



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution



Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF MECHANICAL ENGINEERING

19MET201 ENGINEERING THERMODYNAMICS

UNIT 1 –BASIC CONCEPTS AND FIRST LAW

TOPIC –System and their Types



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Thermodynamics



- ❑ Science of energy transfer and its effect on the physical properties of the substances
- ❑ The word “Thermo” means **Heat** ; “Dynamics” means **Movement**
- ❑ Governs laws of thermodynamics (**Zeroth, First, Second, Third Laws**)
- ❑ Deals with **Heat and Work interactions**



Basics of Thermodynamics



System: A quantity of matter upon which the attention is focused

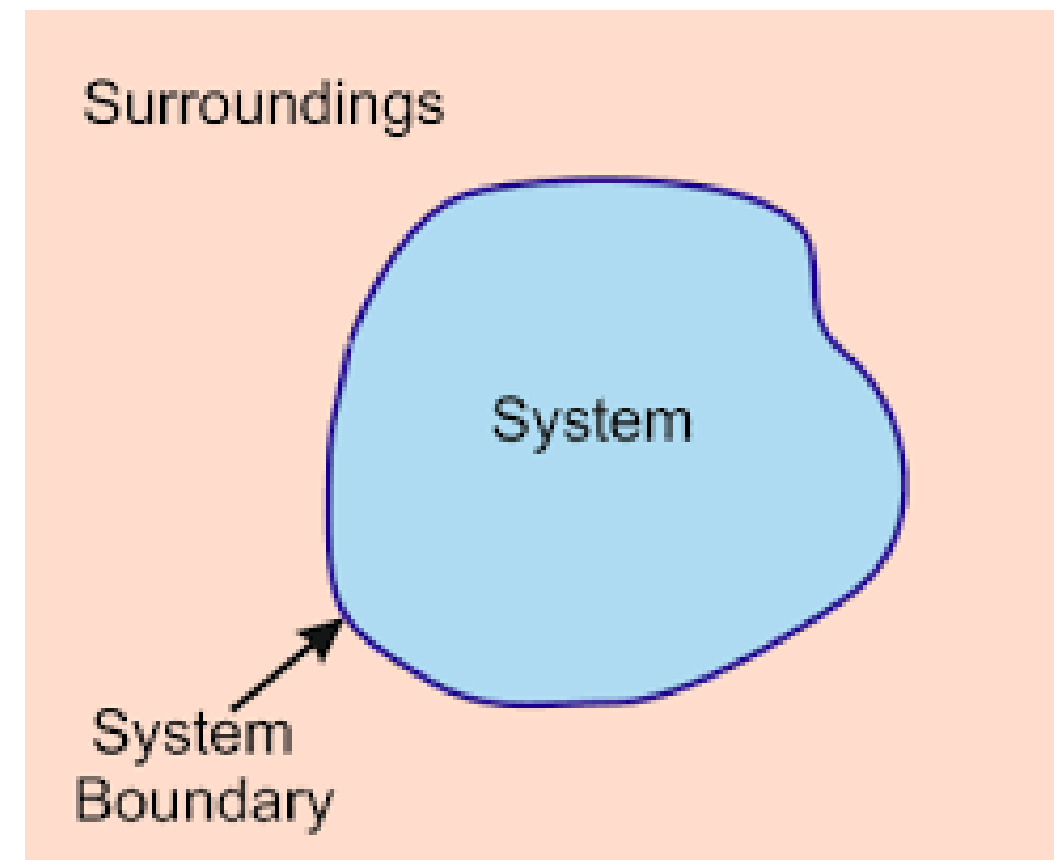
Surrounding: Everything external to the system

Boundary: The system has been separated from the surrounding by the boundary. It may be a fixed or flexible



Thermodynamic boundary

The system has been separated from the surrounding by the boundary
It may be a fixed or flexible.



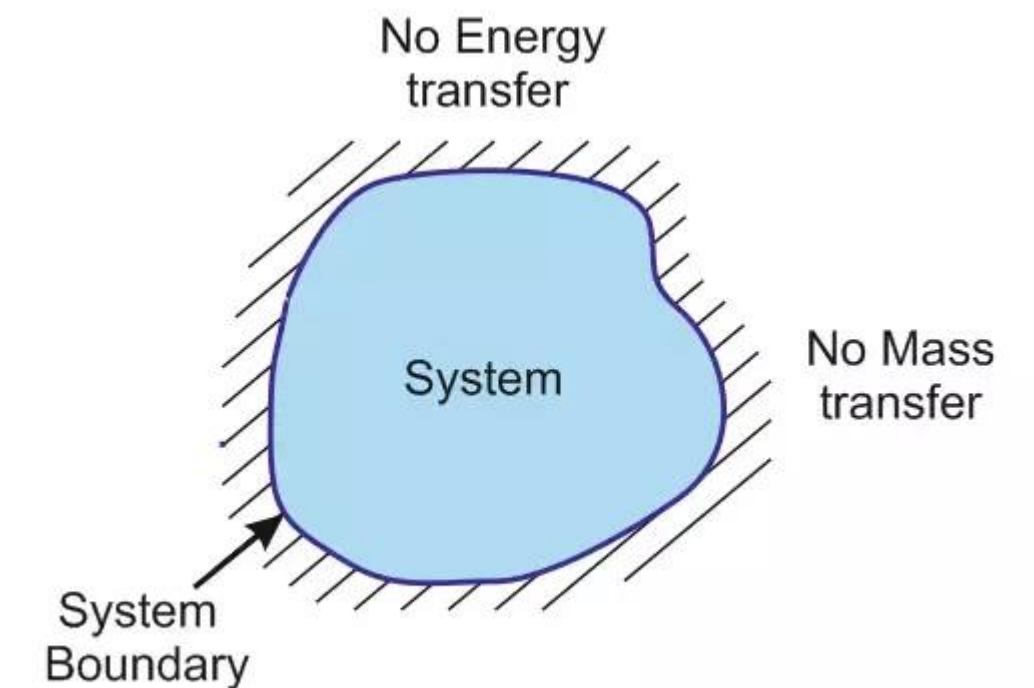
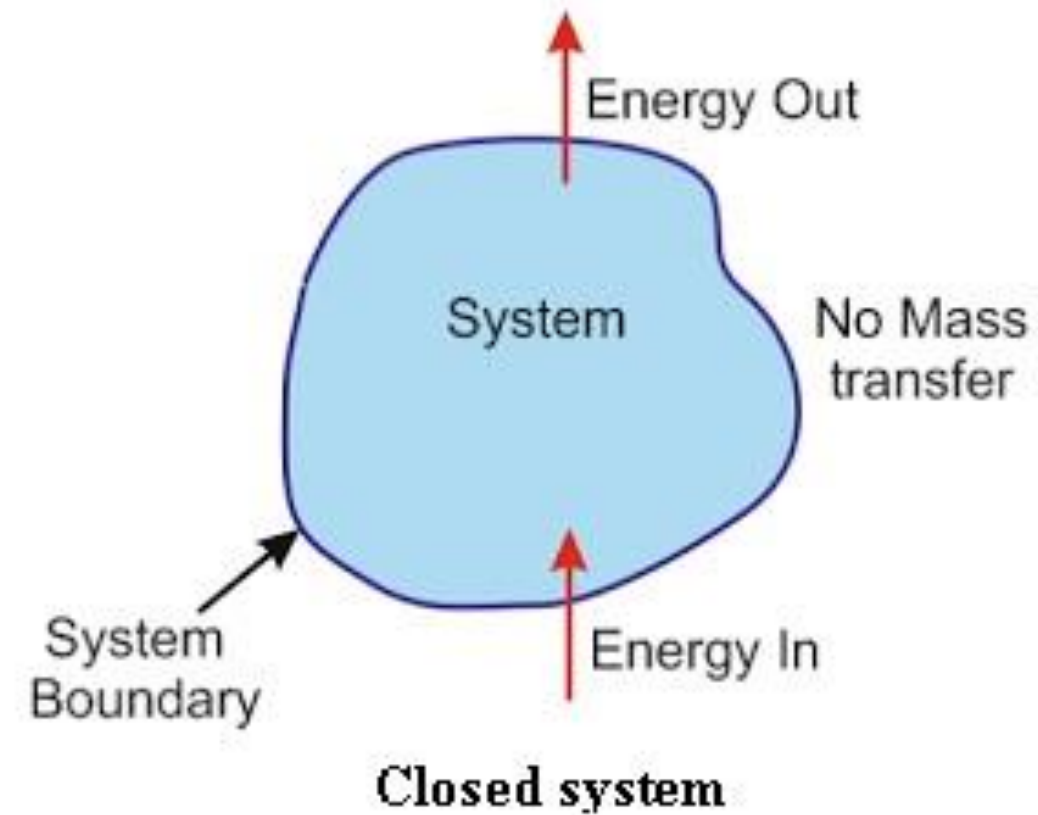
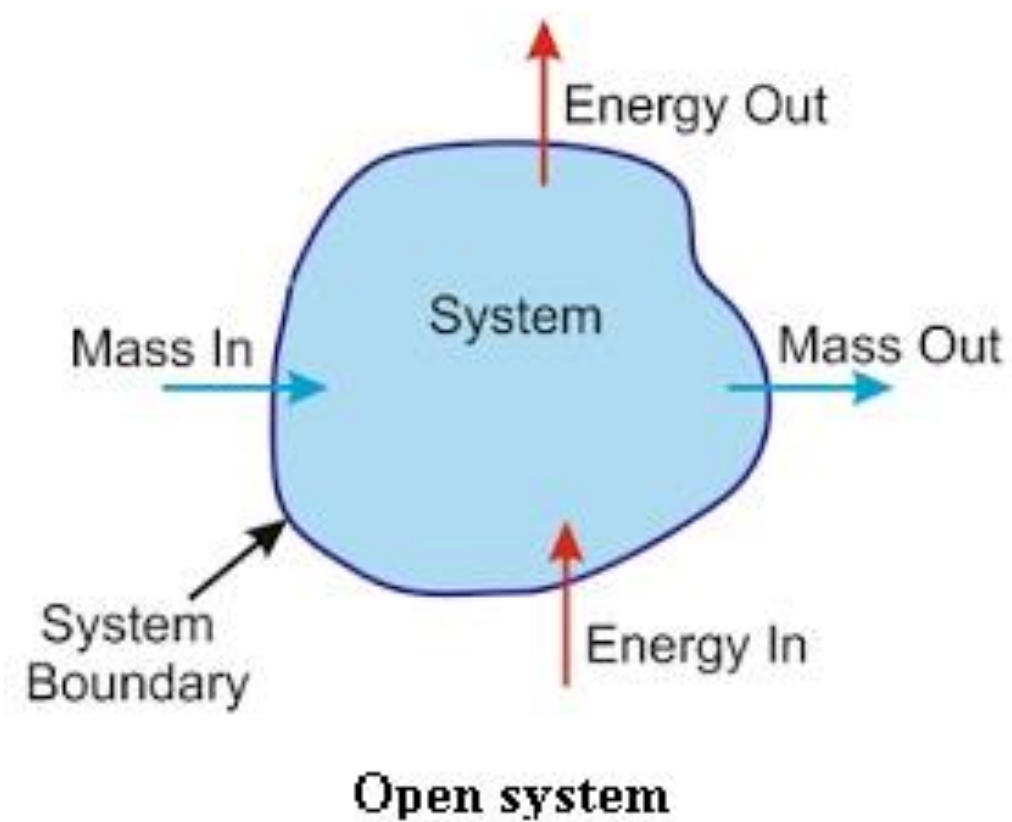
Source: <https://www.hkdivedi.com/>



Types of System



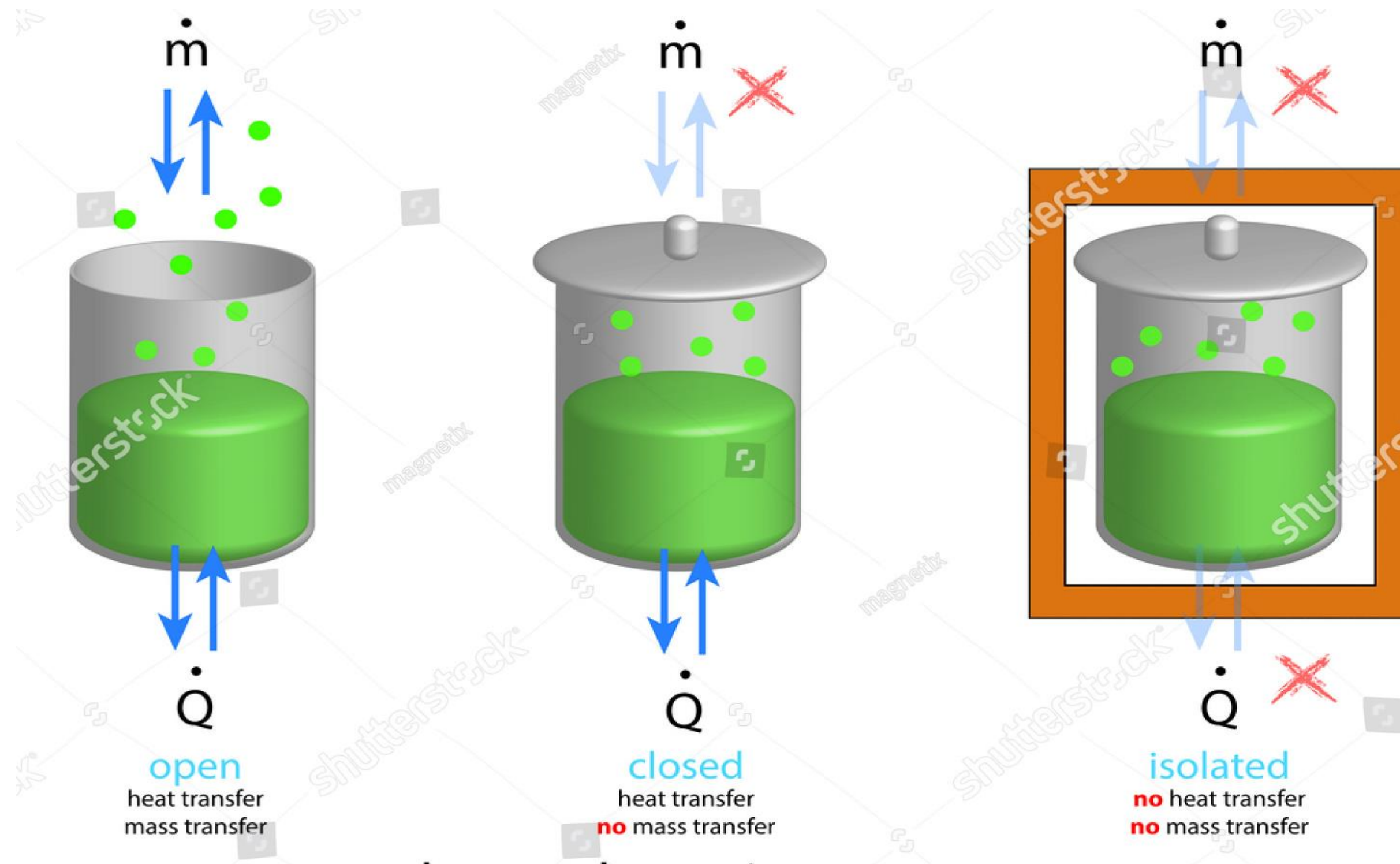
- ❖ **Open System**
- ❖ **Closed System**
- ❖ **Isolated system**



Source: <https://www.hkdivedi.com/>



Types of System(Contd..)

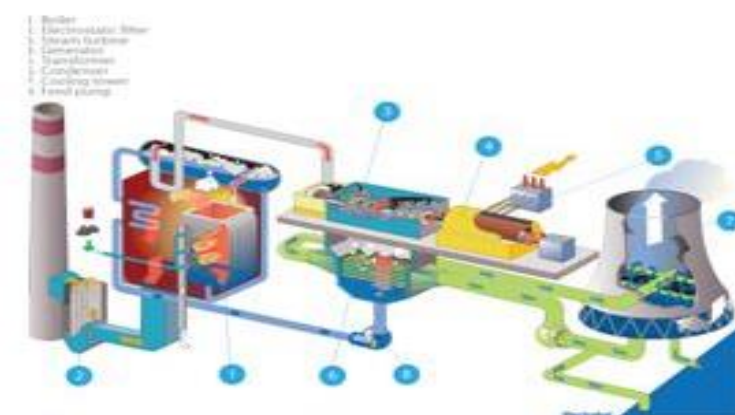
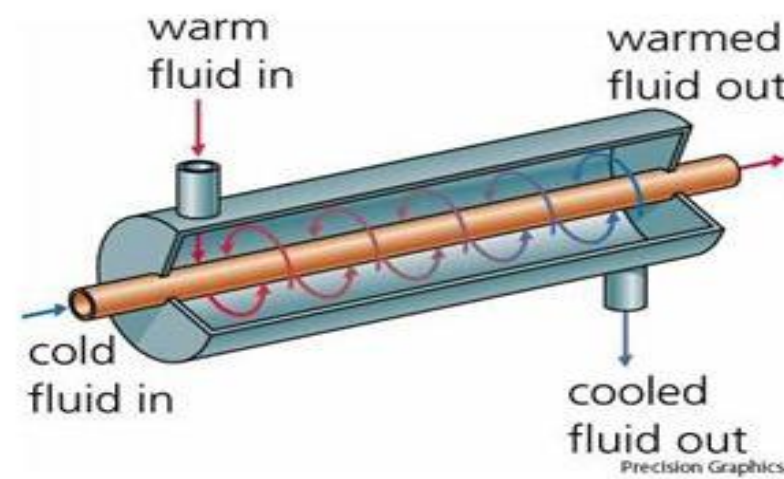
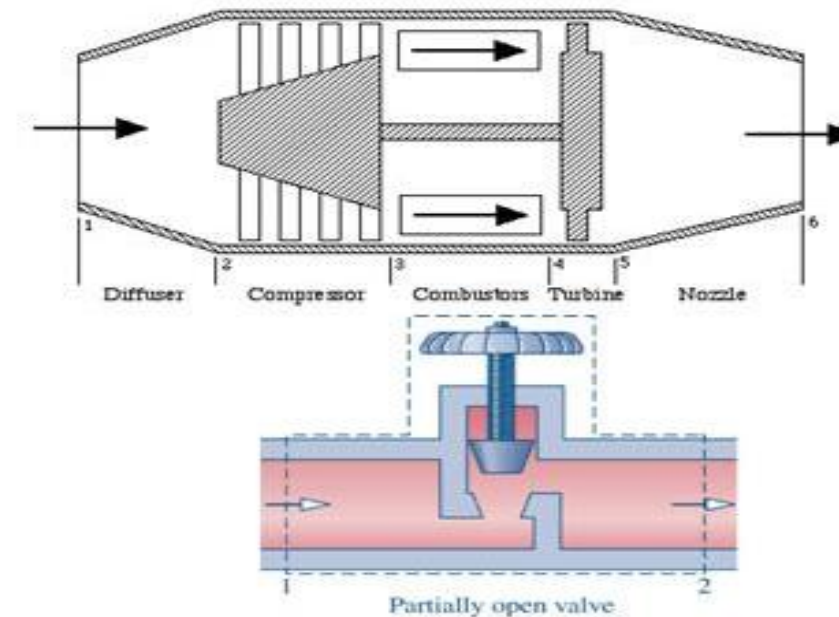
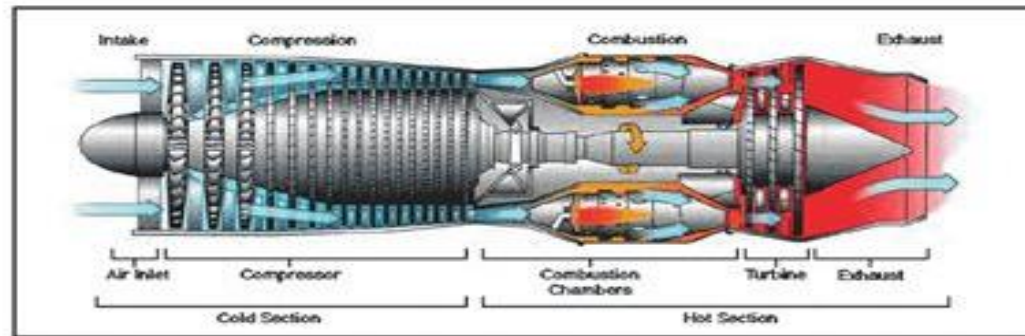


Source: <https://tinyurl.com/y5s6gzjk>



Types of System- (Contd..)

OPEN SYSTEM : Both mass and energy (heat and work) transfer takes place



Source: internet

- Turbine
- Compressor (related: pump, blower)
- Heat exchanger (related terms: boiler/condenser/evaporator, mixer etc.)
- Nozzle/diffuser
- Throttling devices (related terms: valves)

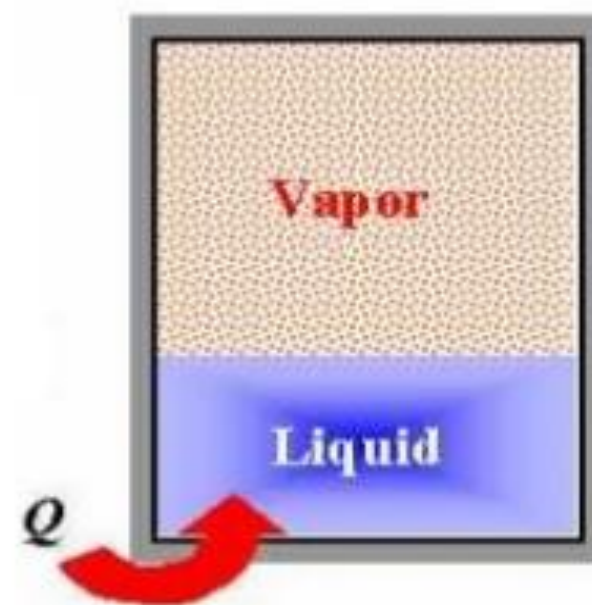
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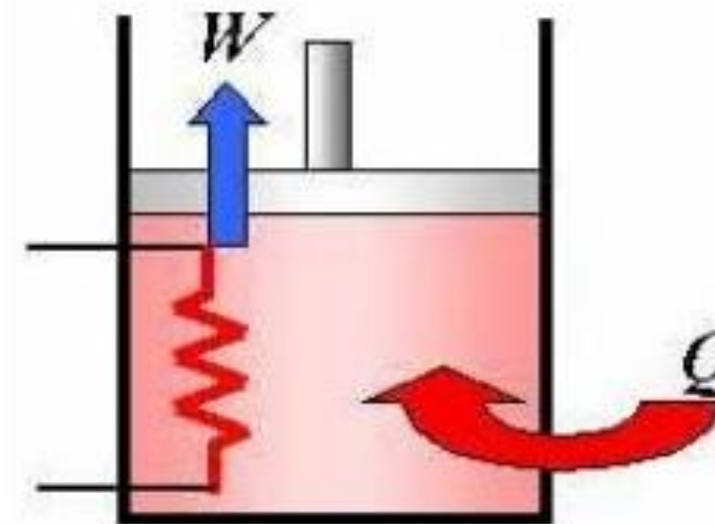
Types of System (Contd..)

CLOSED SYSTEM : Energy (heat and work) transfer takes place only
There is no mass transfer

Example of Closed Systems



Rigid tank



Piston cylinder

Source: <https://tinyurl.com/y5s6gzjk>



Types of System(Contd..)



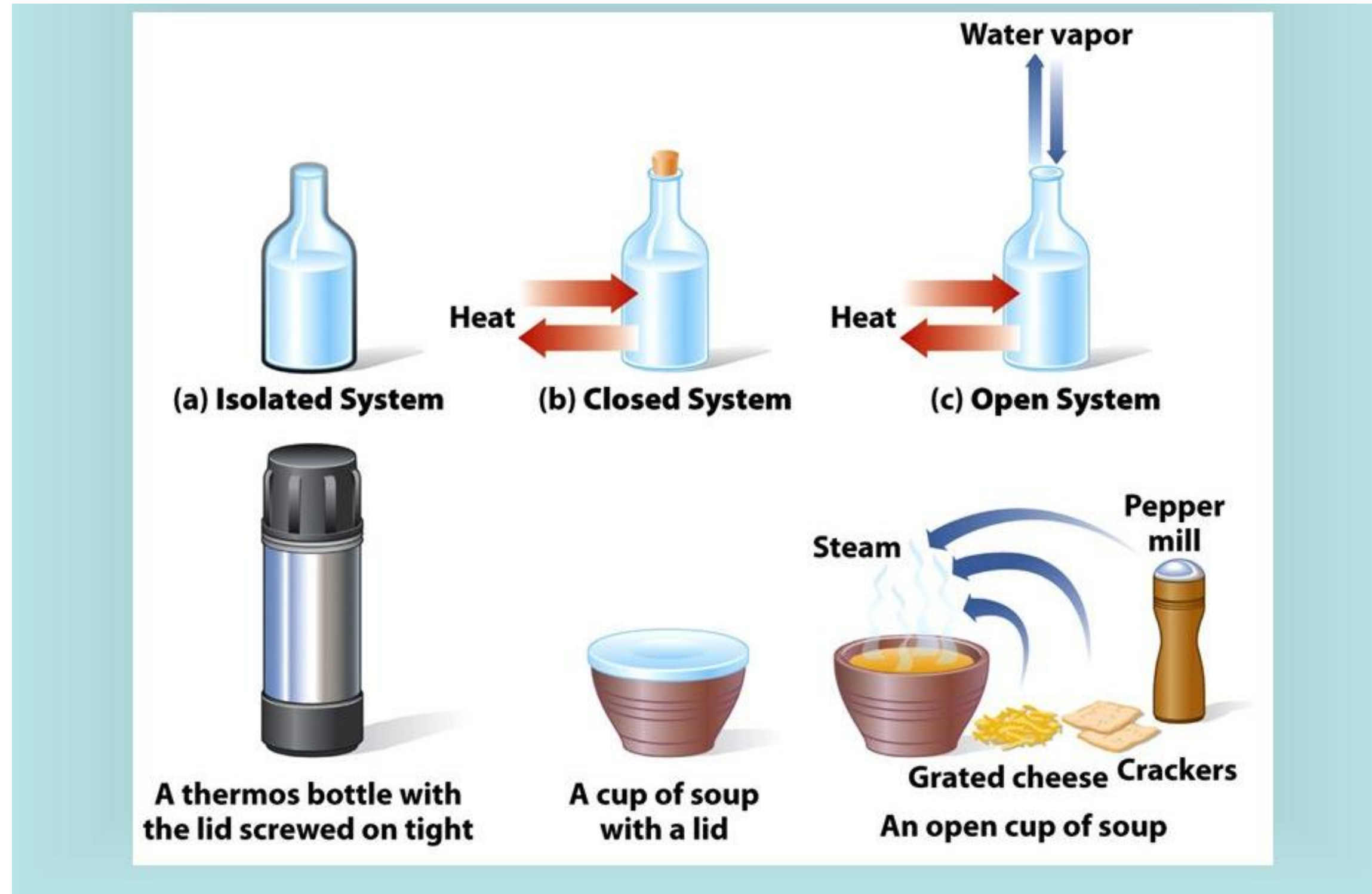
ISOLATED SYSTEM : There are no mass and energy (Heat and Work) transfer



Source: <https://tinyurl.com/y5wqv22e>



Types of System (Contd..)



Source: <https://tinyurl.com/yxqzlp8>



Assessment -1

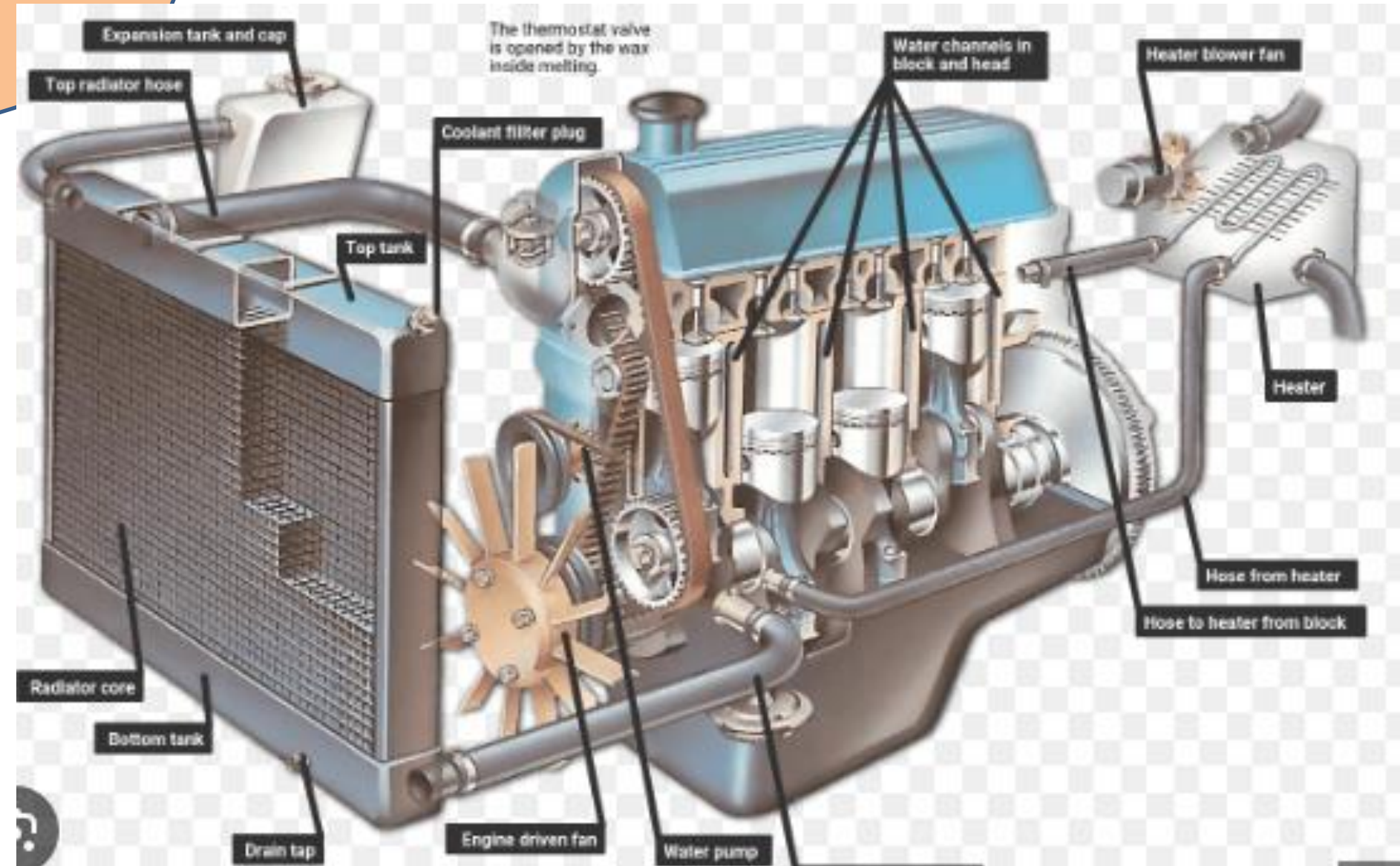
1. In which system, the energy transfer only occurs, but no mass transfer
 - a) Open system
 - b) Closed system
 - c) Isolated system
 - c) Insulated system
2. In an isolated system there are no _____ and energy transfer occur
 - a) mass transfer
 - b) heat transfer
 - c) work transfer
 - d) All of the above





Puzzle

Identify open ,
closed & isolated
system if any.





References

- Nag. P.K., "Engineering Thermodynamics", 4th Edition, Tata McGraw-Hill, New Delhi, 2013
- Cengel. Y and M.Boles, "Thermodynamics - An Engineering Approach", 8th Edition, Tata McGraw Hill, 2014
- Moran, Shapiro, Boettner & Bailey "Principles of Engineering Thermodynamics:", Wiley & Sons, 2015
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Thank You