

Function generator is an electronic equipment used to generate different periodic electrical signals. DC power supply is an instrument that gives DC voltage to power a device. Multi-meter is a measuring instrument that can measure various electrical properties. In this experiment, you learn how to work with function generator, DC power supply, and digital multi-meter.

MANDATORY EXPERIMENTS

Experiment 1

Set the controls of the function generator to produce a sine wave of 1 kHz frequency and 2 V amplitude.

(a) Use the oscilloscope to see the wave and fine tune its frequency and amplitude.

(b) Investigate the impact of attenuation, offset, and duty knobs on the signal.

(c) Repeat this part for triangle and square waves.

Experiment 2

Set the controls of the function generator to produce a sine wave of 50 Hz frequency and 1 V amplitude around an offset of 1 V.

(a) Use the oscilloscope to see the wave and read its frequency and amplitude.

(b) Measure the voltage of the wave using a multi-meter in AC and DC modes. Compare the readings with that of the oscilloscope and interpret the results.

(c) Change the frequency, amplitude, and offset of the wave and check the readings of the multi-meter and oscilloscope.

(d) Repeat this part for a square wave of 50% duty cycle with a same frequency, amplitude, and offset as the previous sine wave. Investigate the readings as the duty cycle changes.

Experiment 3

Tune the power supply to generate a 10 V DC voltage on its master output.

(a) Drive a 10 k Ω resistor with the set voltage and measure its current using the multi-meter. Compare the measured and analytical results and justify any difference.

(b) Repeat this part for a 1 k Ω resistor.

Experiment 4

Set the master output of the DC power supply to 1 V and its corresponding current limit volume to 0 A. Then, short circuit the master output using an alligator clip wire and turn the current volume slowly to 0.5 A.

(a) Discuss the observations.

(b) What do the C.C and C.V LEDs show?

(c) Can you propose an experiment to measure the resistance of the alligator clip wire?

Experiment 5

The DC power supply has three operational modes of independent, series, and parallel.

(a) Use the supply to create two independent 2 V and 3 V DC voltages and measure them using the multi-meter.

(b) Use the supply in parallel mode to create a 3 V DC voltage and measure it using the multi-meter. How is this voltage different from a 3 V voltage generated from the master output on independent mode?

(c) Use the supply in series mode to create two ± 2 V DC voltages and measure them using the multi-meter.

(d) Use the supply to create two -2 V and 3 V DC voltages and measure them using the multi-meter.

Experiment 6

Set the selector dial of the multi-meter to resistance mode.

(a) Measure the resistance of a 1 k Ω resistor in the most accurate range and compare it with the nominal resistance value.

(b) Repeat the previous part for a 100 k Ω resistor. What happens if you touch the probes of the multi-meter while measuring the resistance?

(c) Connect the probes of the multi-meter to each other and read the displayed resistance. Can you measure the resistance of an alligator clip wire using the multi-meter and its probes?

Experiment 7

Set the selector dial of the multi-meter to continuity test mode.

(a) Connect the probes of the multi-meter to a 10 k Ω resistor and see what happens.

(b) Repeat the previous part for a 1 k Ω resistor and for short-circuited probes.

(c) Can you determine the threshold value of the continuity test mode using a simple experiment?

BONUS EXPERIMENTS

Experiment 8

How can the legs of a diode be determined using a multi-meter which has no diode test feature?

Experiment 9

The DT9208 multimeter is used to measure a 5 V DC voltage. The catalog of the multimeter is available online.

(a) Calculate the measurement accuracy if the voltage is measured using the 20 V range.

(b) Calculate the measurement accuracy if the voltage is measured using the 200 V range.

(c) Calculate the measurement accuracy if the voltage is measured using the 1000 V range.

Experiment 10

Return your work report by filling the \LaTeX template of the manual. Include useful and high-quality images to make the report more readable and understandable.