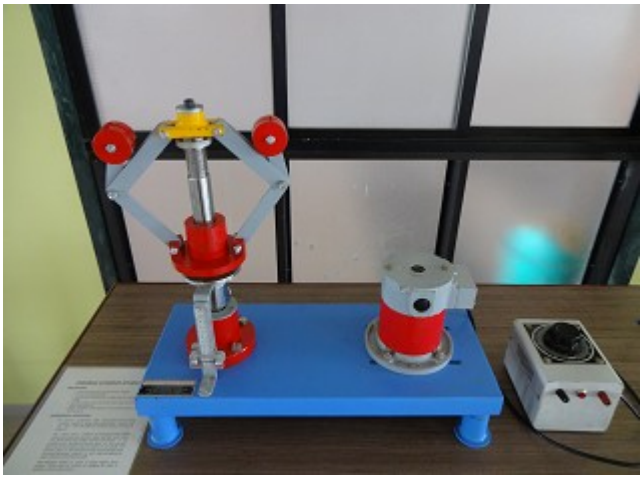
Kinematics and Dynamics of Machine Laboratory

Subject overview:

Kinematics deals with the relative motion between the parts, neglecting the forces which act on them. Dynamics of machinedeals with the forces acting on the different parts of the mechanism. The forces can be either static or dynamic. Also kinetics is the study of forces when the body is in motion, whereas statics deals with forces when the body is stationary. The important area of dynamics are balancing, vibrations, whirling and other basic principles of applied mechanics which are fully covered using this range of products. This laboratory contains equipments both in the form of working and non-working models through which the students are able to synergies theory and practical skills.

Universal Governor Apparatus:

The function of the governor is to regulate the mean speed of an engine, when there is a variation of loads. If the load on the shaft increases, the speed of the engine decreases unless the supply of fuel is increased by opening the throttle valve. On the other hand, if the load on the shaft decreases, the speed of the engine increases unless the fuel supply is decreased by closing the valve sufficiently to slow the engine to its original speed.



Epicyclic Gear Train Apparatus:

A gear train is a combination of gears used to transmit motion from one shaft to another. It becomes necessary when it is required to obtain large speed reduction. In epicyclic gear train, the axes of some of the wheels are not fixed but rotate around the axes of other wheels with which they mesh. Epicyclic gear trains are useful to transmit very high velocity ratios with gears of smaller sizes in lesser space.

Static & Dynamic Balancing Apparatus:

A system of rotating masses is said to be in static balance if the combined mass centre of the system lies on the axis of rotation. When several masses rotate in different planes, the centrifugal forces, in addition to being out of balance, also form couples. A system of rotating masses is in dynamic balance when there does not exist any resultant centrifugal force as well as resultant couple.

Motorised Gyroscope Apparatus:

This device consisting of a spinning mass, typically a disk or wheel, mounted on a base so that its axis can turn freely in one or more directions and thereby maintain its orientation regardless of any movement of the base. If the axis of the spinning or rotating body is given an angular motion about an axis perpendicular to the axis of the spin, an angular acceleration acts on the body about the third perpendicular axis. The torque required to produce the acceleration is known as active gyroscopic torque. The reactive gyroscopic torque or

couple also acts similar to the concept of centripetal and centrifugal forces on a body.

Cam Analysis Machine:

A cam is a mechanical member used to impart desired motion to a follower by direct contact. The cam may be rotating or reciprocating whereas the follower may be rotating, reciprocating or oscillating. Complicated output motions which are otherwise difficult to achieve can easily be produced with the help of cams. Cams are widely used in automatic machines, internal combustion engines machine tools and so on.

Corioli's Component Of Acceleration:

It is designed to study & determine Corioli's Component of Acceleration of a slider crank mechanism, theoretically and experimentally. It is seen that the acceleration of a moving point relative to a fixed body may have two components of acceleration; the centripetal and the tangential. To determine Corioli's component of acceleration, the unit uses hydraulic analogy to represent the rotating slider.

Whirling of Shaft Apparatus:

The rotational speed at which a shaft tends to bow out is called a whirling or whipping or critical speed of the shaft. The apparatus is used to determine the critical speed of the rotating shaft and its theoretical verification. With the help of this experiment an observation of whirl form as well as the observation of self-excited motion (vibration) is also done.

Universal Vibration Test Rig:

Universal Vibration Test Rig. Is used for conducting various experiments such as single pendulum, compound pendulum, bifilar suspension for determination of M.I., spring mass system with damped vibrations and others. A universal frame is provided upon which quick and easy assembly of various experiments can be done. The students can easily assemble the experiments and study the theory of vibrations practically.