLAB 7	Prentice Hall	2004
2.	William John Palm	Introduction to MATLAB 7 for Engineers	McGraw –Hill professional	2005

SEMESTER II

ELECTIVE II - MATLAB - PRACTICAL I (MTH14P2)

Credits: 2 **Total Duration: 28 Hrs**

LIST OF PRACTICALS

1. Launch MATLAB, do some calculations and quit.
2. Create and work with arrays in particular
3. Create and work with vectors in particular
4. Write and execute a script file
5. Write and execute a function file
6. Learn about file and directory navigations
7. 2D Plots and 3D Plots

SEMESTER II

ELECTIVE II - JAVA PROGRAMMING (MTH14E4)

Credits: 4 **Total Duration: 58 Hrs**

Objective

The subject is intended to provide the student with the in -depth knowledge of JAVA language for creating safe robust object -oriented multithreaded interactive programs. It also sheds light around wide spread applications of the internet.

Unit I **(10 Hrs)**

Overview of Java Language: Introduction - Simple Java program - Structure - Java tokens - Statements - Java virtual Machine.

Unit II **(11 Hrs)**

Constants - Variables - Data types - Operators and expressions - Decision making and Branching: If, *IF…Else*, else..If ladder, switch?

Unit III **(11 Hrs)**

Decision making and looping: While - do for - Jumps in loops - labeled loops – Classes, Objects and Methods.

Unit IV **(12 Hrs)**

Arrays - Strings and Vectors - Interfaces - Multiple Inheritance - Multi Threaded Programming.

Unit V **(12 Hrs)**

Managing Errors and Exceptions - Applet Programming - Graphics programming.

*** ---------*: Self Study**

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	E. Balagurusamy	Programming with Java – A primer	Tata Mc Graw Hill, 3rd edition, ISBN: 0 -07 - 061713 -9	2008
	Unit I - Chapter 3 - Section 3.1 to 3.9 Unit II - Chapter 4 - Section 4.1 to 4.10 Chapter 5 - Section 5.1 to 5.15 Chapter 6 - Section 6.1 to 6.8 Unit III - Chapter 7 - Section 7.1 to 7.6 Chapter 8 - Section 8.1 to 8.18			

	Unit IV - Chapter 9 - Section 9.1 to 9.9 Chapter 10 - Section 10.1 to 10.5 Chapter 12 - Section 12.1 to 12.10 Unit V - Chapter 13 - Section 13.1 to 13.8 Chapter 14 - Section 14.1 to 14.16 Chapter 15 - Section 15.1 to 15.9

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Patrick Naughton	The Java Handbook	Tata Mc Graw Hill, 1st edition	2003
2.	Pramod Koparkar	Java for U	Tata Mc Graw Hill, 1st edition	2001
3.	Thomas Powell,Fritz Schneider	Java Script: The Complete Reference	Tata Mc Graw Hill, 2nd edition	2005

SEMESTER II

ELECTIVE II - JAVA PRACTICAL (MTH14P4)

Credits: 2 **Total Duration: 28 Hrs**

Objective

The subject is intended to provide the student with the in-depth knowledge of JAVA language for creating safe robust object -oriented multithreaded interactive programs. It also sheds light around wide spread applications of the Internet

LIST OF PRACTICAL

1. Write a java program to print the following triangle of numbers.

   1

   1 2

   1 2 3

   1 2 3 4

   1 2 3 4 5

2. Write a java program to define a class with the following attributes:

   1.name 2.date of birth. 3.date on which leg injection has to be given (60 days from the date of birth).4.date on which polio injection is to be given(45 days from the date of birth).

   Write a constructor to construct the baby object.The constructor must find out the leg & polio drops date from the date of birth. In the main program define a baby and display its details.

3. Write a java program which creates & displays a message on the window.
   1. Write a java program to draw several shapes in the created window.
   2. Write a java program to create an applet and draw gridlines .
   3. Write a java program to create a frame with two buttons called father and mother. When we click “Father”, the name of the father, his age and designation must appear. Similarly when a click is made on “ Mother” button , details of the mother must be displayed.
4. Write a java program to create four text fields for name ,street, city, pincode with suitable labels. Also add a button called “ My Details ”, when we click the button, name, city, pincode, street must appear in the text field.
5. Write a java program to create a frame with three text fields for name, age and qualification and a text field of multiple lines for address.
6. Write a java program to demonstrate the multiple selection list box.

SEMESTER II

CONTROL THEORY (MTH1410)

Credits: 4 **Total Duration: 56 Hrs**

Objective

To enable the students to learn the detailed aspects of control theory.

Unit I **(12 Hrs)**

Observability: Linear systems - Observability Grammian - Constant coefficient systems - Reconstruction Kernel - Nonlinear Systems.

Unit II **(11 Hrs)**

Controllability: Linear Systems - Controllability Grammian - Adjoint Systems - Constant coefficient systems - Steering function - Nonlinear systems.

Unit III **(11 Hrs)**

Stability: Stability - Uniform Stability - Asymptotic Stability of Linear Systems - Linear time varying systems - *Perturbed linear systems*- Nonlinear systems.

Unit IV **(11 Hrs)**

Stabilizability**:** Stabilization via linear feedback control - Bass method - Controllable subspace - Stabilization with restricted feedback.

Unit V **(11 Hrs)**

Optimal Control: Linear time varying systems with quadratic performance criteria - Matrix Riccati equation - Linear time invariant systems - Nonlinear Systems.

***------*:Self Study**

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	K.Balachandran and J.P.Dauer	Elements of Control Theory	Narosa, New Delhi	1999
	Unit I : Chapter 2- Sections : 2.1-2.2 Unit II : Chapter 3- Sections : 3.1-3.2 Unit III : Chapter 4- Sections : 4.1- 4.3 Unit IV : Chapter 5- Sections : 5.1- 5.3 Unit V : Chapter 6- Sections : 6.1- 6.3			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	D.L.Russell	Mathematics of Finite Dimensional Control Systems	Marcel	1979
2.	J.Klamka	Controllability of Dynamical Systems	Klumer Academic Publisher, Dordrecht	1991
3.	R.Conti	Linear Differential Equations and Control	Academic Press, London	1976
4.	R.F.Curtain and A.J.Pritchard	Functional Analysis and Modern Applied Mathematics	Academic Press, New York	1977

SEMESTER II

INTER DISCIPLINARY COURSE

FINANCIAL AND MANAGEMENT ACCOUNTING

(MCM11A3)

Credits: 5 **Total Duration: 75 hrs**

Objective

To know the basic accounting methods. To enhance the students knowledge on treatment of accounts practically. To know the tools and techniques of financial Analysis. To learn the techniques of management of current assets.

Unit-I **(14 hrs)**

Accounting; Definition - Objectives - *advantages* - accounting concepts and conventions - Methods of Accounting - Double Entry System - Basic books of Accounts - Journal - Ledger - Preparation of Trial Balance.

Unit -II **(16 hrs)**

Final Accounts: Trading and Profit and Loss Account - Balance sheet of Sole Proprietary concern.

Unit -III **(15 hrs)**

Analysis and interpretation of financial Statements - Comparative statements - Common size statements - trend analysis - limitations of financial analysis.

Unit -IV **(15 hrs)**

Ratio Analysis - Meaning - Importance - advantages and limitations - classification of Ratios - profitability - Turnover - Solvency ratios.

Unit -V **(15 hrs)**

Working Capital – Concepts, Kinds, Importance of Working Capital - Working Capital requirements and their computations.

***------*:** Self Study

Text Books

S.No	Author	Title of the book	Publisher	Year of Publication
1.	Jain & Narang	Advanced Accounting	Kalyani Publications	14th Edition, 2002
	Unit I and II			
2.	T.S. Reddy & A. Murthy	Financial Accounting	Margham Publications	11th Revised Edition, 2005
	Unit I and II			
3.	Shashi.k.Gupta R.K.Sharma	Management Accounting	Kalyani Publications	Reprint 2007
	Unit III,IV,V			

SEMESTER III

TOPOLOGY (MTH1411)

Credits: 4 **Total Duration: 86 Hrs**

Objective

To expose the concepts in the subject which ensure its position as a basic discipline of pure mathematics.

Unit I **(18 Hrs)**

Topological Spaces - Basis for a Topology - The Order Topology - Closed Sets and Limit Points - Continuous Functions - Product Topology - Metric Topology.

Unit II **(17 Hrs)**

Connectedness and Compactness: Connected Spaces - Connected sets in R - Components and Path Components - Local Connectedness - Compact Spaces - *Limit Point Compactness* - Local Compactness.

Unit III **(15 Hrs)**

Countability and Separation Axioms: Countability Axioms - Separation Axioms - Urysohn's Lemma – Urysohn Metrization Theorem.

Unit IV **(17 Hrs)**

The Tychonoff Theorem - Completely Regular spaces - The Stone-Cech Compactification.

Unit V **(19 Hrs)**

Complete Metric Spaces - Compactness in Metric Spaces - Point-wise and Compact Convergences - Ascoli's Theorem - Baire spaces.

*** ----------* : Self Study**

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	James R.Munkres	Topology A First Course	Prentice Hall of India Pvt. Ltd,New Delhi	2000
	Unit I : Chapter 2 -Sections 12 -15,17 -20 Unit II : Chapter 3 -Sections 23 -29 Unit III : Chapter 4 -Sections 30,31,33,34 Unit IV : Chapter 5 -Sections 37,38 Unit V : Chapter 7 -Sections 43,45,46,47,48			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	George F. Simmons	Introduction to Topology and Modern Analysis	Tata McGraw -Hill Edition	2004
2.	J.Dugundji	Topology	Prentice Hall of India	1966
3.	J.L.Kelley	General Topology	Van Nostrand, Reinhold Co,New York	1995
4.	L.Steen and J.Seebach	Counterexamples in Topology	Holt -Rinehart and Winston, New York	1978
5.	R.Engelking	General Topology	Polish Scientific Publishers	1977
6.	Sze – Tsen Hu	Elements of General Topology	Holden – Day, Inc	1965

SEMESTER III

FLUID DYNAMICS (MTH1412)

Credits: 4 **Total Duration: 86 Hrs**

Objective

To familiarize the students with the concept of Fluid Dynamics as the subject has got application in medical, astrophysical, geophysical, agricultural, aerodynamical and other related disciplines. Fluids Dynamics is one of the most important parts of the recent interdisciplinary activities concerning energy and technological development.

Unit I **(16 Hrs)**

Introductory Notions - Velocity - Streamlines and path lines - Stream tubes and filaments - Fluid body - Density - Pressure - Differentiation following the fluid - Equation of continuity - Boundary condition - Kinematical and physical - Rate of change of linear momentum - Equation of motion of an inviscid fluid.

Unit II **(18 Hrs)**

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 **(18 Hrs)**

Two dimensional motion - Two dimensional functions - Complex potential - basic singularities - Source and sink vortex - Doublet - circle theorem - flow past a circular cylinder with circulation - Conformal transformation - Blasius theorem - * Lift force *.

Unit IV **(17 Hrs)**

Viscous flows - Navier-stokes equations - Vorticity and circulation in a viscous fluid - Steady flow through an arbitrary cylinder under pressure - Steady couette flow between cylinders in relative motion - Steady flow between parallel planes.

Unit V **(17 Hrs)**

Laminar boundary layer in incompressible flow - Boundary layer concept - boundary layer equations - displacement thickness - momentum thickness - kinetic energy thickness - integral equation of boundary layer - flow parallel to semi infinite flat plate - Blasius equation and its solution in series.

*** ----------* : Self Study**

Text Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	L.M. Milne Thomson	Theoretical Hydro Dynamics	Dover Publications, New edition	2011
	Unit I & II : Chapter I : 1.0 -1.3 Chapter III: 3.10 – 3.53 omit 3.32 -3.44			
2.	N.Curle and H.J.Davies	Modern Fluid Dynamics Volume I	D.Van Nostrand Company Ltd, London	1968
	Unit III -IV & V: Chapter III : 3.1 –3.7.5. omit 3.4(full) and 3.5 -3.5.3 Chapter V : 5.1 –5.3.3 Chapter VI : 6.1 - 6.3.1. Omit 6.2.2			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	F.D Shanti Swarup	Fluid Dynamics	Krishna Prakashnan media P (Ltd) Meerut	2000
2.	M.D Raisinghania	Fluid Dynamics(with Hydrodynamics)	S.Chand & Company	2003

SEMESTER III

BASICS OF CRYPTOGRAPHY (MTH1423)

Credits 4 **Total duration: 86 hours**

Objective: To impart knowledge on securing information and cryptosystems

Unit I **(19 hours)**

Introduction to Information Security: Introduction, security, critical characteristics of information, NSTISSC security model, components of an information system, Security components, Approaches to information security implementation. The System Development life cycle, The Security System Development life cycle.

The need for security: Business needs first, threats, attacks, secured software development.

Cryptography: Basic concepts of cryptography, cryptographic algorithm, Cryptograph tools. *Authentication, Passwords, keys versus passwords, Attacking Systems via passwords, Password verification.*

UNIT II **(19 hours)**

Classical Encryption Techniques: Symmetric Cipher model, Substitution techniques, Transposition Techniques. Block Ciphers and the Data Encryption Standard: Block cipher principles, the data encryption standard, the strength of DES.

Introduction to Number Theory: Prime Numbers, Fermat's and Euler's Theorem, Testing for primality, Miller -Rabin Algorithm. Chinese Remainder Theorem, Discrete Logarithms, Algorithms**.** (Except problems)

Unit III **(18 hours)**

Public Key cryptosystems: Principles of Public -Key cryptography, Public -Key cryptosystems, Applications for Public -Key cryptosystems, Requirements for Public -Key cryptography, Public -Key Cryptanalysis, RSA Algorithm, Description of the Algorithm, Computational Aspects, Security of RSA.

Key Management: Diffie – Hellman Key Exchange - Algorithm, Key Exchange protocols, Elliptic Curve Arithmetic, Elliptic Curve cryptography.(Except problems)

Unit IV **(15 hours)**

Digital signatures and Authentication Protocols: Requirements. Direct Digital Signature. Arbitrated Digital Signature, Authentication Protocols, Mutual Authentication, One way Authentication, Digital Signature Standard, DSS Approach, and Digital Signature Algorithm. (Except problems)

Unit V **(15 hours)**

Virus: Viruses and Related threats, Virus Countermeasure

Fire walls: Firewalls, Types of Fire wall, Design Principles of Firewall, Trusted systems.

*** ----------*: Self Study**

Text Books

S.No	Author	Title of the book	Publishers	Year of Publication
1	Dr.Michael E. Whitman, Herbert J. Mattord	Principles and Practices of Information Security	Course Technology Cengage Learning	2009
	Unit I: Chapter 1 : Upto SSDLC & Chapter 2 Chapter 8 : Upto Cryptographic Tools			
2	William Stallings	Cryptography and Network security	Pearson education	Fourth edition, 2006
	Unit II : Chapter 2 : 2.1 -2.3, Chapter 3 : 3.1 -3.3 & Chapter 8: 8.1 -8.5 Unit III: Chapter 9 : 9.1 -9.3, Chapter 10:10.1 -10.4 Unit IV: Chapter 13: 13.1 – 13.3 Unit V : Chapter 19: 19.1&19.2, Chapter 20:20.1& 20.2			

Reference Books

S.No	Author	Title of the book	Publishers	Year of Publication
1	Straub.D.W	Information Security	Prentice Hall of India, New Delhi	2009
2	Pachghare.V.K	Cryptography and Information Security	PHI Learning Pvt Ltd, New Delhi	2009
3	Boris Ryabko, Andrey Fionov	Basics of Contemporary Cryptography for IT Practitioners, Series on Coding Theory and Cryptology – Vol. 1	World scientific Publishing Co.Re.Ltd, Singapore.	2005

SEMESTER III

RESEARCH METHODOLOGY (MTH08S1)

Credits: 2 **Total Duration: 30 Hrs**

Objective

To motivate the Students in Research Oriented Topics.

Unit I **(5 Hrs)**

What is research in Mathematics? - Fixing an area for research - Proof Techniques - Pure and applied Mathematics research - Articles (Popular, Technical, Review, Survey), Magazines, Journals -Mathematical and Statistical Software's (free and commercial) - Mathematical - Statistical Societies (National and International) - Prizes and Medals in Mathematics.

Unit II **(6 Hrs)**

Dissertation - Thesis - Expository - Research Paper - Abstract - Review - Referee Components of Dissertation and Thesis - the Internet - Web sites related To mathematical articles and softwares.

Unit III **(7 Hrs)**

Fuzzy Logic: Introduction - Crisp Sets: An over view - The notion of Fuzzy Sets - Basic concepts of Fuzzy Sets - Classical Logic: Complement - Fuzzy Union - Intersection.

Unit IV **(6 Hrs)**

Fuzzy Arithmetic - Fuzzy Numbers - Linguistic variables - Arithmetic Operations on intervals.

Unit V **(6 Hrs)**

Fuzzy equations - Fuzzy Relations - Binary Fuzzy Relations - Fuzzy equivalence relations.

Text Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	J.Anderson	Thesis and Assignment Writing	Wiley Eastern	2001
	Unit I , Unit II : Chapters 1 - 12			
2.	George J.Klir and Tina A.Folger	Fuzzy Sets -Uncertainty and Information	Prentice Hall of India Pvt Ltd	1995
	Unit III, Unit IV, Unit V : Chapters 1.1 -1.6, 2.1 – 2.6, 3.1 – 3.4.			

Reference Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	George .J. Klir and Bo Yuan	Fuzzy Sets and Fuzzy Logic	Prentice Hall	2000

SEMESTER III

ELECTIVE III - C++ Theory (MTH15E5)

Credits: 4 **Total Duration: 58 Hrs**

Objective

Object oriented programming is the latest trend in the industry. C++ is considered as a highly suitable language to understand the classes -objects concept. It has emerged as a language of choice for most applications due to its ease of use and code compactness.

Unit I **(10 hrs)**

The Big Picture: Overview of object-oriented programming –Characteristics of object-oriented languages –C++ and C. C++ Programming Basics: Basic program construction –Output using cout –Preprocessor directives –Comments –Integer variables –Character variables –Input with cin –Type float –Manipulators –Variable type summary –Type conversion –Arithmetic operators –Library functions.

Unit II **(12 hrs)**

Loops and Decisions: Relational operators –Loops –Decisions –Logical operators –Precedence summary –Other control statements. Structures: Enumerated datatypes. Functions: Simple functions –Passing arguments to functions –Returning values from functions –Reference arguments –Overloaded functions –Inline functions –Default arguments –Variables and storage classes –Returning by reference.

Unit III **(12 hrs)**

Objects and Classes: A simple class – C++ objects as physical objects –C++ objects as datatypes –Constructors –Objects as function arguments –Returning objects from functions –A card game example –Structures and classes –Classes, objects, and memory –Static class data. Arrays: Array fundamentals –Arrays as class member data –Arrays of objects –Strings.

Unit IV **(12 hrs)**

Operator Overloading: Overloading unary operators –Overloading binary operators –Data conversion –Pitfalls of operator overloading and conversion. Inheritance: Derived class and base class –Derived class constructors –Overriding member functions –Inheritance in the English distance class –Class hierarchies –Public and private inheritance –Levels of

inheritance –Multiple inheritance –Ambiguity in multiple inheritance –Containership: classes within classes –Inheritance and program developing.

Unit V **(12 hrs)**

Pointers: Address and pointers –Pointers and arrays –Pointers and functions –Pointers and string –Memory management: new and delete –Pointers to objects –A linked list example – Pointers to pointers – Debugging pointers. Virtual Functions and Other Subtleties: Virtual functions –Friend functions –Static functions –Assignment and copy-initialization – The this pointer. Files and Streams: Streams –String I/O –Character I/O –Object I/O – I/O with multiple objects –File pointers –Disk I/O with member functions –Error handling – Redirection –Command-line arguments –Printer output –Overloading the extraction and insertion operators.

*** ----------* : Self Study**

Text Book

S. No	**Author**	**Title of the book**	**Publishers**	**Year of Publication**
1.	R. Lafore	Object – Oriented Programming in Microsoft C++	Galgotia publications	2004, 3rd Edition
	Unit I : Chapters 1,3 Unit II : Chapters 4,5,6. Unit III: Chapter 7, 8. Unit IV: Chapters 9, 10. Unit V : Chapters 12, 14.			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	E.Balaguruswamy	Object Oriented Programming in C++	Tata Mc.Graw Hill	2001
2.	Bjarne Stroustruo	The C++ Programming Language	pearson education	2004, 3rd Edition
3.	Rajesh K. Shukla	Object Oriented Programming in C++	Wilsey India Pvt Ltd	2008, 1st Edition
4.	Tony Gaddis	Object Oriented Programming in C++	Judy Walfer's, Godfrey muganda Dreamtict	2006, 3rd Edition

SEMESTER III

ELECTIVE III - C++ Practicals (MTH14P1)

Credits: 2 **Total duration: 28 hrs**

LIST OF PRACTICALS

1. DISTANCE CONVERSION PROBLEM

Create two classes DM and DB which store the value of distances. DM stores 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 coordinates.
You need to use following trigonometric formulas.
$X = r * \cos(a); \; Y = r * \sin(a);$ $a = \tan^{-1}(Y/X)$; $r = \sqrt{(X^2 + Y^2)};$

4. POLAR CONVERSION

Define two classes polar and rectangular coordinates to represent points in the polar and rectangular systems. Use conversion routines to convert from one system to another.

5. 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*

6. AREA COMPUTATION USING DERIVED CLASS

Area of rectangle = *X*Y*

Area of triangle = ½ * *X* * *Y*

7. 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.

SEMESTER III

ELECTIVE III - VISUAL PROGRAMMING (MTH14E6)

Credits: 4 **Total Duration: 58 hrs**

Objective

It is a powerful programming system for developing sophisticated, graphical applications for Microsoft Windows environment. Its productivity has been enhanced by addition of a complete set of tools to simplify rapid application development and Internet tackling.

Unit I **(12 hrs)**

Introduction to Visual Basic: What is Visual Basic? - IDE - elements of visual basic syntax - using literals - Declaring and using constants - Data types - declaring and using variables - Using the other operators.

Unit II **(12 hrs)**

Subroutines and functions - looping and decision control structure - If/Then/Else structure - Select structure - For/Next Structure - While Structure

Unit III **(12 hrs)**

Intrinsic Controls - Label - *check box* - Combo box - Picture box - Text box - Command button - list box - line -Building forms.

Unit IV **(12 hrs)**

Using forms as objects: Creating the basic elements - Login form - Developing with tree view and list view controls.

Unit V **(10 hrs)**

Database programming - Data control - ADO control Data view window.

*** ---------*: Self Study**

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Eric.A. Smith, Valor Whisler and Hank marquis	Visual Basic 6 Programming Bible	Wiley Dreamtech India (P) Ltd.	Reprint 2005
	Unit I : Chapter 2, 3 – Page No.13 -27,31 -62 Unit II : Chapter 3 – Page No. 63 - 76 Unit III : Chapter 3 – Page No.76 -102 Unit IV : Chapter 5, 6 – Page No. 149 -173,175 -194 Unit V : Chapter 9 – Page No. 247 -266			

Reference Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Gary Cornell	Visual Basic 6 from the Ground Up	Tata McGraw Hill 23rd reprint.	2006

SEMESTER III

ELECTIVE III - VISUAL PROGRAMMING – PRACTICAL II (MTH15P3)

Credits: 2 **Total duration: 28 hrs**

LIST OF PRACTICALS

1. Font Applications
2. Notepad Applications
3. Employee payroll Details
4. Product Details
5. Hospital Management System
6. Newspaper Vendor Details
7. Sine Series
8. Projectiles
9. Designing a Calculator
10. String Operations
11. Designing a Calendar
12. Database Application Using Data Control

SEMESTER IV

FUNCTIONAL ANALYSIS (MTH1414)

Credits: 4 **Total Duration: 86 Hrs**

Objective

To introduce the concepts and methods of elementary analysis and related branches of algebra and geometry and present an unified treatment to problems in different branches of analysis.

Unit I **(18 Hrs)**

Banach spaces - The definition and some example - Continuous linear transformations - The Hahn -Banach theorem - The natural imbedding of N in N** - The open mapping theorem - The Closed graph theorem.

Unit II **(17 Hrs)**

The conjugate of an operator - Hilbert spaces - Definition and some simple properties - Orthogonal complements - Orthonormal sets.

Unit III **(17 Hrs)**

The Conjugate space H* - The adjoint of an operator - Self adjoint operators - Normal and unitary operators - Projections.

Unit IV **(16 Hrs)**

Matrices - Determinants and the spectrum of an operator - The spectral theorem.

Unit V **(18 Hrs)**

The definition and some *examples of Banach algebras* - Regular and singular elements - Topological divisors of zero - The spectrum - The formula for the spectral radius.

*** ----------* : Self Study**

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	G.F. Simmons	Introduction to Topology and Modern Analysis	Tata McGraw -Hill comany	1983
	Unit I :Sections : 46 -50 Unit II :Sections : 51 -54 Unit III :Sections : 55 -59 Unit IV :Sections : 60 -63 Unit V :Sections : 64 -68			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	A.E Taylor	Introduction to Functional Analysis	John Wiley and Sons, NewYork	1958
2.	C.Goffman and G. Pedrok	A Course in Functional Analysis	Prentice Hall of India, New Delhi	1987
3.	G.Bachman and L.Narici	Functional Analysis	Academic Press, New York	1966, 1st Edition
4.	L.A. Lustenik and V.J. Sobolev	Elements of Functional Analysis	Hindustan Publishing Corporation, New Delhi	1971, 1st Edition

SEMESTER IV

MATHEMATICAL METHODS (MTH1415)

Credits: 4 **Total duration: 86 Hrs**

Objective

The aim of the subject is to provide the use of integral transforms for students of applied mathematics, physics and engineering. Integral transforms arise in the analysis of some boundary value and initial value problems of classical physics.

Unit I **(17 Hrs)**

Fourier transforms: Fourier sine and cosine transforms - Fourier transform of derivatives - Fourier transform of simple functions - Convolution integral - Parseval's Theorem - Solution of PDE by Fourier transforms - Laplace equation in half plane in infinite strips in semi infinite stripe - The Linear diffusion equation on a semi infinite line - The two dimensional diffusion equation.

Unit II **(17 Hrs)**

Hankel Transforms: Properties of Hankel transforms - Hankel inversion theorem of derivatives of functions (proof is omitted) - The Parseval's relation - Relation between Fourier and Hankel transforms - Axisymmetric Dirichlet problem for a half space - Axisymmetric Dirichlet problem for a thick plate.

Unit III **(15 Hrs)**

Integral equations: Type of integral equations - Integral Fredholm alternative - approximate Method - Equation with separable Kernel - Volterra integral equations - Fredholm's theory - Fredholm's First - second and third theorems.

Unit IV **(18 Hrs)**

Application of integral equation to ordinary differential equation - Initial value problems - Boundary value problems - Singular integral equations - Abel integral equation.

Unit V **(19 Hrs)**

Calculus of Variations: Variation and its properties - Euler's equation - Functionals of the integral form - Functional dependent on higher order derivatives - Functionals dependent on the Functions of several independent variable - *Variational problems in parametric form* - Applications.

*** ----------* : Self Study**

Text Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Ian N. Sneddon	The use of Integral Transforms	McGraw Hill Book Company	1979
	Unit I and II			
2.	Ram P. Kanwal	Linear Integral Equations : Theory and Technique	Academic Press, New York	2012
	Unit III and IV			
3.	L. Elsgolts	Differential Equations and Calculus of Variations	University Press of the Pacific	2003
	Unit V			
	Unit I : Chapter 2: 2.4 – 2.7, 2.9 –2.10,2.16 - 2.2(a) Unit II : Chapter 5: 5.2 – 5.4, 5.6 – 5.7, 5.10 – 1.2 Unit III : Chapter 2: 2.3 – 2.5, Chapter 3: 3.3 – 3.4 Unit IV : Chapter 5: 5.1 – 5.2, Chapter 8: 8.1 – 8.2 Unit V : Chapter 6: 6.1 – 6.7			

Reference Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Tulsi Dass and Sathish K. Sharma	Mathematical Methods in Classical and Quantum Physics	Universities Press(India) Private Limited	1998

SEMESTER IV

ELECTIVE IV - MATHEMATICAL MODELLING (MTH15E7)

Credits: 4 **Total Duration: 56 Hrs**

Objective

To enable the students to learn mathematical modelling concepts.

Unit I **(11 Hrs)**

Introduction- basic Concepts of mathematical Modelling – needs - types of models- limitations

Unit II **(11 Hrs)**

Elementary ideas of dynamical systems, autonomous dynamical systems in the plane – linear theory. Equilibrium point- node- saddle point-focus- centre and limit-cycle ideas with simple illustration and figures

Unit III **(11 Hrs)**

Mathematical modeling in the biological environment - Blood flow and oxygen transfer. Modeling blood flow – viscosity- poiseuille law, mathematical formulation of the problem- solution – interpretation – limitations

Unit IV **(12 Hrs)**

Single Species population models- basic concepts- Exponential growth mode- formulation – solution – interpretation – limitations. Compensation and depensation. Logistic growth model – formulation – solution – interpretation – limitations – Gomperts growth model- formulation – solution – interpretation – limitations- two species population model – Types of interaction between two species- Lotka- Volteita prey- predator model- formulation – solution – interpretation and limitations

Unit V **(11 Hrs)**

Mathematical modeling of Epidemics – Basic concepts – simple epieemic model- formulation – solution- interpretation – limitation – General epidemic model- formulation – interpretation- limitations

*** ----------* : Self Study**

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	J.N. Kapoor	Mathematical Modelling	Willey Eastern Limited	Reprint 2000
	Unit I: Chapter 3: 3.1,3.2, 3.5 and 3.6 Unit II: Chapter 5:5.1 - 5.3 Unit III: Chapter 5: 5.4- 5.6 Unit IV: Chapter 7:7.1 to 7.4 Unit V: Chapter 9:9.1 to 9.3			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	D.J.G James and J.J Macdonald	Case Studies in Mathematical Modeling	Stanly Thames, Cheltenham	2003
2.	C.Dyson, Elvery	Principles of Mathematical Modeling	Academic Press ,New York	2001

SEMESTER IV

ELECTIVE IV- MATHEMATICAL PROGRAMMING (MTH15E8)

Credits: 4 **Total Duration: 56 Hrs**

Objectives

This course introduces advanced topics in Linear and non-linear Programming

Unit I **(12 Hrs)**

Integer Linear Programming

Types of Integer Linear Programming Problems - Concept of Cutting Plane - Gomory's All Integer Cutting Plane Method - Gomory's mixed Integer Cutting Plane method - Branch and Bound Method. - Zero-One Integer Programming.

Dynamic Programming: Characteristics of Dynamic Programming Problem - Developing Optimal Decision Policy - Dynamic Programming Under Certainty - DP approach to solve LPP.

Unit II **(11 Hrs)**

Classical Optimization Methods

Unconstrained Optimization - Constrained Multi-variable Optimization with Equality Constraints - Constrained Multi-variable Optimization with inequality Constraints

Non-linear Programming Methods: Examples of NLPP - General NLPP - Graphical solution - Quadratic Programming - Wolfe's modified Simplex Methods - Beale's Method.

Unit III **(11 Hrs)**

Theory Of Simplex Method

Canonical and Standard form of LP - Slack and Surplus Variables - Reduction of any Feasible solution to a Basic Feasible solution - Alternative Optimal solution - Unbounded solution - Optimality conditions - Some complications and their resolutions - Degeneracy and its resolution

Unit IV **(11 Hrs)**

Revised Simplex Method

Standard forms for Revised simplex Method - Computational procedure for Standard form I - comparison of simplex method and Revised simplex Method.

Bounded Variables LP problem: The simplex algorithm

UNIT V **(11 Hrs)**

Parametric Linear Programming

Variation in the coefficients cj , Variations in the Right hand side, bi .

Goal Programming: Difference between LP and GP approach - Concept of Goal Programming - Goal Programming Model formulation - Graphical Solution Method of Goal Programming - Modified Simplex method of Goal Programming.

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	J.K.Sharma	Operations Research, Theory and Applications	Third Edition Macmillan India Ltd.	2007
	Unit I : Chapter-7: 7.1 - 7.7, Chapter-20: 20.1 - 20.5 Unit II : Chapter-23: 23.1 - 23.4, Chapter-24: 24.1 - 24.4 Unit III : Chapter-25: 25.1 - 25.4, 25.6-25.9 Unit IV : Chapter-26: 26.1 - 26.4, Chapter-28: 28.1, 28.2 Unit V : Chapter-29: 29.1 - 29.3, Chapter-8: 8.1 - 8.4, 8.6 and 8.7.			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Beightler. C, D.Phillips, B. Wilde	Foundations of Optimization	2nd Edition, Prentice Hall Pvt Ltd., New York.	1979
2.	F.S. Hillier & J.Lieberman	Introduction to Operation Research	7th Edition, Tata-McGraw Hill Company, New Delhi	2001
3.	Hamdy A Taha	Operations Research	Prentice Hall of India Pvt Ltd, New Delhi	1997
4.	S.S. Rao	Optimization Theory and Applications.	Wiley Eastern Ltd. New Delhi.	1990

SEMESTER IV

OPERATIONS RESEARCH (MTH1413)

Credits: 4 **Total Duration: 86 Hrs**

Objective

To enable the students to solve the linear and non – linear programming problems by using optimization techniques.

Unit I **(16 Hrs)**

Advanced Linear Programming - Generalized Simplex Tableau in matrix form - Decomposition algorithm - *Matrix definition of dual problem* - optimal dual solution.

Unit II **(17 Hrs)**

Integer Programming - Integer Programming Algorithm - Gomory Cutting plane algorithm - Deterministic Dynamic Programming - Recursive nature of computation in D.P - Forward and Backward recursion.

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Unit III **(18 Hrs)**

Simulation modeling: Types of simulation - Monte carlo simulation - generation of random numbers - Sampling from probability distributions.

Unit IV **(17 Hrs)**

Classical Optimization Theory - Unconstraint problems - Necessary and Sufficient Conditions - The Newton - Raphson Method - Constrained problems - Equality Constraints (Jacobi method and Lagrangian method).

Unit V **(18 Hrs)**

Non–Linear Programming - Unconstrained algorithms - Direct Search method - Gradient method - Constraint algorithms - Quadratic programming - Stochastic programming.

*** ---------*: Self Study**

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Hamdy A Taha	Operations Research	Prentice Hall of India Pvt Ltd, New Delhi	2007, 8th Edition
	Unit I : Chapter 7 : 7.1 -7.2 and 7.4 Unit II : Chapter 9 : 9.1and 9.2.3. Chapter 10: 10.1 and 10.2 Unit III : Chapter 18: 18.1 to 18.3 Unit IV : Chapter 20 : 20.1 and 20.2.1 Unit V : Chapter 21: 21.1, 21.2.2 - 21.2.4.			

Reference Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Kanti Swarup, P.K.Gupta and Man Mohan	Operations Research	Sultan Chand and Sons, New Delhi	2005, 12th Edition

SEMESTER IV

PROJECT (MTH14PROJ)

Credits: 7 **Hours Per Week: 6 Hrs**

Maximum Marks: 100

Internal Evaluation

I Review – Selection of the field of study, Topic & research design	- 5 Marks
II Review – Literature Collection & Data Collection	- 10 Marks
III Review – Analysis & Conclusion Preparation of rough draft	- 5 Marks
Total	- 20 Marks

End Semester Examination

Evaluation of the project	- 60 Marks
Viva Voce	- 20 Marks
Total	- 80 Marks
TOTAL	- 100 Marks

SEMESTER IV

ADVANCED LEARNER COURSE

LINEAR DIFFERENCE EQUATIONS (MTH1321)

Credits:5

Objective

To enable the students to understand classical and modern treatments of difference equations for engineering and physical sciences.

Unit I

Linear difference equations: First-order equations - general results for linear equations - solving linear equations - applications - equations with variable coefficients.

Unit II

Stability theory: Initial value problems for linear systems - stability of linear systems - phase plaqne analysis for linear systems - fundamental matrices and floquet theory.

Unit III

Asymptotic methods: Introduction - Asymptotic analysis of sums - linear equations.

Unit IV

The self adjoint second order linear equations: Introduction - sturmian theory - greens functions - disconjucacy.

Unit V

The strum - liouville problem: Introduction - finite fourier analysis - non homogeneous problem.

Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Walter G.Kelley and Allan C.Peterson	Difference equations: An Introduction with applications	second edition, Academic press,USA	2001
	Unit I : Chapter 3: Section 3.1 -3.5 Unit II : Chapter 4: Section 4.1 – 4.4 Unit III : Chapter 5: Section 5.1 - 5.3 Unit IV : Chapter 6: Section 6.1 – 6.4 Unit V : Chapter 7: Section 7.1 – 7.3			

*Applicable for students who have secured 75% and above in I, II and III semester examinations.

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Saber Elaydi	An Introduction to difference equations	third edition, Springer, New york	2005
2.	Samuel Goldberg	Introduction to difference equations	Dover Publications	2010
3.	S.G. Deo and V.Raghavendra	Ordinary differential equations and Stability theory	Tata Mc Graw hill publishing company (P) Ltd, New Delhi	2002

SEMESTER IV

ADVANCED LEARNER COURSE

ADVANCED COMPUTING TECHNIQUES (MTH1322)

Credits: 5

Objective

To expose the concepts in the subject which ensure its position as a advanced computing techniques.

Unit I

Crisp sets - union and intersection of crisp sets - Fundamental properties of Crisp operations - Fuzzy sets - union and intersection of fuzzy sets - Fundamental properties of fuzzy operations.

Unit II

Cryptographic Protocols - Cryptographic Techniques.

Unit III

Cryptographic Algorithms - Mathematical Background - Data encryption Standard - other block ciphers.

Unit IV

Automata and Regular expressions - Finite Automata - Kleene's theorem - derived languages.

Unit V

Finite automata with output - Register machines.

Text books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Bruce Schneier	Applied Cryptography Unit II & III	John Wiley & Sons, INC	2006
2.	George .J. Klir and	Fuzzy Sets and Fuzzy	Prentice Hall	2000

	Bo Yuan	Logic Unit I		
3.	John Truss	Discrete mathematics for computer Scientists Unit IV & V	Pearson Education Ltd, Second edition	2001

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Reference Books

S. No	**Author**	**Title of the book**	**Publishers**	**Year of Publication**
1.	Bruce Schneier, Niels Ferguson	Practical Cryptography	John Wiley & Sons, INC	2003
2.	J.P.Tremblay and R. Manohar	Discrete Mathematical Structures with Applications to Computer Science	Tata McGraw Hill	2008

SEMESTER II
INTER DISCIPLINARY COURSE
QUANTITATIVE TECHNIQUES FOR COMMERCE (MTH11A3)

Credits: 5 **Total Duration: 75 Hrs**

Objective

To know the tools of Quantitative Techniques and to understand the application of Quantitative Techniques for Managerial Decision making.

Unit I **(12 Hrs)**

*****Quantitative approach to management - Sets - events* - Probability - additions and multiplication theories - conditional probability - Mathematical expectation - Baye's theories.

Unit II **(15 Hrs)**

Binomial - Poisson and normal distribution (without derivations & proof - properties). Fitting of these distributions - Correlation - Rank correlation - Regression and regression lines on x and y.

Unit III **(15 Hrs)**

Test of significance - Large sample test - small sample test - application of chi - Square test - 't' & 'F' distribution.

Unit IV **(15 Hrs)**

Operation research : origin - meaning - definition - model - Phases - general linear programming - graphical method - simplex method (slack) variable - Transportation problem - method of initial & optimum solutions.

Unit V **(18 Hrs)**

Queuing theory: Problems from single server - finite and infinite population. Assignment and traveling salesman problems - Network analysis - critical path method - PERT.

*** ---------*: Self Study**

Text Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Man Mohan, P.K. Gupta, Kanti Swarup	Operations Research	Sultan Chand & Sons	2005
	Unit 4: Chapter 1 section 1.1 – 1.6, Chapter 2 section 2.1 – 2.2 Chapter 3 section 3.1 – 3.5, Chapter 4 section 4.1,4.3 Chapter 10 section 10.1 – 10.10 (exclude 10.4)			
	Unit 5 : Chapter 20 section 20.1 – 20.8 Model I & III Chapter 11 section 11.1 – 11.6(exclude 11.5) Chapter 21 section 21.1 – 21.7			
2.	S.P. Gupta	Statistical Methods	Sultan Chand & Sons	2004
	Unit 1 : Chapter 1 Unit 2 : Chapter 2 Unit 3 : Chapter 3,4,5			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	J.K Sharma	Operation Research	MacMillan India Ltd,Second Edition	2004
2.	Levin, Ruben, Stinson	Quantitative Approach for Management	McGraw Hill Book company	1993
3.	R.Veerachamy	Quantitative methods For Economists	New Age International Publishers	2010
4.	S.C.Gupta & V.K Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand & Sons	2007

SEMESTER II
INTER DISCIPLINARY COURSE
TENSOR & NUMERICAL METHODS (MTH15A4)

Credits: 5 **Total duration: 60 Hrs**

Objective

To enable the students to learn tensors and Numerical methods.

Unit I **(11 Hrs)**

Tensor Analysis Definition of Tensors - Contravariant - covariant and mixed tensors - addition and subtraction of Tensors - Summation convention - Symmetry and Anisymmmetry Tensor - Contraction and *direct product* - Quotient rule.

Unit II **(13 Hrs)**

Numerical solutions of Algebraic and Transcendental Equation: Method of False position(Regula Falsi method) -Newton -Raphson Method -Solution of Simultaneous Linear Algebraic Equations: Gauss Elimination Method -Interpolation with equal intervals: Gregory -Newton's forward interpolation formula for Equal Intervals - Gregory -Newton's Backward interpolation formula for Equal Intervals - Interpolation with unequal Intervals: Lagrange's Interpolation Formula for unequal Intervals - Method of Least Squares: Fitting a straight line - Fitting a Second Degree Parabola.

Unit III **(12 Hrs)**

Numerical Differentiation: Values of the derivatives of y - based on Newton's Forward Interpolation formula - Values of the derivatives of y - based on Newton's Backward Interpolation formula.

Unit IV **(12 Hrs)**

Numerical integration: Newton -Cote's Quadrature Formula - Trapezoidal rule - composite trapezoidal rule - simpson's one - third rule - composites simpson's one - third rule - Simpson's three - eighths rule - - composite Simpson's three eights rule.

Unit V **(12 Hrs)**

Numerical solutions of ordinary differential equations: Euler's method - Runge - Kutta formulas of first and second order - Runge - Kutta formulas of the third and fourth order - Runge Kutta formula for the solution of second order differential equation.

*** ---------*: Self Study**

Text Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	A.W.Joshi	Matrices and Tensors in Physics Unit I	Wiley Eastern Ltd	1984
2.	M.K. Venkataraman	Numerical methods in science and engineering	National Publisher Company	1986

Reference Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	V. Rajaraman	Computer Oriented Numerical Methods	Prentice–Hall of India	1993

SEMESTER II
INTER DISCIPLINARY COURSE
APPLICATIONS OF STATISTICAL TECHNIQUES (MTH15A5)

Credits: 4 **Total Duration: 60 hrs**

Objective

Understand the need for solving real world problems. Analyze the models and their appropriate to use in practical situations.

Unit I **(12 Hrs)**

Solution of ordinary differential equations : Taylor sries method-*Euler and modified Euler's methods*-Runge-kutta methods for 1st order - multistep methods-Milne's method-Adam's Moulton method

Unit II **(12 Hrs)**

Theoretical Distributions: Binomial Distribution - Poisson distribution - Normal Distribution. Testing of hypothesis: Test of significance for large samples and small samples.

Unit III **(12 Hrs)**

Chi-Square Distributions and *Goodness of fit* - F-test - Analysis of Variance (ANOVA): One -way Classification - Two -way Classification.

Unit IV **(12 Hrs)**

Linear Programming: Introduction to Linear Programming - LPP Formulation - Graphical Method - Simplex Method - Big M Method - Two Phase Simplex Method - Dual Simplex Method.

Unit V **(12 Hrs)**

Simulation Modelling: Monte Carlo Simulation - Types of Simulation - Elements of Discrete Event Simulation - Generation of Random Numbers.

*** ---------*: Self Study**

Text Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Kanti swarup and Man Mohan	Operations research	Sultan Chand & Sons Publications, New Delhi	2002
	Unit : IV and V			
2.	M.K. Venkataraman	Numerical methods in science and engineering	National Publisher Company	1986
	Unit I : Chapter XI: section 6,8,10-14,17,19-21			
3.	S.P.Gupta	Statistical methods	Sultan Chand & Sons Publications	2005
	Unit II : Volume II: Chapter: 4, 5 Unit III			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Kanti swarup and Man Mohan	Operations research	Sultan Chand & Sons Publications, New Delhi	2002
2.	Pillai, R.S.N. and Bagavathi	Statistics: Theory and Practice	S.Chand & Company Ltd, New Delhi	2012
3.	S.C.Gupta, V.K.Kapoor	Fundamental of Mathematical Statistics	Sultan Chand & Sons Publications	2005
4.	S.D.Sharma	Operations research	Kedarnath Ramnath & Co	2002

SEMESTER I
B.COM (PROFESSIONAL ACCOUNTING)
QUANTITATIVE APTITUDE – MATHEMATICS (TH12A18)

Credits: 4 **Total Duration: 86 Hrs**

Objective

To test the grasp of elementary concepts in mathematics and application of the same as useful quantitative tools.

Unit I **(18 Hrs)**

Ratio and Proportion - indices - surds - variation - logarithms: Ratio - Proportion - indices - surds - variation - logarithms Meaning - definition - related problems.

Unit II **(18 Hrs)**

Equations: Introduction - simple Equation - simultaneous linear equations up to three variables - Quadratic equation - nature of roots - cubic equation - graphical solution of linear equations.

Unit III **(17 Hrs)**

Set theory - Simple and Compound Interest - Definition - related terms - *Effective rate of Interest* - Annuity - Future value - present value - sinking fund - problems - applications - Permutations and combinations**:** Introduction - factorial - permutations - results - Problems - circular permutations - combinations - results - problems.

Unit IV **(16 Hrs)**

Sequences and Series: Sequence - Series - Arithmetic progression - Geometric progression - Geometric mean. Sets - Functions and relations: Sets - de Morgan's law Domain and range of function - various types of functions.

Unit V **(17 Hrs)**

Limits and Continuity: Introduction - types of functions - concepts - important limits - continuity Basic concepts of differential and integral calculus: Introduction - differential coefficient - implicit functions - parametric form - Integration: Basic Formulae - methods of substitution - integration by parts - method of partial fraction - important properties.

*** ---------*: Self Study**

Text Book

S.No	Author	Title of the book	Publishers	Year of publication
1	Trivedi	Quantitative Aptitude": For CA Common Profiency Test	Tata Mcgraw, Hill publications	2009
	Unit I – Chapter :1 Unit II – Chapter :2 Unit III – Chapters:4, 5, 7 Unit IV – Chapter :6 Unit V – Chapters:6, 8, 9			

Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Pradeep Jha, parag Shah	Quantitative Aptitude – Mathematics: For CA -CPT	Tata McGraw, Hill publications	2009

SEMESTER II
B.COM (PROFESSIONAL ACCOUNTING)
QUANTITATIVE APTITUDE – STATISTICS (TH12A19)

Credits: 4 **Total Duration: 86 Hrs**

Objective

To test the grasp of elementary concepts in Statistics and application of the same as useful quantitative tools.

Unit I **(18 Hrs)**

Statistical description of data: Textual - Tabular - Diagrammatic representation of Data - frequency Distributions - Graphical representation of data - *Frequency Polygon* - Ogive.

Unit II **(18 Hrs)**

Measures of Central tendency and Description: Introduction - mean - median - partition values - mode - Geometric mean - harmonic mean - standard deviation - quartile deviation - Correlation - regression.

Unit III **(17 Hrs)**

Probability and expected value by mathematical Expectation - Definition - problems - Theoretical Distributions: Binomial - Poisson - Normal.

Unit IV **(16 Hrs)**

Sampling Theory: basic Principles of sampling theory. Comparison between sample survey and complete enumeration - Errors in sample survey - some important terms associated with sampling - Types of sampling - Theory of estimation - Determination of sample size

Unit V **(17 Hrs)**

Index Numbers: Definition of index number - uses - problems in the construction of index numbers - cost of living index numbers.

*** ---------*: Self Study**

Text Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.A.Navnitham	Business Statistics	Jai Publishers	2003
	Unit V : Chapter 10			
2.	Trivedi	Quantitative Aptitude": For CA Common Proficiency Test	Tata Mcgraw, Hill publications	2009
	Unit I : Chapter 11 Unit II : Chapter 12 Unit III: Chapters 14 & 15 Unit IV: Chapter 16			

Reference Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Pradeep Jha, parag Shah	Quantitative Aptitude – Mathematics: For CA - CPT	Tata McGraw, Hill publications	2009