CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter will explain the objective of the project, scope of the project, problem statement and the project background. In this introduction section the review of switched-mode power supply (SMPS), fullwave rectifier, dc-dc buck converter and pulse width modulation (PWM) control will be explain. At the end of chapter 1 the thesis outline is briefly describe.

1.2 Objective of the Project

The objectives of the project are as follows:

(i) To develop rectifier to rectify 230 V ac to 24 V dc

(ii) To develop buck converter which produces dc output voltage that varying from 0 V dc to 24 V dc

(iii) To control dc motor speed by varying PWM
1.3 Scope of the Project

This project is developed by using input of 240 V ac from TNB. Then PWM control technique is used to vary the output voltage of power supply. At the end of buck converter output dc voltage can be produce in the range of 0 –24 V. Then a dc motor is connected to the buck converter output to varying the speed.

1.4 Problem Statement

Dc motor is widely used in speed control systems which need high control requirements, such as rolling mill, double-hulled tanker, and high precision digital tools. So, it is crucial to control the motor speed in order to achieve good production. One of the most common methods to drive a dc motor is by using PWM signals with respect to the motor input voltage.

1.5 Project Background

This section will describe the overview of switch mode power supply and the methodology to develop this project. The methodology will be described by using the block diagram.
1.5.1  Overview of Switch Mode Power Supply

Switch mode power supplies are high frequency dc to dc converters capable of stepping up and down the dc according to need. There are basically four types of switch mode power converter such as [1]:

(i) Buck Converter (Step Down Converter )
(ii) Boost Converter ( Step up Converter )
(iii) Buck Boost Converter ( step up/step down Converter )
(iv) Cuk Converter

The first three converters operate with the help of inductive power transfer principle, whereas, the Cuk converter operates with capacitive power transfer principle. In this project, the buck converter which is known as step down converter is mainly used.

1.5.2  Methodology of the Project

In the research of this project, the 240 V ac TNB power supply is first step down to produce lower ac voltage. Then the ac voltage is rectified using fullwave rectifier to produce pure dc voltage. This dc voltage is then feed as input of buck converter which is also acts as step down converter. The converter uses MOSFET as power switch in this project. The output voltage of the converter is then varied by using pulse width modulation control which varies the duty cycle of the switch. The basic block diagram of the project is shown in Figure 1.1.