Recitation n° : 2

Exercise 1 :

A single-phase, uncontrolled bridge (diode bridge) is powered by a transformer supplying an alternating voltage whose expression is $v(t)=V_m \sin(wt)$

I-Power Delivery to a Resistive Load

The load is a resistance R=10Ω.

1-Draw the waveforms of the rectified voltage.

2- Calculate the average value of the current delivered to the load.

II. Power delivery to the load R, with supply voltage E

The load now consists of a battery with an EMF E=V10 and negligible internal resistance, in series with a 2Ω resistor."

1-Determine the diode turn-on times.

2- Draw the waveform of the voltage U across the load.

Exercise 2:

A three-phase diode rectifier supplies an R=10Ω load. The maximum phase voltage across each phase of the secondary of a transformer connected in star-star is **Vs=140V**

1. Draw the waveforms of $V_L(t)$; $I_L(t)$; $V_{D1}(t)$; $I_{D1}(t)$; $I_{S1}(t)$; $I_{S2}(t)$; $I_{S3}(t)$

2. Calculate the maximum, average, and RMS voltages $V_L$avg, $V_L$rms, $V_D$inv and the currents $I_L$avg, $I_L$rms, $I_D$avg, $I_D$rms.

3. Calculate the form factor (FF) of the load voltage.

Exercise 3 :

A three-phase, three-pulse (P3) rectifier using ideal diodes supplies a motor with a counter-electromotive force (CEMF) of 180 V and an armature resistance of 2Ω. The inductance is considered negligible. The RMS phase voltage at the terminals of each phase of the secondary winding of a star-star connected transformer is 220 V, with a frequency of 50 Hz.

1. Provide the circuit diagram of the setup.

2. Calculate the average current and the maximum current in the load.

3. An inductance is added in series with the motor to achieve a constant current in the load. Calculate the average value of this current.

Exercise 4:

An uncontrolled three-phase full-wave rectifier is connected to a three-phase supply via a (Yy) coupling transformer. The secondary line voltage is 380V/50Hz and supplies a resistive load R=10Ω.

1.Draw the waveforms of. $U_L(t)$, $I_L(t)$,$U_d(t)$, $I_{S1}(t)$; $I_{S2}(t)$; $I_{S3}(t)$

2 .Calculate: V_L_avg, I_L_avg