EXPERIMENT NO. 6

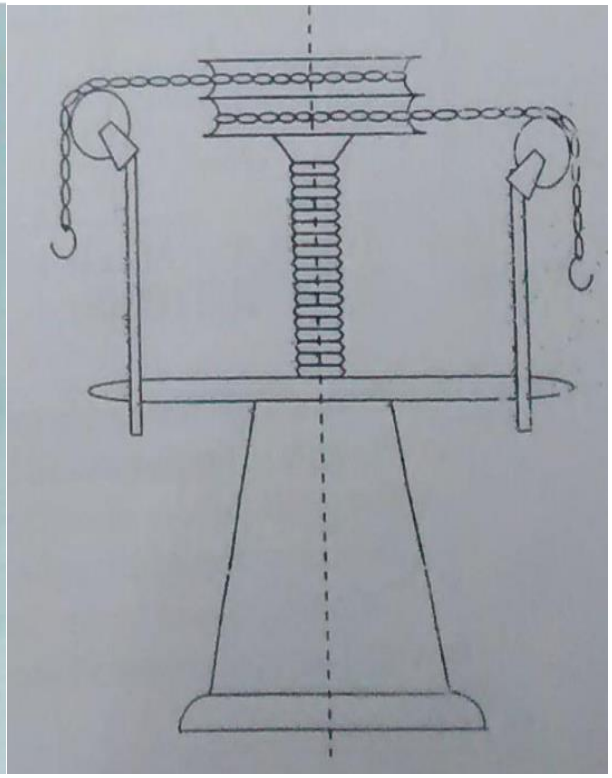
Practical Name: Simple Screw Jack

AIM:

To find the Mechanical Advantage, Velocity Ratio and Efficiency of Simple Screw-Jack.

APPARATUS REQUIRED:

Simple screw jack, Load to be lifted (W), Weights or Effort to be applied (P), Vernier caliper, Pan, Weight box.



THEORY:

Screw Jack

- It is a device used for lifting heavy loads which are usually centrally loaded by applying smaller effort.
- It works on the principle of inclined plane. The device consists of a nut and screw. The load is carried by screw head. The body consisting of a nut is fixed and screw is rotated by means of a lever.
- The axial distance moved by the screw when it makes one complete revolution is known as the Lead of the screw. The distance between two consecutive threads is called Pitch of the screw.
- For single threaded screw Lead = Pitch, and for double threaded screw L = 2p

Mechanical Advantage

It is the ratio of weight lifted to effort applied. M.A. = W/ P

Velocity Ratio

It is the ratio of distance moved by the effort (y) to the distance moved by the load (x). V.R. = y/ x

In one complete revolution of the lever by effort P:

Distance traveled by effort = $2 \pi R$

And, distance traveled by the load = p

Therefore, Velocity Ratio = $2 \pi R / p$

Mechanical efficiency =M.A/V.R

i) **Parts of machine:** Simple screw jack fitted with nut

ii) **Working of machine:** Screw jack fitted with a nut works on the principle similar to as that of an inclined plane. If screw is rotated by application of an effort applied at one end of pulley, load kept on load table will be lifted.

iii) Take care, whether the string is properly wound on the circular disc or not.

iv) Different loads are applied and corresponding efforts are recorded.

v) To keep the friction constant, readings are taken at particular point.

vi) Calculation for V.R. and efficiency is done.

PROCEDURE:

1. Note down the pitch 'p' of the screw.
2. Measure the circumference of the flanged table with an inextensible thread and meter scale or measure the diameter of flanged table with the help of outside caliper.
3. Wrap the string around the circumference of the flanged table and pass it over one pulley. Similarly, wrap another string over the circumference of flanged table and take it over the second pulley. The free ends of both the strings be tied to two pans/hanger in which the weights are placed/hanged.
4. Place a load 'W' on the top of the flanged table and start adding weights on to the pans gradually till the load starts lifting. P1 and P2 are the weights (effort) in the pans.
5. Calculate M.A, V.R and % Efficiency.
6. Repeat the above procedure by increasing the load on flanged table and note down the corresponding efforts applied.

OBSERVATIONS:

Let, Load Lifted = W

Effort Applied = P

Effort Wheel Diameter (D) =

Diameter of the rope (d) =

Pitch of the screw (p) =

No. of teeth on the gear (N) =

Weight of the Pan (w) =

SR.NO	W(kg)	P(kg)	M.A=W/P	V.R=2ΠR/p	%ή=M.A/V.R*100

Conclusion:

i. Efficiency of machine is less than 50%, the machine is irreversible.

ii. VR of machine remains constant.

iii. Efficiency of machine increases with load in the beginning and then remains constant.

iv. The graph line indicates a linear motion.

v. As load on machine increases, the effort required to lift also increases

RESULT:

i. V.R. of machine =

ii. Efficiency of machine = M.A. /V.R.