

Al's Electronic Class Room



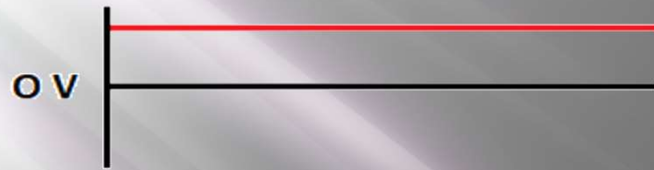
Understanding Voltage

AC Voltage

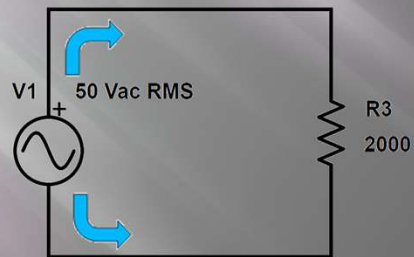
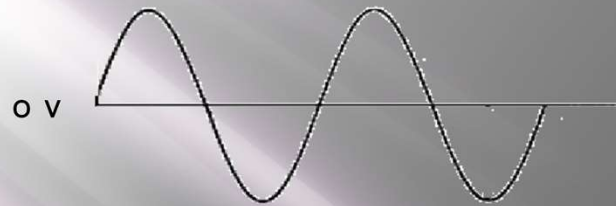
- AC Voltage Current flows in Both Directions.
- The Voltage that is brought into our home, 120 RMS VAC at 60 Hz
- Easier to transport over long distance Then DC Voltage

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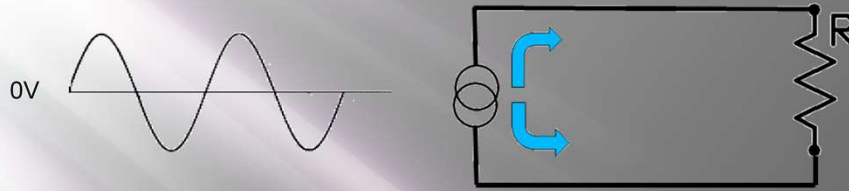
Understanding Voltage



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Understanding Voltage



- The hertz (symbol: Hz) is the derived unit of frequency is defined as one cycle per second.
- It is named for Heinrich Rudolf Hertz, the first person to provide conclusive proof of the existence of electromagnetic waves.
- Hertz are commonly expressed in multiples: kilohertz (kHz), megahertz(MHz),gigahertz (GHz), and terahertz (THz).

Understanding Voltage

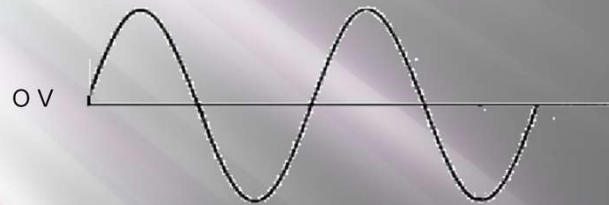
What is RMS Voltage AC ?

Root-Mean-Square

- Take The Square of each Individual Value (Square).
- Adding the Squares Dividing the Sum by the Number of Values (Mean).
- Take the Square Root of this Value is the RMS Value (Root)

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Understanding Voltage,

What is RMS Voltage AC ?

Root-Mean-Square

Example: Find the RMS Value of 2,3,4

- Take The Square of Each Value $2^2 = 4$, $3^2 = 9$, $4^2 = 16$
- Find the Mean (Average) , $4 + 9 + 16 / 3 = 29/3 = 9.67$
- Root Square Root of 9.67, $\sqrt{9.67} = \text{RMS Value } 3.11$

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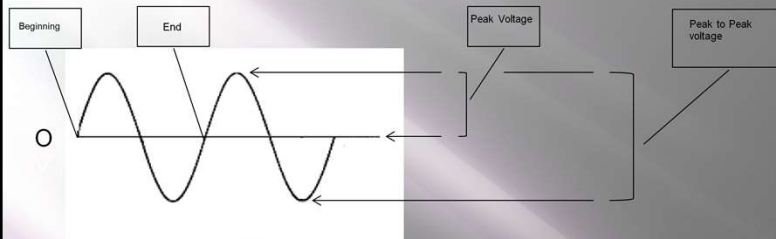
Understanding Voltage

- 120 VAC RMS at 60 Hz.
- Peak Voltage Equals $1.414 \times \text{RMS}$
- Peak to Peak Voltage equals $2.828 \times \text{RMS}$ or $2 \times \text{Peak Voltage}$
- RMS Voltage Equals $.707 \times \text{Peak Voltage}$
- $1/T = F$ & $1/F = T$

Questions

- 60 VAC Find p-p Voltage =
- 90 VAC p-p Find Peak Voltage =
- 170 VAC Peak Find RMS =
- Find T for 60 Hz =
- Find F for 8.33 ms =

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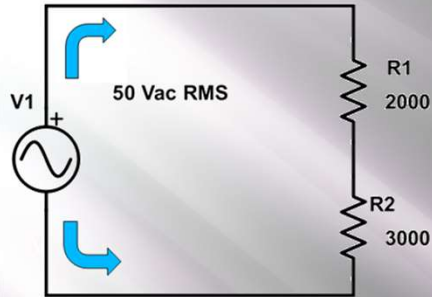
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Answers to Questions

- 60 VAC Find p-p Voltage = 169.68 or 170 Volts p-p AC
- 90 VAC p-p Find Peak Voltage = 45 Volts Peak AC
- 170 VAC Peak Find RMS = 120.19 Volts AC
- Find T for 60 Hz = 0.01667 s or 16.67 ms
- Find F for 8.33 ms = 120 Hz

Understanding Voltage

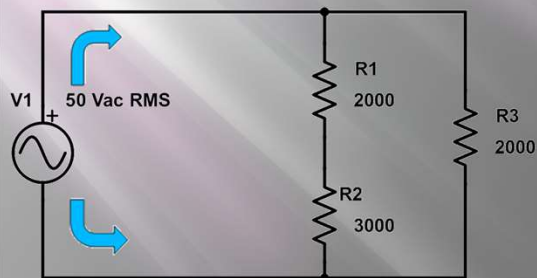


$$VR1 = V1 \left(\frac{R1}{R1 + R2} \right) ; 50\text{Vac} \left(\frac{2000}{5000} \right)$$

$$VR1 = 20 \text{ Vac RMS.}$$

$$VR2 = V1 - VR1 = 50 \text{ Vac} - 20 \text{ Vac} = 30 \text{ Vac}$$

$$I_{\text{Total}} = V1 / RT = 50 \text{ Vac} / 5000 = 10 \text{ ma}$$



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$$RT = R1 + R2 \parallel R3 = 5000 \parallel 2000 = 1428 \text{ ohms}$$

$$I1 = V1 / R1 + R2 = 50 \text{ Vac} / 5000 =$$

Understanding Voltage

Conversions:

1 Volt = 1000 milli Volts or 1000000 u Volts or Micro Volts;

Powers of 10; 1×10^{-3} is milli; 1×10^{-6} μ or micro

1000 Volts = 1 Kilo Volts ; 1 KV Powers of 10 : $1 \times 10^{+3}$

1000000 Volts = 1 Mega Volts : Powers of 10 : $1 \times 10^{+6}$

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