Short Report – Experiments 60 & 63

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Experiment 60 – Basics in Electronics

Although this experiment does not require a full report, we completed all practical exercises with the multimeter and oscilloscope as preparation for the AC measurements in Experiment 63.

We began by determining the internal resistance of the voltmeter using voltage-divider circuits with both kilo-ohm and mega-ohm resistors. The measured output voltages deviated from the theoretical values, which allowed us to calculate the effective internal resistance of the instrument. We then performed a similar procedure for the ammeter, measuring currents in the microampere and milliampere ranges and comparing them to the expected values. This confirmed that the internal resistance of the ammeter is large in the μA-range and significantly smaller in the mA/A ranges.

Next, we built and adjusted a compensation (bridge) circuit. By tuning the potentiometer until the differential voltage dropped to zero, we could read off the corresponding potentiometer voltage and observe how this method eliminates measurement loading effects.

Finally, we worked with the oscilloscope. We measured the PROBE-COMP calibration signal, performed multichannel measurements on diodes, and carried out difference measurements. We also investigated signal rectification using a capacitor at different frequencies, determining ripple voltages and observing how the smoothing effect changes with frequency. These tasks helped us gain confidence in using both the multimeter and the oscilloscope before moving on to AC circuits.

Experiment 63 – Alternating Currents and RLC Circuits

I carried out Experiment 63 alone, although the practical course is normally performed in pairs. As a result, I had to operate all equipment independently. Additionally, the oscilloscope and signal generator were not correctly configured at first, which required several measurements to be repeated. Because of this additional workload, I was unable to finish all parts of the experiment.

I began with the RC low-pass filter, using a resistor and capacitor in series. The input voltage was set to approximately 1 V peak-to-peak, and I measured both the input and output signals over a wide range of frequencies. For each point, I recorded peak-to-peak voltages and the phase shift between the channels. After correcting the oscilloscope settings, I obtained consistent data showing the expected decrease in output amplitude and the increasing phase shift towards high frequencies.

I then attempted to determine the cutoff frequency and roll-off from the measured values. While I collected data in both the low- and high-frequency regimes, I did not have enough time to complete the full plot or calculate the slope precisely.

Finally, I began setting up the parallel RLC resonant circuit. I observed initial changes in amplitude and phase when sweeping the frequency, but time constraints prevented me from recording a full resonance curve or determining the quality factor Q.

Overall, despite the technical difficulties and working alone, I was able to complete the essential parts of Experiment 63 and deepen my understanding of frequency-dependent behaviour in AC circuits.