

Mechanical Engineering Interview Questions and Answers

1. What is the difference between thermodynamics and heat transfer?

Thermodynamics" means the amount of energy in the form of heat or work done during a process. It measures energy only in the end states of equilibrium. It will not give information about how long it will take to reach the final state in equilibrium.

"Heat Transfer" refers to the rate of energy transfer. It determines how long a heat transfer will occur. Heat transfer deals with time. Heat can only transfer when there is a temperature gradient that exists in a body. This is an indication of nonequilibrium phenomena.

2. Why are most of the gas containers cylindrical in shape?

Gas containers are made mostly cylindrical in shape so that they can withstand high pressure. A cylinder with a domed top and bottom is quite cheaper than a sphere and has sufficient potential to withstand high internal gas pressure.

3. Explain the role of Nitrogen in welding.

Nitrogen in welding is used to prevent porosity. During welding, it prevents entry of oxygen and air into the fused metal.

4. Which gases can be used in place of nitrogen in welding?

Argon, Helium, or Carbon Dioxide can be used to replace Nitrogen during welding to prevent porosity.

5. What is a periscope?

Periscope is an optical instrument. Its function is to help in viewing objects which are above the level of sight. Periscope is used in submarines to keep a check on enemies or any other danger.

6. What is the cause of white smoke in two-stroke locomotive engines?

When the engine is running out of fuel, smoke comes out. This condition is harmful to the engine as it may result in overheating causing mechanical failure.

7. Can motor oil be used in a hydraulic system?

Motor oil can be used in a hydraulic system but it is not safe. Motor oil has lower sulfur content, and has tackifiers. These are harmful to seals and other components of the hydraulic system. Thus, hydraulic fluids are preferred.

8. Why airplanes made up of thicker paper fly farther?

Increase in the thickness of the paper increases its mass and potential energy. During motion, this potential energy transforms into kinetic energy. This kinetic energy provides a larger lift to the airplane. Larger lift causes it to fly farther.

9. Explain the difference between turbine and pump.

Turbine converts the flow energy present in the fluids into mechanical energy. Pump helps in changing the mechanical energy into flow energy.

10. What is the advantage of using a double pulley?

Using a double pulley reduces our efforts. It requires half the effort. It also moves the object to double the distance.

11. What is a Turboprop engine?

A turboprop engine is a gas turbine engine. It is used to power the propellers. It transforms thrust into rotational energy. This provides power to the propeller. It is highly reliable and efficient. It is used for aircrafts.

12. Name the different types of gate valves.

Parallel disk, Single disk, and wedge are the different types of gate valves.

13. Are the pneumatic system and the hydraulic system similar? Explain, how?

The mechanism of action of both these systems is similar. They use pressure to act on a given application. The gas used by the pneumatic system is nitrogen. The hydraulic system uses oil or water.

14. Can we see the pipes behind the wall?

Yes, we can see the pipes behind the wall by using radio waves.

15. What is the difference between a rocket motion and a projectile motion?

A rocket motion has a motor on it. This accelerates its motion. It also resists forces like gravity. There is no rocket on a projectile motion, All the momentum that is generated is absorbed by the body when it gets launched. An example of projectile motion is throwing a piece of chalk across a room.

16. Does stress produce strain or strain that produces stress?

The displacement of an object caused due to applied force is known as strain. Stress is the force that is applied per unit area. Both stress and strain are produced due to the force applied.

17. What is F.O.F in piping design?

FOF is defined as Face of Flange. It determines the exact dimensions of the flange . This avoids errors in measurement while laying vertical or horizontal pipelines.

18. What is extrusion?

The process of elongating a metal bar is known as extrusion . This is achieved by pulling it through a mandrel. It gives shape to the metal bar.

19. What are Newtonian fluids?

Newtonian Fluids possess a linear stress-strain relationship curve . They also pass through the origin. These types of fluids do not change due to the action of forces upon them.

20. What are the two conditions of perfect gas?

A perfect gas is one where there is minimal interaction between the molecules. For the gas molecules to move independently, the pressure should be low.

21. Why are galvanized pipes not used for steam lines?

The high temperature and pressure of the steam can flake off the zinc coating on the pipe. This flaked coating may clog the orifices which may cause an explosion. Thus galvanized pipes are not used for steam lines.

22. Why is tolerance analysis important for engineers?

Engineers use tolerance analysis for reducing costs and to avoid time-consuming iterations. It facilitates manufacturing. It is necessary to optimize tolerance as it determines how reliable the final piece will be.

23. What is mechanical refrigeration?

Mechanical refrigeration is a process in which heat is removed from the desired location using an artificial heat-exchange system. This can be either magnetic, cyclic, non-cyclic, or thermoelectric.

24. Why is the pneumatic system preferred over the hydraulic system?

Advantage of pneumatic systems is that they are cheaper than hydraulic systems. Pneumatics also move faster. They do not spill oil in case of any leakage.

25. What is the basic difference between a pipe and a tube?

The measurement of a pipe is based on its internal diameter . The measurement of a tube is done according its external diameter.

26. Define the exact meaning of machine and engine?

Machines can convert any type of energy to mechanical energy except the heat energy. In an engine, the heat energy will be converted to mechanical energy, so this is the major difference between a machine and an engine.

27. Explain about pump, turbine and justify the difference between pump and turbine?

Pump is an equipment which works on mechanical energy to transfer the fluids. Turbine is a device which transfers the flow energy of the fluids into the mechanical energy.

28. Main difference of positive displacement pump and centrifugal pump?

The flow rate in the positive displacement pump will not change and remains constant but in a centrifugal pump, the flow rate will vary with the head.

29. Explain the major difference of heat pump and heat engine?

Heat engine transfers energy from high temperature to low-temperature medium and produces work, but in the heat pump it transfers energy from low to high temperature medium and external work is required.

30. Let me know the difference between reaction turbine and impulse turbine?

In impulse turbine, it converts the total amount of pressure energy to kinetic energy. For the reaction turbine it converts some division of pressure energy into kinetic energy and remaining as same as pressure energy.

31. Gear ratio means?

It is defined as the ratio between the number of revolutions of the pinion gear by idler gear one revolution.

32. Exact difference of a machine and a mechanism?

A mechanism is a kinematics chain forming with number of links. The purpose of the mechanism is to transfer or transmit or modify motion.

A machine which deals with a mechanism with energies and forces to be transmitted and apply to modify mechanical work.

33. Pump efficiency factors?

Basically the efficiency of the pump is depends on speed, size and proportions of the impeller and casing.

34. Major losses of centrifugal pump?

Three major losses of centrifugal pump is friction losses, power losses, Eddie's losses

35. What is cavitation damage?

In pumps and pipelines the pressure drops below the vapour pressure and evaporates rapidly in various regions. This process is called cavitation. The damage that occurs in the cavitation by vapour bubbles is called cavitation damage.

36. How to avoid cavitation?

To avoid cavitation carefully design the operating speed and suction lift

1. Explain What is Ferrite?

Ans: Ferrite is a material of magnetic iron rock

2. The Second Law Of Thermodynamics Explanation?

Ans: The entropy of the universe changes over time and reaches towards a maximum value.

3. Gear Ratio definition ?

Ans: It is the ratio of the count of revolutions of the pinion gear to one revolution of the idler gear.

4. Annealing Means?

Ans: It is the method of heating a material above the recrystallization temperature and cooling after a specific interval period. This increases the strength of the material.

5. A Uniformly Distributed Load Question and Answer?

Ans: It is a load which is spread over a beam in such a way that each unit length is loaded the same level of extent.

6. Representative Elementary Volume question?

Ans: Smallest volume over which measurements can be made and that will yield a representative of the whole.

7. Reason of LNG pipes curved?

Ans: LNG pipes are curved because LNG is a condensed gas and it can expand to extent level, that's why engineers designed it curved.

Q. List out the various types of Fits and explain it?

A. There are three types of fits and they are:

1. clearance Fit
2. Interference Fit
3. Transition Fit

- **Clearance Fit:** This category is characterized by the occurrence of a clearance between two mating parts. The variation between the Minimum size of the hole and the maximum size of the shaft is known as Minimum clearance. and the other one which varies the difference between the maximum size of the hole and the minimum size of the shaft.

- **Interference Fit:** In this mating parts are predefined so that interference between them always occurs.
- **Transition Fit:** In this Fit, its mating parts sized limited to allow clearance or interference.

Q. Tell me the Factors which affects the factor of safety selection:

A. There are various points must be taken into consideration and they are:

- Applied Load reliability
- Localized (limit of Stresses)
- loss of property and life in case of failures.
- properties of the material which is used for the machine.
- Extent to which the assumptions can be solved
- The intrinsic properties over the service time period.



Q. What is meant by Heat Treatment?

A. Heat Treatment is nothing but an operation which was performed in heating / Cooling of a Metal / Alloy. To change the size of the grain and also provides better resistance to heat, corrosion etc.

Mainly this heat treatment is generally used in Normalizing, Annealing, Hardening, Case hardening etc.

Q. List out some rules while designing castings?

A. Fillets must be avoided for frequent use.

- Avoid the abrupt changes.
- Casting must be very simple because simplicity is the only key.
- Ribs and webs used for stiffening.
- Curved shapes used to develop the stress handling.

Q. Assumptions which was made in the simple theory of bending?

A. The Assumptions are:

- The beam is a homogeneous material which is uniform density, strength and also having isotropic.

- The beam is straight and unstressed while initial stage.
- The beam layer can contract longitudinally and expand laterally.
- It was very large while compared with a cross-sectional dimension of the beam.

Q. What type of materials used for manufacturing the shafts?

A. High index of strength

- Machinability with high level.
- Very low notch sensitivity factor.
- The material should have to wear resistant properties along with good heat treatment.
- The shafts are created by the hot rolling method which was finally the shaft is completed using grinding processes.

Q. Explain briefly about different types of springs?

A. springs are classified into various types, they are:

- Helical springs: In this spring they are another two types: **Compression helical spring and Tension helical spring.**
- conical and volute springs
- Torsion Springs
- Leaf springs
- Disc springs
- Special purpose springs.

Q. Define Hess law?

A. The energy transfer is simply independent of the way being followed. the product of the whole process is the same amount of energy will be absorbed.