

Contents

PART I

<i>Foreword</i>	v
<i>Preface</i>	vii
1. Relations and Functions	1
1.1 Introduction	1
1.2 Types of Relations	2
1.3 Types of Functions	7
1.4 Composition of Functions and Invertible Function	12
1.5 Binary Operations	19
2. Inverse Trigonometric Functions	33
2.1 Introduction	33
2.2 Basic Concepts	33
2.3 Properties of Inverse Trigonometric Functions	42
3. Matrices	56
3.1 Introduction	56
3.2 Matrix	56
3.3 Types of Matrices	61
3.4 Operations on Matrices	65
3.5 Transpose of a Matrix	83
3.6 Symmetric and Skew Symmetric Matrices	85
3.7 Elementary Operation (Transformation) of a Matrix	90
3.8 Invertible Matrices	91
4. Determinants	103
4.1 Introduction	103
4.2 Determinant	103
4.3 Properties of Determinants	109
4.4 Area of a Triangle	121
4.5 Minors and Cofactors	123
4.6 Adjoint and Inverse of a Matrix	126
4.7 Applications of Determinants and Matrices	133

5. Continuity and Differentiability	147
5.1 Introduction	147
5.2 Continuity	147
5.3 Differentiability	161
5.4 Exponential and Logarithmic Functions	170
5.5 Logarithmic Differentiation	174
5.6 Derivatives of Functions in Parametric Forms	179
5.7 Second Order Derivative	181
5.8 Mean Value Theorem	184
6. Application of Derivatives	194
6.1 Introduction	194
6.2 Rate of Change of Quantities	194
6.3 Increasing and Decreasing Functions	199
6.4 Tangents and Normals	206
6.5 Approximations	213
6.6 Maxima and Minima	216
Appendix 1: Proofs in Mathematics	247
A.1.1 Introduction	247
A.1.2 What is a Proof?	247
Appendix 2: Mathematical Modelling	256
A.2.1 Introduction	256
A.2.2 Why Mathematical Modelling?	256
A.2.3 Principles of Mathematical Modelling	257
Answers	268