**Homework 5**

**Page 96, Chinese textbook**

**Question 18**

Considering a single-phase bridge fully-controlled rectifier circuit, which harmonics are there in the rectifier output voltage and which one in it has the largest magnitude? Which harmonics are there in the second side current of the transformer and which ones in it are dominating?

**Question 19**

Considering a three-phase bridge fully-controlled rectifier circuit, which harmonics are there in the rectifier output voltage and which one in it has the largest magnitude? Which harmonics are there in the second side current of the transformer and which ones in it are dominating?

**Question 24**

What is the main purpose of using multiplex rectifier circuit?

**Question 25**

Which harmonics are there in the rectifier output voltage and AC input current of the 12-pulse and 24-pulse rectifier circuit respectively?

**Question 27**

Considering a three-phase bridge fully-controlled converter connected to a EMF load with resistor and inductor, when ,, ,, calculate the value of , ,and . How much active power is being sent back to the grid?

**Answer 18**

For a single-phase bridge fully-controlled rectifier circuit, there exists 2kth harmonics in the output voltage, the maximum of which is second harmonics. (k=1,2,3……) There exists (2k+1)th harmonicsin the current of the secondary side of the transformer. (k=1,2,3……) The 3rd and 5th harmonics are the main part of the current.

**Answer 19**

For a single-phase bridge fully-controlled rectifier circuit, there exists 6kth harmonics in the output voltage, the maximum of which is second harmonics. (k=1,2,3……) There exists (6k+1)th and (6k-1)th harmonics in the current of the secondary side of the transformer. (k=1,2,3……) The 5th and 7th harmonics are the main part of the current.

**Answer 24**

The main reasons of using multiplex rectifier circuit are

(1) With the power of rectifier circuit increasing, the need of the capacity of rectifier is higher.

(2) Reduce harmonic and reactive power generated by power grid

**Answer 25**

There are (12k+1)th and (12k-1)th harmonics in the AC input current of the 12-pulse rectifier circuit. And there are 12kth harmonics in the rectifier output voltage of the 12-pulse rectifier circuit. (k=1,2,3……)

There are (24k+1)th and (24k-1)th harmonics in the AC input current of the 24-pulse rectifier circuit. And there are 24kth harmonics in the rectifier output voltage of the 12-pulse rectifier circuit. (k=1,2,3……)

**Answer 27**

