Dr Isselmou Abd El Kader

CALCULATOR IS ALLOWED

HDD3010 Electric Circuits

MATERIALS ARE NOT ALLOWED

Exam : 23.10.2026

Max : 100 points

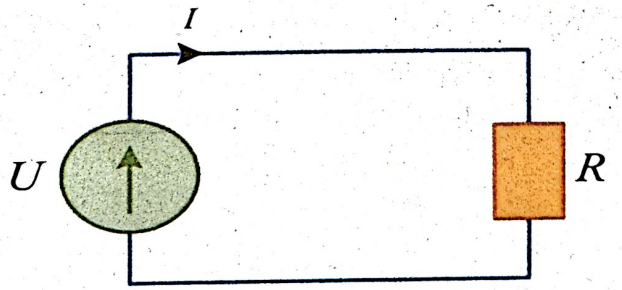
Exercice 1 (20 points)

State whether the following sentences are **true** or **false**:

1. An ideal voltage source can deliver electrical energy to the rest of a circuit.
2. In a purely resistive AC circuit, the current reaches its maximum value at the same time as the voltage.
3. RMS values of sinusoidal voltage and current are commonly used when performing AC phasor calculations.
4. The apparent complex power in an AC circuit can be expressed as $S = UI^*$, where I^* is the complex conjugate of the current.
5. The mesh-current method determines unknown loop currents by applying Kirchhoff's Voltage Law around the meshes of a circuit.

Exercise 2 (20 points)

A flashlight is powered by four **2V** batteries connected in series. The resistance of the lamp is R=14 Ω. Consider the circuit shown in Figure.

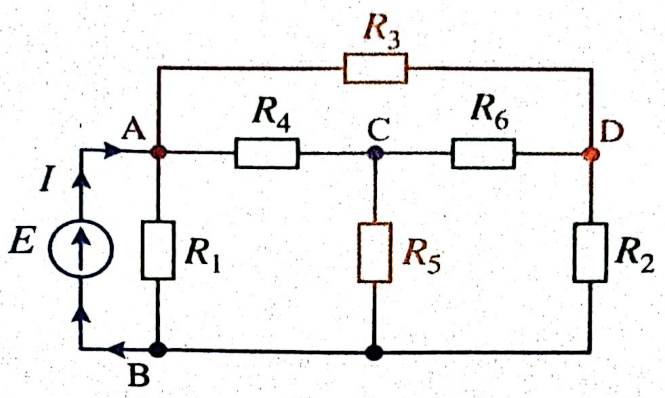


1. Calculate the current *I* flowing through the circuit.
2. Calculate the electrical power consumed by the flashlight lamp.

Exercice 3 (20 points)

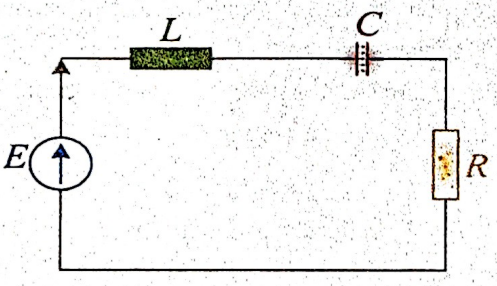
Calculate the total resistance $\boldsymbol{R_{tot}}$ and total current $\boldsymbol{I}$ for the circuit using wye-delta transformation for wye formed by R_4, R_5 and R_6.

Values: R_1= 6Ω, R_2= 2Ω, R_3= 6 Ω, R_4= 7Ω, R_5= 2Ω, R_6= 4Ω and E=4V.



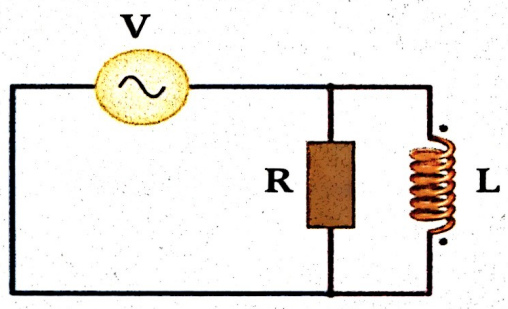
Exercise 4 (20 points)

Calculate the resonance frequency f_r, half-power bandwidth **Δf** and quality factor **Q** and RMS value of internal voltage U_{rms} of the below circuit, when E = 2V, L= 11mH, C = 10 μF and R = 10Ω.



Exercise 5 (20 points)

Calculate the total current and branch currents in the circuit in Figure. What is the total impedance Z in the circuit? Resistance R is 6 Ω and inductance L = 100 mH. Source voltage is 120 V∠0°. AC frequency is 62 Hz.



Good Luck