

University of Moratuwa  
Faculty of Engineering  
Department of Electronic & Telecommunication Engineering  
EN1014 Electronic Engineering

## Assignment 1

B.Sc Engineering, Semester 2

2020 Batch

### Introduction

In this assignment you will simulate the circuit of a conventional DC power supply using LTspice simulation tool and analyze its behavior.

### Description of the Power Supply

Output	:	Regulated 12V DC
Input	:	AC utility power of 325V(peak), 50 Hz
Load Resistance	:	(1000+Last three digits of your index number) $\Omega$
Rectifier	:	Full Wave Bridge
Smoothing	:	Capacitor type
Regulator	:	Simple Zener Regulator

Following components should be used for designing and simulating the conventional DC power supply.

One 470 $\mu$ F Capacitor

Four RR1LAM4S diodes

One BZX84C12VL Zener diode (Maximum power dissipation=250mW)

A transformer primary inductance: 2.2H, Secondary inductance: 5mH

One 100  $\Omega$  Resistor (for Zener regulator)

One 50  $\Omega$  Resistor

AC Input to the circuit should be connected to the transformer through a 50  $\Omega$  series resistor.

### Questions

(Q1) Draw the schematic circuit diagram of the power supply, run the simulation, observe voltage and current waveforms at different points

(Q2) Is the output regulated properly at 12V?

- (Q3) Find the peak-to-peak ripple voltage after the smoothing capacitor and find the ripple factor .
- (Q4) Find the minimum and maximum zener currents. Is the Zener diode capable of handling this maximum current?
- (Q5) Find Peak-Inverse-Voltage(PIV) and peak current of rectifier diodes.
- (Q6) Find the real power drawn from the AC supply(in watts) and the DC power delivered to the load.
- (Q7) Calculate the overall power efficiency of the DC power supply using your answers in Q6.
- (Q8) What are your suggestions to improve this design.

### **Submission Details:**

Save the LTspice schematic file with your index number as the name of the file. Submit duly named LTspice schematic file and a pdf file containing the answers to the questions. Name the pdf file also by your index number.