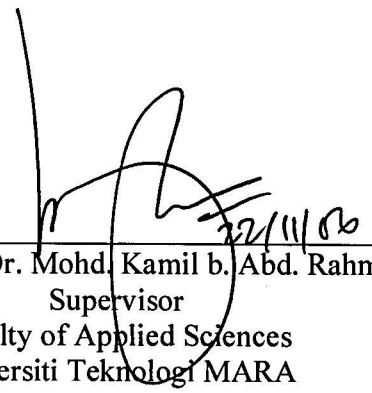
RING CAVITY ERBIUM- YTTERBIUM CO-DOPED FIBER LASERS

MAIZATUL WAHEDA BINTI ABDUL RAHMAN

BACHELOR OF SCIENCE (Hons.) PHYSICS
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA

NOVEMBER 2006

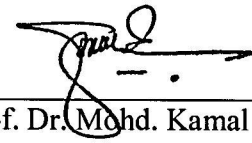
This Final Year Project Report entitled "**Ring Cavity Erbium-Ytterbium Co-Doped Fiber Lasers**" was submitted by Maizatul Waheda Binti Abdul Rahman, in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons.) Physics, in the Faculty of Applied Sciences, and was approved by



Assoc. Prof. Dr. Mohd. Kamil b. Abd. Rahman
Supervisor
Faculty of Applied Sciences
Universiti Teknologi MARA

Dr. Muhd Zu Azhan b. Yahya

Head of Programme
B.Sc.(Hons.) Physics
Universiti Teknologi MARA



Assoc. Prof. Dr. Mohd. Kamal b. Harun
Dean
Faculty of Applied Sciences
Universiti Teknologi MARA

Date: 23 November 2006

ACKNOWLEDGEMENTS

Assalamualaikum w.b.t. The highest gratitude to the Almighty Allah s.w.t for His blessing gives me the determination, idea and finally manages to complete this proposal on time. I would like to thank to my supervisor Associate Professor Dr Mohd Kamil Abdul Rahman, who giving me an opportunity to do this proposal of final project to complete part 1 before do the final project on PHY 690. He helps me a lot in completing this proposal by give an idea about the overall of the project.

Besides that, I also want to thank to the assistant to Dr Mohd Kamil i.e. Shahrin Zen Muhammad Yassin, who helping us a lot in knowing overview of laser, optical fiber and so on. Not forget to my friends who give me a support to complete this proposal.

Last but not least to my husband; En Wan Kamaruzaman b. Wan Abdullah and my parents; ASP Abdul Rahman b. Ismail and Pn Zaimah bt Jusoh who understand my job as a student and give a morale support to me. That's all thank you.

TABLE OF CONTENTS

		Page
ACKNOWLEDGEMENT		iii
TABLE OF CONTENTS		iv
LIST OF TABLES		vii
LIST OF FIGURES		viii
LIST OF ABREVIATIONS		xiii
ABSTRACT		xiv
ABSTRAK		xv
CHAPTER		
1 INTRODUCTION		
1.1	Historical development	1
1.2	Significance of study	3
1.3	Problems statements	4
1.4	Objectives of study	5
2 LITERATURE REVIEW		
2.1 Laser		6
2.1.1	The nature of light	6
2.1.2	Amplification of light	10
2.1.3	Process of laser action	16
2.1.4	Characteristics of laser	17
2.1.5	Types of laser	19

ABSTRACT

RING CAVITY ERBIUM-YTTERBIUM CO-DOPED FIBER LASER

The performance of Erbium-Ytterbium Co-Doped Fiber (EYDF) and ring cavity lasers has been investigated. An 8-meter length of erbium-ytterbium co-doped fiber (EYDF), which pumped from 980nm laser diode, was used as a gain medium in the building of a fiber laser using ring cavity configuration in different ratio of optical coupler. The characteristics of the output power with laser diode pump power are discussed. The fiber laser performance and the quality of the signal generated were measured by using optical spectrum analyzer (OSA). The output characteristics of the laser were determined in term of threshold level and slope efficiency.