Glossary

back emf the emf generated by a running motor, because it consists of a coil turning in a magnetic field; it opposes the voltage powering the motor

capacitive reactance the opposition of a capacitor to a change in current; calculated by $X_C = \frac{1}{2\pi \mathrm{fC}}$

characteristic time constant denoted by τ, of a particular series RL circuit is calculated by $\tau = \frac{L}{R}$, where L is the inductance and R is the resistance

eddy current a current loop in a conductor caused by motional emf

electric generator a device for converting mechanical work into electric energy; it induces an emf by rotating a coil in a magnetic field

electromagnetic induction the process of inducing an emf (voltage) with a change in magnetic flux

emf induced in a generator coil emf = $\mathrm{NAB}\omega \sin \omega t$, where A is the area of an N-turn coil rotated at a constant angular velocity ω in a uniform magnetic field B, over a period of time t

energy stored in an inductor self-explanatory; calculated by $E_{\mathrm{ind}} = \frac{1}{2}\mathrm{LI}^2$

Faraday's law of induction the means of calculating the emf in a coil due to changing magnetic flux, given by $\mathrm{emf} = -N\frac{\Delta\Phi}{\Delta t}$

henry the unit of inductance; $1\ \mathrm{H} = 1\ \Omega \cdot \mathrm{s}$

impedance the AC analogue to resistance in a DC circuit; it is the combined effect of resistance, inductive reactance, and capacitive reactance in the form $Z = \sqrt{R^2 + (X_L - X_C)^2}$

inductance a property of a device describing how efficient it is at inducing emf in another device

induction (magnetic induction) the creation of emfs and hence currents by magnetic fields

inductive reactance the opposition of an inductor to a change in current; calculated by $X_L = 2\pi \mathrm{fL}$

inductor a device that exhibits significant self-inductance

Lenz's law the minus sign in Faraday's law, signifying that the emf induced in a coil opposes the change in magnetic flux

magnetic damping the drag produced by eddy currents

magnetic flux the amount of magnetic field going through a particular area, calculated with $\Phi = \mathrm{BA}\cos\theta$ where B is the magnetic field strength over an area A at an angle θ with the perpendicular to the area

mutual inductance how effective a pair of devices are at inducing emfs in each other

peak emf $\text{emf}_0 = \text{NAB}\omega$

phase angle denoted by ϕ, the amount by which the voltage and current are out of phase with each other in a circuit

power factor the amount by which the power delivered in the circuit is less than the theoretical maximum of the circuit due to voltage and current being out of phase; calculated by $\cos \phi$

resonant frequency the frequency at which the impedance in a circuit is at a minimum, and also the frequency at which the circuit would oscillate if not driven by a voltage source; calculated by $f_0 = \frac{1}{2\pi\sqrt{\text{LC}}}$

self-inductance how effective a device is at inducing emf in itself

shock hazard the term for electrical hazards due to current passing through a human

step-down transformer a transformer that decreases voltage

step-up transformer a transformer that increases voltage

thermal hazard the term for electrical hazards due to overheating

three-wire system the wiring system used at present for safety reasons, with live, neutral, and ground wires

transformer a device that transforms voltages from one value to another using induction

transformer equation the equation showing that the ratio of the secondary to primary voltages in a transformer equals the ratio of the number of loops in their coils; $\frac{V_\text{s}}{V_\text{p}} = \frac{N_\text{s}}{N_\text{p}}$