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AC Bridge Circuits Formulas

Calculators! Examples! Conversions!

List of 24 AC Bridge Circuits Formulas

AC Bridge Circuits

Anderson Bridge

1) Capacitor Current in Anderson Bridge

Open Calculator

$$I_{c(ab)} = I_{1(ab)} \cdot \omega \cdot C_{(ab)} \cdot R_{3(ab)}$$

ex $2.436\text{A} = 0.58\text{A} \cdot 200\text{rad/s} \cdot 420\mu\text{F} \cdot 50\Omega$

2) Unknown Inductance in Anderson Bridge

Open Calculator

$$L_{1(ab)} = C_{(ab)} \cdot \left(\frac{R_{3(ab)}}{R_{4(ab)}}\right) \cdot \left(\left(r_{1(ab)} \cdot \left(R_{4(ab)} + R_{3(ab)}\right)\right) + \left(R_{2(ab)} \cdot R_{4(ab)}\right)\right)$$

ex $546\text{mH} = 420\mu\text{F} \cdot \left(\frac{50\Omega}{150\Omega}\right) \cdot ((4.5\Omega \cdot (150\Omega + 50\Omega)) + (20\Omega \cdot 150\Omega))$

3) Unknown Resistance in Anderson Bridge

Open Calculator

$$R_{1(ab)} = \left(\frac{R_{2(ab)} \cdot R_{3(ab)}}{R_{4(ab)}}\right) - r_{1(ab)}$$

ex $2.166667\Omega = \left(\frac{20\Omega \cdot 50\Omega}{150\Omega}\right) - 4.5\Omega$

De Sauty Bridge

4) Dissipation Factor of Known Capacitor in De Sauty Bridge

Open Calculator

$$D_{2(dsb)} = \omega \cdot C_{2(dsb)} \cdot r_{2(dsb)}$$

ex $0.5344 = 200\text{rad/s} \cdot 167\mu\text{F} \cdot 16\Omega$

5) Dissipation Factor of Unknown Capacitor in De Sauty Bridge

Open Calculator

fx $$D_{1(dsb)} = \omega \cdot C_{1(dsb)} \cdot r_{1(dsb)}$$

ex $$0.729106 = 200\text{rad/s} \cdot 191.87\mu\text{F} \cdot 19\Omega$$

6) Unknown Capacitance in De Sauty Bridge

Open Calculator

fx $$C_{1(dsb)} = C_{2(dsb)} \cdot \left(\frac{R_{4(dsb)}}{R_{3(dsb)}}\right)$$

ex $$191.8723\mu\text{F} = 167\mu\text{F} \cdot \left(\frac{54\Omega}{47\Omega}\right)$$

Hay Bridge

7) Quality Factor of Hay Bridge using Capacitance

Open Calculator

fx $$Q_{(hay)} = \frac{1}{C_{4(hay)} \cdot R_{4(hay)} \cdot \omega}$$

ex $$0.784929 = \frac{1}{260\mu\text{F} \cdot 24.5\Omega \cdot 200\text{rad/s}}$$

8) Unknown Inductance in Hay Bridge

Open Calculator

fx $$L_{1(hay)} = \frac{R_{2(hay)} \cdot R_{3(hay)} \cdot C_{4(hay)}}{1 + \omega^2 \cdot C_{4(hay)}^2 \cdot R_{4(hay)}^2}$$

ex $$109.4288\text{mH} = \frac{32\Omega \cdot 34.5\Omega \cdot 260\mu\text{F}}{1 + (200\text{rad/s})^2 \cdot (260\mu\text{F})^2 \cdot (24.5\Omega)^2}$$

9) Unknown Resistance of Hay Bridge

Open Calculator

fx $$R_{1(hay)} = \frac{\omega^2 \cdot R_{2(hay)} \cdot R_{3(hay)} \cdot R_{4(hay)} \cdot C_{4(hay)}^2}{1 + \left(\omega^2 \cdot R_{4(hay)}^2 \cdot C_{4(hay)}^2\right)}$$

ex $$27.88245\Omega = \frac{(200\text{rad/s})^2 \cdot 32\Omega \cdot 34.5\Omega \cdot 24.5\Omega \cdot (260\mu\text{F})^2}{1 + \left((200\text{rad/s})^2 \cdot (24.5\Omega)^2 \cdot (260\mu\text{F})^2\right)}$$

Maxwell Bridge

10) Quality Factor of Maxwell Inductance-Capacitance Bridge

Open Calculator

fx $$Q_{(max)} = \frac{\omega \cdot L_{1(max)}}{R_{eff(max)}}$$

ex $$0.501092 = \frac{200\text{rad/s} \cdot 32.571\text{mH}}{13\Omega}$$

11) Unknown Inductance in Maxwell Inductance Bridge

Open Calculator

fx $$L_{1(max)} = \left(\frac{R_{3(max)}}{R_{4(max)}}\right) \cdot L_{2(max)}$$

ex $$32.57143\text{mH} = \left(\frac{12\Omega}{14\Omega}\right) \cdot 38\text{mH}$$

12) Unknown Resistance in Maxwell Inductance Bridge

Open Calculator

fx $$R_{1(max)} = \left(\frac{R_{3(max)}}{R_{4(max)}}\right) \cdot \left(R_{2(max)} + r_{2(max)}\right)$$

ex $$110.5714\Omega = \left(\frac{12\Omega}{14\Omega}\right) \cdot (29\Omega + 100\Omega)$$

Schering Bridge

13) Capacitance due to Space between Specimen and Dielectric

Open Calculator

fx $$C_o = \frac{C \cdot C_s}{C - C_s}$$

ex $$0.55\mu F = \frac{5.5\mu F \cdot 0.5\mu F}{5.5\mu F - 0.5\mu F}$$

14) Capacitance of Specimen

Open Calculator

fx $$C_s = \frac{\varepsilon r \cdot (A \cdot [\text{Permitivity-vacuum}])}{d}$$

ex $$1.8E\hat{}\text{-}5\mu F = \frac{1.5 \cdot (13m^2 \cdot [\text{Permitivity-vacuum}])}{9.5m}$$

15) Capacitance with Specimen as Dielectric

Open Calculator

fx $$C_s = \frac{C \cdot C_o}{C - C_o}$$

ex $$-19.25\mu F = \frac{5.5\mu F \cdot 7.7\mu F}{5.5\mu F - 7.7\mu F}$$

16) Dissipation Factor in Schering Bridge

Open Calculator

fx $$D_{1(sb)} = \omega \cdot C_{4(sb)} \cdot R_{4(sb)}$$

ex $$0.6104 = 200\text{rad/s} \cdot 109\mu F \cdot 28\Omega$$

17) Effective area of Electrode

Open Calculator

fx $$A = C_{sp} \cdot \frac{d}{\varepsilon r \cdot [\text{Permitivity-vacuum}]}$$

ex $$13 = 0.000109\mu F \cdot \frac{9.5}{9.000435 \cdot [\text{Permitivity-vacuum}]}$$

18) Effective Capacitance of Cs and Co

Open Calculator

fx $$C = \frac{C_s \cdot C_o}{C_s + C_o}$$

ex $$0.469512\mu F = \frac{0.5\mu F \cdot 7.7\mu F}{0.5\mu F + 7.7\mu F}$$

19) Parallel Plate Relative Permeability

Open Calculator

fx $$\varepsilon r = \frac{C_s \cdot d}{A \cdot [\text{Permitivity-vacuum}]}$$

ex $$41286.4 = \frac{0.5\mu F \cdot 9.5m}{13m^2 \cdot [\text{Permitivity-vacuum}]}$$

20) Unknown Capacitance in Schering Bridge

Open Calculator

fx $$C_{1(sb)} = \left(\frac{R_{4(sb)}}{R_{3(sb)}}\right) \cdot C_{2(sb)}$$

ex $$183.3548\mu F = \left(\frac{28\Omega}{31\Omega}\right) \cdot 203\mu F$$

21) Unknown Resistance in Schering Bridge

Open Calculator

fx $$r_{1(sb)} = \left(\frac{C_{4(sb)}}{C_{2(sb)}}\right) \cdot R_{3(sb)}$$

ex $$16.64532\Omega = \left(\frac{109\mu F}{203\mu F}\right) \cdot 31\Omega$$

Wien Bridge

22) Angular Frequency in Wien's Bridge

Open Calculator

fx $$\omega_{(wein)} = \frac{1}{\sqrt{R_{1(wein)} \cdot R_{2(wein)} \cdot C_{1(wein)} \cdot C_{2(wein)}}}$$

ex $$138.5107\text{rad/s} = \frac{1}{\sqrt{27\Omega \cdot 26\Omega \cdot 270\mu F \cdot 275\mu F}}$$

23) Resistance Ratio in Wien Bridge

Open Calculator

fx $$RR_{(wein)} = \left(\frac{R_{2(wein)}}{R_{1(wein)}}\right) + \left(\frac{C_{1(wein)}}{C_{2(wein)}}\right)$$

ex $$1.944781 = \left(\frac{26\Omega}{27\Omega}\right) + \left(\frac{270\mu F}{275\mu F}\right)$$

24) Unknown Frequency in Wien Bridge

Open Calculator

fx $$f_{(wein)} = \frac{1}{2 \cdot \pi \cdot \left(\sqrt{R_{1(wein)} \cdot R_{2(wein)} \cdot C_{1(wein)} \cdot C_{2(wein)}}\right)}$$

ex $$22.04466\text{Hz} = \frac{1}{2 \cdot \pi \cdot \left(\sqrt{27\Omega \cdot 26\Omega \cdot 270\mu F \cdot 275\mu F}\right)}$$

Variables Used

- **A** Effective Area of Electrode *(Square Meter)*
- **A** Effective Area of Electrode Op
- **C** Effective Capacitance *(Microfarad)*
- $C_{(ab)}$ Capacitance in Anderson Bridge *(Microfarad)*
- $C_{1(dsb)}$ Unknown Capacitance in De Sauty Bridge *(Microfarad)*
- $C_{1(sb)}$ Unknown Capacitance in Schering Bridge *(Microfarad)*
- $C_{1(wein)}$ Known Capacitance 1 in Wein Bridge *(Microfarad)*
- $C_{2(dsb)}$ Known Capacitance in De Sauty Bridge *(Microfarad)*
- $C_{2(sb)}$ Known Capacitance 2 in Schering Bridge *(Microfarad)*
- $C_{2(wein)}$ Known Capacitance 2 in Wein Bridge *(Microfarad)*
- $C_{4(hay)}$ Capacitance in Hay Bridge *(Microfarad)*
- $C_{4(sb)}$ Known Capacitance 4 in Schering Bridge *(Microfarad)*
- C_o Capacitance due to Space between Specimen *(Microfarad)*
- C_s Capacitance of Specimen as Dielectric *(Microfarad)*
- C_{sp} Capacitance of Specimen *(Microfarad)*
- **d** Distance between Electrodes *(Meter)*
- **d** Spacing between Electrode
- $D_{1(dsb)}$ Dissipation Factor 1 in De Sauty Bridge
- $D_{1(sb)}$ Dissipation Factor in Schering Bridge
- $D_{2(dsb)}$ Dissipation Factor 2 in De Sauty Bridge
- $f_{(wein)}$ Unknown Frequency in Wein Bridge *(Hertz)*
- $I_{1(ab)}$ Inductor Current in Anderson Bridge *(Ampere)*
- $I_{c(ab)}$ Capacitor Current in Anderson Bridge *(Ampere)*
- $L_{1(ab)}$ Unknown Inductance in Anderson Bridge *(Millihenry)*
- $L_{1(hay)}$ Unknown Inductance in Hay Bridge *(Millihenry)*
- $L_{1(max)}$ Unknown Inductance in Maxwell Bridge *(Millihenry)*

- $\mathbf{L_{2(max)}}$ Variable Inductance in Maxwell Bridge *(Millihenry)*
- $\mathbf{Q_{(hay)}}$ Quality Factor in Hay Bridge
- $\mathbf{Q_{(max)}}$ Quality Factor in Maxwell Bridge
- $\mathbf{r_{1(ab)}}$ Series Resistance in Anderson Bridge *(Ohm)*
- $\mathbf{R_{1(ab)}}$ Inductor Resistance in Anderson Bridge *(Ohm)*
- $\mathbf{r_{1(dsb)}}$ Capacitor 1 Resistance in De Sauty Bridge *(Ohm)*
- $\mathbf{R_{1(hay)}}$ Unknown Resistance in Hay Bridge *(Ohm)*
- $\mathbf{R_{1(max)}}$ Unknown Resistance in Maxwell Bridge *(Ohm)*
- $\mathbf{r_{1(sb)}}$ Series Resistance 1 in Schering Bridge *(Ohm)*
- $\mathbf{R_{1(wein)}}$ Known Resistance 1 in Wein Bridge *(Ohm)*
- $\mathbf{R_{2(ab)}}$ Known Resistance 2 in Anderson Bridge *(Ohm)*
- $\mathbf{r_{2(dsb)}}$ Capacitor 2 Resistance in De Sauty Bridge *(Ohm)*
- $\mathbf{R_{2(hay)}}$ Known Resistance 2 in Hay Bridge *(Ohm)*
- $\mathbf{r_{2(max)}}$ Decade Resistance in Maxwell Bridge *(Ohm)*
- $\mathbf{R_{2(max)}}$ Variable Resistance in Maxwell Bridge *(Ohm)*
- $\mathbf{R_{2(wein)}}$ Known Resistance 2 in Wein Bridge *(Ohm)*
- $\mathbf{R_{3(ab)}}$ Known Resistance 3 in Anderson Bridge *(Ohm)*
- $\mathbf{R_{3(dsb)}}$ Known Resistance 3 in De Sauty Bridge *(Ohm)*
- $\mathbf{R_{3(hay)}}$ Known Resistance 3 in Hay Bridge *(Ohm)*
- $\mathbf{R_{3(max)}}$ Known Resistance 3 in Maxwell Bridge *(Ohm)*
- $\mathbf{R_{3(sb)}}$ Known Resistance 3 in Schering Bridge *(Ohm)*
- $\mathbf{R_{4(ab)}}$ Known Resistance 4 in Anderson Bridge *(Ohm)*
- $\mathbf{R_{4(dsb)}}$ Known Resistance 4 in De Sauty Bridge *(Ohm)*
- $\mathbf{R_{4(hay)}}$ Known Resistance 4 in Hay Bridge *(Ohm)*
- $\mathbf{R_{4(max)}}$ Known Resistance 4 in Maxwell Bridge *(Ohm)*
- $\mathbf{R_{4(sb)}}$ Known Resistance 4 in Schering Bridge *(Ohm)*
- $\mathbf{R_{eff(max)}}$ Effective Resistance in Maxwell Bridge *(Ohm)*
- $\mathbf{RR_{(wein)}}$ Resistance Ratio in Wein Bridge

- **εr** Parallel Plate Relative Permeability
- **εr** Parallel Plate Relative Permeability
- **ω** Angular Frequency *(Radian per Second)*
- $\omega_{(wein)}$ Angular Frequency in Wein Bridge *(Radian per Second)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Constant: **[Permitivity-vacuum]**, 8.85E-12
  Permittivity of vacuum
- Function: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Electric Current** in Ampere (A)
  Electric Current Unit Conversion
- Measurement: **Area** in Square Meter (m^2)
  Area Unit Conversion
- Measurement: **Frequency** in Hertz (Hz)
  Frequency Unit Conversion
- Measurement: **Capacitance** in Microfarad (μF)
  Capacitance Unit Conversion
- Measurement: **Electric Resistance** in Ohm (Ω)
  Electric Resistance Unit Conversion
- Measurement: **Inductance** in Millihenry (mH)
  Inductance Unit Conversion
- Measurement: **Angular Frequency** in Radian per Second (rad/s)
  Angular Frequency Unit Conversion

Check other formula lists

- **AC Bridge Circuits Formulas**

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