Circuit Analysis I (DC)

University Electrical Engineering · Vocabulary in context

Word	Example
direct-current circuit analysis /daɪˈrekt ˈkʌrənt ˈsɜːkɪt əˈnæləsɪs/	**Direct-current circuit analysis** finds the voltages and currents in a steady circuit.
transient response /ˈtrænsɪənt rɪˈspɒns/	The **transient response** is how the circuit changes just after switching.
charge /tʃɑːdʒ/	A proton has a positive **charge**.
coulombs /ˈkuːlɒmz/	A current of 2 A moves two **coulombs** of charge every second. 2 A
conserved /kənˈsɜːvd/	Charge is **conserved**: none is lost at the junction.
current /ˈkʌrənt/	The **current** in the lamp is 0.5 A. 0.5 A
amperes /ˈæmpeəz/	The heater draws ten **amperes**.
voltage /ˈvəʊltɪdʒ/	The battery has a **voltage** of 1.5 V. 1.5 V
volts /vəʊlts/	The battery gives nine **volts**.
power /ˈpaʊə/	A 60 W lamp has a **power** of 60 watts. 60 W 60
watts /wɒts/	The lamp uses three **watts** of power.
energy /ˈenədʒi/	Food gives your body the **energy** it needs to move.
joules /dʒuːlz/	A 3 W lamp uses 360 **joules** in two minutes. 3 W 360

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kilowatt-hour /ˈkɪləwɒt ˈaʊə/	One **kilowatt-hour** is the energy a 1 kW heater uses in one hour. 1 kW
passive sign convention /ˈpæsɪv saɪn kənˈvenʃn/	The **passive sign convention** tells you whether a part absorbs or gives out power.
ammeter /ˈæmiːtə/	Connect the **ammeter** in series.
Ohm's law /əʊmz lɔː/	**Ohm's law** says current is proportional to voltage.
resistor /rɪˈzɪstə/	A **resistor** limits the current.
ohms /əʊmz/	The resistor is 2,000 **ohms**. 2,000
conductance	A **conductance** of 0.5 siemens means a resistance of 2 ohms. 0.5 2
series /ˈsɪəriːz/	Springs in **series** stretch more than one spring.
parallel /ˈpærəlel/	Two springs side by side, in **parallel**, are stiffer.
voltage divider /ˈvəʊltɪdʒ dɪˈvaɪdə/	A **voltage divider** gives a fraction of the supply voltage.
current divider /ˈkʌrənt dɪˈvaɪdə/	A **current divider** splits current between two branches.
Kirchhoff's current law /ˈkɜːkhɒfs ˈkʌrənt lɔː/	**Kirchhoff's current law** says current in equals current out at a junction.
node /nəʊd/	Each **node** holds a value and a pointer.
Kirchhoff's voltage law /ˈkɜːkhɒfs ˈvəʊltɪdʒ lɔː/	**Kirchhoff's voltage law** says the voltages around a loop add to zero.

Word	Example
loop /luːp/	Add the voltages round each **loop**.
• **nodal analysis** /ˈnəʊdl əˈnæləsɪs/	**Nodal analysis** uses the voltage at each node as the unknown.
reference node /ˈrefrəns nəʊd/	Choose a **reference node** and call its voltage zero.
mesh analysis /meʃ əˈnæləsɪs/	**Mesh analysis** uses a current in each loop as the unknown.
mesh current /meʃ ˈkʌrənt/	Two **mesh currents** flow in the shared resistor.
Thévenin's theorem	**Thévenin's theorem** replaces a circuit with one voltage source and one resistor.
open-circuit voltage	The **open-circuit voltage** is the voltage when nothing is connected.
Norton's theorem /ˈnɔːtnz ˈθɪərəm/	**Norton's theorem** replaces a circuit with one current source and one resistor.
source transformation /sɔːs trænsfɔːˈmeɪʃn/	A **source transformation** swaps a voltage source for a current source.
superposition /ˌsuːpəpəˈzɪʃn/	With **superposition**, you find the effect of each source alone and add them.
maximum power transfer /ˈmæksɪməm ˈpaʊə ˈtrænsfɜː/	**Maximum power transfer** happens when the load resistance equals the source resistance.
operational amplifier /ˌɒpəˈreɪʃənl ˈæmplɪfaɪə/	An **operational amplifier** amplifies the difference between its two inputs.

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gain-bandwidth product /geɪn ˈbændwɪdθ ˈprɒdʌkt/	The **gain-bandwidth product** limits how fast a high-gain amplifier can work.
ideal op-amp	An **ideal op-amp** draws no current into its inputs.
negative feedback /ˈnegətɪv ˈfiːdbæk/	**Negative feedback** sends part of the output back to reduce the error.
golden rules	The two **golden rules** of op-amps: no input current, and equal input voltages.
virtual short /ˈvɜːtʃuːəl ʃɔːt/	The **virtual short** means the two inputs of an ideal op-amp have the same voltage.
inverting amplifier /ɪnˈvɜːtɪŋ ˈæmplɪfaɪə/	An **inverting amplifier** flips the sign of the signal.
virtual ground	The inverting input sits at a **virtual ground** of zero volts.
non-inverting amplifier /nɒn ɪnˈvɜːtɪŋ ˈæmplɪfaɪə/	A **non-inverting amplifier** keeps the signal the same way up.
voltage follower	A **voltage follower** copies the input voltage to the output.
summing amplifier	A **summing amplifier** adds two signals together.
saturation /ˌsætʃəˈreɪʃn/	In **saturation**, the output cannot go above the supply voltage.
capacitor /kəˈpæsɪtə/	A **capacitor** stores a small electric charge.
capacitance /kəˈpæsɪtəns/	A large capacitor has a large **capacitance**.

Word	Example
farads	A capacitor of two **farads** stores 2 coulombs at 1 volt. 1 2
inductor /ɪnˈdʌktə/	An **inductor** resists changes in current.
inductance /ɪnˈdʌktəns/	Greater **inductance** stores more energy.
henrys	The coil has an inductance of 0.02 **henrys**. 0.02
natural response /ˈnætʃərəl rɪˈspɒns/	The **natural response** comes from energy already stored in the circuit.
step response /step rɪˈspɒns/	The **step response** shows how the circuit reacts to a sudden switch-on.
time constant /taɪm ˈkɒnstənt/	The **time constant** is RC. RC

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