University of Biskra
Faculty of Science and Technology
Department of Electrical Engineering
3rd Year LMD /3rd Year ING

Series No. 2

Exercise n°1

The semi-controlled half-wave rectifier shown in Fig.1; supplies an inductive load R=8Ω, L=8mH. $v_s(t) = -v_s(t) = 220\sqrt{2}\sin(314)\,t$ α=$\pi + \frac{\pi}{3}$, β=200°.

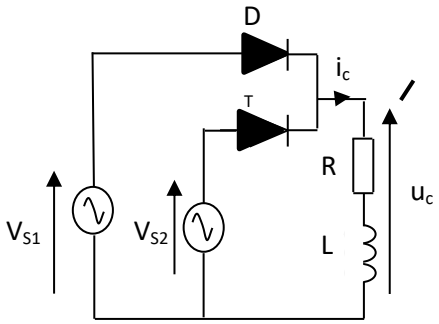

Figure1

1. State the rule that determines which diode conducts when several diodes share a common cathode.
2. State the rule that determines which diode conducts when several diodes share a common anode.
3. Complete the following table **:**

TIMES			
D			
T			
uc			
V_D			
VT			

4. Plot the waveforms of uC, iC, VT, and VD, indicating which switches are conducting.
5. Calculate the average value of the load voltage uC.

Exercise n°2

The controlled single-phase bridge rectifier shown in Figure 2 supplies a highly inductive load (R-L; L ≫ R) with a constant current of 60 A. Vs=120V/50Hz et α = π/3 .

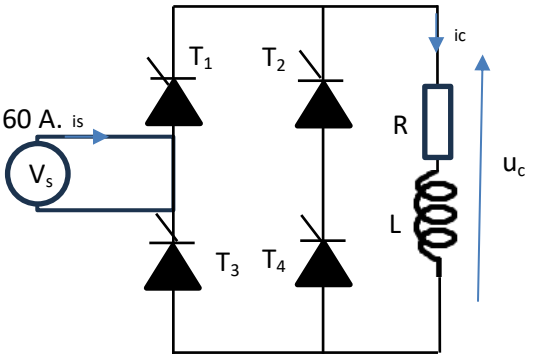

Figure 2

1) Plot the waveforms of uc, ic, is, and VTh1.
2) Calculate the average and RMS values of the load voltage uc.
3) Calculate the RMS value of the source current is.
4) Calculate the power factor cos φ of the source.

Exercise 03

A single-phase asymmetric mixed bridge connected to the grid 230 V / 50 Hz supplies a DC motor modelled by an RLE load

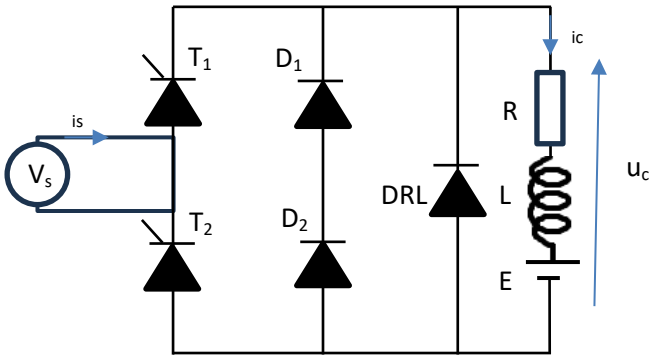

Figure 3

1. In continuous conduction, with E = 100 V, L = 1 H, R = 0.92 Ω, and α = 60°, calculate the average voltage of the load (uc_avg), the average current (ic_avg), and the power delivered to the back Back-EMF E.
2. In discontinuous conduction, for E = 100 V, L = 0, R = 10 Ω, and α = 90°, plot uc(t) and ic(t). Then, for α = 60° and a non-zero inductance L that is insufficient to maintain continuous conduction, draw the waveforms of uc(t), ic(t), and is(t).