Module name: **Electrical Circuits 1**

Module ID: **IS-FEE-10070W**

Module type: **Specialization Workshop**

Semester: **winter 2024/2025**

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| **Workshop 02 (28.10.2024)** |

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| 1. Calculate the currents in all branches of the circuit shown in the figure using the Loop-Current Method. Then, use the PSpice program to determine the currents in all branches of the same circuit, and compare these results with the calculations.

R2 = R3 = 10 , R4 = R5 = 5 , J6 = 2 A, E1 = 60 V, E5 = 20 V |
| The report should include:* an electrical circuit diagram,
* calculations of current values in all circuit branches,
* an electrical circuit diagram (from the PSpice program) showing the determined current values,
* conclusions: a comparison of calculation results with computer simulation results.
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| 1. Maximum power transfer matching in a DC circuit occurs when the maximum power is transferred to the load (i.e., the load power reaches its maximum value). At this point, the voltage across the load is half of the source voltage. Using the PSpice program, perform a parametric analysis and plot the graphs Pload = f(Rload) and Uload = f(Rload).
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| Assume E = 9 V, Rint = 20 . Vary the resistance Rload from 1 to 50  in increments of 1 . Based on the obtained graphs, determine the Rload value at which the maximum power transfer occurs. |
| The report should include:* an electrical circuit diagram and a simulation circuit diagram (from the PSpice program),
* the graphs Pload = f(Rload) and Uload = f(Rload)
* conclusions: determination of the Rload value at which maximum power transfer occurs.
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| 1. Design a voltage divider in which the output voltage Uout = ½ Uin. To do this, determine the values of resistors R1 and R2 from the E12 series (10, 12, 15, 18, 22, 27, 33, 39, 47, 56, 68, 82) or their series or parallel combinations. Using the PSpice program, perform a parametric analysis and check whether, after connecting a load RL to the divider, which varies from 1 kΩ to 5 kΩ, the output voltage Uout does not drop by more than 10% of its original value. If it does, adjust the values of R1 and R2 accordingly. Assume Uin = 9 V.

The report should include:* an electrical circuit diagram and a simulation circuit diagram (from the PSpice program),
* the values of resistances R1 and R2,
* graphs Pout = f(RL),
* conclusions.
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