TABLE OF CONTENTS

CONTENTS		**Page No.**
LIST OF FIGURES		Xii
LIST OF TABLES		Xix
LIST OF ABBREVIATIONS/SYMBOLS		Xx
ABSTRACT		Xxi
Chapter 1	**INTRODUCTION**	1
Chapter 2	**REVIEW OF LITERATURE**	
2.1	COMPOSITE AND ITS TYPES	5
2.1.1	DESIGN AND PROCESSING TECHNIQUES FOR COMPOSITES	6
2.1.1.1	LIQUID STATE PROCESSING	7
2.1.1.2	SOLID STATE PROCESSING	8
2.1.1.3	VAPOUR AND GAS PHASE DEPOSITION	11
2.1.1.4	IN-SITU PROCESSING	13
2.2	VACUUM ARC MELTING	14
2.3	TRIBOLOGY	15
2.4.	WEAR AND TYPES OF WEAR	16
2.4.1	FACTORS AFFECTING WEAR	17
2.5	TITANIUM BASED COMPOSITES AND THEIR MECHANICAL PROPERTIES	20

2.6	DRY SLIDING OF WEAR OF TITANIUM-BASED COMPOSITES	29
2.6.1	CONTAINING TiB PHASE IN Ti MATRIX	30
2.7	FORMULATION OF THE PROBLEM	36
2.8	OBJECTIVES OF STUDY	37
Chapter 3	**EXPERIMENTAL PROCEDURE**	
3.1	MATERIALS USED	39
3.2	FABRICATION OF COMPOSITES	41
3.2.1	MIXING OF POWDERS	41
3.2.2	SPARK PLASMA SINTERING	42
3.2.3	VACUUM ARC MELTING	43
3.3	CHARACTERISATION OF COMPOSITES	45
3.3.1	X-RAY DIFFRACTION ANALYSIS OF COMPOSITES	45
3.3.2	HARDNESS MEASUREMENT	46
3.3.3	POROSITY MEASUREMENT	46
3.4	MICROSTRUCTURAL EXAMINATION	46
3.5	DRY SLIDING FRICTION AND WEAR TESTING	47
3.6	EXAMINATION OF WORN SURFACES	49
3.6.1	HIGH-RESOLUTION SCANNING ELECTRON MICROSCOPY(HR-SEM)	50
3.6.2	X-RAY DIFFRACTION ANALYSIS	51
Chapter 4	**Ti-TiB-Fe COMPOSITES WITH VARYING AMOUNT OF Fe**	

4.1	RESULTS: Ti-TiB-Fe COMPOSITES WITH VARRYING AMOUNT OF Fe	52
4.1.1	CHARACTERIZATION OF COMPOSITES	52
4.1.2	FRICTION AND WEAR BEHAVIOR OF COMPOSITES	56
4.1.3	EXAMINATION OF WORN SURFACE OF COMPOSITES	59
4.1.4	WORN SURFACE MORPHOLOGY OF COUNTERFACE	62
4.1.5	EXAMINATION OF WEAR DEBRIS	65
4.2	DISCUSSION	66
4.3	RESULTS: Ti-TiB-Fe COMPOSITES WITH VARRYING AMOUNT OF B	69
4.3.1	CHARACTERIZATION OF COMPOSITES	69
4.3.2	FRICTION AND WEAR BEHAVIOR OF COMPOSITES	71
4.3.3	EXAMINATION OF WORN SURFACE OF COMPOSITES	73
4.3.4	EXAMINATION OF WORN SURFACE OF COUNTERFACE	77
4.3.5	EXAMINATION OF WEAR DEBRIS	79
4.4	DISCUSSION	81
Chapter 5	**RECIPROCATING WEAR BEHAVIOUR OF Ti-TiB COMPOSITES SYNTHESIZED VIA VACUUM ARC MELTING**	
5.1	RESULTS	84
5.1.1	CHARACTERIZATION OF POWDERS	84
5.1.2	CHARACTERIZATION OF COMPOSITES	85
5.1.3	FRICTION AND WEAR BEHAVIOR OF COMPOSITES	88

5.1.4	WORN SURFACE MORPHOLOGY OF COMPOSITES	92
5.1.5	WORN SURFACE MORPHOLOGY OF COUNTERFACE	97
5.1.6	MORPHOLOGY OF DEBRIS	102
5.1.7	XPS ANALYSIS OF DEBRIS	103
5.2	DISCUSSION	105
5.3.1	FRICTION AND WEAR BEHAVIOR OF COMPOSITES	110
5.3.2	WORN SURFACE MORPHOLOGY OF COMPOSITE	114
5.3.3	WORN SURFACE MORPHOLOGY OF COUNTERFACE	118
5.3.4	EXAMINATION OF WEAR DEBRIS	121
5.4	DISCUSSION	123
5.5	RESULTS	125
5.5.1	RECIPROCATING WEAR OF COMPOSITES AT 10Hz	128
5.5.2	EXAMINATION OF WORN SURFACE OF COMPOSITE	129
5.5.3	EXAMINATION OF WORN SURFACE OF COUNTERFACE	133
5.5.4	EXAMINATION OF DEBRIS	137

5.6	DISCUSSION	139
5.7	RESULTS	140
5.7.1	RECIPROCATING WEAR OF COMPOSITES AT 15Hz	141
5.7.2	EXAMINATION OF WORN SURFACE OF COMPOSITE	144
5.7.3	EXAMINATION OF WORN SURFACE OF COUNTERFACE	149
5.7.4	EXAMINATION OF DEBRIS	152
5.8	DISCUSSION	154
Chapter 6	**CONCLUSIONS**	159
FUTURE SCOPE		167
REFERENCES		168
LIST OF PUBLICATIONS		177