Here is the notes of alternating current chapter:

Consider each topic as a main node and the contents under them as individual sub nodes

AC Sources

- Direct current (dc)
  refers to systems in which the source
  voltage
  is constant.
- Alternating current (ac)
  refers to systems in which the source
  voltage
  varies periodically, particularly sinusoidally.
- The
  voltage
  source of an ac system puts out a
  voltage
  that is calculated from the time, the peak
  voltage
  , and the angular frequency.
- In a simple
  circuit
  , the current is found by dividing the
  voltage
  by the
  resistance
  . An
  ac current
  is calculated using the peak current (determined by dividing the peak
  voltage
  by the
  resistance
  ), the angular frequency, and the time.

Simple AC Circuits

- For resistors, the current through and the
  voltage
  across are in phase.
- For capacitors, we find that when a sinusoidal
  voltage

is applied to a
capacitor
, the
voltage
follows the current by one-fourth of a cycle. Since a
capacitor
can stop current when fully charged, it limits current and offers another form of ac
resistance
, called
capacitive reactance
, which has units of ohms.

- For inductors in ac circuits, we find that when a sinusoidal
  voltage
  is applied to an
  inductor
  , the
  voltage
  leads the current by one-fourth of a cycle.
- The opposition of an
  inductor
  to a change in current is expressed as a type of ac reactance. This
  inductive reactance
  , which has units of ohms, varies with the frequency of the ac source.

RLC Series Circuits with AC

- An **RLC** series
  Circuit is a resistor,
  capacitor
  , and
  inductor

  series combination
  across an ac source.
- The same current flows through each element of an **RLC** series
  circuit
  at all points in time.
- The counterpart of
  resistance
  in a dc

circuit
is
impedance
, which measures the combined effect of resistors, capacitors, and inductors. The maximum current is defined by the ac version of
Ohm
’s law.

- Impedance
has units of ohms and is found using the
resistance
, the
capacitive reactance
, and the
inductive reactance
.

Power in an AC Circuit

- The average ac power is found by multiplying the rms values of current and voltage
.
- Ohm
’s law for the rms ac is found by dividing the
rms voltage
by the
impedance
.
- In an ac
circuit
, there is a
phase angle
between the source
voltage
and the current, which can be found by dividing the
resistance
by the
impedance
.

- The
  average power
  delivered to an **RLC**
  circuit
  is affected by the
  phase angle
  .
- The
  power factor
  ranges from –1 to 1.

Resonance in an AC Circuit

- At the
  resonant frequency
  ,
  inductive reactance
  equals
  capacitive reactance
  .
- The
  average power
  versus angular frequency plot for a **RLC**
  circuit
  has a peak located at the
  resonant frequency
  ; the sharpness or width of the peak is known as the
  bandwidth
  .
- The
  bandwidth
  is related to a dimensionless quantity called the
  quality factor
  . A high
  quality factor
  value is a sharp or narrow peak.

Transformers

- Power plants transmit high voltages at low currents to achieve lower ohmic losses in their many kilometers of transmission lines.
- Transformers use induction to transform voltages from one value to another.
- For a transformer, the voltages across the primary and secondary coils, or windings, are related by the transformer equation.
- The currents in the primary and secondary windings are related by the number of primary and secondary loops, or turns, in the windings of the transformer.
- A step-up transformer increases voltage and decreases current, whereas a step-down transformer decreases voltage and increases current.