Contents

1 Differential Calculus 1

1.1 Introduction 1
1.2 Representations of functions 2
1.3 Limit of a function 9
1.4 Continuity 51
1.5 Derivative 65
1.6 The product, Quotient and Chain rules 79
1.7 Implicit Differentiation 97
1.8 Derivative of Trigonometric functions 102
1.9 Derivative of Logarithmic functions 113
1.10 Hyperbolic Functions 119
1.11 Tangent and Normal 132
1.12 Maxima and Minima 140

2 Functions and Several Variables 181

2.1 Introduction 181
2.2 Jacobian 240
2.3 Taylor's Series 254
2.4 Maxima and Minima 268
2.5 Lagrange Multiplier 290

3 Integrals Calculus 309

3.1 Introduction 309
3.2 The Area Problem 310
3.3 The Definite Integral 333
3.4 The Fundamental Theorem of Calculus 355
3.5 The Indefinite Integrals 364
3.6 Method of Substitution 370

3.7 The Integration of Parts 377
3.8 Trignometric Integrals 384
3.9 Trignometric Substitution 422
3.10 Integration of Rational and Irrational Functions 435
3.11 Integration of Rational Functions by Partial Fraction ... 454
3.12 Improper Integral 470

4 Multiple Integrals 481
4.1 Introduction 481
4.2 Double Integration 482
4.3 Evaluation of a Double Integral over a given region 505
4.4 Area 512
4.5 Area in Polar Co-ordinates 530
4.6 Change of Order of Integration 538
4.7 Change of Variables 564
4.8 Triple Integral 576
4.9 Evaluation Triple Integral in polar coordinate 584
4.10 Evaluation Triple Integral over a given region 585
4.11 Volume as Triple Integral 590
4.12 Change of Variables in Triple Integral 610

5 Differential Equations 621
5.1 Introduction 621
5.2 Linear Differential Equations 622
5.3 Linear Differential Equations with variable coefficients .. 674
5.4 Variation of Parameters 705
5.5 System of Linear Differential Equations 723
5.6 Method of undetermined coefficient 738

Index 751