

# Notes for Unit V

## Table of Contents

V.	<b>Further topics</b>	1
1.	Homotopy of paths and line integrals	1
	Path independence of line integrals	2
	Background from multivariable calculus	4
	Broken line inscriptions	5
	Proof of Theorems 1 and 4	8
	Line integrals of complex analytic functions	11
	Application to the Fundamental Theorem of Algebra	13
2.	Graph complexes	14
	Basic definitions	15
	An alternate definition	15
	Subgraphs	16
	Connectedness	16
	Further topological properties of graphs	17
3.	Chains, homology and fundamental groups	18
	Similar questions in higher dimensions	19
	Algebraic chains for graphs	19
	An application	22
4.	Euler paths	23
	A general result	24
	Further references for graph theory	26