

Recitations N° : 1

Exercise n° : 1

Single phase half wave with RL load

A single-phase half-wave rectifier is supplied by an ideal sinusoidal voltage source. The rectifier uses a perfect diode and feeds a resistive and inductive load has $L = 6.5 \text{ mH}$, $R = 2.5 \Omega$, The input voltage is $V_s = 120 \text{ V}$ at 50 Hz ;

1. Draw the schematic diagram of the circuit.
2. Draw the waveforms over period of the source voltage for:
 - * a) The supply voltage $v_s(t)$.
 - * b) The output voltage (load voltage) $v_L(t)$.
 - * c) The output current $i_L(t)$.
 - * d) The voltage across the diode $v_d(t)$.
3. Calculate:
 - * a) The average value of the output voltage, $V_{o(avg)}$.
 - * b) The average value of the output current, $I_{o(avg)}$.
 - * c) The RMS value of the output voltage, $V_{O(rms)}$.

Exercise N°:2

Single phase half wave with Resistive-Inductive Load (with Freewheeling Diode)

Now, connect the freewheeling diode (FD) across the load.

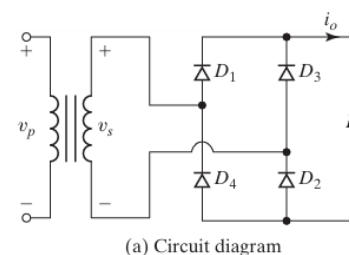
1. Draw the schematic diagram of the circuit.
2. Draw the waveforms over period of the source voltage for:
 - * a) The supply voltage $v_s(t)$.
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 - * d) The voltage across the diode $v_d(t)$.
3. Calculate:
 - * a) The average value of the output voltage, $V_{o(avg)}$.
 - * b) The average value of the output current, $I_{o(avg)}$.
 - * c) The RMS value of the output voltage, $V_{O(rms)}$.

Exercise N°3:

Single phase full-wave uncontrolled rectifier based on Bridge rectifier with Resistive-Inductive Load

The single-phase full-wave rectifier of Figure –a- has $L = 6.5 \text{ mH}$, $R = 2.5 \Omega$, The input voltage is $V_s = 120 \text{ V}$ at 50 Hz ;

1. Draw the waveforms over period of the source voltage for:
 - * a) The supply voltage $v_s(t)$.
 - * b) The output voltage (load voltage) $v_L(t)$.
 - * c) The output current $i_L(t)$.



* d) The voltage across the diode $v_d(t)$.

3. Calculate:

* a) The average value of the output voltage, $V_{o(avg)}$.

* b) The average value of the output current, $I_{o(avg)}$.

* c) The RMS value of the output voltage, $V_O(rms)$.

Exercise N°4:

Single phase full-wave uncontrolled rectifier based on Bridge rectifier with Resistive-Inductive Load (with Freewheeling Diode)

Now, connect the freewheeling diode (FD) across the load.

1. Draw the waveforms over period of the source voltage for:

* a) The supply voltage $v_s(t)$.

* b) The output voltage (load voltage) $v_L(t)$.

* c) The output current $i_L(t)$.

* d) The voltage across the diode $v_d(t)$.

3. Calculate:

* a) The average value of the output voltage, $V_{o(avg)}$.

* b) The average value of the output current, $I_{o(avg)}$.

* c) The RMS value of the output voltage, $V_O(rms)$.