

Contents

Chapter 1	Permutation and Combination	
1.1	Introduction	1
1.2	Basic Principles of Counting	3
	<i>Exercise 1(A)</i>	8
1.3	Factorial Notation	9
1.4	Permutations	9
	<i>Exercise 1(B)</i>	17
1.5	Combinations	19
	<i>Exercise 1(C)</i>	23
Chapter 2	Binomial, Exponential and Logarithmic Expansions	
2.1	Binomials with Integer Exponents	25
	<i>Exercise 2(A)</i>	36
2.2	Binomials with Rational Exponents	39
	<i>Exercise 2(B)</i>	42
2.3	Exponential and Logarithmic Series	42
	<i>Exercise 2(C)</i>	51
Chapter 3	Group Theory	
3.1	Binary Operations	53
3.2	Properties of Binary Operations	58
	<i>Exercise 3(A)</i>	62
3.3	Groups	64
3.4	Abelian Groups	67
3.5	Elementary Properties of Groups	69
	<i>Exercise 3 (B)</i>	71
Chapter 4	Conic Sections	
4.1	Conic Sections	73
4.2	Parabolas	76

	<i>Exercise 4(A)</i>	84
4.3	Tangents and Normals	86
	<i>Exercise 4(B)</i>	94
4.4	Ellipse	96
	<i>Exercise 4(C)</i>	104
4.5	Hyperbola	105
	<i>Exercise 4(D)</i>	113

Chapter 5 Coordinates in Space

5.1	Introduction	114
5.2	Points in Space	116
	<i>Exercise 5(A)</i>	123
5.3	Direction Cosines of a Line	125
5.4	Angle between Two Lines	133
	<i>Exercise 5(B)</i>	141
5.5	Equation of a Plane	144
5.6	Angle between Two Planes	149
5.7	Distance of a Point to a Plane	151
	<i>Exercise 5(C)</i>	153

Chapter 6 Vectors and their Applications

6.1	Introduction	156
6.2	Vectors: Basic Terms and Notations	156
6.3	Addition of Vectors	162
6.4	Multiplication by a Scalar	164
6.5	Laws of Vector Algebra	164
6.6	Unit Vectors	165
6.7	Plane Vectors	168
6.8	Space Vectors	171
6.9	Linear Dependence and Independence of Vectors	172
	<i>Exercise 6 (A)</i>	175
6.10	Product of Vectors	176
6.11	Scalar Products	176
	<i>Exercise 6 (B)</i>	187
6.12	Vector Products	189

	<i>Exercise 6 (C)</i>	200
Chapter 7	Derivative and its Applications	
7.1	Limits and Continuity (Review)	202
7.2	Derivatives	206
	<i>Exercise 7(A)</i>	215
7.3	Derivatives of Hyperbolic Functions	218
	<i>Exercise 7(B)</i>	220
7.4	Tangents and Normals	221
	<i>Exercise 7(C)</i>	225
7.5	Differentials as Approximations	226
	<i>Exercise 7(D)</i>	229
7.6	Mean Value Theorems	230
7.7	L'Hospital's Rule	236
	<i>Exercise 7 (E)</i>	239
Chapter 8	Antiderivatives	
8.1	Antiderivatives	241
	<i>Exercise 8(A)</i>	249
8.2	Integrals of Trigonometric Functions	253
8.3	Integration of Hyperbola Functions	260
	<i>Exercise 8(B)</i>	262
8.4	Integration of Rational Fractions	265
	<i>Exercise 8(C)</i>	271
Chapter 9	Application of Antiderivatives	
9.1	Introduction	275
	<i>Exercise 9(A)</i>	279
9.2	Differential Equations of the First Order and First Degree	280
9.3	Differential Equations with Separable Variables	280
	<i>Exercise 9(B)</i>	283
9.4	Homogeneous Differential Equations	284
	<i>Exercise 9(C)</i>	286
9.5	Exact Differential Equation	287

	<i>Exercise 9(D)</i>	290
9.6	Linear Differential Equations	291
	<i>Exercise 9(E)</i>	295