



SNS COLLEGE OF TECHNOLOGY

An Autonomous Institution

Coimbatore-35



Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A+' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

IIYEAR/ III SEMESTER

19ECT201 Electrical Engineering and Instrumentation

unit 5-MEASUREMENT SYSTEMS-BRIDGES-AC&DC



If the electrical components are arranged in the form a bridge or ring structure, then that electrical circuit is called a **bridge**. In general, bridge forms a loop with a set of four arms or branches. Each branch may contain one or two electrical components.

The two Types of bridges are,

The D.C bridges are used to measure the resistance

A.C bridges are used to measure the impedances consisting capacitance and inductances.

The D.C bridges use the D.C voltages as the excitation voltage while the A.C bridges use the alternating voltage as the excitation voltage.

The two types of D.C bridges

Wheatstone Bridge

Kelvin Bridge

The various types of A.C Bridges are,

Capacitance Comparison Bridge

Inductance Comparison Bridge

Maxwell's Bridge

Hay's Bridge

Anderson Bridge

Schering Bridge

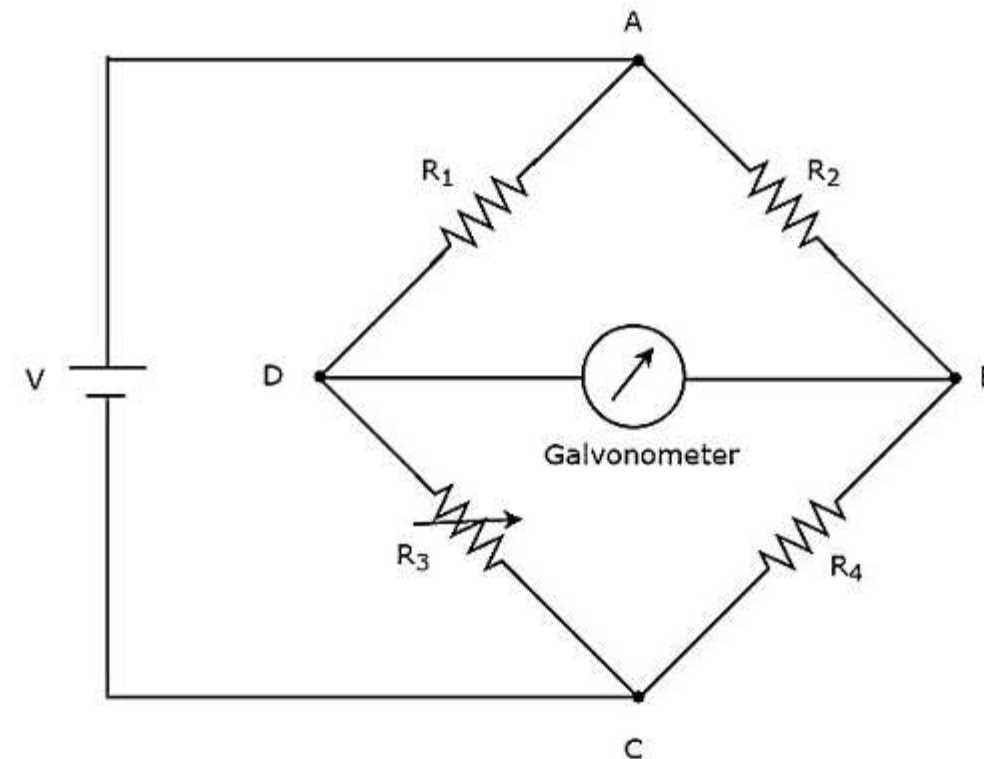
Wien Bridge



DC BRIDGES



If the bridge circuit can be operated with only DC voltage signal, then it is a DC bridge circuit or simply **DC bridge**. DC bridges are used to measure the value of unknown resistance. The **circuit diagram** of DC bridge looks like as shown in below figure.





The above DC bridge has **four arms** and each arm consists of a resistor. Among which, two resistors have fixed resistance values, one resistor is a variable resistor and the other one has an unknown resistance value.

The above DC bridge circuit can be excited with a **DC voltage source** by placing it in one diagonal. The galvanometer is placed in other diagonal of DC bridge. It shows some deflection as long as the bridge is unbalanced.

Vary the resistance value of variable resistor until the galvanometer shows null (zero) deflection. Now, the above DC bridge is said to be a balanced one. So, we can find the value of **unknown resistance** by using nodal equations.

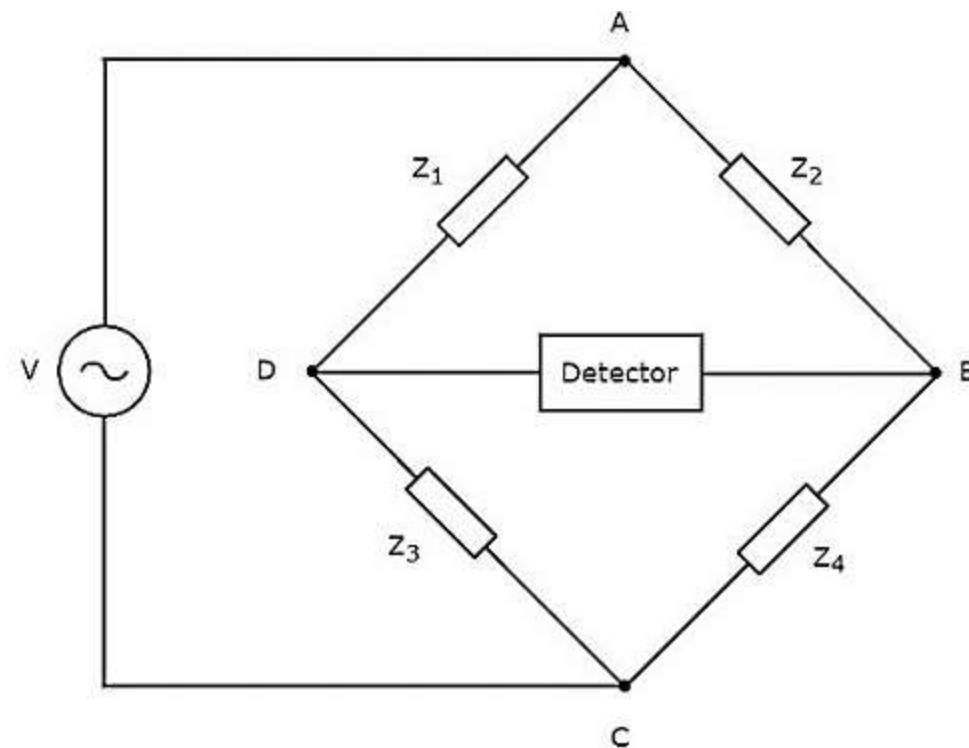


AC BRIDGE



If the bridge circuit can be operated with only AC voltage signal, then it is said to be AC bridge circuit or simply **AC bridge**. AC bridges are used to measure the value of unknown inductance, capacitance and frequency.

The **circuit diagram** of AC bridge looks like as shown in below figure.





The circuit diagram of AC bridge is similar to that of DC bridge. The above AC bridge has **four arms** and each arm consists of some impedance. That means, each arm will be having either single or combination of passive elements such as resistor, inductor and capacitor.

Among the four impedances, two impedances have fixed values, one impedance is variable and the other one is an unknown impedance. The above AC bridge circuit can be excited with an **AC voltage source** by placing it in one diagonal. A detector is placed in other diagonal of AC bridge. It shows some deflection as long as the bridge is unbalanced.

The above AC bridge circuit can be excited with an **AC voltage source** by placing it in one diagonal. A detector is placed in other diagonal of AC bridge. It shows some deflection as long as the bridge is unbalanced. Vary the impedance value of variable impedance until the detector shows null (zero) deflection. Now, the above AC bridge is said to be a balanced one. So, we can find the value of **unknown impedance** by using balanced condition.