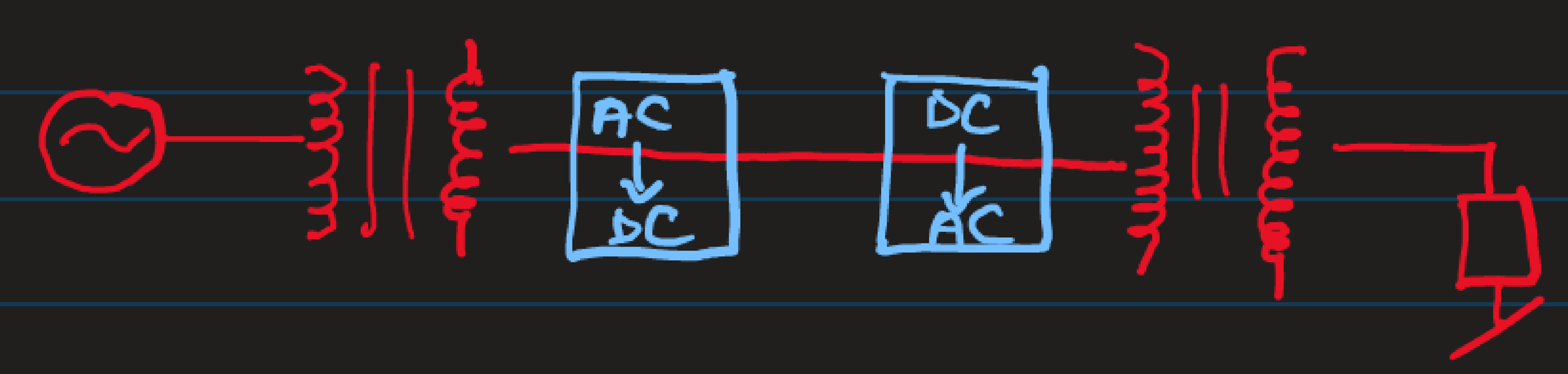
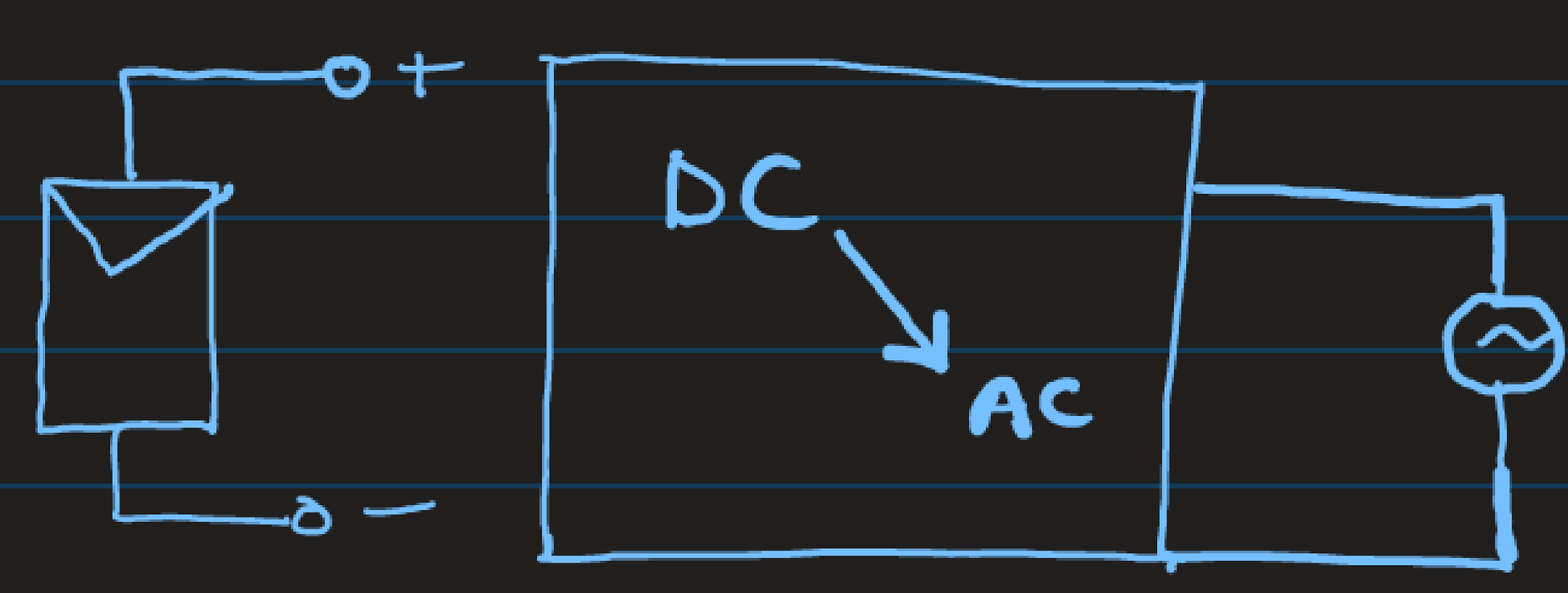
Day 1

06 January 2025 08:23

- Efficient conversion of electrical power



- We require to convert electric power using power electronics,
  eg: Electronic device chargers.



- Power electronics applications –

  (i) Battery charger (mobile, laptop, EV battery)

  (ii) Integration of renewables to grid (PV, winds)

  (iii) HVDC transmission
  (iv) motor drives
  (v) UPS
  (vi) Locomotives
  (vii) Aircrafts

- Grading policy –

  - Relative
  - Quiz – 20%, midsem – 30% (≤ 2 classes skipped → Free 30% on assignment)
  - Assignments – 10%
  - Endsem – 40% (Unlimited)

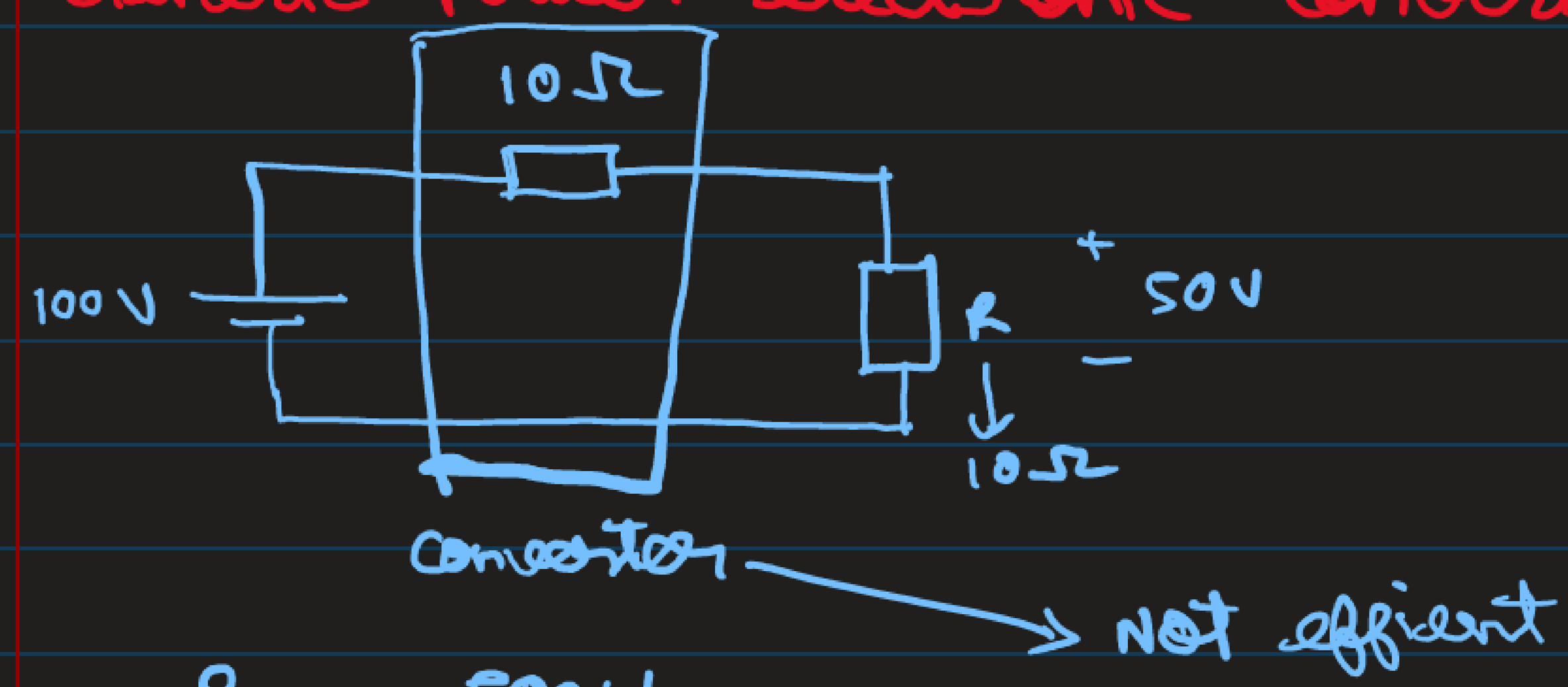
- Contents –

  Converters
  - AC–DC (Rectifiers) (maybe 1st half)
  - DC–DC (Choppers)
  - DC–AC (Inverters)
  - AC–AC (Cycloconverters)

  } mostly 2nd half

  Basic Electronics (1st half)

- Generic power electronic converter :

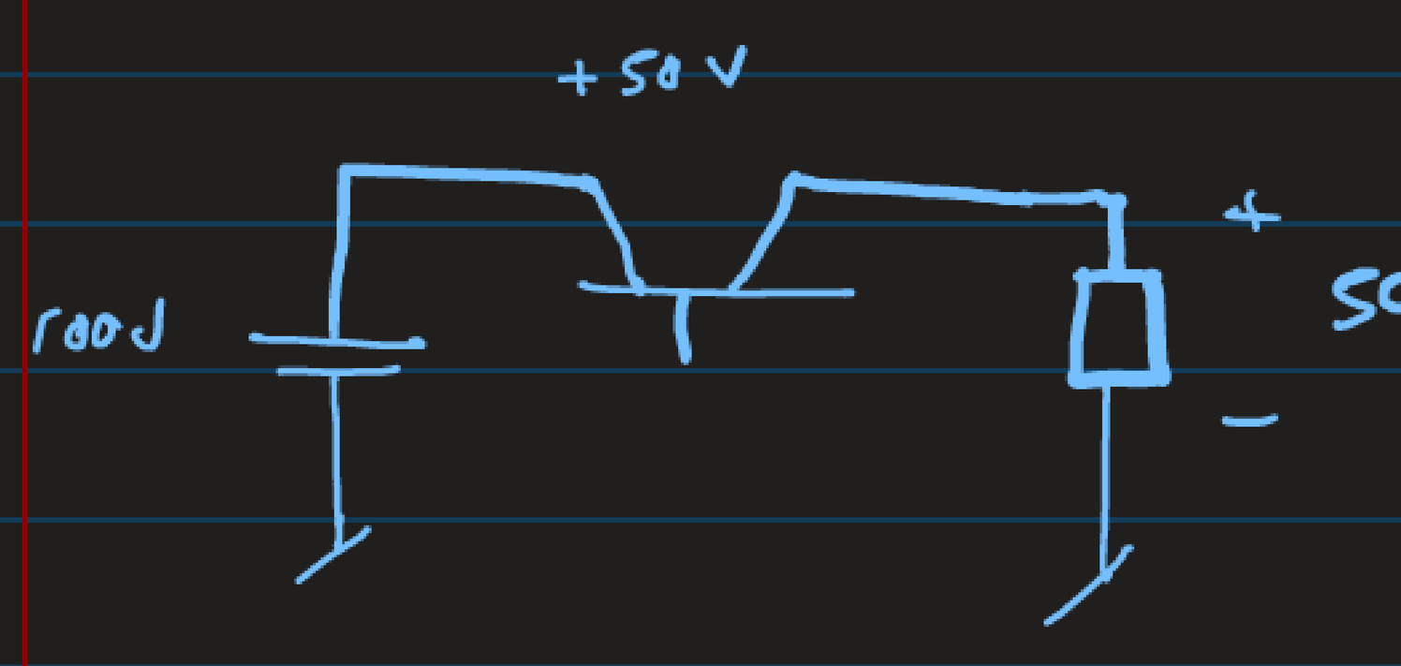


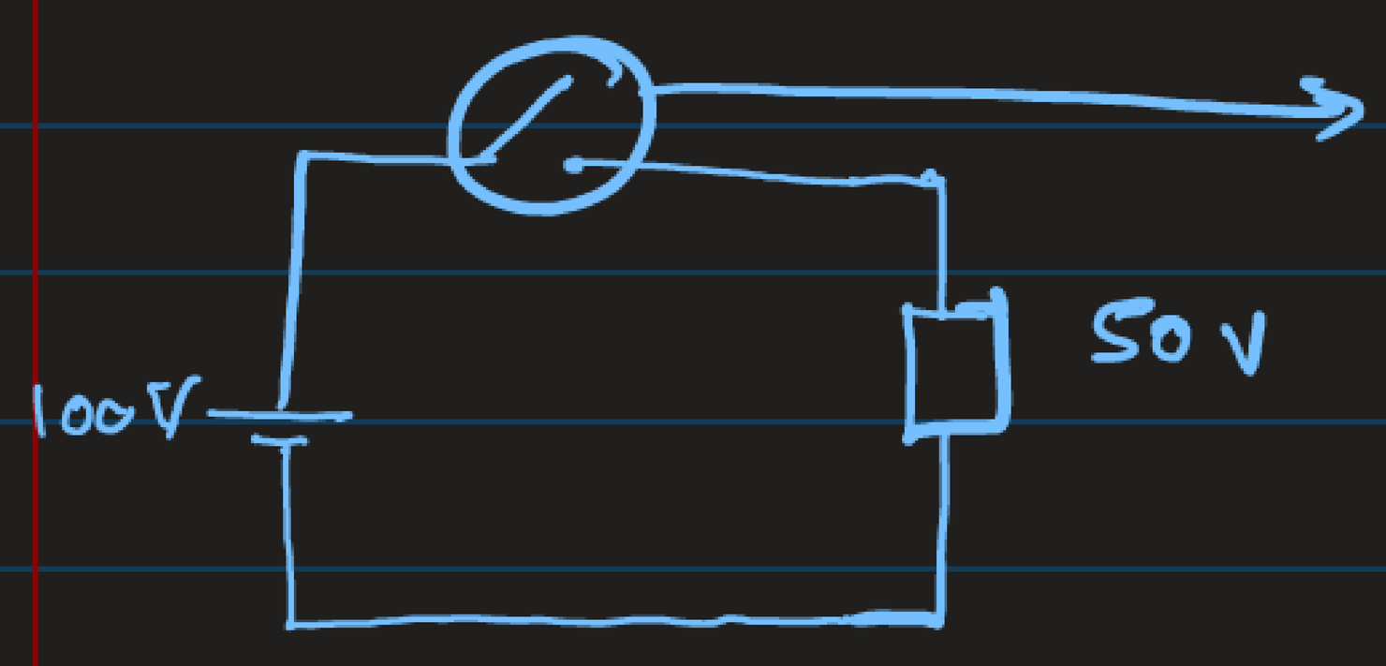
$P_{in} = 500\,W$

$P_{out} = 250\,W$

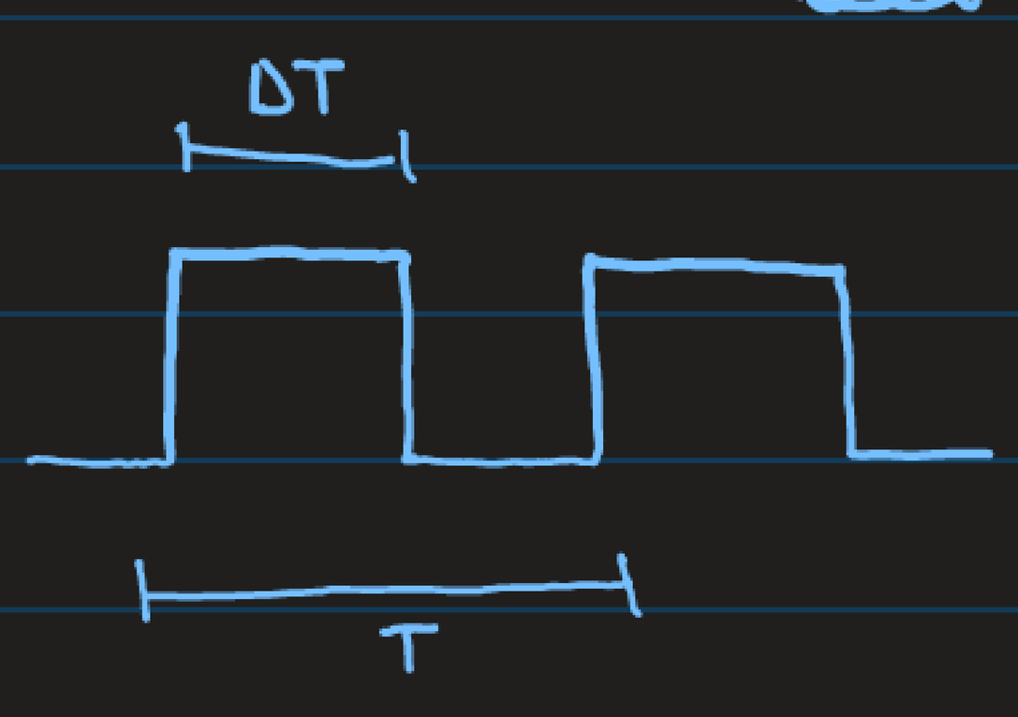
$\eta = 50\%$ (too bad)

☆ Resistive-based solution is lossy and $\eta \downarrow$

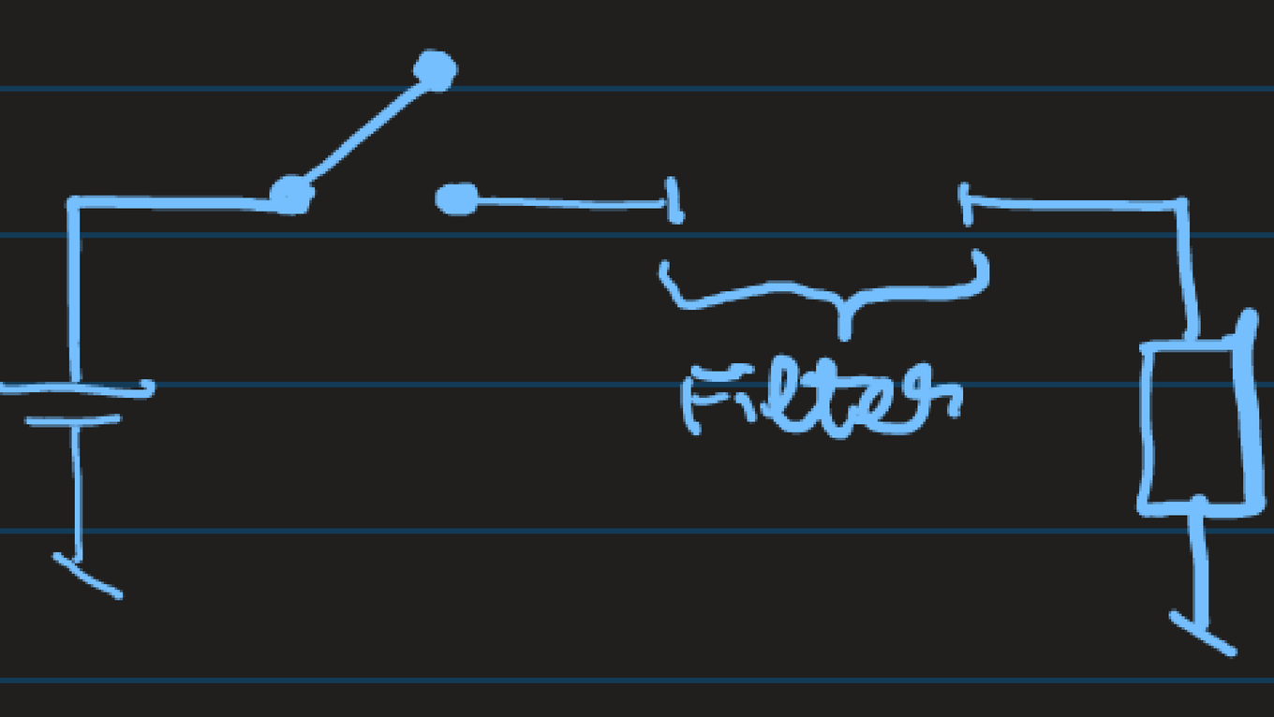


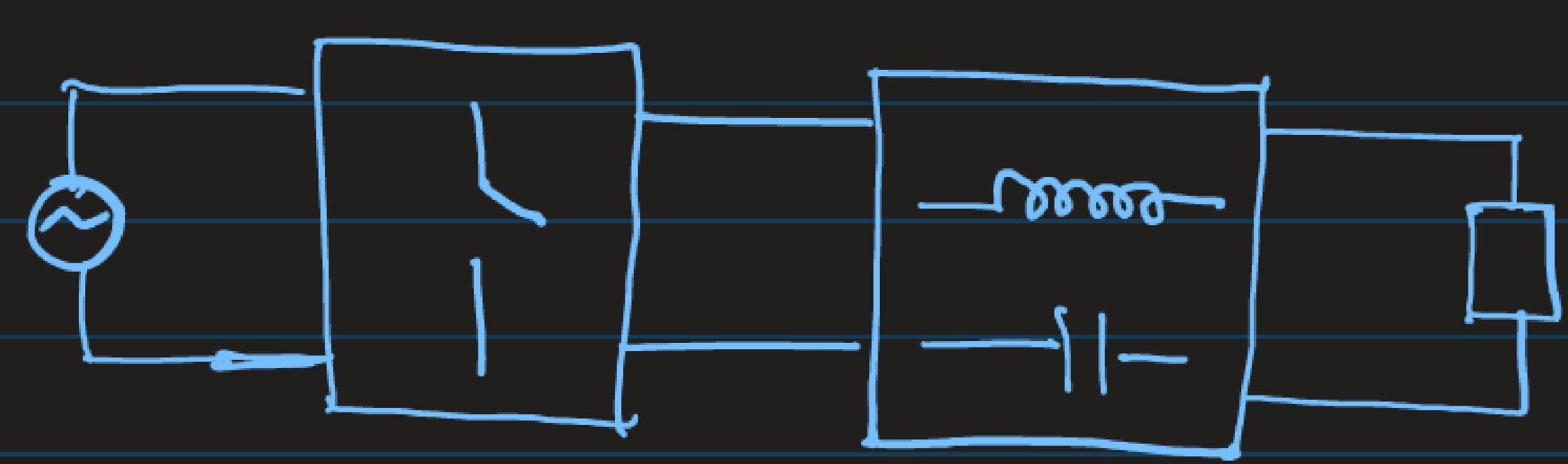


On for 50%. (Concept: Periodically switching between saturation and cut-off)



(Average → D)





Ref: Prof. Umanand, Prof. N. Mohan, Prof. John G. Kassakian

- Prof. Umanand → PE – Essentials and applications
- Prof. N. Mohan → PE – Converters, application and design
- Prof. John G. Kassakian → Principles of PE

Prof. P. T. Krein, Elements of PE