

Table of Contents

1.	Syst	em of I	Linear Equations and Matrices	1
	1.1	Systen	n of Linear Equations	1
		1.1.1	Introduction	1
		1.1.2	Solve Systems of Linear Equations by Substitution	n6
		1.1.3	Solve System of linear Equations by Elimination	8
	1.2	Matric	es & Elementary Row Operations	10
		1.2.1	Introduction	10
		1.2.2	Types of Matrices	11
		1.2.3	Equality of Matrices	13
		1.2.4	Elementary Row Operations	13
		1.2.5	Augmented Matrix	17
	1.3	Arithm	netic operation on matrices	19
		1.3.1	Introduction	19
		1.3.2	Addition & Subtraction	20

		1.3.3	Transpose of a Matrix	22
		1.3.4	Scalar Multiplication of a Matrix	23
		1.3.5	Matrix Multiplication	25
	1.4	Deterr	ninants	28
		1.4.1	Introduction	28
		1.4.2	Properties of Determinant	30
		1.4.3	Minors	30
		1.4.4	Cofactors	30
	1.5	Invers	e of a Matrix	31
		1.5.1	Introduction	31
		1.5.2	Computing Inverse of a Matrix using Adjoint	32
		1.5.3	Computing Inverse of a Matrix using	
			Gauss-Jordan Method	35
	1.6	Solvin	g System of Equations Using Matrices	39
		1.6.1	Introduction	39
		1.6.2	5 1	40
		1.6.3	5	42
		1.6.4	1 5	44
		1.6.5	Cramer's Rule for Solving System of Linear	
			Equations in two variables	45
		1.6.6	Cramer's Rule for Solving System of Linear	
			Equations in three variables	47
	1.7		ations of System of Linear Equations	49
		1.7.1	Introduction	49
	Refe	rences		55
2.	Prob	oability	and Statistics	56
	2.1 Mathematical Treatment		57	
		2.1.1	Experiments, Outcome, Sample Space and	
			Events	57
		2.1.2	Operations on Events	58
	2.2	Assigr	nment of Probabilities	61
	2.3	Calcul	ation of the Probabilities of Events	71
		2.3.1	Experiments with Equally possible outcomes	71
		2.3.2	Complement Rule	73
	2.4	Condit	tional and Independent Probabilities	75
		2.4.1	Conditional Probability	75
		2.4.2	Independent Events	77

	0.5	T D	•	0.1
	2.5		iagrams	81
	2.6	0	Theorem	86
			Bayes' Theorem for 2 events	87
			Bayes' Theorem for 3 events	87
	0 7		Bayes' Theorem for n events	87
	2.7		Representations of Data	90
			Bar Chart	91
			Pie Chart	92
	0.0		Median, Quartiles, range and Interquartile range	
	2.8	-	ency, Probability Distributions and Binomial Trials	
		2.8.1	1 5	96
			5	100
	2.0	2.8.3		103
	2.9	,		105
				105
			1	108
				110 112
			Variance and Standard Deviation of a	112
		2.9.3		113
	Pofo	rences		115
	Kele	ences		110
3.	Line	ar Prog	jramming ***	117
	Intro	duction	l	117
	3.1	Linear	inequalities	119
	3.2	Proper	ties associated with linear inequalities	120
	3.3	Graphi	ng Linear Inequalities	122
	3.4	Linear	0 0	130
		3.4.1	8	130
			1	135
		3.4.3	0 0	140
		3.4.4		144
		3.4.5	1 11 0	151
	Refe	rences		164
4.	Limi	ts, Deri	vatives and Applications	165
	Intro	duction	l l	165
	4.1 Limits			166

ix

		4.1.1	Introduction to Limits	166
		4.1.2	Existence of Limits of a Function	167
		4.1.3	Determining the Limits	168
	4.2	Contin	uity	182
		4.2.1	Definition	182
		4.2.2	Discontinuity	185
		4.2.3	Singularity	185
	4.3	Deriva	tives	194
		4.3.1	Introduction to Derivatives	194
		4.3.2	Algebra of Derivatives	198
		4.3.3	Differentiation of one function with respect to	
			another Function/ Parametric Differentiation	203
		4.3.4	Chain Rule	205
	4.4	Differe	entiability	210
		4.4.1	Introduction	210
		4.4.2	Rolle's Theorem	214
		4.4.3	Lagrange's Mean Value Theorem	216
	4.5	Workir	ng with Derivatives	221
		4.5.1	Derivatives of Implicit Functions	222
		4.5.2	Derivative of Inverse Trigonometric Functions	223
		4.5.3	1 8	
			Functions	226
	Refe	rences		230
5.	Integ	gration		231
	Intro	oduction	n	231
	5.1 T	he Inde	efinite Integral	232
		5.1.1	-	232
		5.1.2	Integral of some functions:	234
	5.2	Applica	ations of integrals	236
	5.3	Metho	ds of integration	238
		5.3.1	Integration by substitution	238
	5.4	Some	Important Integrals of Functions	244
	5.5	Integra	ation by Partial Fractions	255
		5.5.1	Form of the rational function converted	
			into partial fraction	255
	5.6	Integra	ation by parts	258
		5.6.1	Some special type of integrals	262

Table of	of Contents	
----------	-------------	--

	5.7	Definite Integral		264
	5.8	Elemental Theorem of Calcu	lus	269
		5.8.1 Area Function		269
		6	ethod for computation	
		of Definite Integrals		272
	5.9	Properties of Definite Integra	1	274
	5.10	Application of Integrals		281
		5.10.1 Introduction		281
		5.10.2 Area bounded by Sir	nple Curves	282
		Area between Two Curves		287
		Some more applications of c	6	290
	5.13	Applications in Physics and	,	296
		5.13.1 Fluid Force on a Ver		297
		5.13.2 The Normal Probabi	ity Density Function	298
	Refer	rences		301
6.	Diffe	rential Equations		302
	6.1	First order differential equation	on	302
			a differential equation	304
		6.1.2 Method to form diffe		305
	6.2	Variable separable method	1	308
	6.3	Solution of homogeneous di	fferential equation	311
	6.4	Linear differential equation	-	314
	6.5	Partial derivatives		318
		6.5.1 Definition		318
		6.5.2 Higher Order Partial	Derivative	320
	6.6	Exact Differential Equation		322
		6.6.1 Definition		322
		6.6.2 Solution of exact diff	ferential equation	324
	6.7	Second order differential equ	lation	327
		6.7.1 Linear and nonlinea		327
		6.7.2 Solution of second d	egree differential equation	328
	6.8	Solution of other types of dif	ferential equation	341
			$d^n v$	
		6.8.1 Differential equation	of the type $\frac{d^n y}{dx^n} = f(x)$	341

	6.8.2	Differential equation of the type $\frac{d^n y}{dx^n} = f(y)$	342
	6.8.3	The differential equation does not have y directly	345
	6.8.4	The differential equation does not have x directly	347
	References	anoony	349
7.	Mathematio	cal Induction	350
	Introduction 7.1 The Pri References	inciple of Mathematical Induction	350 351 375
Inc	dex		376