

Topic 11 – Guidance for Practical 1

Diode bridge rectification

Safety

Although great care has been taken in checking the accuracy of the information provided in this guidance, Cambridge University Press shall not be responsible for any errors, omissions or inaccuracies.

Teachers and technicians should always follow their school and departmental safety policies. You must ensure that you consult your employer's model risk assessments and modify them as appropriate to meet local circumstances before starting any practical work. Risk assessments will depend on your own skills and experience, the skills and experience of your students, and the facilities available to you. Everyone has a responsibility for his or her own safety and for the safety of others. The notes below should not be regarded as a risk assessment.

You should carry out the practical yourself before presenting it to students. Make sure you are comfortable with the procedures, and can anticipate any difficulties your students may encounter.

Guidance

Students will practice constructing electrical circuits, using oscilloscopes and comparing signal waveforms.

Apparatus and materials

Each group will need:

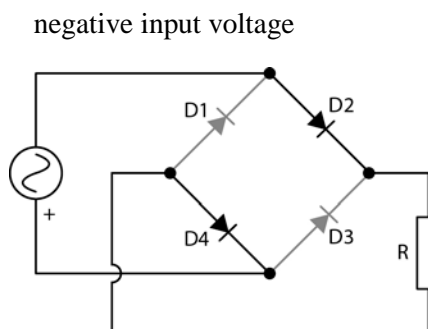
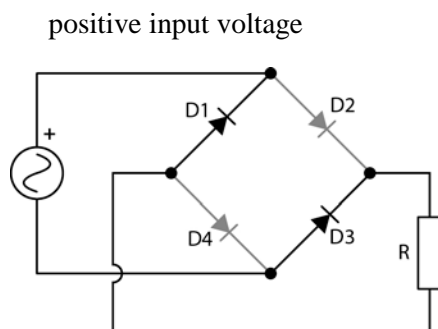
- AC power supply (5–25 V)
- four diodes 1N4001 (max current 1 A)
- resistor (100 Ω or greater)
- two oscilloscopes (or one oscilloscope with two channels)
- connecting wires
- graph paper

Setting up the practical

If voltage sensors are available, they can be used connected with laptops instead of oscilloscopes to record and compare the input and output signals.

Answers to questions

- 1 Maximum output voltage is lower than maximum input voltage.
- 2 Output frequency is twice the input frequency.



Topic 11 – Guidance for Practical 2

RC circuit – Capacitor charging

Safety

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You should carry out the practical yourself before presenting it to students. Make sure you are comfortable with the procedures, and can anticipate any difficulties your students may encounter.

Guidance

Students will practice constructing electrical circuits, taking electric measurements, plotting graphs using oscilloscopes and comparing signal waveforms.

Apparatus and materials

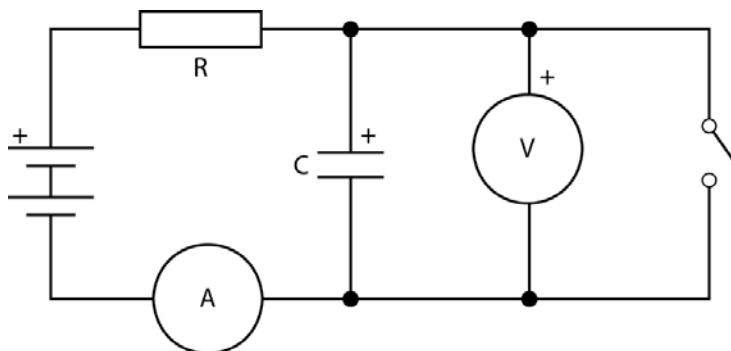
Each group will need:

- batteries or dc power supply
- resistors $10\text{k}\Omega$, $22\text{k}\Omega$
- capacitors $1000\mu\text{F}$, $2200\mu\text{F}$
- voltmeter or multimeter
- push-to-make switch
- connecting wires
- stopwatch
- graph paper

Setting up the practical

If voltage sensors are available, they can be used connected with laptops instead of voltmeters to record the measurements.

Another variation of this experiment is to measure current instead of pd while the capacitor is charging, using the circuit below. In this case, the current will decrease exponentially as the capacitor charges and RC is equal to the time it takes for the current to fall to 37% of its initial value.



Answers to questions

- 1 Exponential growth.
- 2 Of smaller resistance, so that the time constant, RC , is smaller.