

Fundamentals of Mechanical Lab

Subject overview:

'Fundamentals of mechanical engineering' is core subject for all engineering students and foundation subject for mechanical engineering students. The knowledge of subject is necessary for understanding the concept and principles which leads to design process and ultimately manufacturing in practice. Various applications of the same give idea about complex and high quality mechanical design used in day to day life.



Boiler:

Boiler is a closed vessel in which heat produced by the combustion of fuel is utilized to produce steam from water, at desire temperature and pressure. Boiler is used for driving prime movers like steam turbine which ultimately leads to the power generation. It is also used for industrial purpose like process heating.





Internal Combustion Engine:

Engine refers to a device which transforms one form of energy into other form. Heat engine is a modified form of engine used for transforming chemical energy of fuel into thermal energy and subsequently for producing work. Heat engine further classified based on where the combustion of fuel takes place. i.e. Internal combustion engine and External combustion engine. 2 stroke and 4 stroke petrol and diesel engines are recently used in mopeds, bikes, cars as well as heavy transport vehicles.

Gear Drives:

Gear drive is important in mechanical power transmission. Gear drive is used when larger or moderate power is to be transmitted at constant velocity ratio. Gear drive is positive drive. Gear is a toothed wheel with teeth cut on the periphery of the cylinder or cone. Gears are mounted on the shaft. Driving gear rotates the driven gear in opposite direction. Gears can convert rotary motion into reciprocating or angular direction. Gears are used in automobiles to transmit power.



Clutch:

Clutch is used to transmit the power from driving shaft to driven shaft of machine which may be required to start or stop frequently. It is so designed that the shafts may be engage or disengages whenever required either by a hand operated device or automatically by the action of some power driven devices. Clutch is used in automobile vehicles while shifting the gears.

Coupling:

Couplings are power transmission elements. It is used for transmitting power from one shaft to another. Shafts are available in limited length. To get a greater length, it is necessary to joint two or more pieces of shaft using coupling. Coupling reduces transmission of shocks from one shaft to another. It allows misalignment of shaft for mechanical flexibility and protects against overloads.

**Brake:**

A brake is a mechanical device which produces frictional resistant against moving machine member, in order to slow down or stops the motion of machine. In the process of performing this function, the brake absorbs kinetic energy (in automobile brake) of moving member and brake absorb potential energy of lowering member (in hoist or elevator brake). The energy absorbed by the brake is released in form of heat. Brake is used in all kind of automobile vehicles.

**Pulleys:**

Pulleys are used to transmit power from one shaft to another shaft with the help of belt or rope running over them. Pulleys are made from cast iron, cast steel, Aluminum. Sometimes pulleys are made from non-metals like wood, nylon, plastics, fibers etc. Pulleys are used in machineries and electric appliances.



**Pump:**

The pump is mechanical device which conveys liquid from one place to another place. It can be define as hydraulic machines which convert the mechanical energy in to hydraulic energy. Pump is power absorbing machine. Power can be taken from prime mover like electric motor or turbine. Pumps are used in agriculture as well as in chemical process industry.

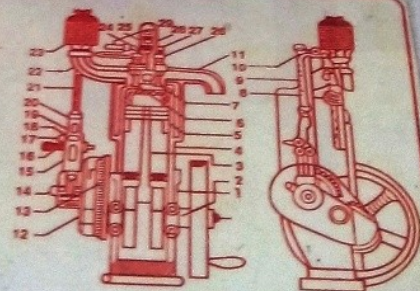






**Demonstration Model
4-STROKE
DIESEL ENGINE**

- | | |
|---------------------------------------|------------------------|
| 1. Crank Case | 15. Injection Pump |
| 2. Crank Shaft | 16. Governor Spindle |
| 3. Connecting Rod | 17. Supply Tube |
| 4. Cylinder | 18. Pump Cylinder |
| 5. Piston | 19. Pump Piston |
| 6. Inlet Valve | 20. Pressure Valve |
| 7. Outlet Valve | 21. Delivery Pipe |
| 8. Piston Shaft | 22. Suction Tube |
| 9. Glow Candle | 23. Air Filter |
| 10. Swing Lever | 24. Injection Nozzle |
| 11. Exhaust Pipe | 25. Nozzle Body |
| 12. Gear Wheel for
Cam Shaft Drive | 26. Nozzle Needle |
| 13. Cam Shaft | 27. Pressure-Bolt |
| 14. Gear Wheel | 28. Pressure Gasket |
| 15. Cam Shaft | 29. Leakage Oil Return |



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