**EE463-HW3**

# Understanding Power and Controlled Rectifiers

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# Introduction

# Question 1- Active Power Creation

## a-)



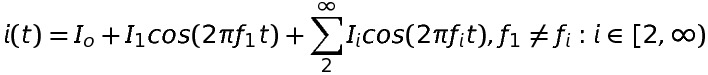


Figure . Figures of Voltage source and supplied current

We can find active power of this voltage source by using this formula:

Therefore, average power is composed of DC and only fundemental frequency component. Harmonic terms does not appear on the average power formula since they become 0 with integration. However, the harmonic terms adds up to the apparent power and it decreases power factor.

The components to create a nonzero avtive power terms should have resistive elements.

## b-)

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# Question 2- Single Phase Controlled Rectifier

## a-)

## b-)

## c-)

# Question 3- Alternative Rectifier Topologies

## a-)

It is the 12-pulse rectifier circuit. It is used generally in HVDC systems with series devices. It is adventagous with creating more voltage, less ripple and less harmonics. Its harmonics is related with 12n +- 1 (11th,13rd…). Its output voltage stability is better regard to 6 pulse full bridge rectifiers.

Since it is the conversion 3 phase AC/DC conversion, we can find full bridge rectifiers in this topology. Most common is 6-pulse. It has 6 diodes in the circuit to create a DC waveform. Its ripple is higher since we use only 6 diodes to contribute. Usage of higher pulses are considered and we are using more pulses to achieve better voltage stability. 24 and 48 pulses are possible. It can be achieved by adding diodes with series to the circuit.

diyagram, çizgi, origami, kalıp, desen, düzen içeren bir resim

Açıklama otomatik olarak oluşturuldu

## b-)

Our expectation would be;

* Higher voltage stability in 12 pulse (Less ripple in the waveform)
* Achieving more voltage in the same configuration
* Achieving a better THD value in 12 pulse.

# Conclusion