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 3 – Kelvin's bridge

SUCCESSFUL STUDENT

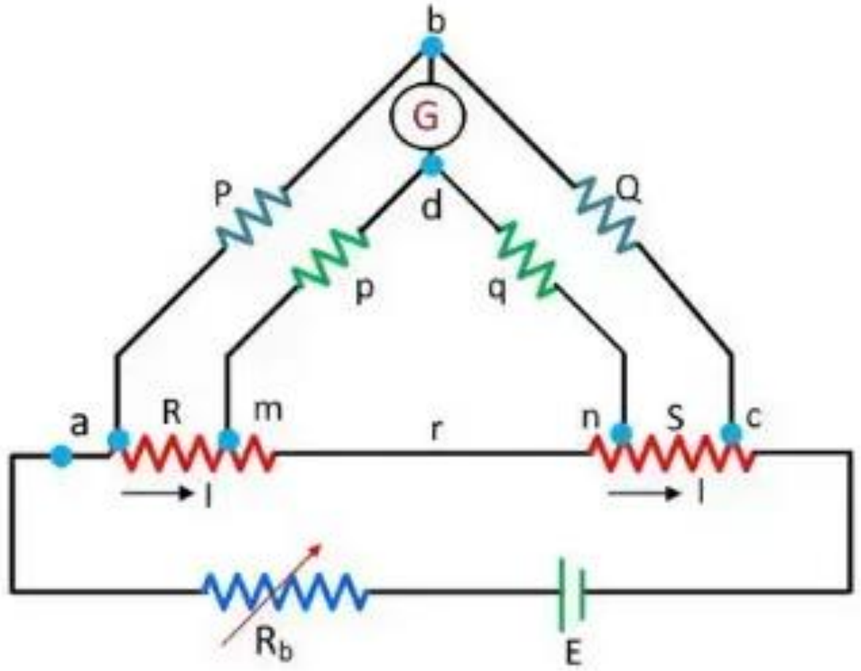
Positive Attitude

Professionally Groomed

Socially Interactive

Technically Skillful

What is Kelvin Bridge Circuit?



$$C + t_1 = \frac{A}{B}(D + t_2)$$

Also we have $\frac{t_1}{t_2} = \frac{A}{B}$ ..... (1)

So, $\frac{t_1}{t_1 + t_2} = \frac{A}{A + B} \Rightarrow t_1 = \frac{A}{A + B} \times t$

As $t_1 + t_2 = t$ *and* $t_2 = \frac{B}{A + B} \times t$

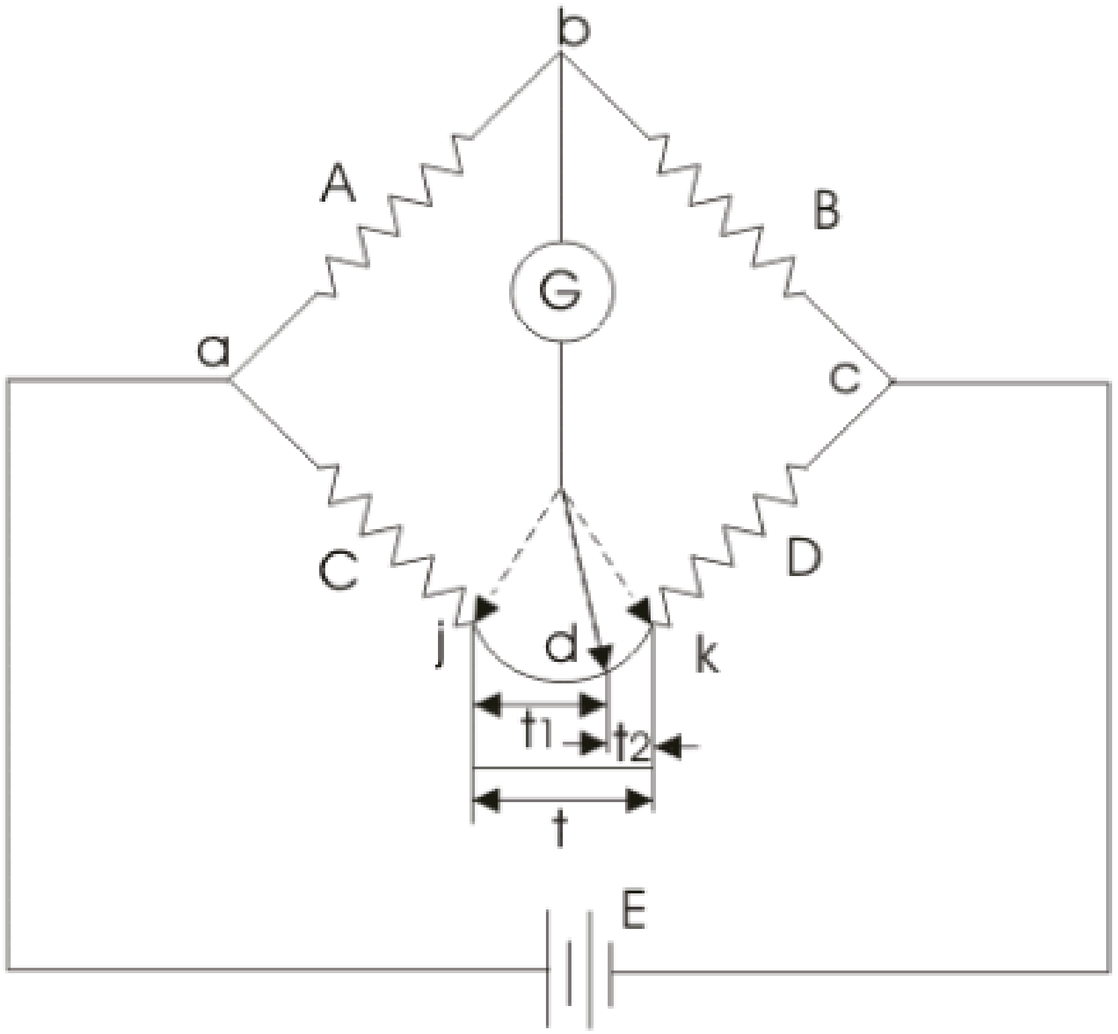
We can write equation (1) as

$$C + \frac{A}{A + B} \times t = \frac{A}{B} \times \left(D + \frac{B}{A + B} \times t\right)$$

It implies that $C = \frac{A}{B} \times D$

•**Kelvin Bridge Definition**: Kelvin's double bridge is a refined version of the Wheatstone bridge designed specifically for measuring low values of electrical resistance with greater accuracy.
•**Measurement Categories**: Resistance is categorized into high, medium, and low classes, which dictates the type of measurement device needed for accurate assessments.
•**Null Point Technique**: The null point in bridge circuits is achieved when there's no measurable current or voltage, indicating perfect balance and accurate resistance measurement.
•**Error Reduction in Kelvin Double Bridge**: The double bridge configuration uses additional ratio arms to correctly position the galvanometer, effectively eliminating errors from lead resistance.
•**Industrial Relevance**: The precision of the Kelvin Bridge makes it invaluable in industrial applications where even small measurement errors can have large implications.

Kelvin Bridge Circuit



$$\frac{t_1}{t_2} = \frac{A}{B}$$

$$C + t_1 = \frac{A}{B}(D + t_2)$$

$$Also\ we\ have\ \frac{t_1}{t_2} = \frac{A}{B} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$So,\ \frac{t_1}{t_1 + t_2} = \frac{A}{A + B} \Rightarrow t_1 = \frac{A}{A + B} \times t$$

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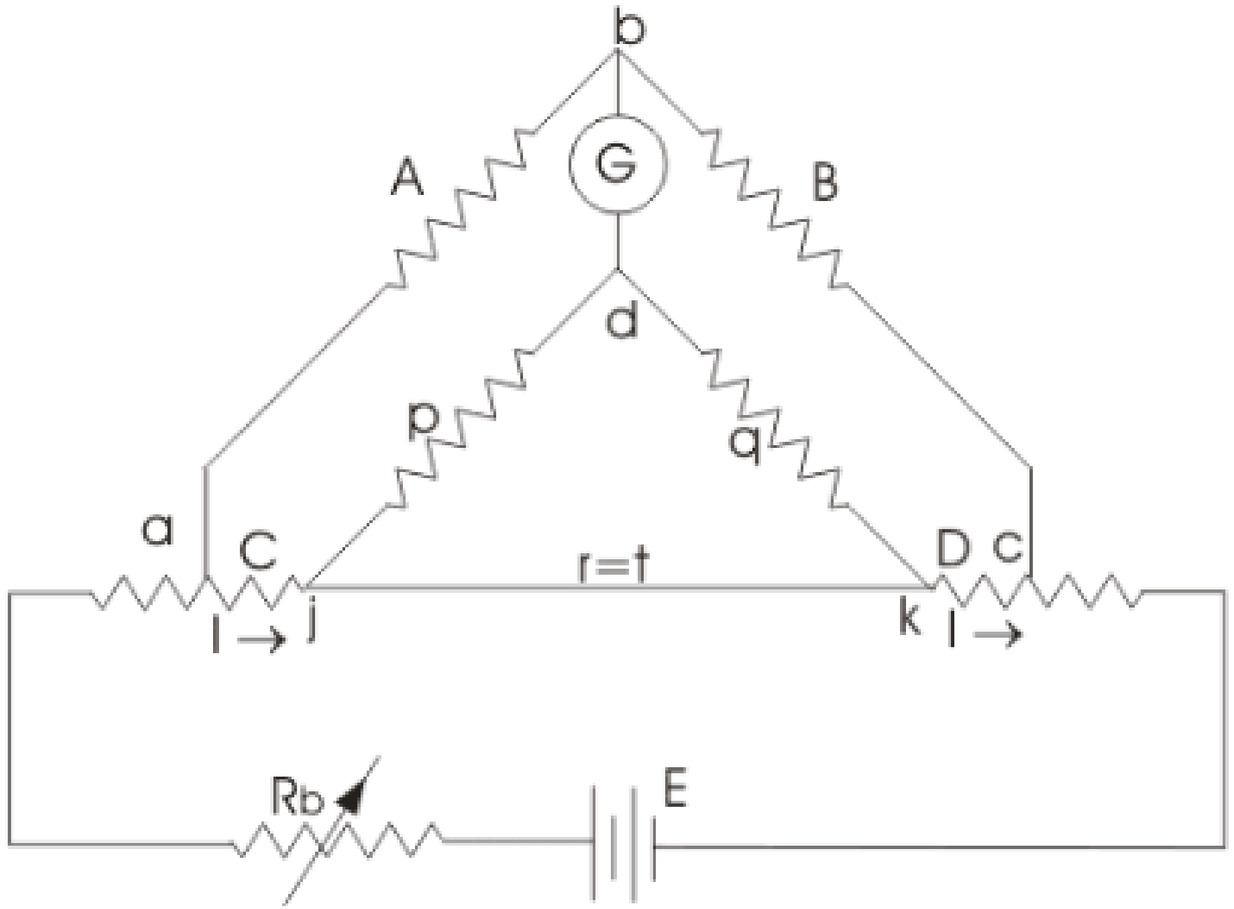
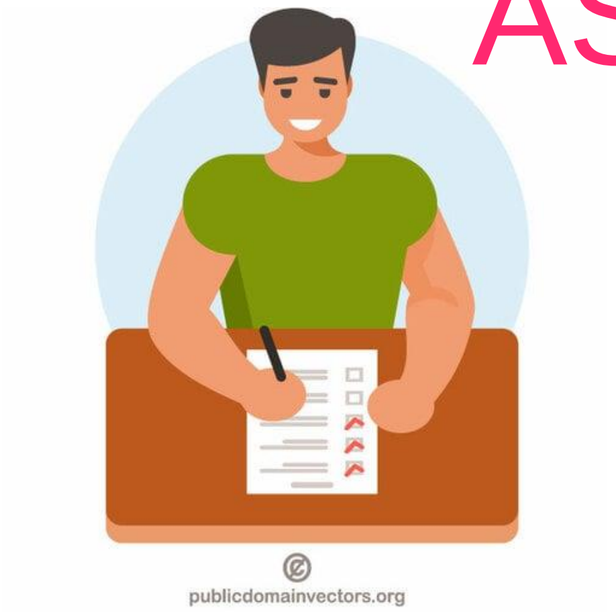
$$It\ implies\ that\ C = \frac{A}{B} \times D$$

Kelvin Double Bridge



ASSESSMENT



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.**

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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**

W2 **https://www.vssut.ac.in/lecture_notes/lecture1423813026.pdf**

W3 **https://hombredelamancha.com/products/ebook-electrical-and-electronic-measurements-and-instrumentation?srsltid=AfmBOorTb5k9Ga1rsImj69-l3SximYYra7U8VhGcqYahqsfk9BR9rC7k**

THANK YOU!!