Engineering Thermodynamics Exam 1 Cheat Sheet

by Shelbeans (shelbeans) via cheatography.com/177819/cs/39393/

Simple terms

Thermodynamic System (TS)

- any object or system of objects

Types of TS

- **Isolated** (no interaction with surroundings), **Closed** (no mass exchange), **open** (mass exchange)

State Postulate

- Defines a number of properties required to fix a state

Intensive properties

- (mass ind.) if the property is the same

Extensive properties

- (mass dep.) if the property is doubled

Energys

macroscopic energys

- **(Work)** kinetic, potential

microscopic energys

- **(Heat transfer)** thermal, chemical, nuclear, etc

1LT

Closed

- U=Qnet-Wnet

Open

- U=Qnet-Wnet+ m(ein-eout)

adiabatic

- no heat transfer

isothermal

- T is constant

isobaric

- P is constant

isochoric

- V is constant

Equations

Specific _____

- x=X/m

kinetic energy

- $ke=v^2/2$

potential energy

- pe=gh

specific total energy

- e=ke+pe+u

total energy

- $E=mv^2/2$ +mgh+u

electric power

- W=Voltage*current

steady electric power

- W=Voltage*current*time

boundary work

- W=P*V

shaft work

- W= T*2*pi*number of turns

Devices

Thermal devices

- n=Q/mfuel*HV (burner, water heater)

Mechanical devices (Turbine)

- n=Wout/Efluid

By **Shelbeans** (shelbeans)
cheatography.com/shelbeans/

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