Electrical Power Engineering Fundamentals

Departamento de Ingeniería Eléctrica. Universidad Carlos III de Madrid

Module 2. Analysis of DC Circuits. Week 3

Exercise 1. In the following circuit:

a) Find the current i and the voltage Ux using the mesh current method and/or the node-voltage method

b) Calculate the power generated by sources and check the power balance.

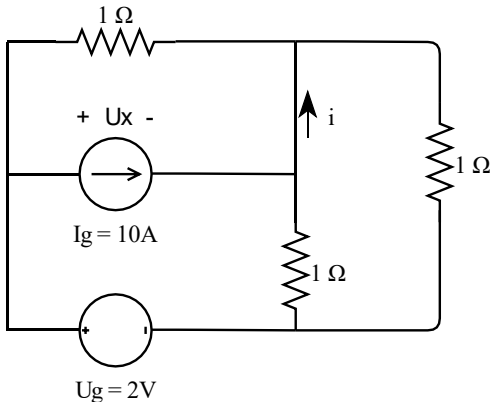

Figure 1 DC circuit 1

Solution: a) Ux = -2V; i = 6A **b)** P_{UG} = 16W; P_{IG} = 20W; $P_{Consumption\_by\_Resistors}$ = $P_{Generated\_by\_sources}$ = 36W

Exercise 2. In the following circuit:

a) Find the current i and the voltage Ux using the mesh current method and/or the node-voltage method

b) Calculate the power generated by sources and check the power balance.

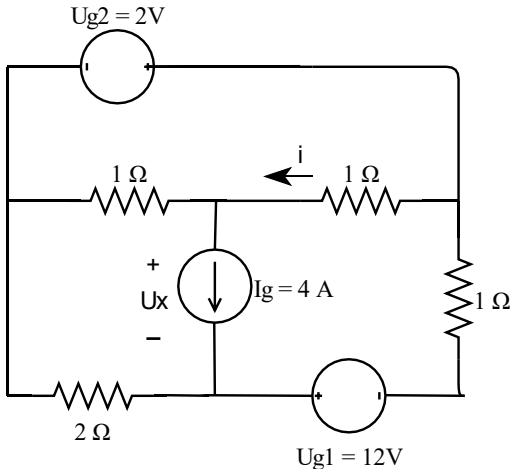

Figure 2 DC circuit 2

Solution: a) Ux = -13V; i = 3A **b)** P_{UG1} = 24W; P_{UG2} = 10W: P_{IG} = 52W; $P_{Consumption\_by\_Resistors}$ = $P_{Generated\_by\_sources}$ = 86W

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Exercise 3. In the following circuit:

a) Find the currents i1 and i2 and the voltages Ux1 and Ux2 using the mesh current method and/or the node-voltage method.

b) Calculate the power generated by sources and check the power balance.

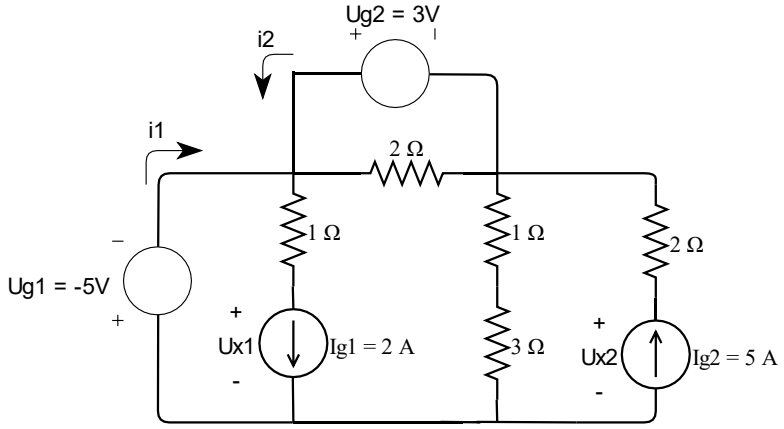

Figure 3. DC circuit 3

Solution: a) i1 =-2.5A; i2 =6A; Ux1 =3V; Ux2 =12V **b)** P_{UG1} =-12.5W; P_{UG2} =18W; P_{IG1} =-6W; P_{IG2} =60W; $P_{Consumption\_resistors}=P_{Generated\_by\_sources}$=59.5W

Exercise 4. In the circuit below:

a) Find the currents i1 and i2 and the voltages Ux1 and Ux2 using the mesh current method and/or the node-voltage method.

b) Calculate the power generated by sources and check the power balance.

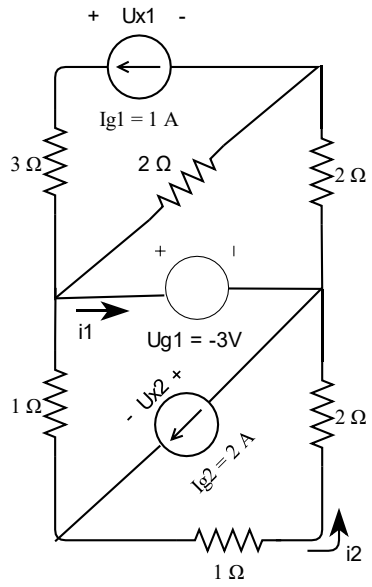

Figure 4. DC circuit 4

Solution: a) i1= 3.5A; i2 = -0.25A; Ux1 =2.5V; Ux2 =0.75V **b)** P_{UG1} =10.5W; P_{IG1} =2.5W; P_{IG2} =-1.5W; $P_{Consumption\_resistors}=P_{Generated\_by\_sources}$=11.5W

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