PAGE 4

Exercise

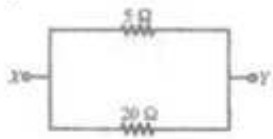
1. Calculate the total resistance for each case

a)

$R_T = 2+5+3+10$

$= 20\Omega$

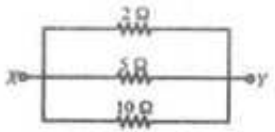
b)



$\frac{1}{R_T} = \frac{1}{5} + \frac{1}{20} = \frac{1}{4}$

$R_T = 4\Omega$

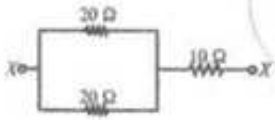
c)



$\frac{1}{R_T} = \frac{1}{2} + \frac{1}{5} + \frac{1}{10} = \frac{4}{5}$

$R_T = \frac{5}{4}\Omega$

d)



$\frac{1}{R} = \frac{1}{20} + \frac{1}{20} = \frac{1}{10}$

$R = 10\Omega$

$R_T = 10 + 10 = 20\Omega$

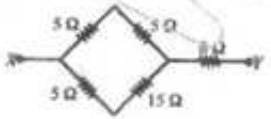
e)

$R = 5+5 = 10\Omega$

$\frac{1}{R_T} = \frac{1}{10} + \frac{1}{5} = \frac{3}{10}$

$R_T = \frac{10}{3}\Omega$

f)



$R = 5+5 = 10\Omega$

$R = 5+15 = 20\Omega$

$\frac{1}{R} = \frac{1}{10} + \frac{1}{20}$

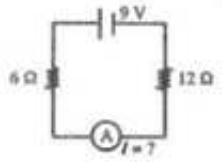
$R = \frac{20}{3}\Omega$

$R_T = \frac{20}{3} + 8 = \frac{44}{3}\Omega$

PAGE 5

2. For the circuit below, find the missing value

a)



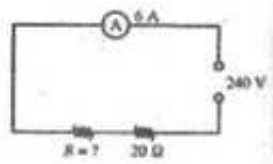
$R_T = 6+12 = 18\Omega$

$V = IR$

$9 = I(18)$

$I = 0.5A$

b)



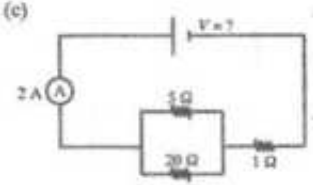
$V = IR$

$240 = 6(R+20)$

$40 = R+20$

$R = 20\Omega$

(c)

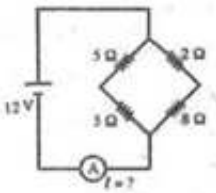


$\frac{1}{R} = \frac{1}{5} + \frac{1}{20} = \frac{1}{4}$

$R = 4\Omega$, $R_T = 4+1 = 5\Omega$

$V = IR = 2(5) = 10V$

d)



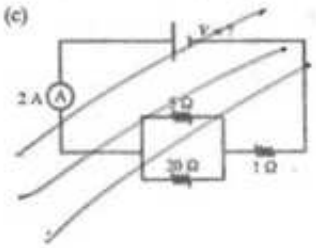
$R = 5+5 = 10\Omega$

$R = 2+8 = 10\Omega$

$\frac{1}{R_T} = \frac{1}{10} + \frac{1}{10} = \frac{1}{5}$

$R_T = 5\Omega$

(c)



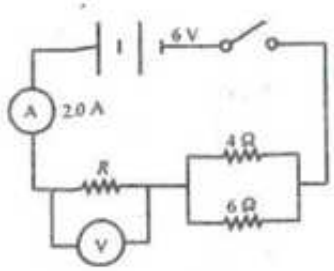
$V = IR$

$12 = I(5)$

$I = 2.4A$

PAGE 6

3.



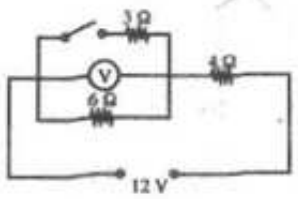
For the circuit above, calculate
a) Total effective resistance
b) Value of R
c) The voltmeter reading

a) $V = IR$
$6 = 2R$
$R_T = 3\Omega$

b) $\frac{1}{R_T} = \frac{1}{4} + \frac{1}{6} = \frac{5}{12}$
$R_T = \frac{12}{5} = 2.4\Omega$
$R + 2.4 = 3\Omega$
$R = 0.6\Omega$

c) $V = IR$
$= 2(0.6) = 1.2V$

4.

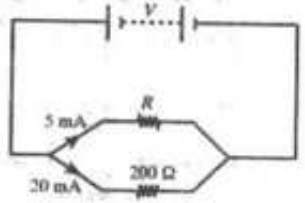


Calculate the voltmeter reading when
a) The switch is ON
b) The switch is OFF

a) $\frac{1}{R} = \frac{1}{3} + \frac{1}{6} = \frac{1}{2}$
$R = 2\Omega$
$V_{2\Omega} = \left(\frac{2}{2+4}\right) \times 12$
$= 4V$

b) $V_{6\Omega} = \left(\frac{6}{6+4}\right) \times 12$
$= 7.2V$

5.

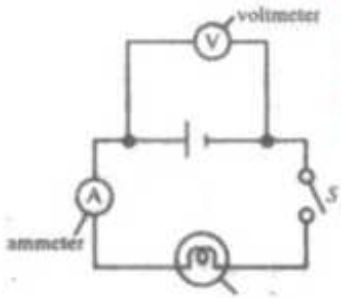


For the circuit above, calculate the value of R

$V_R = V_{200\Omega}$
$5 \times 10^{-3} R = (20 \times 10^{-3})(200)$

PAGE 8

Exercise



$\varepsilon = 1.5\,V$

$V_{ex} = 1.35\,V$

$V_{in} = 0.15\,V$

$V_{in} = Ir$

$0.15 = 0.3r$

$r = 0.05\,\Omega$

1. Diagram above shown that when the switch is OFF, the voltmeter reading is 1.5 V. When the switch is ON, the voltmeter reading become 1.35 V and the ammeter show a 0.3A reading. Find the internal resistance for the cell

2. A dry cell with e.m.f 3.0 V and internal resistance 0.5 Ω is connected to a resistor R Ω. If the current flow in the circuit is 0.4 A. Calculate
   a) potential different at the resistor
   b) the value of R

b) $V_{ex} = IR$

$\varepsilon = 0.4R$

$R = 7\,\Omega$

a) $\varepsilon = V_{ex} + V_{in}$

$V_{ex} = 3 - 0.4(0.5)$

$= 2.8\,V$

3. A cell with internal resistance 2.0 Ω. Potential difference for the cell at the external terminal is 2.4 V when there is 0.3 A current flow. Calculate the e.m.f of the cel

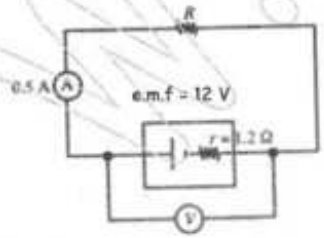
$r = 2\,\Omega,\ V_{ex} = 2.4\,V$

$I = 0.3A,\ \varepsilon = V_{ex} + Ir$

$= 2.4 + 0.3(2)$

$= 3\,V$

4.



For the circuit above, calculate
a) the voltmeter reading
b) external resistance for the cell

a) $\varepsilon = V_{ex} + V_{in}$

$V_{ex} = 12 - 0.5(1.2)$

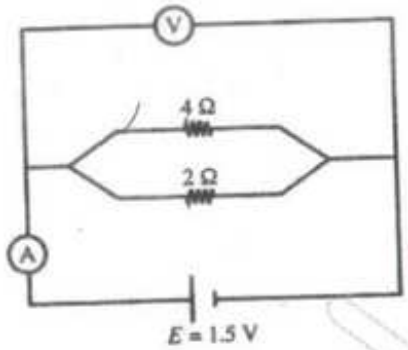
$= 11.4\,V$

b) $V_{ex} = IR$

$11.4 = 0.5R$

PAGE 9

5.



a) $\frac{1}{R} = \frac{1}{4} + \frac{1}{2} = \frac{3}{4}$

$R = \frac{4}{3}\,\Omega$

$\varepsilon = I(R + r)$

$1.5 = I\left(\frac{4}{3} + 2\right)$

$I = 0.45\,A$

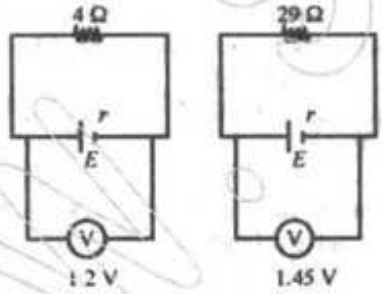
b) $V_{ex} = \varepsilon - Ir$

$= 1.5 - 0.45(2)$

$= 0.6\,V$

A cell with e.m.f = 1.5 V is connected to the circuit as shown in the diagram above
a) If the internal resistance of the cell is 2 Ω, calculate the current flow in the circuit
b) Find the voltmeter reading

6.



$\varepsilon = 1.5\,V$

$r = 1\,\Omega$

Try first ya !

The diagram on the left shown that a cell is connected to a 4 Ω resistor and voltmeter reading is 1.2 V. Then the 4 Ω resistor is being substituted with a 29 Ω resistor and found that voltmeter reading becomes 1.45 V. Find the e.m.f and the internal resistance of the cell