Course Structure for 2yr M.Sc. in Applied Mathematics(2015-16)

1st Semester				2nd Semester			
Theory		Contact Hours		Theory		Contact Hours	
Code	Subject	L-T-P	Credit	Code	Subject	L-T-P	Credit
MMCC101	Real analysis	**3-1-0**	**4**	MMCC201	Topology	**3-1-0**	4
MMCC103	Discrete Mathematics	**3-1-0**	**4**	MMCC203	Complex Analysis	**3-1-0**	4
MAMC102	Ordinary Differential Equation	**3-0-0**	**3**	MMCC202	Numerical Analysis	**3-0-0**	3
MMCF107	Data Structure with C++	**3-0-0**	**3**	MAMC204	Partial Differential Equation	**3-0-0**	3
MMCC104	Abstract Algebra	**3-0-0**	***3***	MAMC205	Continuum Mechanics	**3-1-0**	*4*
MAMC105	Linear Algebra	**3-1-0**	**4**	MAMF206	RDBMS	**3-0-0**	3
		Total	**21**			**Total**	**21**
Practical/Sessional				**Practical/Sessional**			
Code	**Subject**	**L-T-P**	**Credit**	**Code**	**Subject**	**L-T-P**	**Credit**
MMCF151	Data Structure using C++ Lab	**0-0-3**	**2**	MMCC251	Lab on Numerical Analysis	**0-0-3**	**2**
MAMC152	Seminar	**0-0-3**	**2**	MAMF252	RDBMS Lab	**0-0-3**	**2**
MAMC153	Ethics & Human Values						
		Total	**4**			**Total**	**4**
		Total	**21+4= 25**			**Total**	**21+4= 25**

3rd Semester				4th Semester			
Theory		Contact Hours		Theory		Contact Hours	
Code	Subject	L-T-P	Credit	Code	Subject	L-T-P	Credit
MMCC304	**Optimization Techniques**	**3-0-0**	**3**	MAMC402	Design Analysis and Algorithm	**3-1-0**	**4**
MMCC301	**Functional Analysis**	**3-1-0**	**4**	MMCC401	**Differential Geometry**	**3-0-0**	**3**
MAMC302	**Probabilities & Stochastic Process**	**3-1-0**	**4**	MAMC403	Matrix Computation	**3-0-0**	**3**
	Elect -I	**3-1-0**	**4**		**Elective III**	**3-0-0**	**3**
	Elect -II	**3-1-0**	**4**				
		Total	**19**			**Total**	**13**
Practical/Sessional				**Practical/Sessional**			
Code	**Subject**	**L-T-P**	**Credit**	**Code**	**Subject**	**L-T-P**	**Credit**
MMCC351	**Optimization Lab**	**0-0-3**	**2**	MAMC451	**LAB - DAA**		**2**
MMCC352	MAT lab	**0-0-3**	**2**	MAMC452	LAB - Matrix Computation		**2**
MAMC353	**Industry Orient SEMINAR**		**2**	MAMC453	**PROJECT**		**8**
		Total	**6**			**Total**	**12**
		Total	**=25**			**Total**	**=25**

ELECTIVE-I

Sl No	CODE	
1	MAME301	Fluid Dynamics
2	MAME302	Computational Finance
3	MAME303	Convex Analysis and optimization
4	MAME304	Parallel and Distributive Computing
5	MAME305	Number Theory and Cryptography
6	MAME306	Advanced Operating System
7	MAME307	Acomputer Architecture

ELECTIVE-II

1	MAME308	Numerical Solution of Differential Equation
2	MAME309	Advanced Statistics
3	MAME310	Computational Biology
4	MAME311	Graph Theory
5	MAME312	Fourier Analysis
6	MAME313	Theory of Computation
7	MAME314	Finite Element Method

ELECTIVE-III

1	MAME401	Computational Fluid Dynamics
2	MAME402	Distribution Theory and Sobolev spaces
3	MAME403	Artificial Intelligence
4	MAME404	Machine learning
5	MAME405	Hydrostatics
6	MAME406	Fuzzy and Rough set theory
7	MAME407	Numerical Optimization

FIRST SEMESTER

MMCC 101 REAL ANALYSIS (3-1-0)

Module – I : (14 Hours)

Introduction to Metric spaces, compact set, connected set, Weistrass Approximation Theorem, Sequence and series of function, Uniform convergence.Lebesgue measure: Introduction, outer measure, measurable sets and Lebesgue measure, A non measurable set, measurable function.The Lebesgue Integral: The Rimann integral, The Lebesgue integral of a bounded function over a set of finite measure, The integral of a non negative function, The general Lebesgue integral.

Module –II : (14 Hours)

Measure and Integration: measure spaces, measureable functions, Integration, General convergence theorem, Signed measures, The Random-Nikodyn theorem, The L^p spaces.

Measure and Outer measure: Outer measure and measurability, The extension theorem, The Lebesgue-Stieltjes integral, Product measures, Integral operators, Inner measure, Extension by sets measure zero.

Module –III : (12 Hours)

Introduction - Properties of monotonic functions - Functions of bounded variation - Total variation - Additive property of total variation - Total variation on [a, x] as a function of x - Functions of bounded variation expressed as the difference of two increasing functions - Continuous functions of bounded variation.

The Riemann Stieltjes Integrals: Introduction, Notation, The definition of Riemann Stieltjes Integral, Linear operators, Integration by parts, Change of variable in Riemann StetiItjes integrals, Reduction to a Riemann Integral, Euler's summation formula, Monotonically increasing integrals.

Text Book :

1. Real Analysis by H.L Royden(3^{rd} edition) Chapter 3(3.1 to 3.5), Chapter(4.1 to 4.4), Chapter(11), Chapter(12.1 to 12.7).
2. Mathematical analysis by Tom M.Apostol,2^{nd} Edition,Addison-Wesley publication company Inc. Newyork,1974.Chapter6(6.1 to 6.8), Chapter7(7.1 to 7.11)

Reference Book :

1. Bartle, R.G. Real Analysis, John Wiley and Sons Inc., 1976.
2. Rudin,W. Principles of Mathematical Analysis, 3rd Edition. McGraw Hill Company, New York, 1976.
3. Malik,S.C. and Savita Arora. Mathematical Anslysis, Wiley Eastern Limited.New Delhi, 1991.
4. Sanjay Arora and Bansi Lal, Introduction to Real Analysis, Satya Prakashan, New Delhi, 1991.
5. Gelbaum, B.R. and J. Olmsted, Counter Examples in Analysis, Holden day, San Francisco, 1964.
6. A.L.Gupta and N.R.Gupta, Principles of Real Analysis, Pearson Education, (Indian print) 2003.
7.Measure theory and integration by G. De. Barra (willey estern ltd)

MMCC 103 DISCRETE MATHEMATICS (3-1-0)

Module-I : (13 Hours)
Propositional logic operations, First order logic, basic logical Operations Propositional Equivalence, Predicates and Universal & Existential Quantifiers, Nested Quantifiers, Rules of Inference, Proof methods and Strategies, Sequences and Summations, Mathematical Induction, Recursive definition and structural induction, Program Correction Recurrence relation, Solution to recurrence relation, Generating functions, Principle of Inclusion and exclusion, Application of Inclusion and Exclusion Principle, Set Theory, Relation and their properties, Partitions, Closure of Relations, Warshall,s Algorithm, Equivalence relations, Partial orderings, .

Module-II : (14 Hours)
Introduction to graph theory, Graph terminology, Representation of graphs, Isomorphism, Connectivity, Euler and Hamiltonian paths, Shortest path problems, Planar graph, Graph coloring,
Introduction to trees, Application of trees, Tree Traversal, Minimum Spanning tree.

Module-III : (13 Hours)
Matrix representation of a graph: Basic ideas of Incidence matrix, sub matrix, circuit matrix fundamental circuit matrix, cut set matrix, path matrix and adjacency matrix, Coloring :Chromatic number, chromatic partitioning ,chromatic polynomial,matching ,covering Algebraic systems, Lattices, Distributive and Complemented Lattices, Boolean Lattices and Boolean Algrebra, Boolean Functions and Boolean Expressions.

Text Books:

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Sixth Edition, 2008, Tata McGraw Hill Education , New Delhi.
Chapters: 1, 2(2.4), 4, 6(6.1, 6.2, 6.4-6.6), 7, 8, 9

2. C. L. Liu and D. Mohapatra, "Elements of Discrete Mathematics", Third Edition, 2008, Tata McGraw Hill Education, New Delhi
Chapters: 10 (10.1- 10.10), 11(11.1 – 11.7)

Reference:

1. J. L. Mott, A. Kandel, T. P. Baker, "Discrete mathematics for Computer Scientists & Mathematicians", Second Edition, PHI.
Chapters : 1,2,3,4(4.1-4.5), 5, 6(6.1-6.5)

Chapters: 10 (10.1- 10.10), 11(11.1 – 11.7)

Reference:

1. J. L. Mott, A. Kandel, T. P. Baker, "Discrete mathematics for Computer Scientists & Mathematicians", Second Edition, PHI.
Chapters : 1,2,3,4(4.1-4.5), 5, 6(6.1-6.5)

MAMC102 ORDINARY DIFFERENTIAL EQUATION(3-0-0)

Module-I(8 hours)

Existence and uniqueness of Solution: Lipchitz condition, Gronwall inequality, Successive approximations, Picard's theorem, Second order linear equations, Separation and comparison theorems, Solutions in series, Legendre and Bessel functions

Module-II(10 hours)

Systems of differential equations: Existence and uniqueness of solution of systems, Systems of linear Differential equations, nth order equations of a first order system, Fundamental matrix, Non- homogeneous linear systems, linear systems with constant coefficients ,Eigen values and Eigen vectors

Module-III(12 hours)

Boundary value problems for Ordinary differential equations:, Green's functions, Construction of Green's functions, Non-homogenous boundary conditions. Self-Adjoint Eigenvalue Problems: Sturm-Liouville Systems, Eigen values and Eigen functions, expansion in Eigen functions. Stability: Stability of linear and non linear systems, Asymptotically stability, Critical points, Autonomous Systems, , Lyapunov stability.

Books Recommended:

Text book:

Tyn Myint-U: Ordinary Differential Equations, New York, Chapters:2,3(3.1-3.5),4(4.1-4.4)5(5.1-5.6),6(6.1-6.4),7(7.1-7.3),8(8.1-8.5)

Reference Books:

1. S.D.Deo, V. Lakshmikantham and V. Raghavendra: Text book of Ordinary differential equations, 2nd edition, TMH

2. Boyce,W., and R. Diprima. Elementary Differential Equations and Boundary Value Problems. New York;Wiley.

MMCF 107 DATA STRUCTURE using C++ (3-0-0)

Module – I [10 hours] Introduction to data structures: storage structure for arrays, sparse matrices, Stacks and Queues: representation and application. Linked lists: Single linked lists, linked list representation of stacks and Queues. Operations on polynomials, Double linked list, circular list.

Module – II [10 Hours] Dynamic storage management-garbage collection and compaction, infix to post fix conversion, postfix expression evaluation. Trees: Tree terminology, Binary tree, Binary search tree, General tree, B+ tree, AVL Tree, Complete Binary Tree representation, Tree traversals, operation on Binary tree-expression Manipulation.

Module –III [10 Hours] Graphs: Graph terminology, Representation of graphs, path matrix, BFS (breadth first search), DFS (depth first search), topological sorting, Warshall's algorithm (shortest path algorithm.) Sorting and Searching techniques – Bubble sort, selection sort, Insertion sort, Quick sort, merge sort, Heap sort, Radix sort. Linear and binary search methods, Hashing techniques and hash functions.

Text Books: 1. Gilberg and Forouzan: "Data Structure- A Pseudo code approach with C++" by Thomson publication

2. "Data structure in C++" by Y. Kanetkar TMH publication.

Reference Books: 1. Pai: "Data Structures & Algorithms; Concepts, Techniques & Algorithms "Tata McGraw Hill.

2. "Fundamentals of data structure in C" Horowitz, Sahani & Freed, Computer Science Press.

3. "Fundamental of Data Structure" (Schaums Series) Tata-McGraw-Hill. 22 BE

MMCC-104 ABSTRACT ALGEBRA (3-1-0)

Module-I (14 hours)

Normal subgroup, Isomorphism theorem, Automorphisms, Permutation group: Cyclic decomposition and Alternating group A_n. Structure theorems for groups: Direct Product, finitely generated abelian group. Structure theorem for groups: Invariants of a finite abelian group, Sylows theorem. Unique factorization domain, Principal ideal domain, Euclidean domains, polynomial rings over UFD.

Module-II(13 hours)

Algebraic extension of fields: Irreducible polynomials and Einstein criterion, Adjunction of roots, Algebraic extension. Algebraically closed fields, Normal separable extensions: splitting fields, normal extensions. Normal separable extension: Multiple roots, Finite fields, Separable extensions.

Module-III (13hours)

Galois Theory: Automorphism groups and fixed field s, Fundamental theorem of Galois theory. Application of Galois theory to classical problems: Roots of unity and Cyclotomic polynomials, Cyclic extensions, Polynomials solvable by radicals, Symmetric functions, Ruler and compass constructions.

Text Book

P.B. Bhattacharya, S.K Jain and S.R.Nagpaul: Basic Abstact Algebra, Cambridge University Press. Chapter : 5 (Art 2,3), 7(Art 1,2), 8(Art 1-4), 11 (Art 1-4), 15(Art 1-3), 16(Art 1,2), 18(1-5).

Reference Books:

1. **Vivek Sahai and Vikas Bist :** Algebra (Narosa publication House).

2. **I.S. Luthar and I.B.S. Passi :** Algebra Vol. 1 Groups (Narosa publication House).

3. **I.N. Herstein :** Topics in Algebra (Wiley Eastern Ltd.).

4. **Surjit Singh and Quazi Zameeruddin :** Modern Algebra (Vikas Publishing House).

5. **S.K. Jain & S.R. Nagpal :** Basic Abstract Algebra (Cambridge University Press 1995).

MAMC 105 LINEAR ALGEBRA (3-1-0)

Module-I (14-hours)

Geometric interpretation of solution of system of equations in two and three variables; matrix notation; solution by elimination and back substitution; interpretation in terms of matrices, elimination using matrices; elementary matrices, properties of operations on matrices. Definition and uniqueness; non-existence in general: singular matrices; calculation of inverse using Gauss-Jordan elimination; existence of one sided inverse implies invertibility ; decomposition of a matrix as product of upper and lower triangular matrices. Vector spaces and Subspaces, Solving Ax=0 and Ax=b, Linear Independence, Basis and Dimension, The four fundamental Subspaces, graph and networks, Linear Transformations.

Module-II (13-hours)

Orthogonal Vectors and Subspaces, Cosines and Projections onto Lines, Projections and Least Squares, orthogonal Bases and Gram-Schmidt, The Faster Fourier Transform, Properties of the determinant, formulas for the determinant, Expansion of determinant of a matrix in Cofactors, Applications of Determinants.

Module-III (13-hours)

Eigen values and eigenvectors, Diagonalisation of a Matrix, Difference equations and powers A^k, Markov Matrices, Differential equations and e^{At}, stability of differential equation, complex Matrices, unitary Matrices, similarity transformations, Jordan Form, minima , maxima and saddle points, tests for positive definiteness, Test for positive definiteness, singular value decomposition, minimum principles.

Text BooK:

1. Strang, Introduction to Linear Algebra, 4th ed., Wellesley Cambridge Press. Chapters-1-5, 6.1,6.2,6.3,6.4.

MMCF 151 DATA STRUCTURE LAB (0-0-3)

(Minimum 10 experiments to be done)

Experiment No.1 Write a C++ program to perform matrix multiplication using array. **Experiment No.2** (a) Write a C program to create a stack using an array and perform (i) push operation (ii) pop operation (b) Write a C program to create a queue and perform i) Push ii) pop iii) Traversal

Experiment No. 3 Write a C++ program that uses Stack operations to perform the following: i) Converting infix expression into postfix expression ii) Evaluating the postfix expression

Experiment No. 4 Write a C++ program that uses functions to perform the following operations on Single linked list: i) Creation ii) Insertion iii) Deletion iv) Traversal in both ways

Experiment No. 5 Write a C++ program that uses functions to perform the following operations on Double linked list: i) Creation ii) Insertion iii) Deletion

Experiment No. 6 Write a C++ program that uses functions to perform the following operations on Binary Tree: i) Creation ii) Insertion iii) Deletion

Experiment No. 7 Write C++ programs that use both recursive and non recursive functions to perform the Linear search operation for a Key value in a given list of integers: i) Linear search

Experiment No. 8 Write C++ program that use both recursive and non recursive functions to perform the Binary search operation for a Key value in a given list of integers:

Experiment No.9 Write a C++ program that implement Bubble Sort method to sort a given list of integers in descending order.

Experiment No.10 Write a C++ program that implement Quick Sort method to sort a given list of integers in ascending order

Second Semester

MMCC 201 Topology (3-1-0)

Module –I : (14 Hours)

Countable and uncountable set, Infinite sets and the Axiom of choice, Well-ordered sets. Topological spaces, Basis and sub basis for a topology, The order, product and subspace topology, closed sets and limit points. Continues function and homeomorphism, Metric topology, Connected spaces, connected subspaces of the real line, Components and local connectedness.

Module –II : (14 Hours)

Compact spaces, Basic properties of compactness, Compactness and finite intersection property, Compact subspaces of the real line, Compactness in metric spaces, Limit point compactness, Sequential compactness and their equivalence in metric spaces, Local compactness and one point compactification.

Module –III : (12 Hours)

First and second countable spaces, Lindelo''f space, Separable spaces, separable axioms, Hausdorff, Regular and normal spaces. The Urysohn lemma, completely regular spaces, The Urysohn metrization theorem, Imbedding theorem, Tietn extension Theorem, Tychonoff theorem, Stone-Cech campactification.

Text Book :

1. Topology, J.R. Munkhres, 2e, Pearson Education, 2000.

Chapter: 1(7,9,10),2(excluding section 22), 3, 4 (excluding section 36), 5.

Reference Book :

1. Introduction to general Topology, by K.D.Joshi, Wiley Eastern Ltd., 1983.
2. Foundation of General Topology, by W.J. Pervin, Academic Press, 1964.

General Topology, by S.Nanda and S.Nanda, Macmillan India.

MMCC 202 Numerical Analysis (3-0-0)

Module –I (10 Hours)

Solution of equations in one and two variables: Mullers method, for two variables; fixed pt iteration, Newton's method.

Interpolation; Hermite, cubic spline and piecewise interpolation .,Natural cubic splines, B. Splines

Numerical differentiation; first order derivative, higher order derivative, Richardson Extrapolation.

Module -II :(10 Hours)

Numerical integration; Romberg integration, Gaussian Quadrature (2-pt,3-pt,4-pt),asymptotic error formula and their applications , Newton- Cotes rules..

Numerical solution to ODE; Taylor's series methods ,Adaptive Runge - Kutta method, predictor- corrector method, convergence and stability theory for multistep methods,

Module -III: (10 Hours)

Matrix eigen value problem; power method ,shifted power method, inverse power ,RQ-method, error and stability results.

Numerical solution to partial differential equations; parabolic ,elliptic ,Hyperbolic equations using finite difference method.

Text Book ::

1. Numerical Analysis: Richard L. Burden.(chapter – 3,4,5,6,7)
2. An introduction to Numerical Analysis : by Kendall E. Atkinson

Reference Books :

1. Advanced numerical methods ,L.V. Fusset

2. Numerical methods for Scientific and Engineering Computation , M.k.Jain,S.R.K.Iyengar.

3. Numerical methods for Engineers by Chapra & Canale , TMH

MMCC 203 Complex Analysis (3-1-0)

Module-I (14 Hours)

The complex number system: The real numbers, The field of complex numbers, the complex plane, polar representation and roots of complex numbers, Line and half planes in the complex plane. Power series and radius of convergence, analytic function ,Power series representation of analytic functions, Cauchy- Riemann equation , analytic function as mapping and its Mobius transformation.

Module-II (14 Hours)

Complex integration: Zeros of analytic function, entire function, Liouville's theorem, fundamental theorem of algebra, , maximum modulus theorem, Index of a closed curve, Cauchy's theorem and Cauchy's integral formula, Morera's theorem.

Module-III (12Hours)

Classification of singularity, Poles ,absolute convergence, Laurent series development ,Residue theorems, evaluation of integrals by using residue theorem, Argument principle, Rouche's theorem, Maximum Modulus theorem, Schwarz's Lemma.

Text Book :

1. Functions of one Complex variable- J. B. Conway (springer Verlag , International student edition , Narosa Publishing house,

Chapter-1(1.1-1.5),Chapter-3(3.1- 3.3),Chapter-4(4.2 - 4.5),Chapter-5(5.1-5.3) , Chapter-6(6.1 - 6.2).

Reference Books:

1. A Text book of Complex variable: by M.L Khanna (Meerut Publication)
2. Complex Analysis by Alhfors, TMH

MAMC 204 Partial Differential Equations (3-0-0)

Module-I (10 Hours)

PARTIAL DIFFERENTIAL EQUATIONS OF 1ST ORDER: Formation and solution of PDE-Integral surfaces- Cauchy problem for 1st order equation-orthogonal surfaces-First order non linear-characteristics compatible system-Charpits Method. Classification of second order PDE-Canonical forms- Adjoint operators-Riemann's method.

Module-II (10 Hours)

ELLIPTIC DIFFERENTIAL EQUATIONS: Derivation of Laplace & Poisson equation-BVP-Separation of variables-Dirichlets and Newmann problem for a rectangle-Solution of Laplace equation in Cylindrical and spherical coordinates-Examples.

PARABOLIC DIFFERENTIAL EQUATIONS: Formation and solution of Diffusion equation-Dirac-Delta function- Separation of variables method-Solution of Diffusion equation in Cylindrical and spherical coordinates-Examples.

Module-III (10 Hours)

HYPERABOLIC DIFFERENTIAL EQUATIONS: Formation and solution of one dimensional wave equation-Canonical reduction-D'Alembert's solution-IVP and BVP for two dimensional wave equation-Periodic solution of one dimensional equation in Cylindrical and spherical coordinates-Uniqueness of the solution for the wave equation-Duhamel's Principle-Examples.

TEXT BOOK:

K.Sankar Rao, Introduction to Partial Differential Equations, 2nd Edition, Prentice Hall of India, New Delhi,2005

Chapters:0(0.4-0.11,(omit 0.11.1)),1(1.1-1.5),2(2.1,2.2,2.5-2.7,2.10-2.13),3(3.1-3.7,3.9),4(4.1-4.12 omit (4.5,4.6 & 4.10)).

Reference Books

1. R.C.McOwen, Partial Differential Equations, 2nd Edition, Pearson Education, New Delhi, 2005.

2. I.N.sneddon, Elements of Partial Differential Equations, McGraw Hill, New Delhi, 1983.

3. R.Dennemeyer, Introduction to Partial Differential Equations and Boundary Value Problems, McGraw Hill, New York, 1968.

4. M.D.Raisinghania, Advanced Differential Equations, S.Chand & Company Ltd, New Delhi.2001

MAMC 205 Continuum Mechanics (3-1-0)

Module-I (14 Hours)

Vector calculus: Derivative of a Scalar Function of a Vector ,The del Operator ,Divergence and Curl of a Vector ,Cylindrical and Spherical Coordinate Systems ,Gradient, Divergence, and Curl Theorems ,Tensor calculus, Eigen values & Eigen vectors of Tensors. Kinematics of Continua: Descriptions of Motion: Configurations of a Continuous Medium ,Material Description, Spatial Description, Displacement Field ,Analysis of Deformation :Deformation Gradient Tensor ,Isochoric, Homogeneous, and Inhomogeneous Deformations , Change of Volume and Surface, Strain Measures: Cauchy–Green Strain Tensors

Module-II (14 Hours)

Conservation of Mass, Momenta, and Energy: Conservation of Mass: Material Time Derivative, Continuity Equation in Spatial and Material Description, Conservation of Momenta : Principle of Conservation of Linear Momentum ,Equation of Motion in Cylindrical and Spherical Coordinates ,Principle of Conservation of Angular Momentum, Thermodynamic Principles :The First Law of Thermodynamics: Energy Equation ,Energy Equation for One-Dimensional Flows ,The Second Law of Thermodynamics

Module-III (12 Hours)

Constitutive Equations: Elastic Solids: Generalized Hooke's Law ,Material Symmetry, Monoclinic , Orthotropic and Isotropic Materials ,Transformation of Stress and Strain Components, Constitutive Equations for Fluids: Ideal Fluids, Non-Newtonian Fluids, Heat Transfer: Fourier's Heat Conduction Law ,Newton's Law of Cooling,

TEXT BOOKS

J. N. Reddy, An Introduction to Continuum Mechanics with Applications, Cambridge University Press, 2008.

Chapters 2(2.4,2.5.4,2.5.5),3(3.2,3.3,3.4.1),5(5.2.2-5.2.4,5.3.1-5.3.3,5.4.2,5.4.4,5.4.5),6(6.2.2-6.2.7,6.3.2-6.3.4,6.4.2-6.4.3)

M. Gurtin, An Introduction to Continuum Mechanics, Academic press, 1981.

REFERENCES

O. Gonzalez and A. M. Stuart, A First Course in Continuum mechanics, Cambridge University Press, 2008.

J. N. Reddy, Principles of Continuum Mechanics: A Study of Conservation Principles with Applications, Cambridge University Press, 2010.

Y. R. Talpaert, Tensor analysis and Continuum Mechanics, Springer, 2003.

R. Temam and A. Miranville, Mathematical Modelling in Continuum Mechanics, Cambridge University Press, 2005.

MAMF206 Relational Database Management System(3-0-0)

Module I : (10 hours)
Database System Architecture - Data Abstraction, Data Independence, Data Definitions and Data Manipulation Languages. Data models - Entity Relationship(ER), Mapping ER Model to Relational Model, Network .Relational and Object Oriented Data Models, Integrity Constraints and Data Manipulation Operations.

Module II : (10 hours)
Relation Query Languages, Relational Algebra and Relational Calculus, SQL.
Relational Database Design: Domain and Data dependency, Armstrong's Axioms, Normal Forms, Dependency Preservation, Lossless design.
Query Processing Strategy.

Module III: (10 hours)
Transaction processing: Recovery and Concurrency Control. Locking and Timestamp based Schedulers.
Database Recovery System: Types of Data Base failure & Types of Database Recovery, Recovery techniques

Text Books:

1. Database System Concepts by Sudarshan, Korth (McGraw-Hill Education)

2. Fundamentals of Database System By Elmasari & Navathe- Pearson Education

References Books:
(1) An introduction to Database System – Bipin Desai, Galgotia Publications

(2) Database System: concept, Design & Application by S.K.Singh (Pearson Education)

(3) Database management system by leon &leon (Vikas publishing House).

(4) Fundamentals of Database Management System – Gillenson, Wiley India

(5) Database Modeling and Design: Logical Design by Toby J. Teorey, Sam S. Lightstone, and Tom Nadeau, "", 4th Edition, 2005, Elsevier India Publications, New Delhi

MMCC 251 NUMERICAL ANALYSIS LAB(0-0-3)

1. Write a computer oriented algorithm & the corresponding C Program to fit a st. line of the form y = a x + b, for a given data, using the method of least square.
2. Write a computer oriented algorithm & the corresponding C Program to fit a nth degree polynomial of the form $y = \sum_{i=0}^{n} c_i x^i$ for a given data by the method of least square.
3. Write a computer oriented algorithm & the corresponding C Program to find the smallest positive root using fixed point iteration method.
4. Write a computer oriented algorithm & the corresponding C Program to find the smallest positive root using Newton- Raphson method.
5. Write a computer oriented algorithm & the corresponding C Program to find the solution of the system of linear equations using Gauss Seidel Method.
6. Write a computer oriented algorithm & the corresponding C Program to interpolate y using the given pair of values of x and y by Lagrange's interpolation.
7. Write a computer oriented algorithm & the corresponding C Program to find the derivative at the initial point using Newton 's Forward Difference Method.
8. Write a computer oriented algorithm & the corresponding C Program to find the derivative at the final point using Newton 's Backward Difference Method.
9. Write a computer oriented algorithm & the corresponding C Program to integrate Numerically using Trapezoidal & Simpson's Rule.
10. Write a computer oriented algorithm & the corresponding C Program to integrate Numerically using Gauss Quadrature Rule.
11. Write a computer oriented algorithm & the corresponding C Program to solve the Differential Equation. $\frac{dy}{dx} = f(x, y),\ y(x_0) = y_0$ at the specified pivotal points by using the Runge-Kutta Method of 4^{th} order.

MACF252 Relational Database Managements System Lab(0-0-3)

1. Use of SQL syntax: insertion, deletion, join, updation using SQL. (1 class)

2. Programs on join statements and SQL queries including where clause. (1 class)

3. Programs on procedures and functions. (1 class)

4. Programs on database triggers. (1 class)

5. Programs on packages. (1 class)

6. Programs on data recovery using check point technique. (1 class)

7. Concurrency control problem using lock operations. (1 class)

8. Programs on ODBC using either VB or VC++. (1 class)

9. Programs on JDBC. (1 class)

10. Programs on embedded SQL using C / C++ as host language. (1 class)