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## Thermodynamics Interview Questions

### Q1. Explain what is Thermodynamics?

Thermodynamics is the branch of physics that studies the relationship between heat, work, energy and temperature. It provides information about the flow of energy and how thermal energy (energy of a substance or system because of its temperature) converts to and from other forms of energy.

### Q2. What are laws of thermodynamics?

The laws of thermodynamics put a light on how the energy of the system is changing and whether the system is performing any work on its surroundings.

**Zeroth law:** This law states that two bodies having the same thermal equilibrium with the third body are also in equilibrium with each other

**First Law:** This law is also known as the Law of conservation of energy. It states that energy can neither be created nor destroyed but can be transformed or converted from one form to another. It says that the energy of a system is equal to the addition of an increase in thermal energy and work done on the system.

**The Second Law:** This law states that it is impossible to transfer the energy from a body at a lower temperature to higher temperature without using the additional energy. Broadly speaking, it means that the entropy of a system always tends to increase. E.g. the entropy of the universe never decreases and always tends to increase.

**The Third Law:** It states that the entropy of a system approach at zero when the temperature is zero. A perfect crystal which has only one state and minimum energy has zero entropy at absolute zero.

### Q3. What is Zeroth Law of Thermodynamics?

Zeroth law states that if body 'A' and body 'B' are in thermal equilibrium with the body 'C' then body 'A' and body 'B' are also in equilibrium with each other. This law manifests that temperature is a measurable and fundamental property of matter

### Q4. What is Carnot engine?

Carnot engine is a theoretical cycle given by **Nicolas Leonard Sadi Carnot** in 1824. He stated that in this

engine a hot body is needed that transfers the energy to a cold body which ultimately produces mechanical work. You can see this engine in your refrigerator and air conditioners.

### Q5. List types of Thermodynamic System?

There are 3 types of Thermodynamic System:

1. **Closed system:** In this system, mass cannot be transferred throughout the boundary but it allows the energy to be exchanged.
2. **Open system:** This system allows the transfer of both matter and energy across the boundary.e.g. air compressor.
3. **Isolated system:** In this system neither mass nor energy can transfer across the boundary.

### Q6. What are the Advantages of Electronic Ignition System?

The ignition system is used to ignite the mixture of air and fuel in the combustion engine. This system has several advantages and it is better than mechanically timed ignition systems.

- **No Moving Parts:** When moving parts move, they grind with each other due to friction and this makes the moving part to wear down. But the electronic ignition system does not have any of the moving parts. As all of the operations of this system is handled by solid-state electronics, it has a longer lifespan. This makes the system more preferable.
- **Operational Improvements:** It has one more advantage over a mechanically timed system as it does not need many factors for timing the spark plug activation. In this system, fuel and air mixture burnt at an optimal time.
- **Environmental Benefits:** It also possesses environmental benefits because of operational improvements. The clean-burning of air and fuel mixture makes the system less polluting.
- **Does not overload the engine combustion:** The electronic ignition system works electrically without power from the crankshaft and as a result, it does not overload the performance of the engine.

### Q7. What is Roots Blower?

A roots blower is a type of compressor that contains two rotors with a pair of lobes which rotates in an airtight casing. When these rotors rotate, it compresses the air present at atmospheric pressure and traps the air in a pocket. The lobes which are in rotary motion deliver this compressed air to the receiver. Subsequently, more and more air is delivered to the receiver which results in a high pressure in the receiver and then used at required pressure. These are mostly used as Vacuum Pumps in the industry.

### Q8. What is Steam-Turbine and Steam Engine?

**Steam turbine:** Steam turbine was invented by Charles Parsons in 1884. It is a device that uses the thermal energy (extracted from pressurized steam) to operate the work on a rotating output shaft.

**Steam Engine:** A steam engine is a device that uses the steam as its working fluid to do mechanical work. This steam works to push a piston back and forth inside a cylinder. And this pushing force is further converted into rotational force with the help of connecting rod and flywheel.

**Q9. What is entropic Exponent?**

**Q10. What is compression ratio for Diesel engines?**

Compression ratio for Diesel engines lies between **14:1 to 25:1**.

**Q11. How much Watt in 1hp?**

There are **745.7 Watt** in 1 hp.

**Q12. What Is Hess Law?**

Hess law or **Hess's law** of constant heat summation states that if any reaction has taken place in several steps, then the standard enthalpy reaction is equal to the sum of all intermediate reactions at the same temperature. It tells that Enthalpy change for a reaction is not dependent on the way a product is obtained if initial and final conditions both are the same. This law shows that Enthalpy is a state function.

**Q13. Define the term enthalpy?**

Enthalpy is a thermodynamic quantity which represents the total heat content of a system. It is defined as the addition of the internal energy and the product of the (pressure and volume) of a thermodynamic system. It is a state function and its value depends upon pressure, composition and temperature of the system.

In symbols,

$$\mathbf{H = E + PV}$$

Where **H** represents the **enthalpy**

**E** represents **Internal energy**

**Pressure (P)** and **Volume (V)**

#### Q14. Define Torque?

Torque is the amount of force to make an object rotate about an axis. Torque makes an object to acquire angular acceleration. As Torque is a vector quantity, its direction depends on the direction of a force.

#### Q15. What is a closed system?

In thermodynamics, the **Closed system** is a physical system that does not allow the transfer of matter throughout the boundary between system and surrounding. It only allows the energy to pass through this boundary. Example of a closed system is an air compressor.

#### Q16. Which law is used for exergy balance in Thermodynamics?

Both **First law** and **Second law** is used for exergy balance in Thermodynamics.

#### Q17. What is quasi-static process?

A **Quasi-static process** is a process that occurs infinitesimal slowly that every step in the system tends to remain in equilibrium. It is a reversible process. The quasi-Static process permits all adiabatic and isothermal processes to proceed very slowly.

#### Q18. What is a steady flow process?

In this process, fluid properties can change from one point to another at control volume. During this whole process, the fluid properties will remain constant at any fixed point. This process allows the transfer of matter and energy through the open system steadily. Steady flow has some characteristics that are given below: -

- In control volume, no properties of fluid changes with time  
 $M_{cv} = \text{constant}$   
 $E_{cv} = \text{constant}$
- The properties cannot be changed at an inlet or exit point during the whole process.
- Heat and work interactions will remain constant between a steady-flow system and its surrounding during this whole process.

#### Q19. What is unit of energy in S.I. units?

The S.I unit of energy is “**Joule**”.

**Q20. Explain Regnault's law?**

This law states that the specific heat of a gas is the same at constant pressure. It does not depend on the value of pressure. Regnault’s law is also known as Gay Lussac’s law. This law states that the pressure of a given mass of a gas is directly proportional to its absolute temperature at constant volume.

$$P_1/T_1 = P_2/T_2$$

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