

## Circuit Theory II Laboratory

# FREQUENCY RESPONSE MEASUREMENTS

### Aim of the exercise

---

The aim of the exercise is to familiarize with the methods of determining the frequency responses of chosen circuits (filters). The aim of the exercise is achieved by measuring the response of circuits to sinusoidal excitations of different frequencies.

### Measurements Methodology

---

The exercise consists in measuring the voltages at the outputs of the tested filters as a function of the frequency of the excitation signal. The measurement should be carried out using a vector voltmeter.

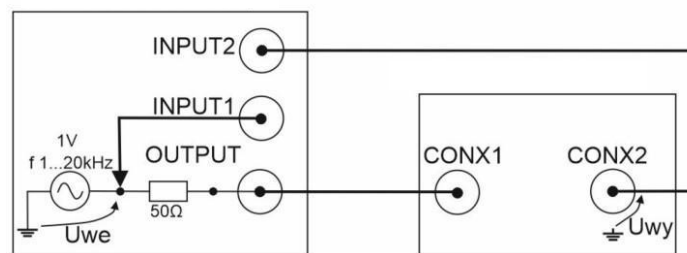


Fig. 1. Conceptual scheme of the measurement system for determining the frequency responses of the tested filters

#### 1.1. Integrating circuit RC (Low-Pass Filter)

In the first part of the exercise, the tested circuit is a first-order RC integrating circuit, which can be also regarded as a low-pass filter.

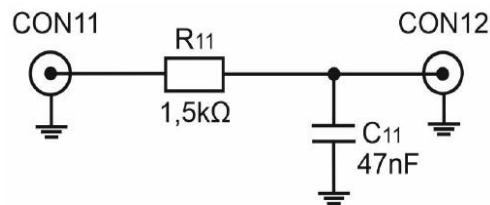


Fig. 2. Schematic of the tested low-pass RC filter

#### Frequency range:

1 - 10 kHz: 1 kHz step

10 - 20 kHz: 2 kHz step

### 1.2. III-order Low-Pass Filter

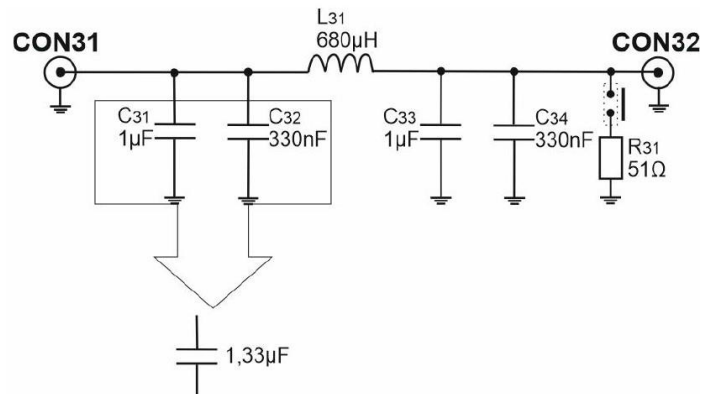


Fig. 3. Schematic of the tested 3rd order low-pass filter.

Note: Measurements should be carried out only for the case involving the resistor  $R_{31}$ .

#### **Frequency range:**

- 1 - 10 kHz: 1 kHz step
- 10 - 20 kHz: 2 kHz step

### 1.3. Resonant Circuit RLC

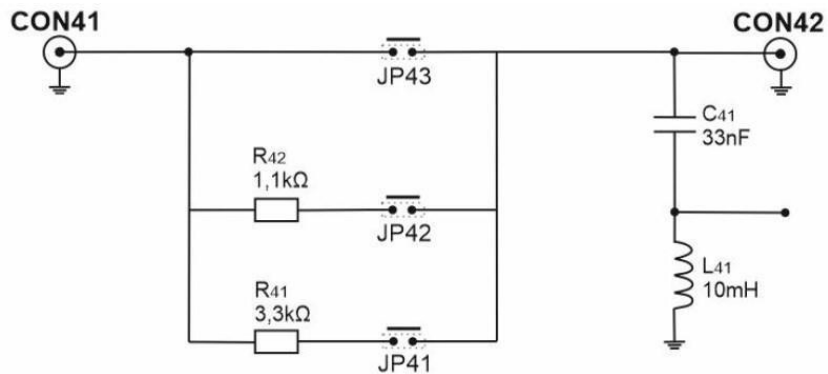


Fig. 4. Schematic of the tested RLC resonant circuit with switched series resistances.

Measurements should be carried out for two series resistances of the circuit set with jumpers JP41-42, starting from JP41 and ending with JP42. The CON42 connector should be treated as the output of the circuit (skip the measurement on the L41 coil itself).

#### **Frequency range:**

- 1 - 8 kHz: 1 kHz step
- 8 - 10 kHz: 0.2 kHz step
- 10 - 20 kHz: 2 kHz step

**Report requirements**

---

The report should include the developed amplitude-frequency and phase-frequency characteristics of the tested circuits. The obtained results should be properly described and conclusions regarding the operation of the circuits should be drawn.