

The Contents

Dedication	I
Acknowledgments	II
Abstract	III
الخلاصةIV

Chapter One

Differential Manifold and Tensor Calculus

1.1. Topological and Differential Manifolds.....	1
1.2. Tangent Vectors and Tangent Space.....	10
1.3. Tangent Covectors and Cotangent Space.....	17
1.4. Tensors Calculus.....22
1.5. Riemannian Metrics.....	34

Chapter Two

Algebra of Differentiable Forms

2.1. Differentiable Forms in R^n40
2.2. Differentiable Forms on Manifolds.....	55
2.3 The Exterior Derivatives, Interior Product, and Lie Derivative.....	60

Chapter Three

Applications of Differential Forms

3.1. First Application to Vector Calculus.....	75
3.2. Second Application in Hamilton's Mechanics.....	77

Conclusion.....	91
References.....	92

بسم الله الرحمن الرحيم

Sudan University of Science & Technology

College of Graduate Studies

APPLICATINS OF DIFFERENTIAL FORMS

تطبيقات الصيغ التفاضلية

By

Mohammed Banaga Al Taibe Al Basheir

Supervised by

Prof. Mohammed Ali Basheir

**A Thesis Submitted In Partial Fulfillment For The
Degree Of M.Sc. In Mathematics**

December 2010