



# **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 ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE NAME: 23EET206/ Measurements and Instrumentation**

**II YEAR / IV SEMESTER**

**UNIT 2 - COMPARATIVE METHODS OF MEASUREMENTS**

**Topic 6 – Schering Bridge**



# SUCCESSFUL STUDENT

Positive  
Attitude

Professionally  
Groomed

Socially  
Interactive

Technically  
Skillful



# Schering Bridge

The Schering bridge use for measuring the **capacitance** of the capacitor, dissipation factor, properties of an insulator, capacitor bushing, insulating oil and other insulating materials. It is one of the most commonly used **AC bridge**. The Schering bridge works on the principle of balancing the load on its arm.



Let,  $C_1$  – capacitor whose capacitance is to be determined,

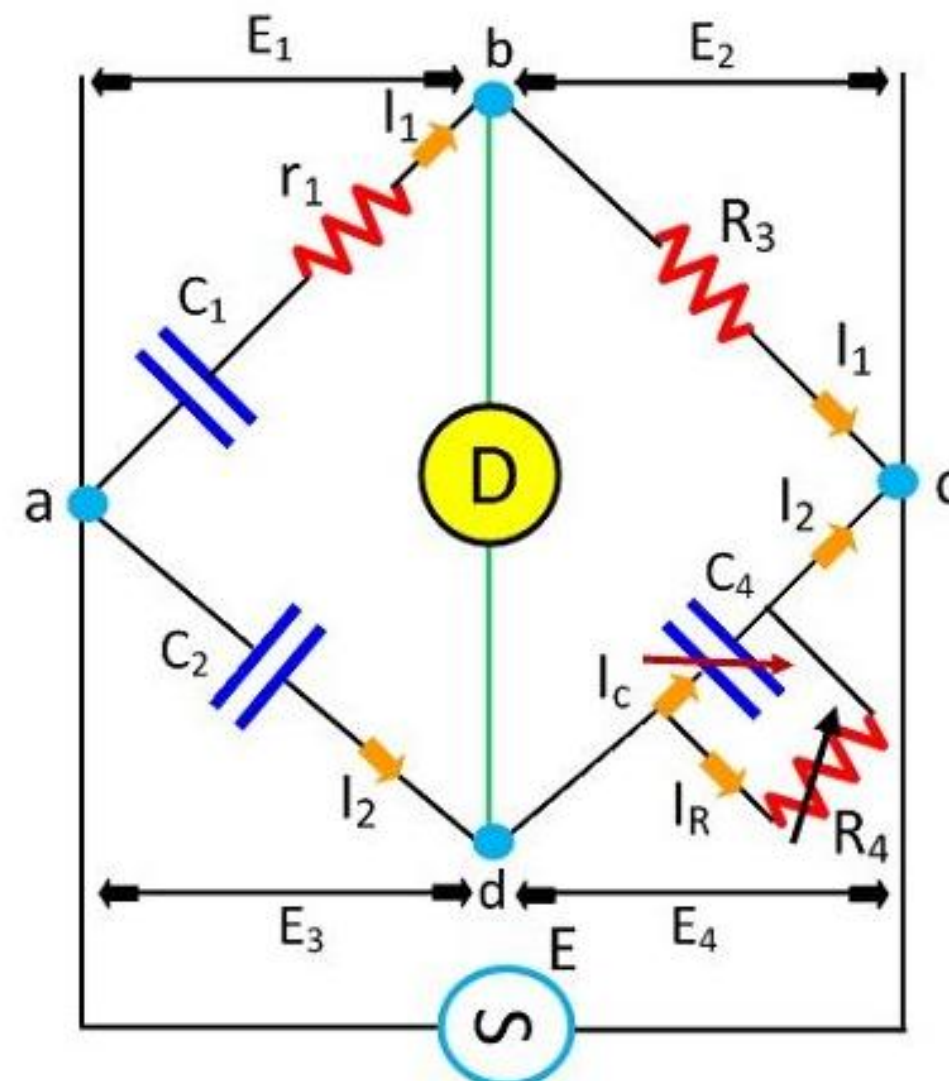
$r_1$  – a series resistance, representing the loss of the capacitor  $C_1$ .

$C_2$  – a standard capacitor (The term standard capacitor means the capacitor is free from loss)

$R_3$  – a non-inductive resistance

$C_4$  – a variable capacitor.

$R_4$  – a variable non-inductive resistance parallel with variable capacitor  $C_4$ .







When the bridge is in the balanced condition, zero current passes through the detector, which shows that the potential across the detector is zero. At balance condition

$$Z_1/Z_2 = Z_3/Z_4$$

$$Z_1 Z_4 = Z_2 Z_3$$

So,

$$\left(r_1 + \frac{1}{j\omega C_1}\right) \left(\frac{R_4}{1 + j\omega C_4 R_4}\right) = \frac{1}{j\omega C_2} \cdot R_3$$

$$\left(r_1 + \frac{1}{j\omega C_1}\right) R_4 = \frac{R_3}{j\omega C_2} (1 + j\omega C_4 R_4)$$

$$r_1 R_4 - \frac{j R_4}{\omega C_1} = -j \frac{R_3}{\omega C_2} + \frac{R_3 R_4 C_4}{C_2}$$

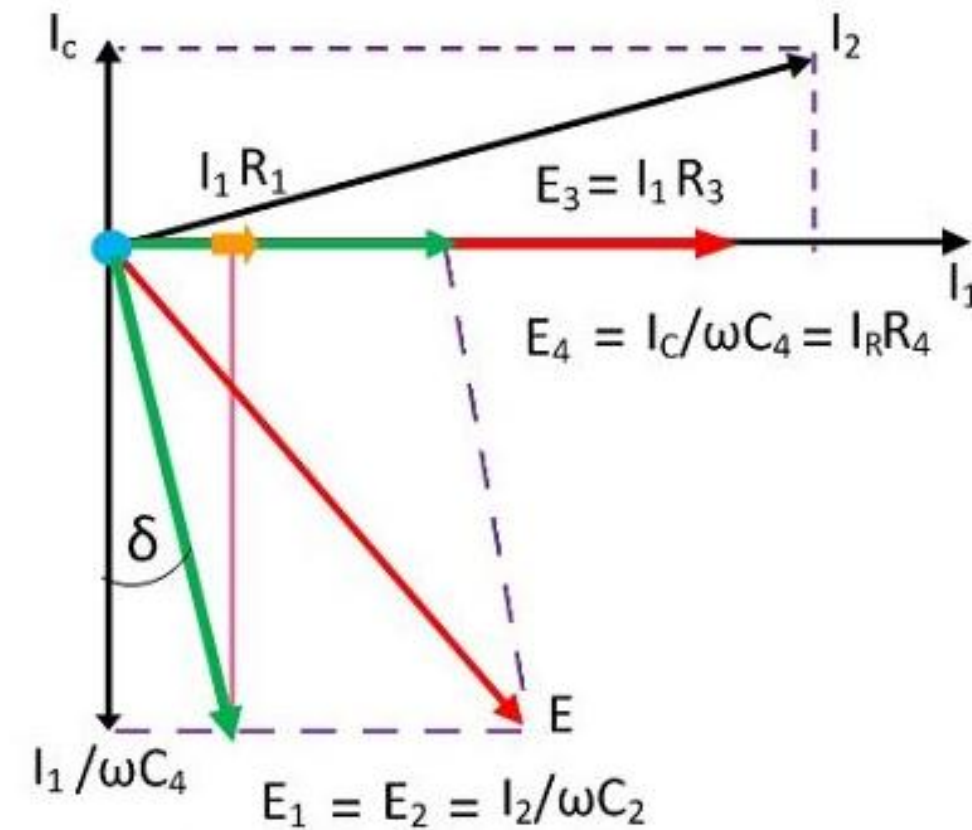
Equating the real and imaginary equations, we get

$$r_1 = \frac{R_3 C_4}{C_2} \dots \dots \dots equ(1)$$

$$C_1 = C_2 \left(R_4 / R_3\right) \dots \dots \dots equ(2)$$

The equation (1) and (2) are the balanced equation, and it is free from the frequency.

The dissipation factor obtains with the help of the phasor diagram. The dissipation factor determines the rate of loss of energy that occurs because of the oscillations of the electrical and mechanical instrument.



Phasor Diagram of Low Voltage Schering Bridge

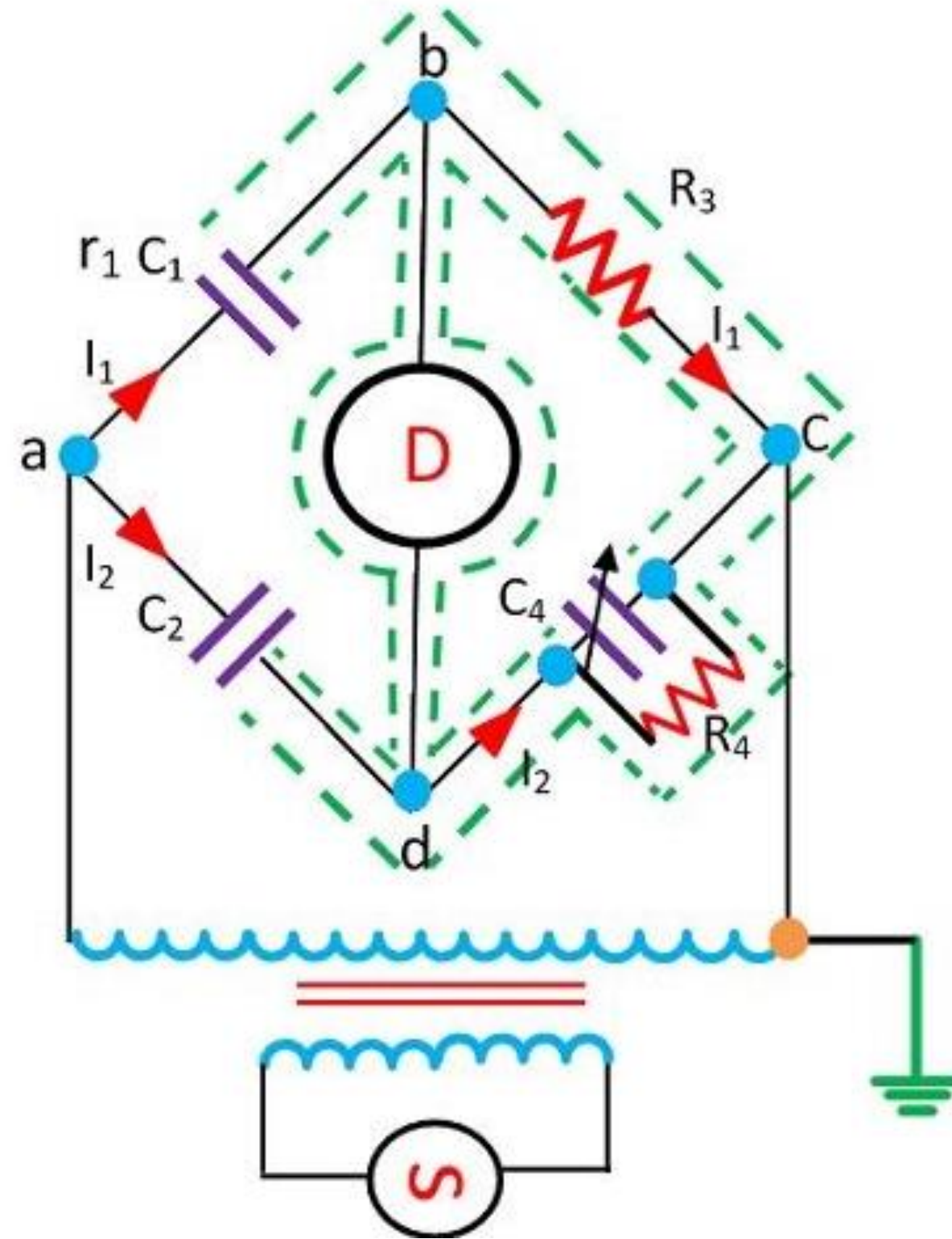
Circuit Globe

$$D_1 = \tan \delta = \omega C_1 r_1 = \omega (C_1 r_1) = \omega (C_2 R_4 / R_3) \times (R_3 C_4 / C_2)$$

$$D_1 = \omega C_4 R_4$$









# ASSESSMENT



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# REFERENCE

## TEXT BOOKS

- T1      A. K. Sawhney, “A Course in Electrical & Electronic Measurements & Instrumentation”, Dhanpat Rai & CO., New Delhi, 2022.**
- T2      S. Gupta and J. John , "Virtual Instrumentation using Lab VIEW", Tata McGraw-Hill Publishing Company Limited, New Delhi, 2010.**

## REFERENCES

- R1      David A.Bell, "Electronic Instrumentation and Measurements”, Oxford Higher Education, 2013**
- R2      Bouwens A J, “Digital Instrumentation”, Tata Mc Graw Hill, New Delhi2016**
- R3      Martin U. Reissland, “Electrical Measurement – Fundamental Concepts and Applications”, New Age International (P) Ltd., 2015**
- R4      J. B. Gupta, “A Course in Electronic and Electrical Measurements and Instrumentation”, S. K. Kataria & Sons, Delhi, 2013**
- R5      M. S. Anand, “Electronics Instruments and Instrumentation Technology”, Prentice Hall India, NewDelhi, 2012.**

## WEB REFERENCES

- W1      [https://pasargadabzar.com/wp-content/uploads/2022/04/Morris\\_Langari-1.pdf](https://pasargadabzar.com/wp-content/uploads/2022/04/Morris_Langari-1.pdf)**
- W2      [https://www.vssut.ac.in/lecture\\_notes/lecture1423813026.pdf](https://www.vssut.ac.in/lecture_notes/lecture1423813026.pdf)**
- W3      <https://hombredelamancha.com/products/ebook-electrical-and-electronic-measurements-and-instrumentation?srsId=AfmBOorTb5k9Ga1rsImj69-l3SximYYra7U8VhGcqYahqsfk9BR9rC7k>**



THANK YOU!!