



# यंत्र गतिकी प्रयोगशाला Dynamics of Machines Lab

## Major Equipments:

- Epicyclic Gear Train & Bobbing Bar Free Motion.
- Spur and Bevel Gear Model.
- Slider Crank Motion model.
- Cam Apparatus with four Cams.
- AM-10 Dynamic Balancing Machine.
- Governor Models.
- Belt Transmission Dynamometer (fabricated in w/s).
- Hydraulic Brake unit.
- Mechanical Brake system.
- All bearing models.
- Models of Brakes.
- Models of Clutches.
- Air brake actual working.
- Whirling of shaft apparatus with dimmer.
- Static and dynamic balancing machine apparatus.
- Gyroscope motorized apparatus with dimmer.
- Journal bearing apparatus with dimmer.
- Set of 55 in one training module.



### In Charge

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# यंत्र गतिकी प्रयोगशाला *Dynamics of Machines Lab*

## **SAFETY AND SECURITY RULES TO BE FOLLOWED IN LABORATORY:**

1. Always wear shoes before entering in the lab.
2. Do not touch anything without the permission of instructor/ lab assistant.
3. Read carefully the lab manual before performing experiments.
4. Do not tamper measuring instruments.
5. Do not open the casing of the equipment.
6. Switch off the power supply to the experimental setup on completion of the experiment.
7. Maintain clean and orderly laboratories and work area.
8. Be aware of the various experiment controls (start button, stop button, speed control) for each experiments.
9. Do not leave experiments running unattended.
10. Any injuries should be reported immediately for proper care.

## **GENERAL INSTRUCTIONS**

1. Enter in lab with closed footwear.
2. Boys should tuck in the shirts.
3. Long hair should be protected, let it not be loose specially near rotating machineries.
4. Any other machines/ equipments should not be operated other than the prescribed one for that day.
5. Power supply to your test table should be obtained only through the lab technician/ instructor.
6. Read carefully the lab manual before performing experiments.
7. Do not lean and do not be close to the rotating components.
8. Tools, apparatus and gauge sets are to be returned before leaving the laboratory.
9. Headings and detail should be neatly written:
  - (i) Aim of the Experiment.
  - (ii) Apparatus/Tools/Instruments Required.
  - (iii) Procedure / Theory / Algorithm/ Program.
  - (iv) Model Calculations.
  - (v) Neat Diagram/ Flowcharts.
  - (vi) Specification / Design Details.
  - (vii) Tabulation.
  - (viii) Graph.
  - (ix) Result / Discussions.
10. Before doing the experiment, the student should get the circuit/ program approval by the faculty in charge.
11. Experiment date should be written in the appropriate place.
12. After completing the experiments the answer to the viva voice questions should be neatly written in the workbook.



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## LIST OF EXPERIMENTS:

### Theory of Machines – I (190401/120303)

1. Study of kinematic links, pairs and chains
2. To find degree of freedom of a given mechanism
3. Study of inversions of slider crank chain and double slider cranks chain
4. Verification of Grashof's law by plotting all inversions of four bar Mechanism.
5. To find velocity and acceleration of a given mechanism.
6. Study of inertia forces in reciprocating parts and analysis of flywheel
7. Experimental investigation of the Characteristics of various type of Governor.
8. Study of various types of clutches.
9. Study of various types of brakes.
10. Study of various types of dynamometers.
11. Study of the Principles of Gyroscope and Verification of the Equation of Gyroscopic Couple.

Experiment No. 12 & 13

Virtual Lab: Perform any two experiments through virtual lab:

1. Velocity analysis of slider C.M.: <http://mm-nitk.vlabs.ac.in/exp8/index.html>
2. Acceleration analysis slider C. M.: <http://mm-nitk.vlabs.ac.in/exp9/index.html>
3. Slider crank mechanism: <http://mm-nitk.vlabs.ac.in/exp7/index.html>
4. Crank and slotted mechanism: <http://mm-nitk.vlabs.ac.in/exp29/index.html>

### Theory of Machines – II (190504/120401)

1. To study gears and law of gearing.
2. To determine the different parameters and terms of given gears.
3. To study and determine gear ratios of different types of gear trains.
4. To find the velocity ratios of epicyclic gear train and differential.
5. To study the balancing of rotating masses lies in same and different planes.
6. To draw cam profiles of a given various cam profiles.
7. To study cam and follower and also write problem of a given cam apparatus.
8. To Study Chebyshev Straight Line Mechanism.

Virtual Lab:

## *Dynamics of Machines Lab*

*Experiment No. 9 & 10, Perform any two experiments from the syllabus through Virtual Lab.*

1. Elliptical CAM mechanism: <http://mm-nitk.vlabs.ac.in/exp28/index.html#>
2. Eccentric CAM mechanism: <http://mm-nitk.vlabs.ac.in/exp20/index.html>
3. Chevishev Mechnism: <http://vlabs.iitb.ac.in/vlabs-dev/labs/asmlab/labs/exp10/theory.php>