

A3 Simulative Engineering - Formulary

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1 Resources for the exam

Allowed:

- ✓ Your hand written Lecture notes
- ✓ Summary of your handwritten lectures
- ✓ This formulary
- ✓ Mathematical book e.g.Papula
- ✓ DHBW Calculator (or just use MATLAB)

Not allowed:

- × Solutions of the laboratory
- × Learning paper

2 Electronical formulas

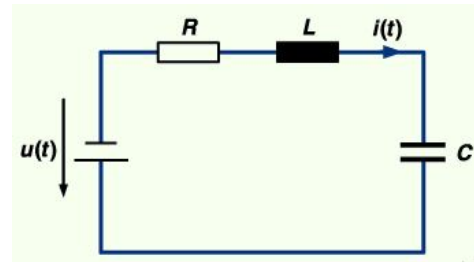


Figure 1: RLC circuit

2.1 Resistor

$$u_R(t) = R \cdot i_R(t) \quad (1)$$

U: voltage [Volt V]

R: resistance [Ohm $\Omega = \frac{V}{A}$]

I: current [Ampere A]

2.2 Capacitor/Condenser

$$Q = C \cdot U_C \quad (2)$$

$$Q = \int i_C(t) \quad (3)$$

$$i_C(t) = C \cdot u'_C(t) \quad (4)$$

Q: electric charge [Coulomb C = As]

C: capacity [Farad F = $\frac{C}{V}$]

2.3 Inductor

$$u_L(t) = L \cdot i'_L(t) \quad (5)$$

L: inductance [Henry H = $\frac{Vs}{A}$]

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3 Mechanical formulas

3.1 Newton's Second Law

$$F = m \cdot a = m \cdot x''(t) \quad (6)$$

m: mass [gramm g]

a: acceleration [$\frac{m}{s^2}$] x: length [meter m]

3.2 Gravitational force

$$F_G = m \cdot g \quad (7)$$

g: gravitational acc. [$\frac{m}{s^2}$] (Germany 9.81 $\frac{m}{s^2}$)

3.3 Spring force

$$F_S = k \cdot x \quad (8)$$

k: spring constant [$\frac{kg}{s^2}$]

3.4 Friction force

$$F_F = r \cdot v = r \cdot x'(t) \quad (9)$$

r: friction constant

v: velocity [$\frac{m}{s}$]

3.5 Rotational force

$$F_R = F_G \cdot \sin \rho \quad (10)$$

ρ : angle of displacement

3.6 Torque

$$M = F \cdot r \quad (11)$$

r: radius

3.7 Rotational movement

$$M = J \cdot \rho'' \quad (12)$$

J: moment of inertia

ρ'' : angular velocity