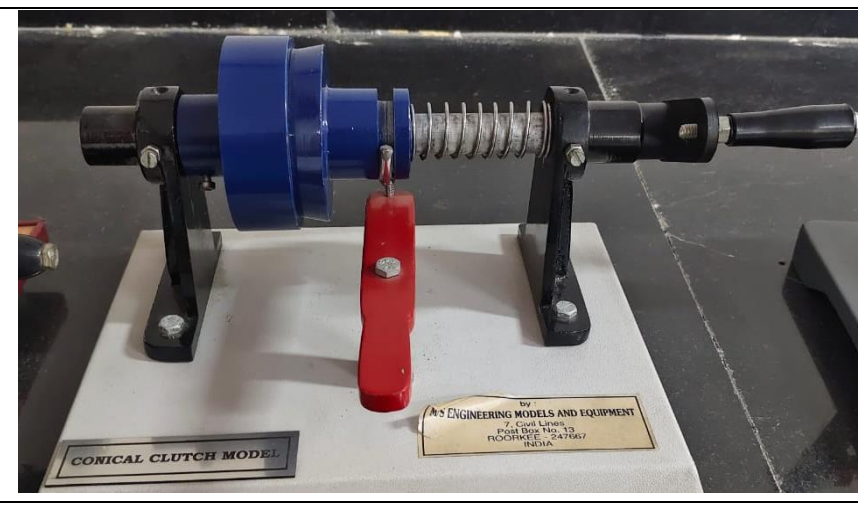
# THEORY OF MACHINES LABORATORY

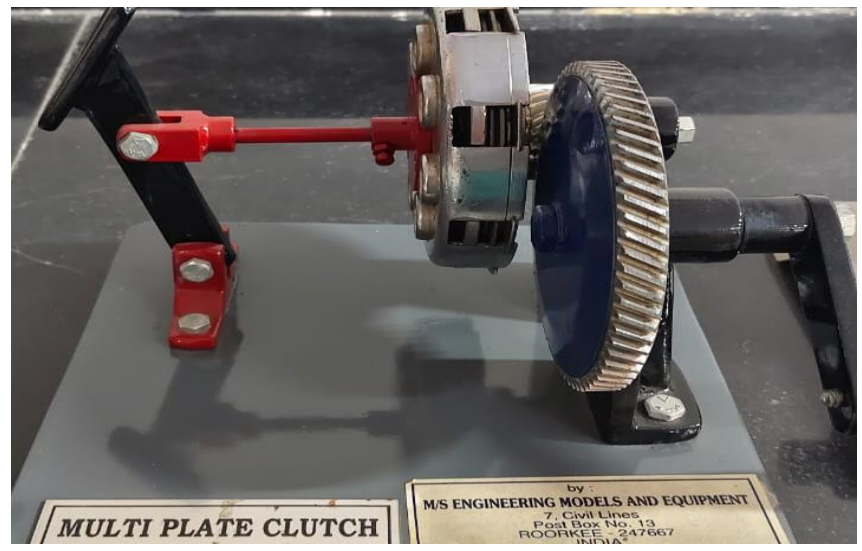
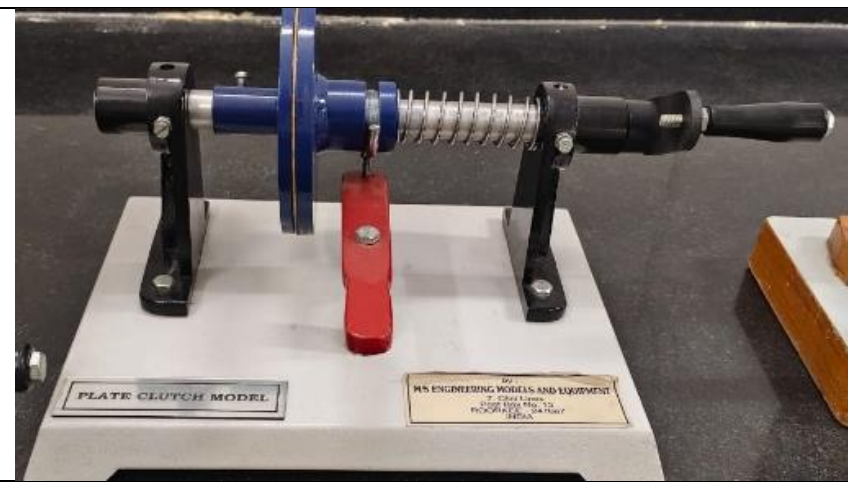
## DEPARTMENT OF MECHANICAL ENGINEERING

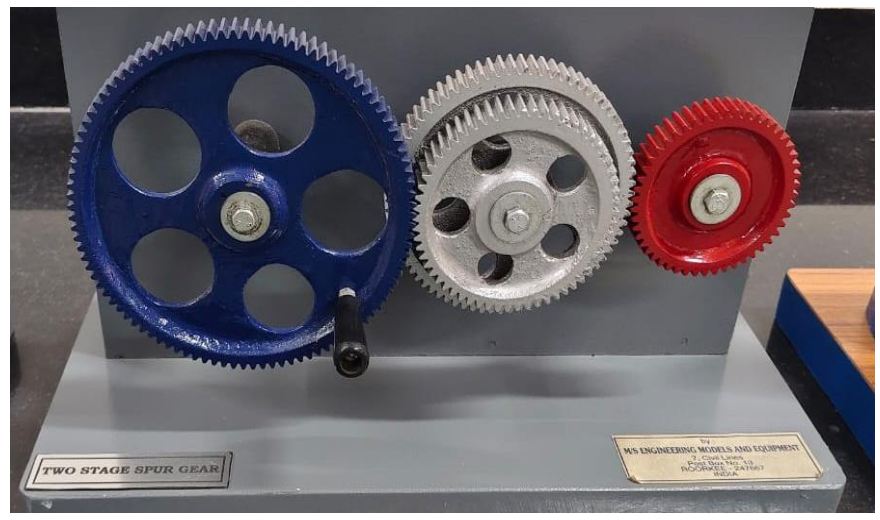
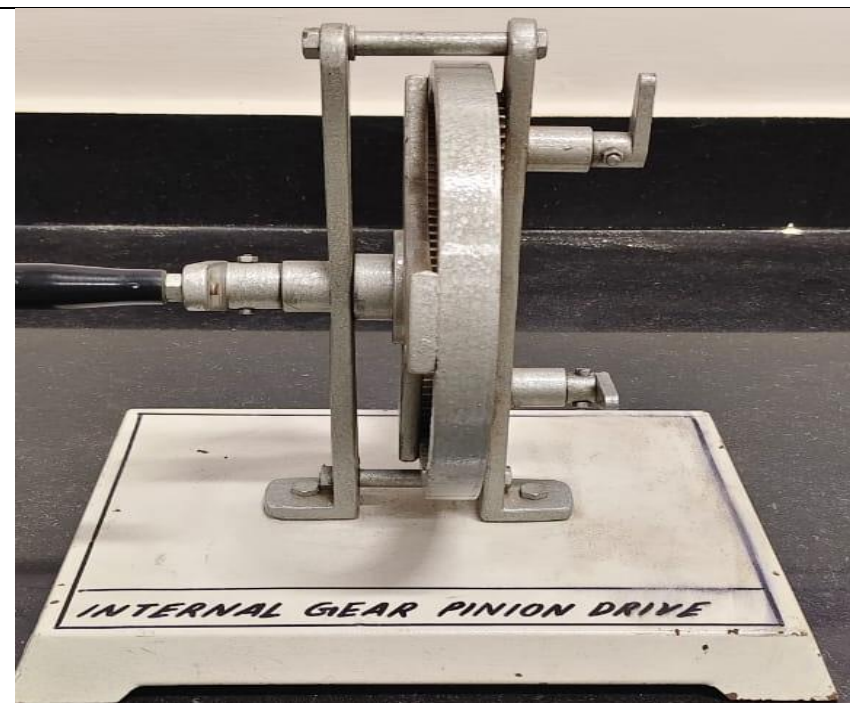
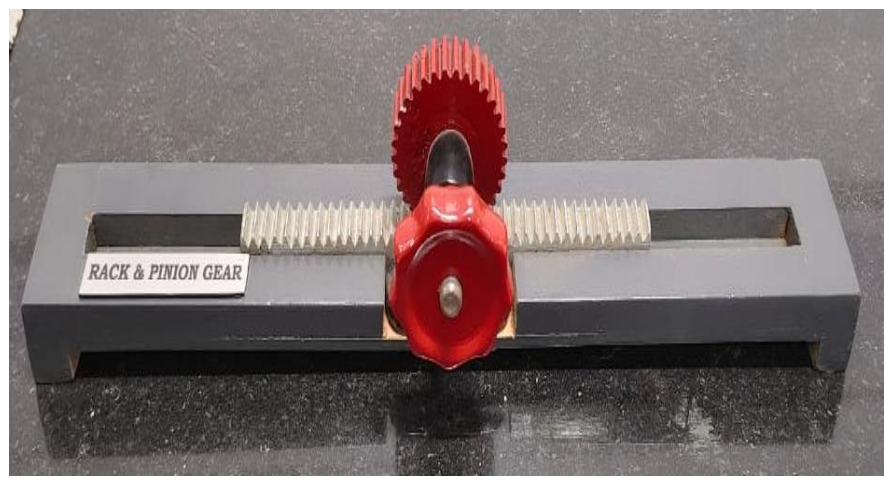
## COLLEGE OF TECHNOLOGY

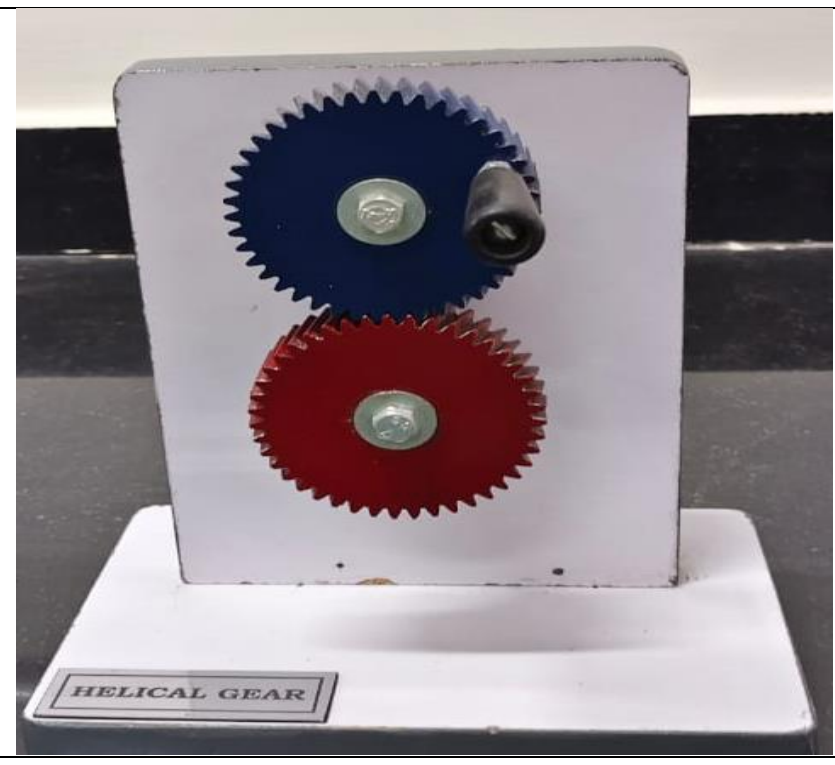
**Sardar Vallabhbhai Patel University of Agriculture & Technology Meerut 250110 (UP)**

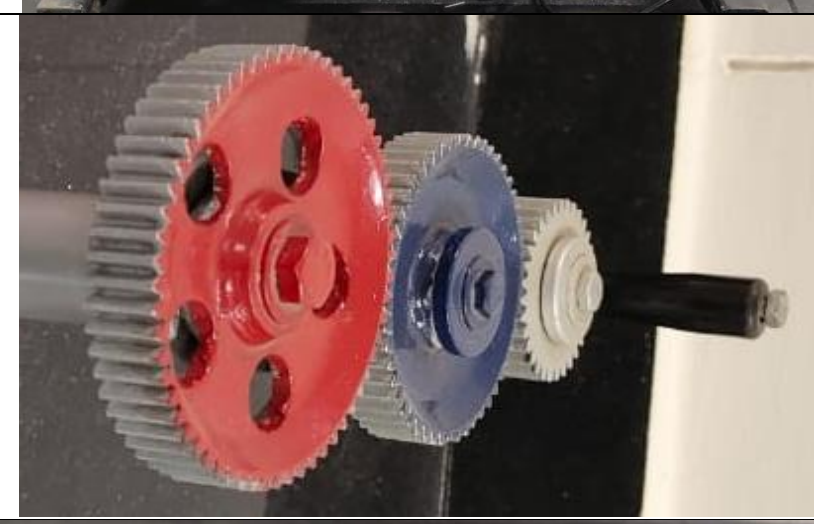
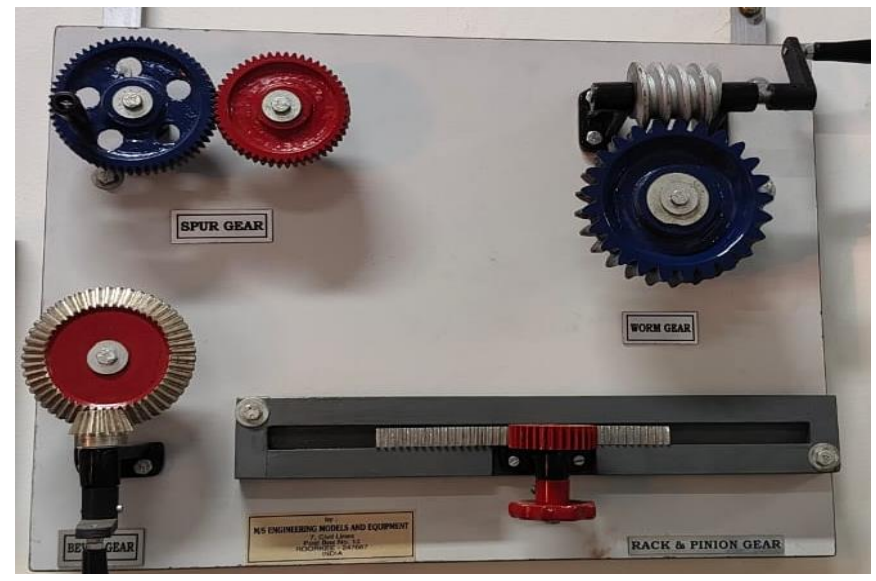
# List of Equipment

| Sr. No. | NAME OF EQUIPMENT | TECHNICAL SPECIFICATIONS | PICTURE OF EQUIPMENT/MODEL/DEVICE |
|---|---|---|---|
| 1. | Epicyclic Gear Train Apparatus | Motor driven with all accessories to measure holding torque |   |
| 2. | Centrifugal Clutch | Model consists of a drum pulley mounted on the output shaft. The input shaft carrying spring controlled fly weights. The working can be demonstrated by rotating the input shaft provided with crank handle. The output shaft rotates with clutch action |   |
| 3. | Claw Clutch | Model is having a sliding groove. A metallic model mounted on base with operating lever |   |
| 4. | Cone Clutch | Model is having sliding groove. A metallic model mounted on base with operating lever. |   |

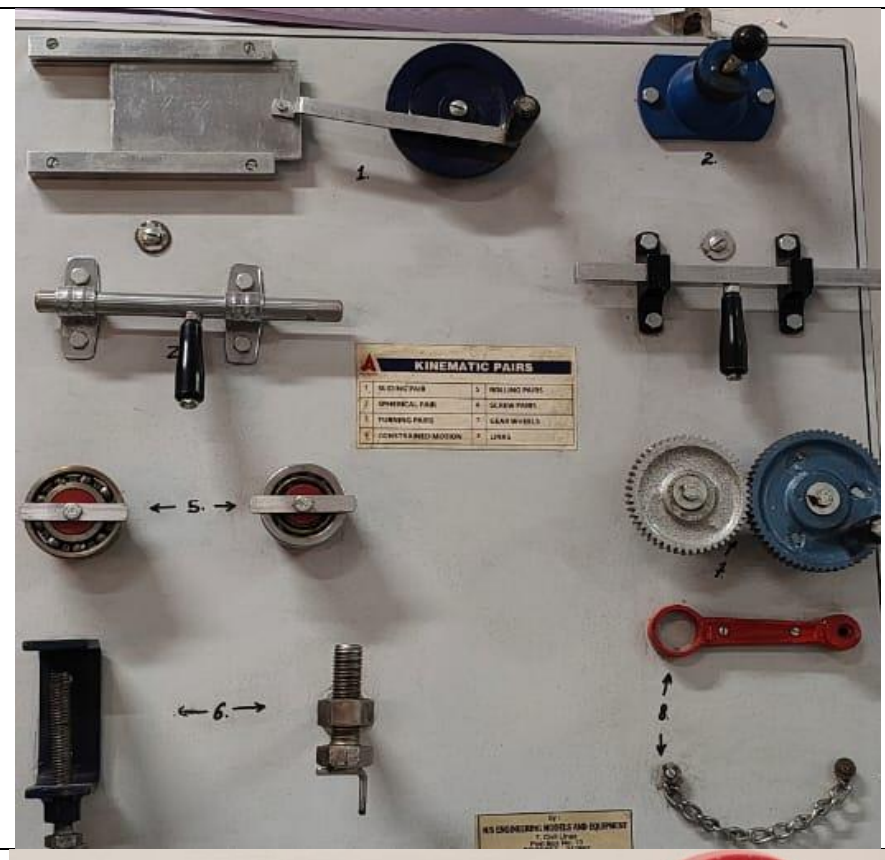
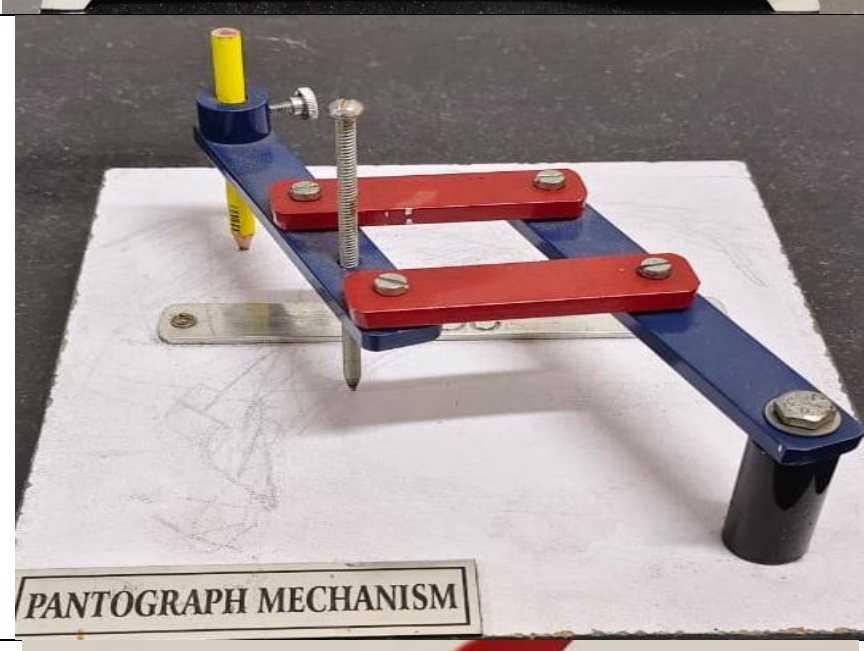
| | | | |
|---|---|---|---|
| 5. | Multi Plate Clutch | A metallic model mounted arrangement |  |
| 6. | Single Plate Clutch | A metallic model, mounted on base with operating lever |  |
| 7. | Universal Governor Apparatus | Determination of characteristic curve of governor (spindle) speed against sleeve displacement.<br>To study the effect of varying the mass of the center sleeve in Porter and Proell governor<br>To study the effect of varying the initial spring compression in Hartnell Governor<br>To study the determination of characteristic curves of radius of rotation against controlling force.<br>• Drive Unit: DC Motor ¼ HP 0-1500 RPM 220 V.<br>• Speed Control: Single phase AC 230 V Motor |  |
| 8. | Single Stage Spur Gears (Simple Train of Gear) | Model is having teeth parallel to the axis of gears. The model is mounted on a wooden board. |  |
| 9. | Single Stage Spur Gears with Intermediate Gear | The model is mounted on a wooden board. |  |

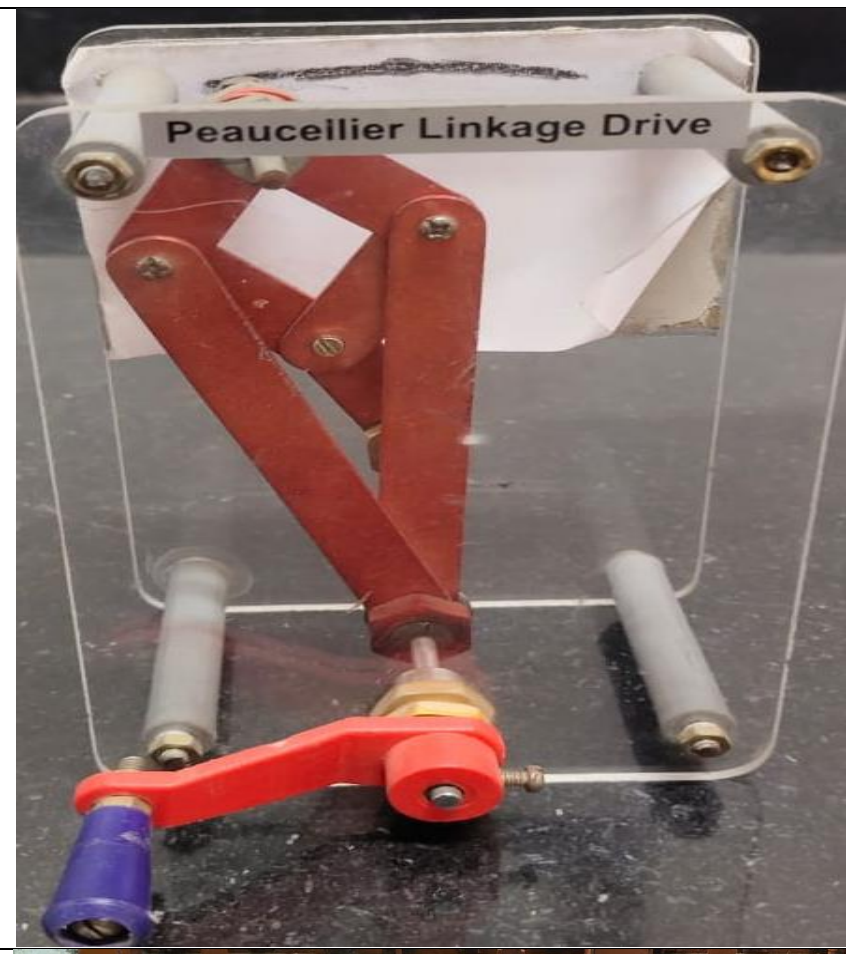
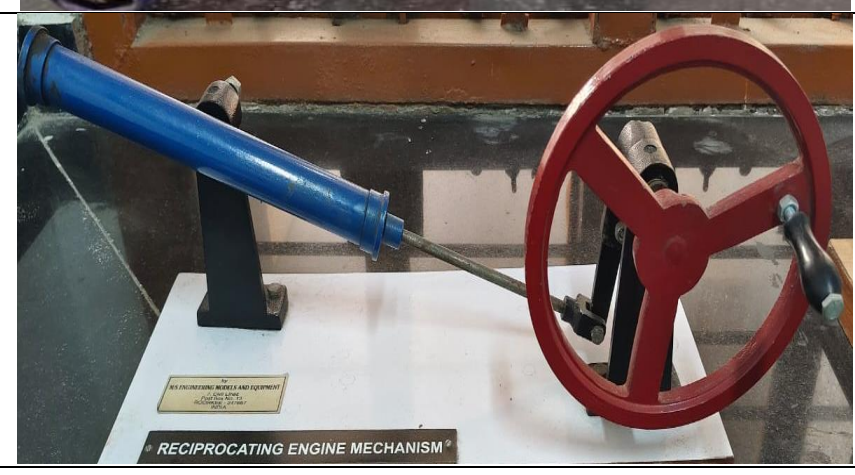
| | | | |
|---|---|---|---|
| 10. | Two Stage Spur Gears (Compound Train of Gears) | The model is mounted on a wooden board. |  |
| 11. | Three Stage Spur Gears (Compound Train of Gears) | The model is mounted on a wooden board. |  |
| 12. | Internal Gear with Pinion Drive | The model is mounted on a wooden board. |  |
| 13 | Spur Rack and Pinion | The model is mounted on a wooden board |  |
| 14. | Bevel Gears | Single Stage Bevel Gear. The model is mounted on a wooden board |  |

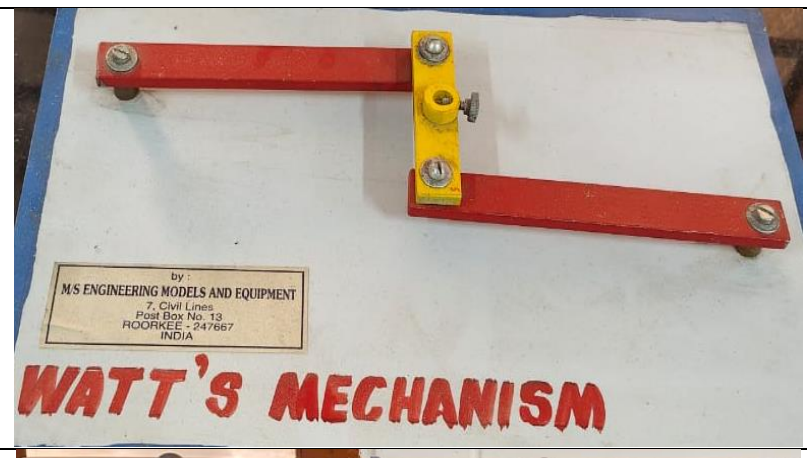
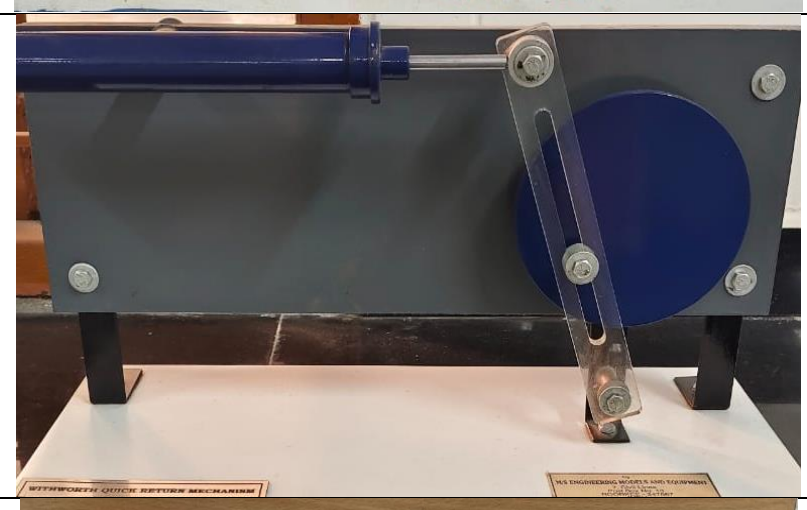
| | | | |
|---|---|---|---|
| 15. | Single Stage Helical Gear | The model is mounted on a wooden board. |  |
| 16 | Double Stage Helical Gear (Herringbone Gear) | The model is mounted on a wooden board. |  |
| 17. | Single Stage Spiral Gears | The model is mounted on a wooden board. |  |
| 18. | Worm Gear | The model is mounted on a wooden board. |  |

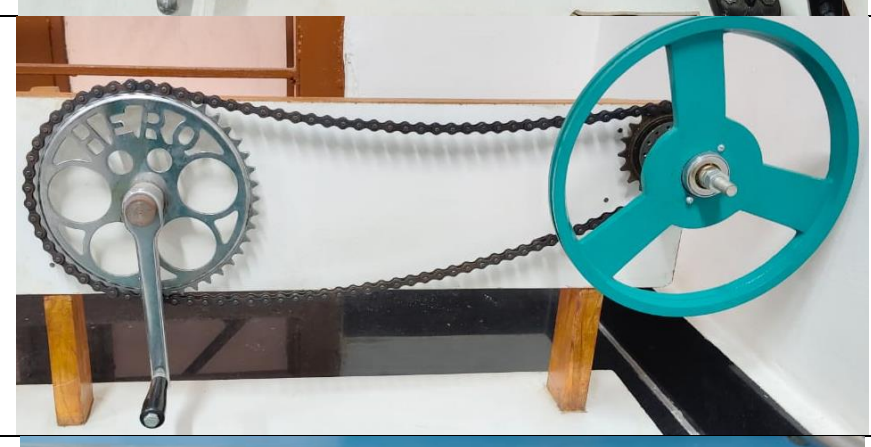
| | | | |
|---|---|---|---|
| 19. | Train of Gear Wheels (Sets) | This will be consisting of<br>(a) Gear train apparatus with adjustable reference pointer<br>(b) Set of 4 gears having the following number of teeth: 50 teeth, 100 teeth, 60 teeth and 75 teeth |  |
| 20. | Epicyclic Gear | Model consists of three gears and a train arm. The model is mounted on a wooden board. |  |
| 21. | Epicyclic Gear Box (Sun and Planet Type) | The metallic model consists of a sun gear, arm and a planetary gear inside a casing. |  |
| 22. | Differential Gear | Actual Model shows the action of differential gear |  |
| 23. | Interconnected Gears | Model consists of interconnected gears namely spur gear, Bevel gear, Worm gear and Rack and pinion. |  |

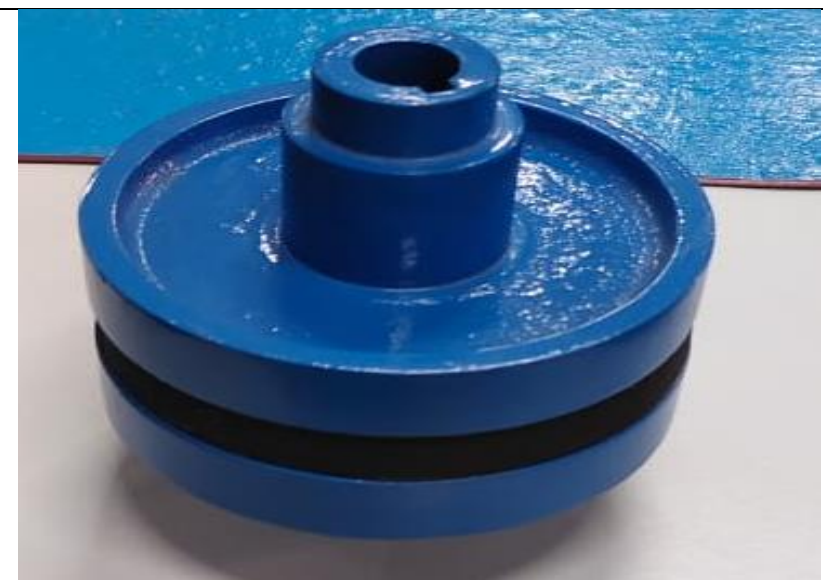
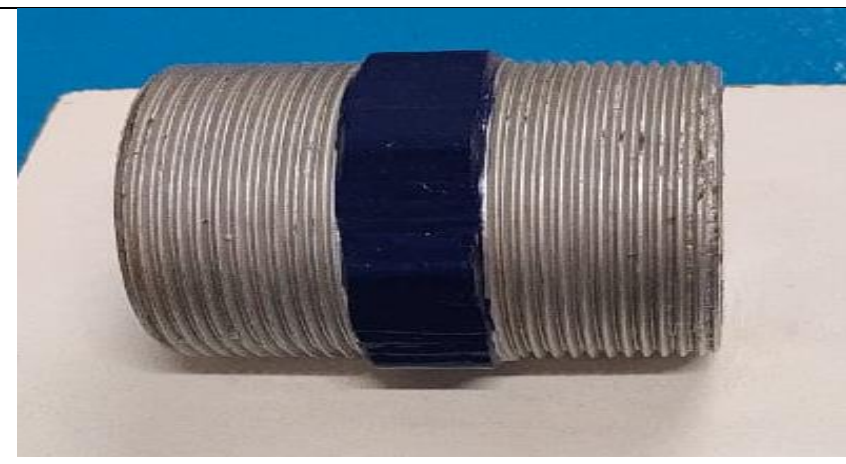
| | | | |
|---|---|---|---|
| 24. | Crank and Connecting Rod Model | Model shows the turning effect on the crank and the linear stress along with the connecting rod on the slide bar (with graduated scale). |  |
| 25. | Crank & Slotted Lever Mechanism | Metallic model mounted on the wooden board. |  |
| 26. | Ellipse Tracer Model | Metallic model mounted on the wooden board. |  |
| 27. | Four Bar Link Mechanism | Model is mounted on the base. |  |
| 28. | Inversion of Four Bar Mechanism | Model is made up of aluminum and other metallic parts. Model is mounted on a wooden board of size 90 x 60 cm. Angular and linear scales are provided to find the displacement of points in links. |  |

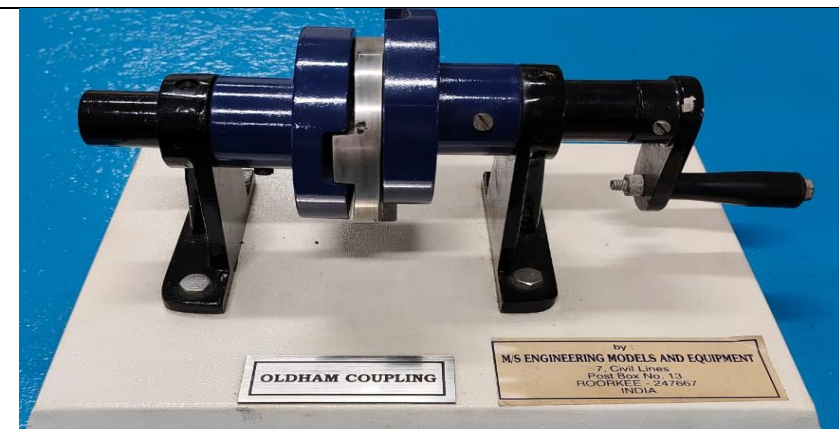
| | | | |
|---|---|---|---|
| 29. | Kinematic Pairs | Model consists of different types of pair viz sliding pairs, turning pair, rolling pair (two types), screw pair (two types), spherical pair, completely constrained motion, gear wheels and two types of links. All pairs mounted on a wooden board. |  |
| 30. | Oscillating Cylinder Mechanism | Metallic model mounted on the wooden |  |
| 31. | Pantograph Mechanism | Model explains the working of pantograph mechanism. |  |
| 32. | Pawl and Ratchet Motion | Model shows intermittent motion of ratchet wheel. |  |

| | | | |
|---|---|---|---|
| 33. | Peaucellier Mechanism | As per Standard |  |
| 34. | Reciprocating engine mechanism/ Slide Crank Mechanism | Metallic model mounted on the wooden board. |  |
| 35. | Scotch Yoke Mechanism | Metallic model mounted on the wooden board. |  |
| 36. | Two Crank Linkage Drive Model | As per Standard |  |

| | | | |
|---|---|---|---|
| 37. | Watt Mechanism | As per Standard |   |
| 38. | Whitworth Quick Mechanism | Metallic model mounted on the wooden board. |  |
| 39. | Crank Shaft to Slider Mechanism | As per Standard |   |
| 40. | Crank Drive to Oscillating Link Mechanism | As per Standard |   |
| 41. | Belt Drive Single Speed | Model consists of two pulleys with a V belt, Model is fitted on a board with crank handle. |  |
| 42. | Belt Drive Two Speed | Model consists of two single pulleys, one double pulley and two V belt. Model is fitted on a board with crank handle. |   |

| | | | |
|---|---|---|---|
| 43. | Belt Drive (Loose and fast pulleys) | Model consists of a driven pulley on one shaft and other shaft has two pulleys, one fixed and other loose one. Model is fitted on a board with crank handle. Model shows starting and stopping of a machine. |  |
| **44.** | Chain Drive | Model is mounted on a wooden board |   |
| **45.** | Friction Wheel Drive | Model shows the system of giving variable speeds. Model is mounted on a wooden board. |   |
| **46.** | Geneva Drive | Model shows intermittent motion. |  |
| **47.** | Cam and Follower | Five different types, mounted individually on separate boards. Model displays circular and displacement of the cams and followers respectively. |   |
| 48. | Keys set of five Box or Muff Coupling | Metallic models mounted on shaft with collars. Metallic model consists of two shafts whose ends are made to butt together by means of a sunk key. |   |

| | | | |
|---|---|---|---|
| 49. | Cotter Joint | Metallic model |  |
| 50. | Flanged Couplings | Model with bolts, key groove and key |  |
| 51. | Flexible Coupling | As per Standard |  |
| 52. | Hook Coupling, Double Type | Metallic model with pointer and graduated scale in degrees is provided. |  |
| 53. | Knuckle Joint | Metallic model |  |
| 54. | Nipple Joint | Metallic model mounted on base. |  |

| | | | |
|---|---|---|---|
| 55. | Oldham's Coupling | Metallic section cut model explains the transmission between two shafts which are not co-axial. The model is mounted on a wooden base. |  |
| 56. | Pin Joint<br>Pipe Joint | Metallic model<br>Italic model |  |
| 57. | Rivets (Different types) | An all metallic models mounted on a base with nomenclature.<br>1- Cup head<br>2-Pan Head<br>3-Conical head<br>4-Counter sunk head |  |
| 58. | Riveted Joint | A set of four wooden models consists of single and double lap joint,<br>single and double strap joint. |  |
| 59. | Splined Shaft | As per Standard |  |
| 60. | Union Joint | As per Standard |  |

| | | | |
|---|---|---|---|
| 61. | Free & Forced Vibration Apparatus & Universal Vibration Apparatus | EXPERIMENTAL CAPABILITIES<br>➢ To Verify the relation T = 2Π√l/g for a simple pendulum.<br>➢ To determine the radius of gyration of compound pendulum.<br>➢ To determine the radius of gyration of given bar by using bifilar suspension.<br>➢ Experiment on Longitudinal Vibration<br>➢ To determine natural frequency of spring mass system.<br>➢ Equivalent mass system.<br>➢ To determine natural frequency of free torsional vibrations of single rotor system. |  |