

SEKOLAH KEJURUTERAAN ELEKTRIK	
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UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SKEE 3742

SEKOLAH KEJURUTERAAN ELEKTRIK
FAKULTI KEJURUTERAAN
UNIVERSITI TEKNOLOGI MALAYSIA

POWER ELECTRONICS LABORATORY PROBLEM PACK

Adjustable DC Power Supply using Full-Wave Controlled AC-DC Converter

<p>Disediakan oleh:</p> <p>PM. Dr. Nik Rumzi Nik Idris PM. Dr. Naziha Ahmad Azli PM. Dr. Awang Jusoh PM. Dr. Junaidi Abdul Aziz PM. Dr. Shahrin Md. Ayob PM. Ir. Dr. Tan Chee Wei Dr. Mohd. Rodhi Sahid Dr. Norjulia Mohammad Nordin En. Nik Din Muhammad En. Zaki Daud</p> <p>Tarikh : 18 Julai 2019</p>	<p>Disahkan oleh:</p> <p>Pengarah Program Dr. Jasrul Jamani Jamian</p> <p>Tandatangan Cop</p> <p></p> <p>DR. JASRUL JAMANI BIN JAMIAN Senior Lecturer Electrical Power Eng. Dept. (POWER) Faculty of Electrical Engineering Universiti Teknologi Malaysia 81310 UTM Johor Bahru Johor Darul Takzim</p> <p>Tarikh : 18 Julai 2019</p>
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Project Introduction:

In the first place, let's review the fundamental question: "What makes AC - DC conversion necessary?"

In Malaysia, the electricity that is delivered to homes and buildings is mainly 230 V AC. Nevertheless, there are many electronic circuits built into products that run on electricity operate at DC voltages such as 5 V, 12 V, 33 V and *etc.* Some devices may not require energy conversion, for example, motors and incandescent bulbs which run at AC voltages. Having said that, nowadays there are few simple devices consisting solely of motors and switches, but many of them are designed to integrate with electronic control circuits that run on DC voltages. For instance, a LED is basically a DC device, the electricity that we receive from TNB is AC, the electronic circuits that lie at the heart of electrical gadgets run on DC. Therefore, a AC - DC converter is essential.

Project tasks:

In this laboratory assignment, students are required to carry out a brief literature review, design and construct the energy conversion circuit (power modulator) so that a variable DC output voltage can be generated. The designed converter must be able to supply variable voltage to the passive load (resistance and inductance). To do the job, the **thyristors (SCR)** can be used to construct the power modulator circuit.

A technical report supported with the experimental results is expected to be produced at the end of project time. The collected data, data analysis and plots of waveforms should be well presented in the report.

Answer the following questions:

- What is a AC – DC converter?
- What type of source is needed?
- What are the circuit topologies available in AC – DC converter?
- List down FIVE applications of AC – DC converter.
- How the variable DC output voltage is achieved?
- What is the relationship between the control angle (delay angle) and generated voltage?
- How to improve the load power if the R-L load is used?
- How to ensure the continuous current mode in the designed AC – DC converter?