

M. Sc. (Mathematics)
Advanced Calculus

Contents

1. Sequences of Functions	1
2. Double Sequence	20
3. Series of Functions	30
4. Power Series and Its Properties	65
5. Multivariable Differential Calculus	91
6. Implicit Functions and Extremum Problems	132
7. Path and Line Integrals	140
8. Surface Integrals	164

M. Sc. (Mathematics)

Algebra-I

Contents

Chapter 1	: Groups	1
	1) Isomorphism Theorems	
	2) Solvable Groups	
	3) Series of A Group	
	4) Sylow Theorems	
Chapter 2	: Ring of Polynomials	80
Chapter 3	: Theory of Modules	123
	1) Modules	
	2) Sum and Direct Sum of Submodules	
	3) Noetherian and Artinian Modules	

M. Sc. (Mathematics)
Classical Mechanics

Contents

1. Lagrange's Formulation	1
2. Variational Principles	95
3. Hamilton's Principle and Hamilton's Formulation	157
4. The Kinematics of a Rigid Body Motion	225
Appendix	278

M. Sc. (Mathematics)
Differential Equations

Contents

Chapter 1	: Linear Equations with Constant Coefficients	1
Chapter 2	: Linear Equations with Variable Coefficients	53
Chapter 3	: Linear Equations with Regular Singular Points	100
Chapter 4	: Existence and Uniqueness of Solution to First Order Equations	159
Chapter 5	: Green's Function and Sturm-liouville Theory	176

M. Sc. (Mathematics)

Real Analysis

Contents

1. Open Sets, Closed Sets and Borel Sets	1
2. Lebesgue Measure	11
3. Lebesgue Measurable Functions	45
4. Lebesgue Integral	66
5. The General Lebesgue Integral	97
6. Differentiability of Monotone Functions	113
7. Absolutely Continuous Functions	131
8. The L^p Spaces	145

M. Sc. (Mathematics)
Linear Algebra

Contents

1. Linerar Algebra	1
2. Inner Product Spaces	26
3. Canonical Forms	54
4. Hermitian, Unitary and Normal Transformations	73
Appendix	278

M. Sc. (Mathematics)
Complex Analysis

Contents

Unit-1 :	Complex Numbers	1
Unit-2 :	Mobius Transformations	16
Unit-3 :	Complex Integration	25
Unit-4 :	Fundamental Theorem of Algebra and Maximum Modulus Theorem	42
Unit-5 :	Winding Numbers and Cauchy's Integral Theorem	54
Unit-6 :	Open Mapping Theorem and Goursat Theorem	71
Unit-7 :	Laurent Series Development and Residue Theorem	78
Unit-8 :	Rouche's Theorem and Maximum Modulus Theorem	97
Unit-9 :	Schwarz's Lemma and its Consequences	107
Unit-10 :	Spaces of Analytic Functions and the Riemann Mapping Theorem	117

M. Sc. (Mathematics)
Differential Geometry

Contents

1. Euclidean Space	1
2. The Frenet Formulas	74
3. Calculus on a Surface	143
4. Shape Operator	190
Glossary	258

M. Sc. (Mathematics)
General Topology
Contents

Unit	Unit Name	Page No.
1.	Topological Spaces	1
2.	Bases and Subspaces	19
3.	Special Subsets	29
4.	Different ways of defining topologies	47
5.	Continuous functions and Homeomorphisms	59
6.	Compact Spaces	75
7.	Connected Spaces	97
8.	First axiom spaces	109
9.	Second axiom spaces	119
10.	Lindelof Spaces	127
11.	Separable Spaces	135
12.	T_0 -Spaces	147
13.	T_1 -Spaces	155
14.	T_2 -Spaces	175
15.	Regular spaces and T_3 -spaces	191
16.	Normal spaces and T_4 -spaces	203
17.	Completely normal spaces and T_5 -spaces	219
18.	Completely regular spaces and $T_{3\frac{1}{2}}$ Spaces	229
19.	Product Spaces and Quotient Spaces	239
20.	The Urysohn Metrization Theorem	256

M. Sc. (Mathematics)
Numerical Analysis

Contents

Unit-1 :	Transcendental and Polynomial Equations	4
Unit-2 :	System of Linear Algebraic Equations and Eigen Value Problems	51
Unit-3 :	Interpolation, Differentiation and Integration	120
Unit-4 :	Numerical Solution of Differential Equation	172

M. Sc. (Mathematics)
Functional Analysis

Contents

Unit-1 :	Normed Linear Spaces, Banach Spaces	1
Unit-2 :	Hahn-Banach Theorem	49
Unit-3 :	Open Mapping Theorem	80
Unit-4 :	Hilbert Spaces	105
Unit-5 :	Bessel Inequalities, Fourier Expansions and Conjugate Space	128
Unit-6 :	The Adjoint Operators and Special Type of Operators	146
Unit-7 :	Finite Dimensional Spectral Theory	171
Unit-8 :	Contraction Mapping Principle	184

M. Sc. (Mathematics)
Advanced Discrete Mathematics

Contents

Unit-1 : Graph Theory	1
Unit-2 : Trees	38
Unit-3 : Lattice Theory	62
Unit-4 : Boolean Algebra	108
Unit-5 : Recurrence Relations	131
Unit-6 : Generating Functions	158
Unit-7 : Combinatorics	179
Unit-8 : Automata and Languages	194

M. Sc. (Mathematics)
Advanced Discrete Mathematics

Contents

Unit-1 : Graph Theory	1
Unit-2 : Trees	38
Unit-3 : Lattice Theory	62
Unit-4 : Boolean Algebra	108
Unit-5 : Recurrence Relations	131
Unit-6 : Generating Functions	158
Unit-7 : Combinatorics	179
Unit-8 : Automata and Languages	194

M. Sc. Mathematics
Integral Equations

C O N T E N T S

UNIT 1	Integral Equation	1 - 16
1.1	Definition	
1.2	Classification of integral equation	
1.3	General form of linear integral equation	
1.4	Classification of linear integral equation	
1.5	Solution of integral equation	
1.6	Some problem which gives rise to integral equation	
UNIT 2	Conversion of ODE to Integral Equation	17 - 50
2.1	Differentiation under integral sign	
2.2	Identity for converting multiple integral into single ordinary integral	
2.3	Conversion of initial value problem to integral equation	
2.4	Conversion of boundary value problem to integral equation	
2.5	Conversion of integral equation to ODE	
UNIT 3	Fredholm Integral Equations with Separable Kernel	51 - 122
3.1	Solution of fredholm integral equation with separebic kernel	
3.2	Fredholm theorem	
3.3	Transpose integral equation	
3.4	Eigen values and eigen functions	
3.5	Eigen values and eigen function of the homogeneous fredholm integral equation by reducing it to sturm Liouville problem	
UNIT 4	Method of Successive Approximation	123 - 156
4.1	Successive approximation for fredholm integral equation	
4.2	Resolvent kernel of fredholm integral equation	
4.3	Solution of fredholm integral equation by method of resolvent kernel	
4.4	Solution of fredholm intearal equation by method of iteration.	
4.5	Successive approximations for volterra integral equation	

UNIT 5	Volterra Integral Equation	157 - 192
5.1	Definition and properties	
5.2	Solution of volterra integral equation by differentiation.	
5.3	Sulessive approximation for valterra integral equation	
5.4	Resolvent kernel of volterra integral equation	
5.5	Solution of volterra integral equation by method of resolvent kernel	
5.6	Solution of volterra integral equation by iteration method.	
UNIT 6	Symmetric Kernels	193 - 226
6.1	Preliminaries	
6.2	Symmetric kernel and properties	
6.3	Orthonormal set	
6.4	Fundamental properties of eigen values and eigen function for symmetric kernel.	
6.5	Expansion of symmatric kernel in eigen function	
UNIT 7	Hibert Thorem and its Consequences	227 - 252
7.1	Hibert - Schmidt theorem	
7.2	Application of Hilbert - Schmidt theorem	
7.3	Solution of symmetric integral equation by Hilbert - Schmidt theorem	
UNIT 8	Integral Transform Method	253 - 286
8.1	Laplace transform	
8.2	Solution of volterra integral equation with convolution type kernel	
8.3	Solution of Integro - differential equation by Laplace transform method	
8.4	Solution of Abel integral equation by laplace transform method	
8.5	Fourier transform	
8.6	Solution by fourier transform method	
UNIT 9	Greens Function	287 - 312
9.1	Introduction	
9.2	Motivation	
9.3	Definition of Greens fuction	
9.4	Existence and uniqueness theorem	
9.5	Construction of Greens fuction	
9.6	Soluiton or conversion of BVP to integral equation by using Greens function	

M. Sc. (Mathematics)
Operations Research-I

Contents

Unit-1 : Convex Sets and Functions	1
Unit-2 : Linear Programming	25
Unit-3 : D-Generacy, Duality and Revised Simplex Method	90
Unit-4 : Interger Programming	139
Unit-5 : Dynamic Programming	169
Unit-6 : Applications ²¹ To Linear Programming	182
Unit-7 : Non-Linear Programming	199
Unit-8 : Wolfe's and Beale's Methods	219

M. Sc. (Mathematics)
Partial Differential Equations

Contents

Unit-1 :	First Order Partial Differential Equations	1
Unit-2 :	Linear Equations of the first Order	29
Unit-3 :	Compatible Systems of First Order Partial Differential Equations	60
Unit-4 :	The Cauchy Problem	114
Unit-5 :	Second Order Partial Differential Equations	173
Unit-6 :	Heat Conduction Problem	223
Unit-7 :	Laplace Equation	248
Unit-8 :	Riemann's Method of Solution of Linear Hyperbolic Equations	294

M. Sc. (Mathematics)
Riemannian Geometry-I

Contents

Unit-1 :	Some Preliminaries and Tensor	1
Unit-2 :	N-Ply Orthogonal System of Hypersurfaces and Orthogonal Ennuple	31
Unit-3 :	Euclidean Space of m-Dimensions	54
Unit-4 :	Christoffel's Three-Index Symbols and Covariant Differentiation	61
Unit-5 :	Divergence and Curl of a Vector and Laplacian Operator	81
Unit-6 :	Curvature of a Curve, Geodesics, Parallelism of Vectors	98
Unit-7 :	Geodesic Co-ordinate System, Riemannian Co-ordinate	121
Unit-8 :	Parallelism of a Vector	136

M. Sc. (Mathematics)
Riemannian Geometry-II

Contents

Unit-1 :	Ricci's Coefficients of Rotation	1
Unit-2 :	Canonical Congruences	18
Unit-3 :	Riemann Curvature Tensor	28
Unit-4 :	Curvature of a Riemannian Space	45
Unit-5 :	Einstein Space	60
Unit-6 :	Hypersurfaces	72
Unit-7 :	Curvature of a Curve in A Hypersurface and Normal Curvature of a Hypersurface	81
Unit-8 :	Gauss and Codazzi Equations for a Hypersurface	106

M. Sc. (Mathematics)
Operations Research-II

Contents

Unit-1 :	Replacement Problems	1
Unit-2 :	Problems in Mortality	24
Unit-3 :	Inventory Control	39
Unit-4 :	Probabilistic Models	72
Unit-5 :	Queing Theory-I	88
Unit-6 :	Queing Theory-II	121
Unit-7 :	Information Theory	158
Unit-8 :	Pert and CPM	175
