R and C Quiz

written by: M. Rao

Revision Date: August 30, 2016

Write both students: email id, name and roll nos.

Thevenin's circuit

If you have a three stage circuit, as shown below in Figure 1. What will be the output of the circuit at the outer end ? Can you improve the circuit and show the component values in the improved circuit. [HINT: Use Thevenin theorm at each stage.]

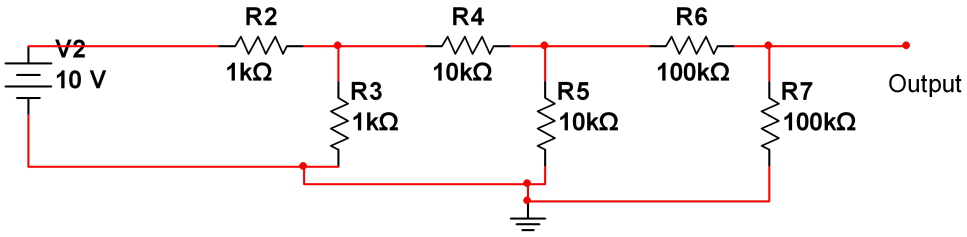

Figure 1: Schematic representation of a circuit.

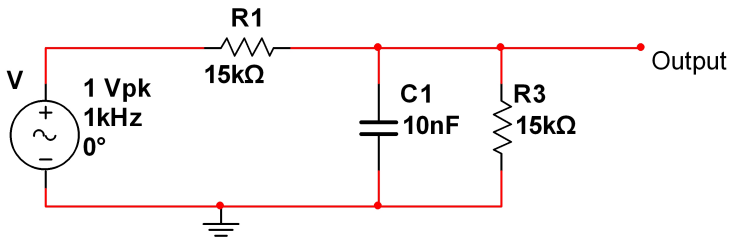

Figure 2: Schematic representation of a circuit.

Frequency of an RC circuit

For measuring f_{3dB} frequency or sometimes called corner frequency, we use the following rule for an RC circuit.

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f3dB = 1/(2(3.14)RC)
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Calculate the f_{3dB} for the circuit shown in figure 2 and draw a rough plot of the Vout/Vin versus frequency. In the same graph draw the Vout/Vin versus frequency for a circuit without the parallel resistance.

Integrator and Differentiator

If we use both integrator and differentiator for a square wave signal, do we get back the same signal at the output. Show the circuit for this and demonstrate this clearly to your instructor.

Capacitors in parallel

If we use two capacitors in parallel, the discharge time constant becomes less or high. Prove that experimentally and show your result to the instructor.

Capacitors in series

If we use two capacitors in series, the discharge time constant becomes less or high. Prove that experimentally and show your result to the instructor.

Diode Quiz

written by: M. Rao

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Write both students: email id, name and roll nos.

Three diodes

If you have a circuit as shown in Figure 1.

What is the maximum voltage reached by this circuit, if we provide an input of 10 Vp-p sinusoidal signal ? What is the ripple voltage for this circuit ? Can you reduce ripple voltage to 20 mV ? If so, please draw the circuit and show the circuit to your instructor ?

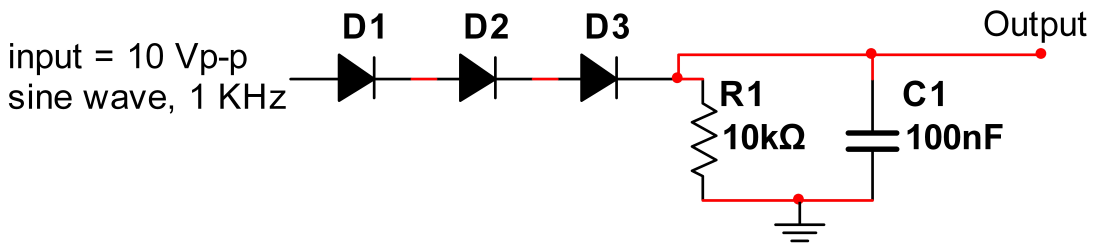

Figure 1: Schematic representation of a circuit.

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Limiting circuit

Draw and demonstrate a circuit which will limit the AC signal to -2.1 V on negative cycle and +1.7 V on other side.

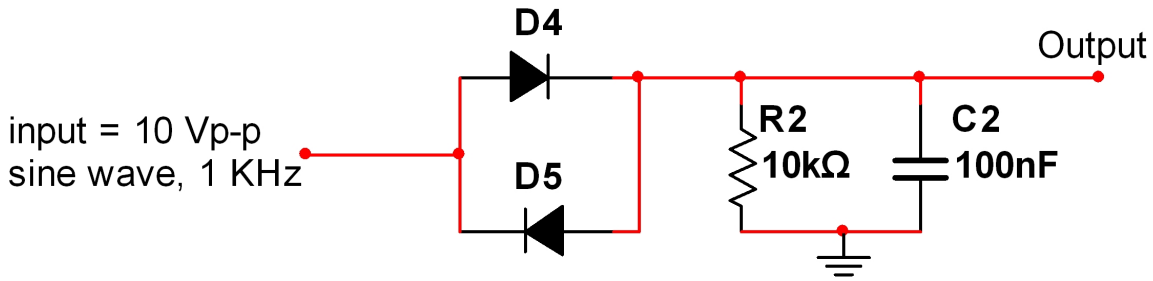

Figure 2: Schematic representation of a circuit.

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Diodes

If you have a circuit as shown in Figure 2.

Draw a rough plot of output and input voltage with respect to time. Provide your justification on the same. What is the ripple voltage for this circuit ?

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Negative impulses

Differentiating a square wave will provide us spikes (impulse signals) as the output. Build and draw a circuit which will provide only negative impulses. Make sure that your differentiator circuit does not lower the voltage level below the cut-in (threshold) voltage of the diode.

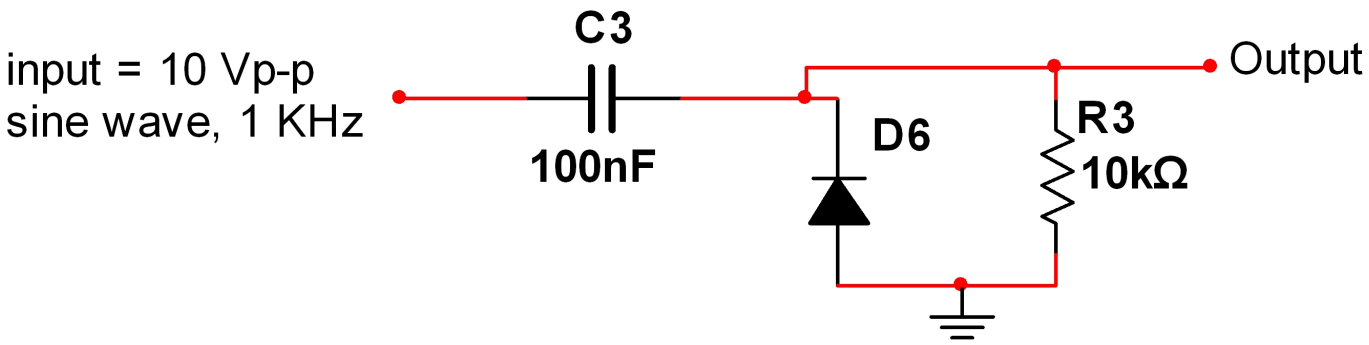

Figure 3: Schematic representation of a circuit.

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Circuit

Draw and justify the output signal provided by the circuit shown in the figure 3 for an input of 10 Vp-p sinusoidal signal. Determine the charging and discharging time constant for this circuit and justify the same.