Вежбе из физике 2

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Вежба 2. Редна и паралелна веза отпорника

1 Редна веза

$I = 23 \cdot 10^{-3} A$
$\Delta I = 1\% I + 3d = 0.6 \cdot 10^{-3} A$
$(I \pm \Delta I) = (23.0 \pm 0.6) \cdot 10^{-3} A$

$U_1 = 2.23 V$
$\Delta U_1 = 0.5\% U_1 + 3d = 0.05 V$
$(U_1 \pm \Delta U_1) = (2.23 \pm 0.05) V$

$U_2 = 1.15 V$
$\Delta U_2 = 0.5\% U_2 + 3d = 0.04 V$
$(U_2 \pm \Delta U_2) = (1.15 \pm 0.04) V$

$U = 3.49 V$
$\Delta U = 0.5\% U + 3d = 0.05 V$
$(U \pm \Delta U) = (3.49 \pm 0.05) V$

$R_1 = \dfrac{U_1}{I} = 101 \Omega$
$\Delta R_1 = R_1 \cdot \left(\dfrac{\Delta U_1}{U_1} + \dfrac{\Delta I}{I} \right) = 5 \Omega$
$(R_1 \pm \Delta R_1) = (101 \pm 5) \Omega$

$R_2 = \dfrac{U_2}{I} = 50 \Omega$
$\Delta R_2 = R_2 \left(\dfrac{\Delta U_2}{U_2} + \dfrac{\Delta I}{I} \right) = 4 \Omega$
$(R_2 \pm \Delta R_2) = (50 \pm 4) \Omega$

$R_r = R_1 + R_2 = 101 \Omega + 50 \Omega = 151 \Omega$
$\Delta R_r = \Delta R_1 + \Delta R_2 = 5 \Omega + 3.1 \Omega = 8.1 \Omega \approx 9 \Omega$
$(R_r \pm \Delta R_r) = (151 \pm 9) \Omega$

2 Паралелна веза

$I_1 = 82.1 \cdot 10^{-3} A$
$\Delta I_1 = 1\% I_1 + 3d = 1.2 \cdot 10^{-3} A \approx 2 \cdot 10^{-3} A$
$(I_1 \pm \Delta I_1) = (82 \pm 2) \cdot 10^{-3} A$

$I_2 = 43.1 \cdot 10^{-3} A$
$\Delta I_2 = 1\% I_2 + 3d = 0.8 \cdot 10^{-3} A$
$(I_2 \pm \Delta I_2) = (43.1 \pm 0.8) \cdot 10^{-3} A$

$I = 124.8 \cdot 10^{-3} A$
$\Delta I = 1\% I + 3d = 1.6 \cdot 10^{-3} A$
$(I \pm \Delta I) = (124.8 \pm 1.6) \cdot 10^{-3} A$

$U = 4.49V$
$\Delta U = 0.5\% U + 3d = 0.06V$
$(U \pm \Delta U) = (4.49 \pm 0.06)V$

$R_1 = \dfrac{U}{I_1} = 54.7\Omega$
$\Delta R_1 = R_1 \cdot \left(\dfrac{\Delta U}{U} + \dfrac{\Delta I_1}{I_1} \right) = 1.6\Omega \approx 2\Omega$
$(R_1 \pm \Delta R_1) = (55 \pm 2)\Omega$

$R_2 = \dfrac{U_2}{I} = 104\Omega$
$\Delta R_2 = R_2 \left(\dfrac{\Delta U}{U} + \dfrac{\Delta I_2}{I_2} \right) = 4\Omega$
$(R_2 \pm \Delta R_2) = (104 \pm 4)\Omega$

$R_p = \dfrac{U}{I} = 36\Omega$
$\Delta R_p = R_p \left(\dfrac{\Delta U}{U} + \dfrac{\Delta I}{I} \right) = 1\Omega$
$(R_p \pm \Delta R_p) = (36 \pm 1)\Omega$

3 Директна мерења

$R_1 = 51.2\Omega$
$\Delta R_1 = 0.5\Omega$
$(R_1 \pm \Delta R_1) = (51.2 \pm 0.5)\Omega$

$R_1 = 101.4\Omega$
$\Delta R_1 = 1.4\Omega \approx 2\Omega$
$(R_1 \pm \Delta R_1) = (101 \pm 2)\Omega$

$R_r = 151.7\Omega$
$\Delta R_r = 1\% R_r + 3d = 1.9\Omega \approx 2\Omega$
$(R_r \pm \Delta R_r) = (152 \pm 2)\Omega$

$R_p = 34.3\Omega$
$\Delta R_p = 1\% R_p + 3d = 0.7\Omega$
$(R_p \pm \Delta R_p) = (34.4 \pm 0.7)\Omega$