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Mechanical Engineering Interview Questions and Answers

Practice here **Top Mechanical Engineering Interview Questions and Answers,** which are mostly asked during Job Interviews.

Q1. What is cooling tower?

A cooling tower is a specialized heat exchanger that reduces the water's temperature. It is done by mixing air and water. Due to this, a small amount of water is evaporated thereby reducing the water temperature in the tower. A cooling tower is used in petrochemicals, oil refineries, thermal power stations, chemical plants, and HVAC for cooling the building.

Types of the cooling tower are: -

- Natural draft
- Induced draft

Q2. List different types of loads?

The different types of loads that are considered during the designing of a building are:

1. **Dead Loads (DL):** The first type of load that is considered in the design of a structure is Dead load. Dead load occurs due to the weight of permanent partition walls, structural members, the weight of different materials, and fixed permanent equipment.
2. **Imposed load:** The imposed load is also known as the live load. It is the moving load without acceleration or having any impact. This load occurs on the building due to the load imposed by moving objects like furniture. Unlike dead loads, imposed loads are temporary loads and it changes from time to time.
3. **Wind loads:** As the name suggests, wind load is the load that occurs due to the air relative to the earth. It is usually horizontal and its calculation depends on the size of the building and the speed of the wind.
4. **Snow load:** Snow load occurs only in snow areas. This is the vertical load occurring on the roof or other part of the building above the roof where the snow accumulates.
5. **Earthquake load:** Earthquake load occurs due to the vibration caused by an earthquake and it constitutes both vertical and horizontal directions.

Q3. What is valve?

It is a device that is used to control the motion of the fluid through a pipe, inlet, outlet, etc. It can start, stop or

regulate the motion of fluid by a movable part.

Q4. What is a nozzle?

A nozzle is a tube or pipe that is designed to control the speed and direction of the fluid as it enters or exits the enclosed chamber

Q5. What is the expression of a polytropic process?

The polytropic process is the process that involves the transfer of heat and describes the compression and expansion of gas. The expression of the polytropic process can be defined by the mentioned equation

pVn = constant

P stands for pressure

V stands for volume and

n stands for a polytropic index where values range from 0 to ?.

Q6. What is enthalpy?

In thermodynamics, Enthalpy is measured as the sum of internal energy and the product of volume and pressure. It is a state function that has the dimension same as that of energy that is joule in S.I and ergs in c.g.s. Its value depends on the pressure, composition, and temperature of the system.

The equation to calculate enthalpy is: **H = E +P V**

Where **H** = enthalpy of the system

E represents internal energy

P represents the pressure and

V is volume.

Q7. Explain what is isometric drawing?

Isometric comes from the Greek word which means equal measure. Isometric drawing or isometric projection is a way of representing three-dimensional objects on a two-dimensional surface. One main characteristic of using isometric drawing is that the final image is not distorted in this case.

Many engineers, technical illustrators, architects used isometric drawing to draw the three-dimensional object.

Q8. What is caustic embrittlement?

Caustic embrittlement or stress corrosion cracking is a phenomenon that occurs in boilers. In these boilers, caustic substance accumulates due to the deposition of concentrated hydroxide at temperature 200°-250°C. In simple ways, caustic embrittlement is the cracking of riveted mild steel. The main focus of caustic embrittlement is on the stressed part of the boiler like bends, crack joint, and rivets.

Q9. What is shear force in fluid particle?

Shear force is defined as the resistance of one layer of fluid on another layer of fluid. It represents the viscosity of the fluid. The fluid with a bigger shear force has a higher viscosity. In comparison with the solid that can resist the shear force, liquids lack this and they flow under the action of the force. The cause of the shear force is the particle in fluid flowing relative to each other.

Q10. What is gutter and where it is used?

A **gutter** is a trough along the eaves to catch and carry off the water which is originated from the term Guttering which is a small thin trough that is used to collect run-off water from your roof. It is basically used to direct rainwater away from the base of the building which helps protect the foundation.

Q11. What is difference between fan and blowers?

Fan	Blowers
Fans do not focus on a particular area. It circulates the air through the entire room.	A blower circulates the air on a pointed area
Fan does not need to use high pressure to produce large amount of gas	Blower uses the high pressure to generate large amount of gas
Pressure ratio is usually below 1.1	Pressure ratio is usually from 1.1 to 1.2

Types of fans are

Axial flow fans.

Centrifugal fans.

Cross- flow fans.

It consists of motor and blades

Types of blowers are: -

Centrifugal blowers.

Positive-displacement blowers.

It consists of fan, inlet, out-let and outer cover

Q12. What is Auto Dosing?

Auto dosing is one of the features of the modern washing machine that automatically takes the detergent as much as loads of clothes require. In auto dosing, the machine guesses the weight of the load to give the best possible wash. This feature saves time, energy, and money.

Q13. What amount of heat energy loss in ESP?

A very huge amount of heat energy loss in **ESP**. It can be estimated by the amount of material used in the process and evaluating it with the formula of heat energy.

Q14. Explain the function of the strainer in IC engine?

For the better efficiency of the engine and quality of combustion, it is very important to have clean fuel. Fuel should be free of any solid contaminants and impurities. The process of removal of solid contaminants and impurities is called mechanical separation and this is performed with the help of a strainer and filters.

Q15. What is difference between enthalpy & entropy?

The differences between enthalpy & entropy:

Enthalpy	Entropy
It is the heat absorbed or evolved in a chemical reaction at constant pressure.	It is the thermal energy that is unavailable to convert to mechanical work.
It tells about the heat transfer.	It tells about the randomness of a system.
It is associated with the first law of thermodynamics.	It is connected with the second law of thermodynamics.
After the chemical reaction, it can be used to measure the energy difference	It can be used for measuring the degree of randomness after the reaction.
H(Enthalpy) = E+ PV	S(Entropy)= q/t

Q16. What is flange rating?

Flange rating is the maximum pressure a flange can withstand at increasing temperature. A flange with a higher rating is stronger in comparison with the flanges with a lower rating because they can withstand more pressure.

There are seven pressure ratings for a flange which are 150, 300, 400, 600, 900, 1500, and 2500.

Q17. What is vapour Lock?

In an internal combustion engine, vapour lock occurs when the liquid fuels convert to vapours or bubble before entering into the fuel rail or carburetor. This is a major problem because pumps are made for liquid, not for vapour.

Because of the excessive heat of the engine in hot weather or vehicles operating at high altitude, the boiling point of the fuel decreases and they become vapour.

As a result, the mentioned problem occurs: -

- Loss of fuel pressure (and flow)
- Loss of power
- Stalling
- Difficulty restarting the engine

Q18. What is moisture choking?

Moisture choking is basically a defect that arises due to moisture. In this, the system got choked due to access moisture and rusting processes.

Q19. What is Deriaz turbine?

The name Deriaz comes from its inventor Paul Deriaz. It is a Kaplan turbine including blades which makes the turbine more suitable for higher heads. The Deriaz turbine efficiently works at a range between 20 meters and 10 meters. Deraiz turbine has several advantages over another turbine as it has both fixed and adjustable blades. Servometer and operating mechanism help in adjusting the running blade according to load. This turbine can be used for various loads. In comparison with the Kaplan turbine, it has more efficiency and has higher cavitation coefficient. Last but not least, these turbines can even work for a reversible pump-turbine service.

Q20. What is Navier-stroke equation.

The Navier-stroke equation was proposed by French engineer and physicist Claude-Louis Navier and George-Gabriel Strokes. The Navier-Stroke equation is composed of a partial differential equation which tells about the motion of the viscous fluid.

This equation follows the law of conservation of mass and conservation of momentum. As it describes the motion of fluid it is also stated as Newton's second law of motion for fluids. For a compressible Newtonian fluid, this yields

$$\underbrace{\rho\left(\frac{\partial \mathbf{u}}{\partial t} + \mathbf{u}\cdot\nabla\mathbf{u}\right)}_{1} = \underbrace{-\nabla p}_{2} + \underbrace{\nabla\cdot\left(\mu(\nabla\mathbf{u} + (\nabla\mathbf{u})^T) - \frac{2}{3}\mu(\nabla\cdot\mathbf{u})\mathbf{I}\right)}_{3} + \underbrace{\mathbf{F}}_{4}$$

where **u** represent the fluid velocity

p is fluid pressure,

? is the fluid density and

? is the fluid dynamic viscosity.

Q21. What is quazi-crystal?

Quasicrystal, known as a quasi-periodic crystal is formed in a way between the amorphous solid and precise pattern of crystal. Its structure is ordered like a crystal but it is not periodic. A quasicrystal is formed from two separate structures. It fills all the void present in it and it doesn’t show translational symmetry.

Q22. What is Recuperator & Regenerators?

Regenerator is a heat exchanger where the heat is stored for a while. The heat from the hot fluid is stored in a thermal storage medium before transferring to the cold fluid. Hot and cold fluid pass through a single flow path.

Recuperator is also a heat exchanger used in power engineering to enhance the efficiency of the thermodynamics cycles. Unlike a regenerator, it has a separate flow path for each fluid. The transfer of heat takes place through the separating walls. Recuperator extracts the heat from the waste heat and transfers this to the compressed air. In this way, the air is preheated before entering the combustion chamber. As the air is heated, offsetting some of the fuel, the efficiency of the system improves.

Q23. What is slip ratio in thermal power plant?

In two-phase fluid flow, a slip ratio is used. It is defined as the velocity of the vapour phase divided by the velocity of the liquid phase. Slit ratio is unity when the bubble in the fluid just forms.

Slit ratio increases as a bubble in the fluid starts to collapse and form a larger bubble.

$$S = \frac{v_v}{v_l}$$

or

$$S = \frac{v_v}{v_l} = \frac{V_v.(1-\alpha)}{V_l.\alpha} = \frac{\rho_l.x.(1-\alpha)}{\rho_v.\alpha(1-x)}$$

where:

S – slip ratio, dimensionless
v – velocity, m/s
V – superficial velocity m/s
α – void fraction, dimensionless
ρ – density of a phase, kg/m^3
x – steam quality, dimensionless.

Q24. What is boiler mounting?

Boiler mountings are the component or special attachments that are mounted on the body of the boiler for better efficiency and safety. It helps in controlling the steam generation. Some mentioned components are important and mounted over the surface of the boiler:

- Water level indicator
- Pressure gauge

- Safety valve
- Steam Stop valve
- Blow off cock
- Feed check valve
- Fusible plug

Q25. What is fast breeder reactor?

A fast breeder reactor is a nuclear reactor which produces more fuel than they consume while generating power. In this way, they increase the efficiency of the sources. This process is done with the help of fast neutron

Q26. What are the anti friction bearings?

Antifriction bearing which is also recognized as rolling contact bearing is used to provide a low friction surface. It is used when little friction is required on rotating or sliding surfaces. These bearings are made up of races and elements. There are many benefits of using these bearings as they minimize the requirement of lubrication and also decrease starting and operating friction. As the friction is less, it requires less power to rotate the engine components and as a result, the output of the engine increases.

There are two types of anti-friction bearing

- Axial ball
- Roller bearing

Q27. What is damping ratio?

Damping ratio describes the oscillation in a system after decay. Many materials after disturbance from their static equilibrium show oscillatory behavior.

Damping ratio has no dimensions.

Q28. Where diamond pin locator is used?

In those cases where the rotation of the parts is not critical, but the central axes must be aligned, a diamond pin locator is used. It all takes to install three diamond pins on the center of the circle part with the contact surfaces aligned radially

Q29. Which process used for cutting thicker plates?

The laser cutting process is used for cutting thicker plates.

Q30. Explain von mises stresses.

Von Mises stress is a value used to determine if a given material will yield or fracture. The von Mises yield criterion states that if the von Mises stress of a material under load is equal or greater than the yield limit of the same material.

Q31. What is 6 stroke engine?

The **6 stroke engine** is an advanced version of an internal combustion engine which is consists of two external electric strokes. It is based on a four-stroke engine with an additional two electric strokes in order to make it more efficient and reduce emissions. It uses fresh air for the second suction or the fifth stroke.

Q32. What is the difference between fuel NOx and thermal NOx ?

Thermal NOx : Nitrogen and oxygen combine in the combustion air to form thermal NOx at high temperatures in a flame. The majority of the NOx formed during the combustion of gases and light oils is thermal NOx.

Fuel NOx: Whereas fuel combustion is formed by the combustion of oxygen in combustion air and nitrogen bound in fuel. Gaseous fuels do not create any serious problems but the oils containing fuel-bound nitrogen, and fuel NOx can go up to 50% of the total NOx.

Q33. What is radiosity?

It is defined as the radiant flux leaving through a particular area. It’s SI unit is the watt per square meter (W/m2)

Q34. What is microbial desulphurisation?

Microbial desulphurization is a process of removing sulfur from a mineral resource mixture such as crude oil with the help of free or immobilized microorganisms as their enzymes or cellular extracts, as catalysts to remove the sulfur from the fuels.

Q35. How to calculate the turbine efficiency?

The efficiency of any turbine can be defined as its ability to convert the input energy into output energy. It can be expressed in the form of the following equation:

- Efficiency (?) = Output / Input
- Efficiency (?) = Work Done / Input Kinetic Energy