

**Complex Engineering Problem**  
**Lab Project**  
**Subject: Power Electronics Lab**  
**Instructor: Dr. Habib Ur Rahman Habib**



**Objective:**

The objective of this activity is to develop hands-on experience on complex engineering problems that mark the following attributes:

1. The activity involves problem solving and critical analysis.
2. The activity covers suitable software simulations.
3. The activity covers hardware implementation.

**Outcomes:**

The activity is mapped to CLO<sub>3</sub>. Your performance in this project will play an important role in CLO attainment.

CLO	LEVEL	PLO	Outcome
03	P3	3, 4, 9, 10	Design, simulation and hardware implementation of power converters.

**Problem Statement:**

An uninterruptible power supply (UPS) also known as uninterruptible power source is an electrical apparatus that provides emergency power to critical loads when the utility-supplied power fails or voltage drops to an unacceptable level. A UPS allows for the safe, orderly shutdown of electrical equipment. The size and design of a UPS determine how long it will supply power.

**Part 1: Simple UPS (Simulation)**

Show simulation of a simple 300 Watt UPS project in MATLAB Simulink or Multisim or any other software tool. If WAPDA supply is available then UPS will charge battery. It will include bidirectional converter (single phase) and dc-dc bidirectional converter for charging battery. When WAPDA is OFF, then battery will feed the AC load through dc-dc bidirectional converter and single phase converter. You can choose other parameters by your own with proper mathematical calculations.

**Part 2: Hardware Design**

You need to design boost converter. It is capable of achieving a constant 12V output from a 5V input. You can choose other parameters by your own with proper mathematical calculations.

**Deliverables:**

Please follow the following dates and instructions for deliverables.

1. The simulation-based design and results to be evaluated from 31<sup>st</sup> May to 7<sup>th</sup> June 2022.
2. Hardware implementation and results to be evaluated from 14<sup>th</sup> June to 20<sup>th</sup> June 2022.

## Note:

- **Project/Final report should include**
  - a) Title page
  - b) Objectives
  - c) Background
  - d) Abstract
  - e) Components description
  - f) Circuit diagrams
  - g) Working
  - h) Simulation results/code and conclusions