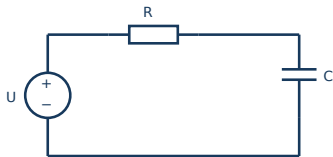


Capacitor, inductor and decoupling

Worksheet · 20 tasks

Name: _____ Datum / Date: _____ Klasse / Class: _____

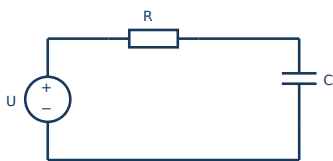
03 An uncharged $100\ \mu\text{F}$ capacitor charges through $10\ \text{k}\Omega$ from $5\ \text{V}$. Find τ and initial current.



Concept diagram; values are in the task.

Method · units · working · check result

04 Calculate capacitor voltage after one time constant in task 3.



Concept diagram; values are in the task.

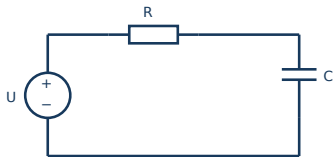
Method · units · working · check result



Worksheet · 20 tasks

Name: _____ Datum / Date: _____ Klasse / Class: _____

05 Calculate charging current after one time constant in task 3.



Concept diagram; values are in the task.

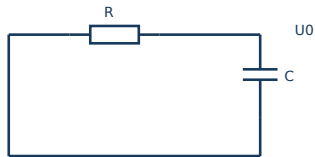
Method · units · working · check result

06 How long does task 3 take to charge to 90% of final voltage?

Method · units · working · check result

Name: _____ Datum / Date: _____ Klasse / Class: _____

07 100 μF discharges from 5 V through 10 k Ω . Calculate voltage after 2 s.



Concept diagram; values are in the task.

Method · units · working · check result

08 Does this ideal discharge stop at 0.7 V? Explain without calculation.

Method · units · working · check result

Name: _____ Datum / Date: _____ Klasse / Class: _____

09 How long does discharge in task 7 take to fall below 0.1 V?

Method · units · working · check result

10 An ideal $10\ \mu\text{F}$ capacitor carries sinusoidal current at $100\ \text{Hz}$. Find reactance magnitude.

Method · units · working · check result



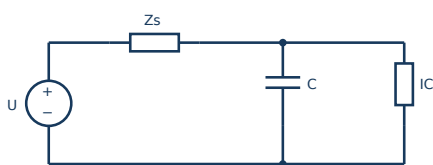
Worksheet · 20 tasks

Name: _____ Datum / Date: _____ Klasse / Class: _____

11 Double the frequency in task 10. How do reactance and current change at fixed voltage?

Method · units · working · check result

12 An IC needs an extra 20 mA for 10 μ s. What ideal capacitance limits voltage droop to 0.1 V?



Concept diagram; values are in the task.

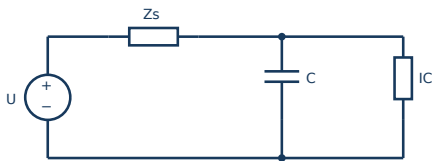
Method · units · working · check result

Capacitor, inductor and decoupling

Worksheet · 20 tasks

Name: _____ Datum / Date: _____ Klasse / Class: _____

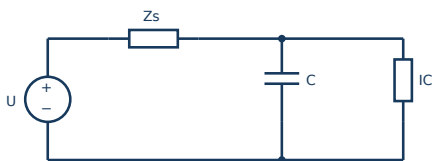
- 13** A decoupling capacitor has 0.1Ω ESR. A current step is 0.5 A . Find the immediate ESR voltage step.



Concept diagram; values are in the task.

Method · units · working · check result

- 14** Why place a small decoupling capacitor next to the IC rather than 30 cm away?



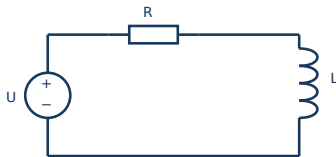
Concept diagram; values are in the task.

Method · units · working · check result

Capacitor, inductor and decoupling

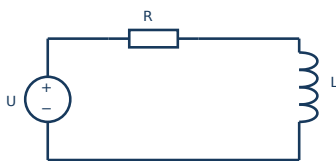
Worksheet · 20 tasks

Name: _____ Datum / Date: _____ Klasse / Class: _____

17 An ideal 10 mH inductor carries 0.2 A. Calculate stored magnetic energy.

Concept diagram; values are in the task.

Method · units · working · check result

18 10 mH and 100 Ω are in series across 5 V. Find τ and steady current; ideal inductor.

Concept diagram; values are in the task.

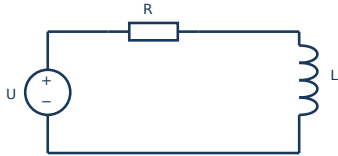
Method · units · working · check result

Capacitor, inductor and decoupling

Worksheet · 20 tasks

Name: _____ Datum / Date: _____ Klasse / Class: _____

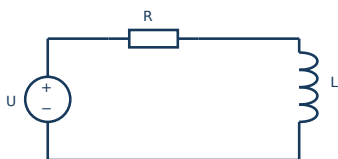
19 Calculate inductor current in task 18 after 0.1 ms, starting at zero.



Concept diagram; values are in the task.

Method · units · working · check result

20 A 10 mH inductor changes current by 0.2 A in 10 μ s. What ideal voltage magnitude is needed? What does this imply at turn-off?



Concept diagram; values are in the task.

Method · units · working · check result