Note: There are 3 Questions (Question1: 0.75Mark, Question2: 0. 5Mark, Question3: 0.75Mark)

Question I:

(a) A circuit consists of two resistors with resistances R1 = 6.0 Ω and R2 = 1.5 Ω, a variable resistor, the resistance Rvar of which can be adjusted, a resistor of unknown value Ru , and 9.0 volt battery connected as shown in the figure. When Rvar is adjusted to 12 ohms, there is zero current through the ammeter.

1. What is the unknown resistance Ru ?

2. Calculate the value of ΔRu

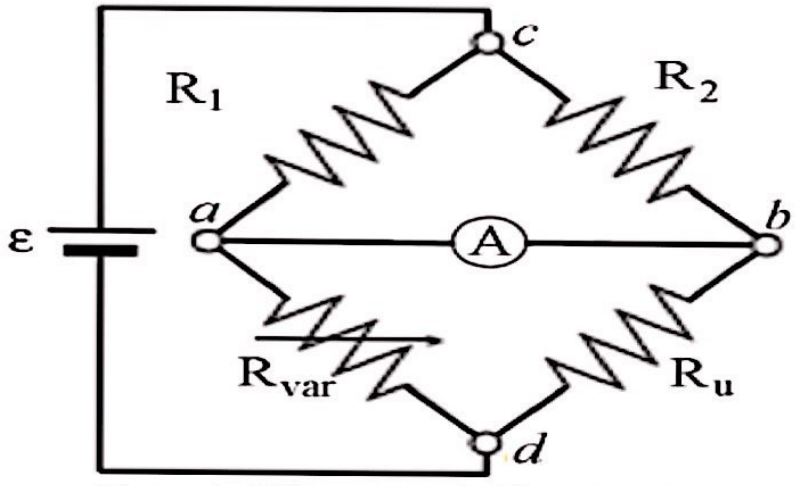


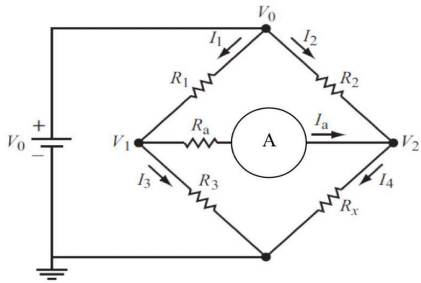
Figure1: Wheatstone bridge circuit

(b) If R1 = 1 Ω, R2 = 2 Ω, and Ru = 3 Ω, to what value should R_{var} be adjusted so as to achieve a balanced condition?

Question II:

For the Wheatstone bridge circuit of the following Figure , solve the following problem:

If $R_1 = 1\Omega, R_2 = 2\Omega, R_3 = 1.5\Omega, V_0 = 6$ V, Ra = 0.1 Ω, and Rx were then to deviate by a small amount to Rx = 3.01 Ω, what would be the reading on the ammeter?



Question III:

a) The AC Bridge of the following figure (Figure2) nulls with R1=1kΩ, R2=2kΩ, R3=100Ω and L3=250mH.

1. Find the values of R4 and L4.

2. Calculate the value of ΔR4 and ΔL4

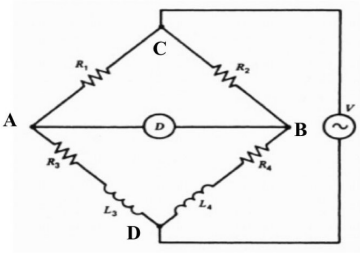


Figure2: AC Bridge

b) Consider The AC Bridge of the Figure2 but replace

- The branch BD by capacitance C4 connected in series with R4.
- And L3 by C3=10μF.

Find the values of R4 and C4.