# DESIGN AND CONSTRUCTION OF AN AQUARIUM

## Project Report Submitted by HADJISOLOMOU MICHALIS

in part satisfaction of the conditions for the award of Diploma of Technician Engineer in Mechanical Engineering of the Higher Technical Institute, Cyprus

Project	Supervisor:	pervisor: Mr G Katodrytis	
		Lecturer in Mech.	Eng.,
		Н.Т.І.	
Externa	l Assessor:	Mr D Savva	
		Mech. Eng.	

Type of Project: Individual

June 1995

HIGHER	PROJECT NO.
TECHNICAL	91100
INSTITUTE	2478

### ACKNOWLEDGMENTS

I wish to express my sincere thanks to the Supervisor of this project, Mr G Katodrytis, for his considerate guidance and assistance in the preparation and completion of this project.

My thanks are extended to everyone who, in any way, helped throughout the project

Finally, I would like to thank Mrs Georgina Spanashis for the time she spent on typing this project.

#### ABSTRACT

The scope of this project is the design and construction of an aquarium. The size of the aquarium is to be such that it can contain about 160 litres of water, and it must be suitable for a freshwater tropical environment.

The types of aquatic environments and the factors affecting them will be examined in Chapter 1.

The three major aquarium systems - natural, biological and sterile - will be presented in Chapter 2.

In Chapter 3, a study will be made about the tank, heating apparatus, air supplies, filtration, lighting and safety, giving specific information, advantages and disadvantages, etc.

Chapter 4 refers to tests and measurements regarding the water, i.e. density test, ammonia test, etc.

The design of an aquarium will be made in Chapter 5, with the selection of material for the design.

Chapter 6 concerns the selection of equipment, showing coloured pictures of locally available products.

A cost analysis will be made in Chapter 7.

Finally, detailed drawings will be presented in Chapter 8.

The last stage of this project will be the construction of the aquarium.

### CONTENTS

ACKNOWLEDGEMENT CONTENTS ABSTRACT INTRODUCTION

		Page
CHAPTER 1	THE AQUATIC ENVIRONMENT	1
1.1	Space	2
1.2	Water	З
1.3	Air	4
1.4	Light	5
1.5	Temperature	7
1.6	The Nitrogen Cycle	7
CHAPTER 2	MAJOR AQUARIUM SYSTEMS	12
2.1	The Natural System	12
2.2	The Biological System	14
2.3	The Sterile System	15
<u>CHAPTER 3</u>	THE TANK - HEATING APPARATUS - AIR SUPPLIES - FILTRATION - LIGHTING - SAFETY	19
3.1	The Aquarium Container (Tank)	19
3.2	Heating Equipment	24
3.3	Air Supply System	3
3.4	Filters	34
3.5	Lighting	40
3.6	Safety	45
CHAPTER 4	TESTS AND MEASUREMENTS	49
4.1	Temperature Test	49
4.2	Density Test	49
4.3	Hydrogen Ion Concentration (pH)	50
4.4	Calcium Carbonate Content	50
4.5	Ammonia, Nitrite and Nitrate Test	51

		Page
CHAPTER 5	DESIGN OF AQUARIUM	田
5.1	Selection of Tank Shape	击
5.2	Material Selection for making the Tank	39
5.3	Estimation of the Glass Sheets (plates)	
	Thickness	Ð
5.4	Selection of Glass Plate Thickness	65
5.5	Selection and Testing of Joint Material	66
<u>CHAPTER 6</u>	SELECTION OF EQUIPMENT	70
6.1	Selection of Heating Equipment	70
6.2	Selection of Filter	72
6.3	Selection of Air Pump	Т
6.4	Selection of Air Stone	79
6.5	Selection of Lighting	80
<u>CHAPTER 7</u>	COST ANALYSIS	æ

CHAPTER 8 DRAWINGS