1. Material Testing Lab

1 Material Testing Lab

The Material Testing Lab provides hands-on experience for students to understand the mechanical properties of materials. Equipped with machines like the Universal Testing Machine, Torsion Testing Machine, Impact Testing Machine, Rockwell Hardness Testing Machine, and Brinell Hardness Testing Machine, the lab enables students to perform a variety of tests to evaluate material strength, hardness, and resistance to external forces. This lab plays a crucial role in bridging theoretical knowledge with practical applications in material science and engineering.

Equipment

Photo	Specification
 **2 Universal Testing Machine**	The TUN 600 is designed for tensile and compression testing of materials, offering precise measurements across a wide range of forces. Its robust capabilities make it suitable for quality control and research in various engineering applications **Specifications:** **Make:** Fine Spavy Associate & Engg. Pvt. Ltd. **Model No.:** TUN 600 **Measuring Range:** • 0 - 60 kN • 0 - 120 kN • 0 - 300 kN • 0 - 600 kN **Maximum Capacity:** 600 kN **Drive:** Electric Power **Clearance for Tensile Test:** 50 mm to 800 mm **Clearance for Compression Test:** 0 mm to 800 mm **Power Capacity of Motor:** 2 HP
 **3.Torsion testing machine**	The FTT 20 is designed for performing torsion tests on mild steel and cast iron bars, enabling precise evaluation of material strength and ductility. **Specifications:** **Make:** Fine Spavy Associate & Engg. Pvt. Ltd. **Model No.:** FTT 20 **Measuring Range:** Torsion test on mild steel bar / cast iron bar • 0 – 5 Kg-m • 0 – 10 Kg-m • 0 – 20 Kg-m **Drive:** Electric Motor **Drive Motor Power:** 0.5 HP **Testing Speed:** 1.5 RPM **Maximum Torque Capacity:** 20 Kg-m **Cross-Section of Specimen:** • **Round:** ○ 7 mm ⌀ to 10 mm ⌀ ○ 10 mm ⌀ to 15 mm ⌀ ○ 15 mm ⌀ to 20 mm ⌀ • **Flat:**

	○ 3 mm x 30 mm to 10 mm x 30 mm
 **4. Impact testing machine**	The FIT 300 N is designed for conducting impact tests using Charpy and Izod methods, providing crucial data on material toughness and resistance to fracture. This machine is vital for quality control and material evaluation in various industries. **Specifications:** **Make:** Fine Testing Machines **Model No.:** FIT 300 N **Maximum Impact Energy:** ● Charpy: 300 Joule ● Izod: 170 Joule **Angle of Drop:** ● Charpy: 140 degrees ● Izod: 90 degrees **Effective Weight of Pendulum:** 21.3 kg
 **5. Rockwell hardness machine**	The TRS model is designed for precise hardness testing, utilizing diamond and ball indenters to assess material properties across a range of load capacities. **Specifications:** **Make:** Fine Testing Machines **Model:** TRS **Load Range:** ● 60 Kgf ● 100 Kgf ● 150 Kgf **Indentor Used:** ● Diamond, 120 cone ● Ball, 1/16” Diameter **Maximum Test Height:** 216 mm

6. Brinell Hardness Machine

The TKB - 3000 is engineered for high-capacity hardness testing, offering flexibility in load increments and indentor sizes. It is ideal for rigorous material evaluation in various industrial applications.

Specifications:
Make: Fine Testing Machines
Model No.: TKB - 3000
Load Range: In stages of 250 Kgf up to 3000 Kgf
Indentor Used:

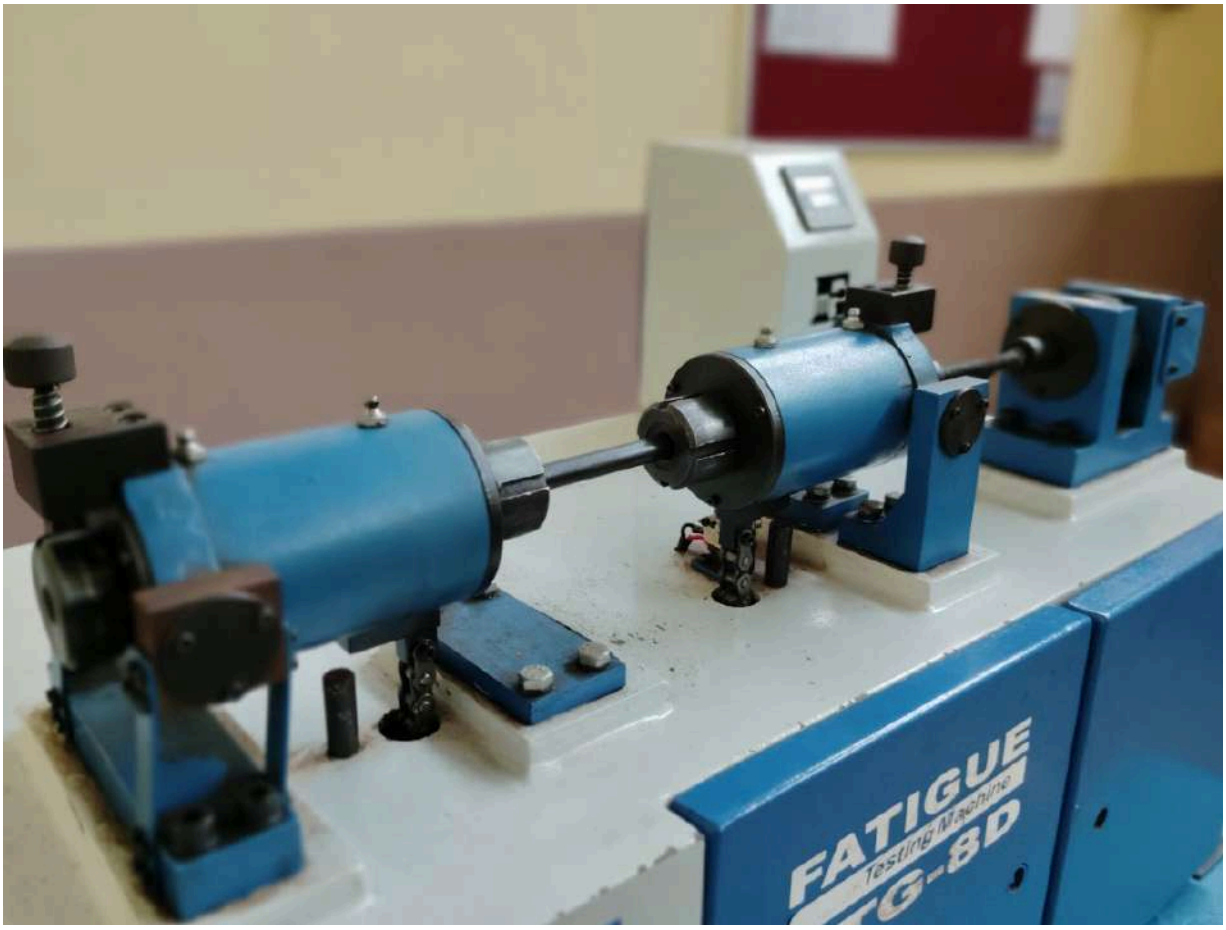
- Ball with 10 mm diameter
- Ball with 5 mm diameter

Maximum Test Height: 410 mm
Drive: Electric Motor
Power Capacity of Motor: 0.5 HP
Main Supply: 400/440 V; 3 phase

List of experiments

- Tension test on mild steel bar (stress-strain behavior, determination of yield strength and modulus of elasticity)
- Torsion test on mild steel bar / cast iron bar
- Impact test on metal specimen (Izod/Charpy Impact test)
- Hardness test on metals – (Brinell Hardness Number)
- Hardness test on metals – (Rockwell Hardness Number)
- Flexural test on beam (central loading)

2. Materials Technology & Metallurgy Lab



7. MT Lab

The Materials Technology and Metallurgy Lab is a hub for exploring the microstructure and properties of metals. Equipped with advanced tools like the Metallurgical Inverted Microscope with image analyzer software, Trinocular Metallurgical Microscope, etc, the lab offers comprehensive analysis capabilities. Students conduct heat treatment using the Muffle Furnace, test material endurance with the Fatigue Testing Machine, and prepare specimens with the Disc Polishing Machine and Belt Grinder. The lab also includes the End Quench Test Apparatus for hardenability studies, providing students with hands-on experience in metallurgy and material science.

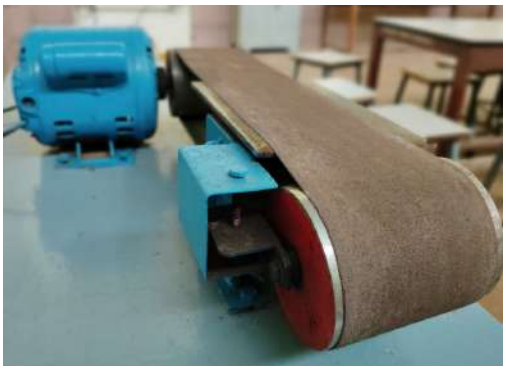
Equipment

Photo	Specification
 **8 Trinocular Optical Metallurgical Microscope**	This high-precision microscope is designed for detailed analysis of material microstructures. It features a trinocular head for optical clarity and allows for capturing images or video, making it an essential tool for metallurgical investigations. **Specifications:** **Make**: S.M. Engineers, Pune **Main Supply**: 220 volts A.C. **Transformer**: 6 volts, 20 watts **Eye Piece Magnification**: 10x, 15x **Objective Magnification**: M5x, M10x, M40x, M100x
 **9. Muffle Furnace 1**	

10. Muffle Furnace 2

The Muffle Furnace is used for high-temperature applications such as heat treatment and material testing. With a microprocessor-based digital controller, it offers precise temperature control, reaching up to 1150°C, making it ideal for metallurgical processes.

Specification:
Make: DTI
Size of Furnace (L x W x H): 22" x 18" x 20"
Heating Area (L x W x H): 6" x 6" x 12"
Maximum Temperature: 1150°C
Temperature Controller: Microprocessor-based P.I.D. digital temperature controller
Temperature Display: Dual display (set point & process temperature)
Mains Supply: Single-phase



11. Belt Grinder

The Belt Grinder is a versatile machine used for surface finishing and material removal. Powered by a ¼ HP motor, it offers efficient grinding with a compact belt size, making it ideal for precision work in metallurgical labs.

Specifications:
Make: S. M. Engineer
Model: BDA52C42686
Motor: ¼ HP, 1425 RPM
Belt Size: 100 x 95 mm
Grinding Area: 100 x 150 mm

12. Disc Polishing Machine

A disc polishing machine is designed for surface finishing of various materials by using abrasive cloth or paper discs. It is equipped with a powerful motor that ensures smooth, high-speed operation, making it suitable for both industrial and laboratory applications.

Specifications:
Make: S.S.P. Enterprise
Diameter of the Disc (cloth): 8 inches
Diameter of the Disc (papers): 8 inches
Motor: Crompton & Greaves

- **Speed**: 1425 RPM
- **Power**: 0.25 HP
- **Phase**: Single Phase

13.Fatigue Testing Machine

A fatigue testing machine is used to determine the durability and performance of materials under cyclic loading. This machine is essential for assessing the fatigue strength of materials by applying a constant bending moment under controlled conditions.

Specifications:
Make: FINE MANUFACTURING INDUSTRIES
Model: BDA52C42686
Maximum Bending Moment: 400 Kg-cm
Load (Adjustable): 5 – 80 kg
Range 1: 100 Kg-cm
Range 2: 200 Kg-cm
Range 3: 300 Kg-cm
Range 4: 400 Kg-cm
Gripping Diameter of Test Specimen: 12 mm
Testing Diameter of Test Specimen: 8 mm
Length of Test Specimen: 226 mm
Rotating Speed of Specimen: 4200 RPM
Accuracy of Applied Load: ±1%
Revolution Counter:

- **Mechanical**:
  - Number of Digits: 7
  - Multiplying Factor: 3
- **Electronic (optional)**:
  - Number of Digits: 8
  - Multiplying Factor: 1

Motor: 3-Phase, 0.5 HP, 2800 RPM
Mains Supply: 3-Phase, 440 Volts, 50 Hz, AC
Overall Size: 1000 L x 500 W x 600 H mm
Weight (Approx.): 120 kg

14. End Quench Test Apparatus

The end quench test apparatus is designed to measure the hardenability of steel specimens by quenching them in water. The apparatus uses a self-priming pump to deliver a controlled water flow, ensuring accurate testing of material properties.

Specifications:
Model: FEQ-25
Motor & Pump:

- Q-tech Centrifugal Regenerative Self-Priming Pump
- Model: SP 01
- Power: 0.12 KW / 0.166 HP
- Single Phase- AC, 240 volts
- Speed: 2700 RPM
- Head Range: 9 - 15 meters

Test Specimen Dimensions: Dia. 25 mm x Length 100 mm
Inside Diameter of Water Supply Pipe: 12.5 mm
Height of Free Water Jet: 65 mm
Distance from Nozzle Tip to Test Piece Bottom: 12.5 mm
Power Supply: 1 Phase, 230V, 50Hz, AC

List of experiments

- Study of Characterization techniques and Metallographic sample preparation and etching.
- Comparison of microstructures and hardness of a steel specimen before and after heat treatments (Annealing, Normalizing and Hardening).
- Comparison of microstructures and hardness of a steel specimen before and after heat treatments (Annealing, Normalizing and Hardening).
- Determination of hardenability of steel using Jominy End Quench Test.
- Determine the number of cycles to failure of a given material at a given stress by performing fatigue test.

3. Center of Excellence In Computer Aided Product Development & Automation

15. Centre of Excellence Lab

The Centre of Excellence Lab, sponsored by industry partners, is a state-of-the-art facility designed to bridge the gap between academia and industry. Equipped with 41 high-performance ACER desktop computers and advanced software like Solidworks 3D, CFD, AutoCAD, and MATLAB, it offers students real-world tools for design and simulation. The lab features cutting-edge equipment, including CNC Milling machines, 3D printers, pneumatic kits, and an ARISTO 6-axis robotic arm. With industry-grade resources such as NI's data acquisition systems and PLC microcontrollers, this lab fosters innovation, hands-on learning, and prepares students for the challenges of modern engineering.

Equipment

16.Desktops for CAD & CAD CAE Lab

The Centre of Excellence lab is splitted into three sections namely

a. CAD Section
b. CAD / CAE Section
c. Automation, CAM & 3D Printing Section

The CAD & CAD / CAE sections are equipped with a total 41 Hi-Tech desktops.
The Automation, CAM & 3D Printing sections consist of Pneumatic Kit, CNC Milling machine and 3D Printer.

Desktop Specifications:

- **Make**: ACER
- **Model**: VERITON M-200 H610
- **Operating System**: Windows 11 Home 64 Bit
- **Processor**: Intel Core i5-12400, 12th Generation (2.50 GHz)
- **RAM**: 16GB (2X8GB) DDR4
- **Storage**: 512 GB SSD
- **Monitor**: Acer 21.5" LED Monitor
- **Mouse**: Acer USB Optical Mouse
- **Keyboard**: Acer USB
- **Quantity**: 40 Nos.

17. CNC Machine

The Pimento CNC Mill is designed for precision machining of materials such as HSS, HCS, and titanium alloys, making it ideal for various applications in manufacturing and prototyping. Its advanced Mach 3 controller and robust specifications ensure high accuracy and efficient operation.

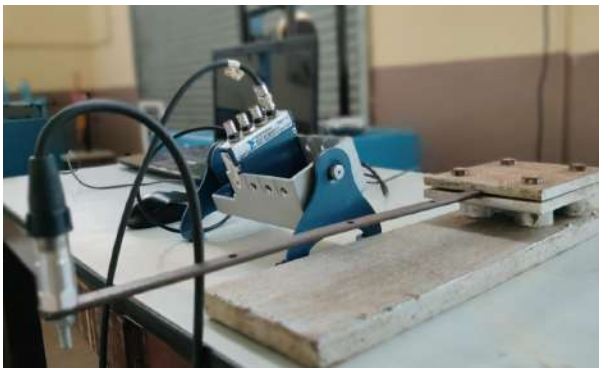
Make: Control Technics
Model No.: Pimento CNC Mill
Controller:

- Standalone Controller: Mach 3, PC Based

Specifications:

- Rapid Speed: 1000 mm/min
- Max. Spindle Speed: 8000 rpm
- Spindle Power: 2.2 kW
- Max. Tool Size: BT 30 (Dia - 25 mm)
- Accuracy: 0.01 mm
- Working Area: 400 x 300 x 250 mm

	• Weight of the Machine: 750 kg • Machinability: HSS, HCS & Ti alloy


18. NATIONAL INSTRUMENTS (NI) DATA ACQUISITION & VIRTUAL INSTRUMENTATION HARDWARE & LABVIEW SOFTWARE
	This system integrates hardware and software solutions for data acquisition and virtual instrumentation. The setup includes a compact chassis, various data acquisition modules for different measurements, and advanced sensors for vibration, sound, and force analysis. LabVIEW software is used for virtual instrumentation, supporting measurement and analysis tasks.
	
	Specifications:
	Hardware:
	
	• **CDAQ-9174 Compact Chassis**
	• 04 Slot-USB for Data Acquisition Modules
	
	Data Acquisition Modules:
	
	• Temperature, Current, Voltage, Strain, Vibration, Fluid, Load, Universal
	
	Sensors:
	
	• **Vibration Sensors**:
	  ○ Accelerometer
	  ○ Frequency Range: 5 to 10 kHz
	• **Impact Hammer**:
	  ○ Maximum Force: 1000 N
	  ○ Frequency Range: 5 kHz
	• **Sound Sensors**:
	  ○ GRAS Array Microphone
	  ○ Frequency Range: 10 Hz - 20 kHz
	  ○ Dynamic Range: 32 dBA - 135 dB
	
	Software:
	
	• NI LabVIEW for Virtual Instrumentation & Vibration Measurement & Analysis
	• 05 Users - NI LABVIEW Academic Site License

19. 3D Printer

The Flashforge Dreamer 3D Printer (Model: Ender-3 S1) is a versatile and efficient printer with dual extruders, designed for detailed 3D printing. It offers a build volume suited for a variety of projects and supports multiple file types and connectivity options.

Specifications:

- **Make**: FLASHFORGE DREAMER
- **Model No.**: ENDER-3 S1
- **Build Volume**: 230L x 150W x 140H mm
- **Layer Resolution**: 100 – 150 microns
- **Filament Diameter**: 1.75 mm (0.069 inch)
- **Nozzle Diameter**: 0.4 mm (0.015 inch)
- **Software & Firmware**: FLASHPOINT
- **File Types Supported**: STL, OBJ
- **Operating System**: Windows 7, Mac OS X
- **Connectivity**: Wi-Fi, USB, SD Card
- **Extruder Quantity**: Two
- **Product Dimensions**: 467 x 381 x 320 mm
- **Gross Weight**: 17 kg

20. PNEUMATIC , ELECTRO-PNEUMATIC KIT

This experimental set up is used to design pneumatic, electro-pneumatic systems using sensors.

- Make: FESTO
- Working Medium: Compressed air
- Working pressure: 6 bar
- Maximum Working Pressure: 8-10 bar

21. ARISTO 6 Axis Robotic Arm

This Robotic arm is used for development of program for pick and place operation.

- Number of Axis: 6
- Payload Capacity: 2.5 kg
- Weight: Approx. 35 kg
- Motors: DC Servo Motors
- Power supply: 230 V AC, 50/60 Hz, 15A

List of Experiments

Finite Element Analysis Lab

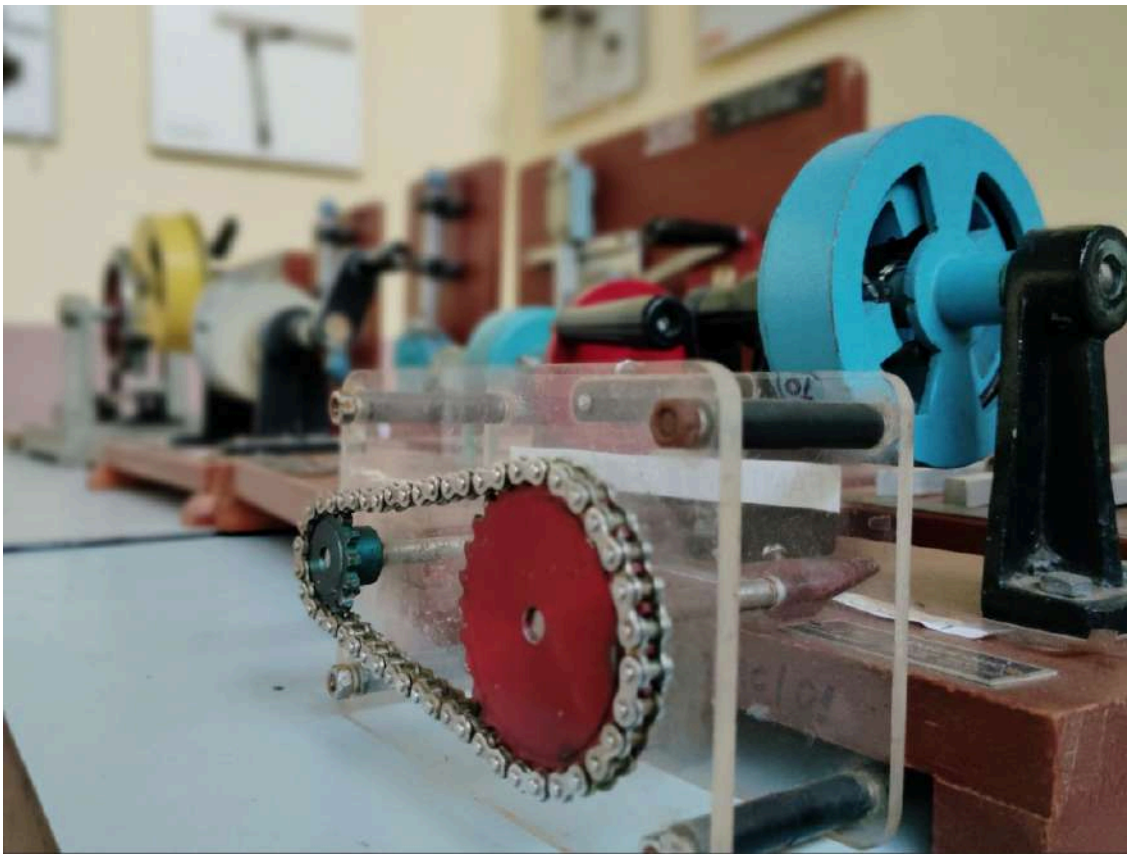
- Any two problems using bar element
- Any two problems using truss element
- Any two problems using CST element
- Any two problems using axisymmetric element
- Any one problem of free vibration analysis using bar
- Any one problem on steady state heat conduction
- Any one problem for analysis of beams

CNC & 3D Printing Lab

- Write & verify part programming & part fabrication on CNC turning trainer for step turning, facing, taper turning & threading operations
- Write & verify part programming & part fabrication on CNC milling trainer for contouring, drilling, facing & pocketing operations
- Tool-path generation by translation of part geometry from computer aided design (CAD) to computer aided manufacturing (CAM) systems
- Post processing of code generated via CAM system

- Development of physical 3D mechanical structure using any one of the rapid prototyping processes
- Segmentation in Slicer's Segment Editor module for the purpose of 3D printing (3D Slicer open source) (Application: Any Bone part as per available Dicom files)
- Creation of 3D model from 2D images using any image processing software and printing it. (3D Slicer open source) (Application: Any body organ like Heart, Gallbladder etc. as per available Dicom files)
- Case Study: Usability of rapid tooling integrated investment casting process, with their advantages and limitations in any one of emerging areas of dentistry, jewelry, surgical implants, turbine blades, etc.

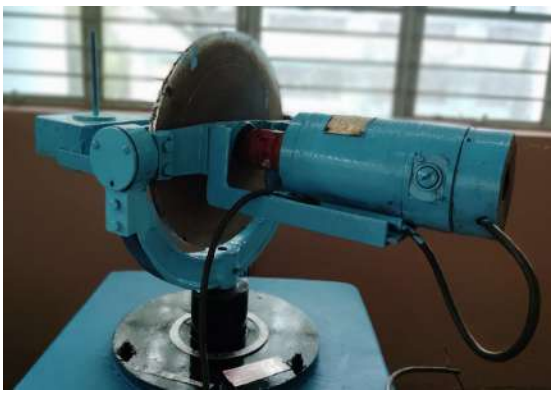
4. Kinematics of Machinery & Dynamics of Machinery Lab



22. KOM DOM Lab

This lab is equipped with machinery to study the principles of motion, force, and vibration in mechanical systems. It enables students to explore the dynamic behavior of mechanisms and machines, enhancing their understanding of concepts such as gyroscopic effects, balancing, vibrations, and shaft whirling. The lab facilitates hands-on learning in the areas of kinematics and dynamics, critical for mechanical engineering applications.

Equipment



23 Motorized Gyroscope

A motorized gyroscope is used to study the principles of gyroscopic motion, including precession and nutation. It consists of a rotating disc (rotor) driven by a motor, demonstrating how angular momentum conservation influences the orientation of the system.

Specifications:

Make: Datacone Pvt. Ltd., Sangli
Motor: 0.25 HP, 6000 RPM
Mass of Rotor: 6.25 kg
Diameter of Rotor: 300 mm
Thickness of Rotor: 12 mm
Mass Moment of Inertia: 0.0703 kg-m^3

24 Universal Governor

A governor is a mechanical device used to regulate the speed of an engine by adjusting the fuel or working fluid supply. The system ensures stable operation under varying load conditions. The various types of governors have distinct designs and principles for maintaining speed control.

Specifications:

Make: Datacone Pvt. Ltd., Sangli
Motor: 0.25 HP, 1500 RPM
Maximum Sleeve Displacement: 120 mm
Weight for Porter Governor: 2 kg
Types of Governor:

- Watt
- Porter
- Proell
- Hartnell

25 Whirling of Shaft apparatus

The whirling of shaft apparatus is used to demonstrate the critical speed of a rotating shaft when it starts to vibrate or whirl due to unbalanced forces. This helps in studying the behavior of shafts under various loading and support conditions.

Specifications:

Make: Datacone Pvt. Ltd., Sangli
Motor: 1/6 HP, 5000 RPM
Types of Support:

- Fixed
- Simply Supported

	• Fixed–Simply Supported **Diameter of Shaft:** • 4.7 mm • 6.4 mm • 7.9 mm
 **26 Vibration Test Rig**	A vibration test rig is designed to study the dynamic behavior of mechanical systems under oscillatory motion. It helps simulate and analyze various vibration modes, frequencies, and amplitudes, providing valuable insights into structural integrity and fatigue resistance. **Specifications:** **Make:** Datacone Pvt. Ltd., Sangli **Motor:** 0.15 HP, 1500 RPM **Disc A:** • Diameter: 225 mm • Mass: 2.85 kg **Disc B:** • Diameter: 190 mm • Mass: 2.0 kg **Length Between Supports:** 1110 mm

27 Balancing Apparatus

The rotating mass balancing apparatus is used to demonstrate the principles of dynamic balancing in rotating systems. It helps visualize how unbalanced masses affect the system and how corrective measures can achieve smooth operation.

Specifications:

Make: Datacone Pvt. Ltd., Sangli
Motor:

- Capacity: 0.5 HP
- Speed: 6000 RPM

Length of Shaft: 190 mm
Diameter of Shaft: 24 mm

List of Experiments

1. Performance testing of Porter governor
2. Performance testing of Hartnell governor
3. To study the Gyroscopic behavior of spinning body & to calculate the gyroscopic couple.
4. To determine natural frequency of compound pendulum, equivalent simple pendulum system
5. To find the natural frequency for longitudinal vibrations of helical springs connected in series to a mass suspended vertically
6. To find natural frequency of Torsional Vibration of single rotor and shaft system
7. To find natural frequency and nodal points of free Torsional vibration of two rotor system.
8. To determine the fundamental and second frequencies of a rotating shaft exhibiting whirling.

9. Measurement of vibration response of a system
10. To check experimentally the method of calculating the position of counter balancing mass in rotary mass systems.

5. Heat Transfer & Thermal Engineering Lab

28 Heat Transfer & Thermal Engineering Lab

The Heat Transfer and Thermal Engineering Lab provides practical exposure to the fundamental principles of heat transfer mechanisms—conduction, convection, and radiation. Students perform experiments to measure thermal properties and study heat exchange in different systems.

Equipment

29. Emissivity Measurement Apparatus

The emissivity apparatus is used to measure the emissivity of a surface by comparing the heat radiated by the surface to a known standard. It allows students to study the heat transfer through radiation and the emissive properties of different materials.

Specifications:

Make: Datacone Equipment Pvt. Ltd, Sangliwadi, Sangali
Diameter of Tube: 38 mm
Length of Tube: 500 mm
Duct Size: 200 mm x 200 mm x 750 mm
Temperature Indicator: 0 to 300°C
Ammeter: 0 to 3 A
Dimmer Stat: 2 A, 240 V
Voltmeter: 0 to 300 V
Number of Thermocouples: 07
Heater: Cartridge Type – 400 W

30. Thermal Conductivity of Metal Bar Apparatus

This apparatus is designed to determine the thermal conductivity of a metal bar by measuring the temperature gradient along its length when subjected to heat. The experiment helps students understand the conduction mechanism in solids.

Specifications:
Make: Datacone Equipment Pvt. Ltd, Sangliwadi, Sangali
Length of Metal Bar: 410 mm
Size of Metal Bar: 25 mm
Test Length of Bar: 200 mm
Number of Thermocouples Mounted on Bar: 09
Number of Thermocouples Mounted on Insulating Material: 02
Heater Coil (Band Type): Nicrome Heater
Cooling Water Jacket Diameter: 80 mm
Temperature Indicator (Multi-channel): 0 to 200°C
Dimmerstat: 2 A, 230 V
Voltmeter: 0 to 300 V
Ammeter: 0 to 3 A
Measuring Flask: For Water Discharge

31. Thermal Conductivity of Insulating Material Apparatus

This apparatus measures the thermal conductivity of insulating materials by assessing the temperature difference of spheres, effectively determining heat transfer properties.

Specifications:
Make: Datacone Equipment Pvt. Ltd, Sangliwadi, Sangali
Radius of Inner Sphere (Ri): 50 mm
Radius of Outer Sphere (Ro): 100 mm
Voltmeter: 0 to 300 V
Ammeter: 0 to 3 A
Temperature Indicator: 0 to 200°C
Thermocouples: Chrome/Aluminium
Dimmerstat: 2 A, 230 V
Heater Coil: MICA Heater
Insulating Powder: Asbestos packed between two copper spheres

32. Natural and Forced Convection Apparatus

This apparatus is designed to study the principles of natural and forced convection, allowing for the observation and measurement of heat transfer under varying flow conditions.

Specification:

Make: Datacone Equipment Pvt. Ltd, Sangliwadi, Sangali
Diameter of Tube: 38 mm
Length of Tube: 500 mm
Duct Size: 200 mm x 200 mm x 750 mm
Temperature Indicator: 0 to 300°C
Ammeter: 0 to 3 A
Dimmerstat: 2 A, 240 V
Voltmeter: 0 to 300 V
Number of Thermocouples: 7
Heater: Cartridge type – 400 W

33. Shell & Tube Heat Exchanger

The shell and tube heat exchanger is a widely used heat transfer device that consists of a series of tubes, one set carrying the hot fluid and the other the cold fluid, maximizing thermal efficiency and facilitating heat exchange.

Specifications:

- **Make:** Datacone Equipment Pvt. Ltd, Sangliwadi, Sangali

Shell

- **Internal Diameter:** 150 mm
- **Thickness:** 6 mm
- **Baffles:** 2 nos.
- **Passing:** 1.2 pass
- **Length of Shell:** 600 mm

Tube

- **Outer Diameter:** 17 mm
- **Inner Diameter:** 13 mm
- **Length:** 600 mm
- **Material Construction:** Mild Steel

Rotameter

- **Flow Rate:** 1 to 10 lpm

Geyser

- **Power:** 3 kW (2 units)

34. Heat Transfer in Forced Convection with inserts

This setup is a sponsored setup by ASHRAE through ASHRAE Project equipment grant. This is used to study heat transfer enhancement techniques.
Sponsored amount = $1100

List of Experiments

- Measurement of Thermal Conductivity of metal rod/liquids/insulating powder
- Performance analysis of extended surfaces under free and forced convection.
- Determination of time constant of different materials under unsteady state heat transfer.
- Measurement of heat transfer coefficient flow through tubes in free/forced convection.
- Measurement of emissivity of Grey surface.

6. Fluid Mechanics and Hydraulic Machinery Lab

35 Fluid Mechanics and Hydraulic Machinery Lab

The Fluid Mechanics and Hydraulic Machinery Lab is designed to help students explore and understand the principles governing fluid flow and hydraulic systems. The lab is equipped with a wide range of test rigs and apparatus to study both theoretical and practical aspects of fluid mechanics and machinery performance. Students conduct experiments on various pumps and turbines to analyze parameters such as efficiency, flow rate, and head, gaining critical insights into real-world fluid dynamics applications.

Equipment

36. Mini Pelton Turbine Test Rig

The Pelton turbine is an impulse-type water turbine used for high-head, low-flow hydropower applications. It converts the kinetic energy of water jets striking the buckets into mechanical energy, which is then converted into electrical power by an alternator.

Specification:

- **Make:** ALTECH INDUSTRIES LTD., Coimbatore
- **Space Required:** 170 cm x 120 cm
- **Drive:** Electric Motor
- **Drive Motor Power:** 0.37 HP

Alternator:

- **Power:** 1 KW, Single Phase
- **Speed:** 1500 RPM
- **Voltage:** 220 / 240 V

37. Kaplan Turbine Test Rig

The Kaplan turbine is a reaction-type axial-flow turbine commonly used in low-head, high-flow hydropower applications. Its adjustable blades allow it to maintain high efficiency across varying flow rates and head conditions, making it ideal for hydroelectric power generation.

Specification:

Make: ALTECH INDUSTRIES LTD., Coimbatore
Space Required: 460 cm x 250 cm
Head: 7 meters
Discharge: 5000 LPM (Liters Per Minute)
Speed: 1500 RPM
Power: 3.7 KW
Drive: Electric Motor
Drive Motor Power: 20 HP, 3 Phase

38. Francis Turbine Test Rig

The Francis turbine is a reaction-type turbine used in medium-head hydropower applications. It is designed to operate efficiently under a wide range of water flows and heads, making it one of the most commonly used turbines in hydroelectric power plants.

Specifications:

Make: ALTECH INDUSTRIES LTD., Coimbatore
Space Required: 320 cm x 120 cm
Head: 18 meters
Discharge: 1900 LPM (Liters Per Minute)
Speed: 1500 RPM
Power: 3.7 KW
Drive: Electric Motor
Drive Motor Power: 15 HP, 3 Phase

39. Reciprocating Pump Test Rig

The reciprocating pump test rig is used to study the performance characteristics of a positive displacement pump. It enables students to understand how such pumps work, including the relationship between flow rate, head, and efficiency under different operating conditions.

Specifications:

Make: ALTECH INDUSTRIES LTD., Coimbatore
Space Required: 170 cm x 80 cm
Piston Stroke (L): 44.5 mm
Piston Diameter (d): 38 mm
Suction Pipe Diameter: 25 mm
Delivery Pipe Diameter: 18 mm
Drive: Electric Motor
Drive Motor Power: 5 HP, Single Phase

40. Centrifugal Pump Test Rig

The centrifugal pump test rig is designed to analyze the performance of a centrifugal pump by measuring key parameters such as flow rate, head, power, and efficiency. It helps students understand the working principles of dynamic pumps and how they respond to varying operational conditions.

41. Hydraulic Bench I

The hydraulic bench test setup is used for conducting various fluid mechanics experiments, such as measuring flow rates, analyzing hydraulic energy, and determining discharge through orifices and nozzles. It provides students with hands-on experience in fluid behavior under different conditions.

Specifications:

Make: ALTECH INDUSTRIES LTD., Coimbatore
Diameter of the Orifice (mm): 10, 12, 25
Diameter of Mouth Pieces (mm): 10, 12, 25
Drive: Electric Motor
Drive Motor Power: 1 HP, Single Phase
Area of Collecting Tank (m^2): 0.15 & 0.2
Leverage: 02
Types of Vanes Available: Flat & Hemispherical
Diameter of Nozzle (mm): 08
Diameter of Glass Tube (mm): 26.35
Graduation in Degrees: 0 to 35 on both sides

42. Hydraulic Bench II

Specifications:

Make: ALTECH INDUSTRIES LTD., Coimbatore
Cross Sectional Areas at the Section (mm²):

- a) 47 x 25
- b) 39 x 25
- c) 32 x 25
- d) 24 x 25
- e) 18 x 25
- f) 12.5 x 25
- g) 18 x 25
- h) 24 x 25
- j) 32 x 25
- k) 39 x 25
- l) 47 x 25

Area of Collecting Tank (m²): 0.15 & 0.35
Pipe Diameters (mm):

- Aluminum: 12.5
- Copper: 12.5
- Stainless Steel: 12.5

Pressure Measurement: Mercury Manometer
Drive: Electric Motor, 1 HP, 1 phase
Meter Constants:

- Orifice Meter: 0.000839
- Venturi Meter: 0.000537

Normal Diameter of Pipe: 15 mm & 25 mm
Manometer Type: Mercury Manometer
Minor Loss Calculations for: Sudden Expansion, Sudden Contraction, Bend, Elbow, Sluice Valve, Gate Valve

List of Experiments:

- Demonstration of boilers, mountings and accessories.
- To calibrate Venturimeter
- To determine friction factor for pipes
- To verify Bernoulli's equation
- Trial on Centrifugal Pump test rig
- Trial on Reciprocating pump test rig
- Trial on Reciprocating compressor test rig
- Trial on Pelton turbine test rig

7. Refrigeration and Air Conditioning Lab

43. Refrigeration & Air Conditioning Lab

The Refrigeration and Air Conditioning Lab offers a hands-on learning environment where students can explore the workings of various cooling and heating systems. The lab is equipped with advanced apparatus to conduct experiments that demonstrate key principles in refrigeration and air conditioning systems. Students understand compressor work, heat rejection in the condenser, and evaporator performance. They learn to measure cooling capacity, coefficient of performance (COP), etc.

Equipment

44. Refrigeration Test Rig

The Refrigeration Test Rig is designed to demonstrate the working of a refrigeration cycle. It is equipped with essential components like a Kirloskar Hermetic Compressor, air-cooled condenser, and various measurement instruments to analyze the system's performance.

Specifications:

- **Compressor**:
  - **Make**: Kirloskar Hermetic CAJ - 34
  - **Refrigerant**: R-12
  - **Cooling Capacity**: 920 Kcal/hr
  - **Electrical Circuit**: Capacitor Start Induction Run
  - **Nominal HP**: 0.6
  - **Power Input**: 500 Watts (430 Kcal/hr)
  - **No. of Cylinders**: One
  - **Displacement**: 2.15 m^3/hr
  - **R.P.M.**: 2875 to 2900
- **Condenser**:
  - **Type**: Air-Cooled Condenser
  - **Diameter**: 3/8"
- **Expansion Device**:
  - **Capacity**: 2-3 mm Tube
- **Rotameter for R-12 Liquid**:
  - **Range**: 7.6 to 76 lit/hr

45. Air-conditioning test rig

The Air Conditioning Test Rig, is designed to demonstrate the principles of air conditioning. It includes essential components such as a hermetically sealed compressor, forced convection air-cooled condenser, and various instruments for measuring temperature, pressure, and air flow.

Specification:

Compressor:

- **Type**: Hermetically sealed
- **Make**: Emerson Climate Tech. or equivalent

Capacity: 1/3 TR @ Rated Test Conditioning
Condenser:Forced Convection Air-Cooled
Condenser Fan: Axial Flow
Expansion Device: Capillary Tube
Evaporator:Direct Expansion, Shell & Coil (Water in Shell, Refrigeration in Coil)
Evaporator Fan:Centrifugal / Axial Flow
Dehumidifier:Finned type Air Heater
Humidifier: Provided
Refrigerant:R 134-a
Refrigerant Flow Measurement: Glass tube Rotameter
Air Temperature Measurement: DBT & WBT by Sling Psychrometer
Supply:

- **Voltage**: 220 – 240 volts
- **Frequency**: 50 Hz
- **Phase**: 1 Phase

46 ICE plant test rig

The Ice Plant Test Rig, is designed to demonstrate the ice-making process in a controlled environment. It includes a hermetically sealed compressor, forced convection air-cooled condenser, and stainless steel brine tank for efficient operation.

Specifications:

Compressor:

- **Type**: Hermetically sealed
- **Make**: Emerson Climate Tech.

Capacity: **Ice Production**: 24 Kg of Ice per 24 Hrs.
Condenser: Forced Convection, Air-Cooled
Expansion Device:Capillary Tube
Evaporator:Immersion Type (Refrigeration Grade Copper Tube)
Brine Tank:Stainless Steel – SS 304
Number of Ice Cans: 4 nos.

47. Heat pump test rig

Heat Pump Test Rig, is designed to demonstrate the heating process in a heat pump system. It features a reciprocating, hermetically sealed compressor and a tube-in-tube co-axial condenser, providing a reliable and efficient setup for educational purposes.

Specifications:

Heating Capacity:

- **Power**: 3.0 KW @ Rated Test Conditions
- **Flow Rate**: 1000 Litres/hour

Maximum Temperature Attained: 55°C
Input Power:1.01 KW
Compressor:

- **Make**: Emersion Climate Technology Ltd.
- **Type**: Reciprocating, Hermetically Sealed

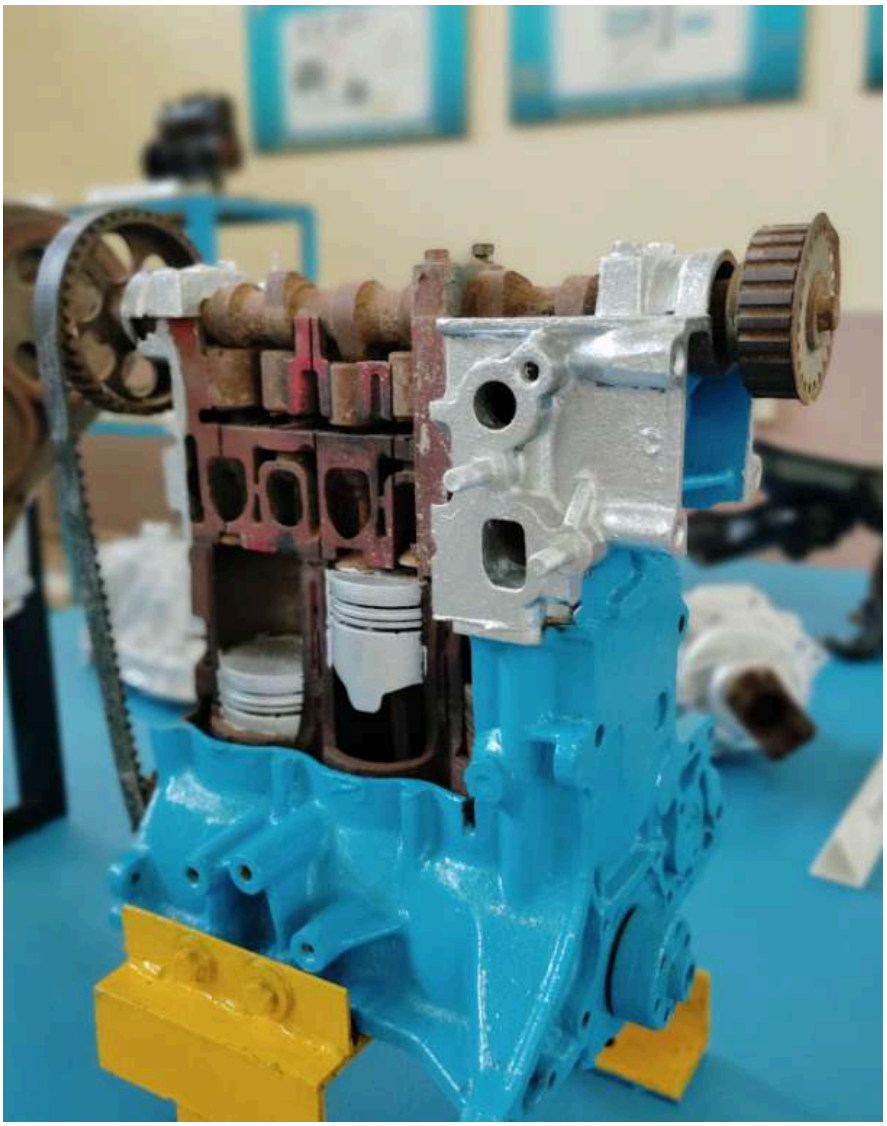
Refrigerant: R 134-a
Condenser: Tube in Tube type, Co-axial condenser
Expansion Device:Capillary Tube
Evaporator: Forced Convection Air-cooled,

	Copper Tubes, Aluminium Fins **Evaporator Fan**: • **Make**: Hicool • **Type**: Axial Flow **Supply**: • **Voltage**: 230 V • **Frequency**: 50 Hz • **Phase**: 1 Ph AC
 **48. Cooling Tower**	The Cooling Tower Test Rig is an educational apparatus designed to demonstrate the principles and operation of a cooling tower. It simulates the cooling process by circulating water through a cooling tower, allowing students to observe and analyze the heat exchange and evaporation processes. This rig is commonly used in HVAC and mechanical engineering labs to study the performance and efficiency of cooling towers under various operating conditions.

List of Experiments

- Study and performance on simple Vapour Compression test rig.
- Study and performance of heat pump test rig.
- Study and performance of refrigeration cycle on Ice Plant.
- Perform Humidification and Dehumidification Air Conditioning process on the Air Conditioning test rig.
- Study and performance of Cooling Tower based on the cooling load and approach to wet bulb temperature.

8. I.C.Engine & Automobile Engineering Lab



49. I C Engine and Automobile Engineering Lab

The IC Engine and Automobile Engineering Lab is equipped to provide hands-on experience with internal combustion engines and automotive systems. This lab allows students to study the mechanics, thermodynamics, and performance characteristics of various types of engines. It also includes apparatus and tools for exploring the design, operation, and diagnostics of automobile components, enabling students to gain practical insights into the functioning of modern vehicles and engine technology.

Equipment

50 Diesel Engine Test Setup

The Diesel Engine Test Rig, is designed to study the performance and characteristics of a diesel engine. It features a two-cylinder engine with a water brake dynamometer, providing measurement of engine parameters.

Specification:

Make: Commet
Fuel Type: Diesel
Number of Cylinders: Two
Bore of the Cylinder: 87.5 mm
Stroke Length: 110 mm
Compression Ratio:18:1
Rated Power: 13 BHP at 1600 rpm
Dynamometer: Water Brake
Orifice Diameter: 29.8 mm

51. Petrol Engine Test Setup

The test setup for a 4-cylinder, 4-stroke petrol engine, specifically the Premier Padmini, involves measuring performance parameters like power output and fuel consumption under controlled conditions. This setup typically includes a water brake dynamometer to evaluate engine performance effectively.

Specification:

Make: Premier Padmini
Fuel: Petrol
No. of Cylinders: Four
Bore of Cylinder: 68.0 mm
Stroke Length: 75.0 mm
Compression Ratio: 7.8:1
Rated Power: 44 BHP at 5000 rpm
Dynamometer: Water brake
Orifice Diameter: 27.4 mm

52 MPFI Petrol Engine Test Setup

The test setup for a 3-cylinder, 4-stroke petrol engine, specifically from Maruti, focuses on assessing key performance metrics like power and efficiency using a water brake dynamometer. This setup ensures accurate measurement of engine characteristics under various operating conditions.

Specifications:

Make: Maruti
Fuel: Petrol
No. of Cylinders: Three
Bore of Cylinder: 66.5 mm
Stroke Length: 72.0 mm
Compression Ratio: 9.2:1
Rated Power: 27.6 kW @ 5000 rpm
Dynamometer: Water brake
Orifice Diameter: 27.4 mm
Dynamometer Arm Length: 200 mm
Additional Orifice Diameter: 35 mm

53 Multi Gas Emission Analyzer

A multi gas emission analyzer is a sophisticated instrument designed to measure the concentration of various gases in exhaust emissions from vehicles, or other combustion sources. This analyzer typically detects gases such as carbon dioxide (CO_2), carbon monoxide (CO), Hydrocarbon (HC) and Oxygen (O_2). Utilizing advanced sensor technologies, it provides real-time data on gas levels, ensuring compliance with environmental regulations and helping to assess the efficiency of combustion processes. The analyzer is essential for monitoring air quality, evaluating emission sources, and implementing strategies for pollution reduction.

Range of Measurement:

- CO : 0 to 9.99% vol. Res. 0.01%
- HC : 0 to 20000 ppm. (Propane) Res. 1 ppm.
- CO_2 : 0 to 20.00 % vol. Res. 0.10%
- O_2 : 0 to 25 % Res. 0.01 %
- Lambda : 0.200 to 1.800 % Res.

	0.001% • Air/Fuel : 0 to 30:1 Res. 1
 **54 Mahindra & Mahindra 4-s Four Cylinder Diesel Engine.**	**Mahindra & Mahindra 4-s Four Cylinder Diesel Engine.** This engine is used for demonstration of purpose. Students dismantle and assemble the entire engine to study the internal structure of the engine.

List of Experiments

- Study and performance and emissions characteristics of a Two-cylinder, Four-stroke Diesel Engine at a constant speed (With Water Brake Dynamometer) (Load Test).
- Determination of frictional power and mechanical efficiency of the Three-Cylinder Petrol Engine by Morse Test.
- Study of performance and emissions characteristics of a Three-cylinder, Four-stroke Petrol Engine at constant speed/load.
- Study of performance characteristics of a Three Cylinder, Four-stroke MPFI Petrol Engine at constant speed along with heat balance sheet.

9. Internet of Things Lab

55. Internet of Things Lab

The Internet of Things (IoT) Lab is designed to provide students with a comprehensive understanding of IoT technologies, enabling them to innovate and develop smart solutions for real-world challenges. This lab serves as a dynamic space for experimentation and research, where students can work on projects involving connected devices, data analytics, and automation.

Equipped with advanced computers and a variety of sensors and modules, the IoT Lab supports a hands-on approach to learning. Students engage in projects that cover a range of topics, from basic sensor integration to complex IoT systems involving cloud connectivity and data processing. This environment fosters collaboration and creativity, encouraging students to explore emerging technologies and their applications in various industries.

List of Equipment

- **DELL Desktop Computers:**
  - Model: OPTILEX 7040 SFF
  - Processor: INTEL (R) Core I5
  - RAM: 12 GB DDR4

    - Storage: 500 GB HDD SATA
    - Monitor: 18.5” LED
    - Peripherals: USB Keyboard & Mouse
    - Operating System: WINDOWS 10 Home, 64 Bit
- **Lenovo Desktop Computers:**
    - Model: NEO50S-11SYS08C00, Lenovo Think Centre
    - Processor: 12th Generation INTEL (R) Core I5 12500
    - RAM: 16 GB DDR4
    - Storage: 1 TB HDD SATA
    - Monitor: 18.5” LED
    - Peripherals: USB Keyboard & Mouse
    - Operating System: WINDOWS 11 Pro, 64 Bit
- **ACER Desktop Computers:**
    - Model: VERITON M200-H610
    - Processor: INTEL (R) Core I5 12 Generation
    - RAM: 16 GB
    - Storage: 512 GB SSD
    - Monitor: 21.5” LED
    - Peripherals: USB Keyboard & Mouse
    - Operating System: WINDOWS 11 Home, 64 Bit
- **Arduino Uno:** A microcontroller board for building digital devices and interactive objects.
- **GL-12 840 Points Breadboard:** For prototyping electronic circuits without soldering.
- **Multimeter:** Essential for measuring voltage, current, and resistance in circuits.
- **Soldering Stand:** For assembling and repairing electronic components.
- **40W Soldering Gun:** Useful for soldering securely.
- **12V, 2A Power Supply Adapter:** Provides power for various devices.
- **DHT 11 Module:** A digital temperature and humidity sensor.
- **Ultrasonic Module HC-SR-04:** For distance measuring applications.
- **Flame Sensor:** Detects the presence of fire or flames.
- **PIR Motion Sensor:** For detecting motion based on changes in infrared light.
- **IR Infrared Obstacle:** Used for obstacle detection and avoidance.
- **ADXL345 Triple Axis Linear Accelerometer:** Measures acceleration in three dimensions.
- **ESP 8266, ESP-01 - Wi-Fi Module:** Enables Wi-Fi connectivity for IoT projects.
- **1 Channel, 5V Relay:** Allows control of high-power devices.
- **12V DC Electric Solenoid Water Air Valve Switch (NC):** Controls the flow of water or air in a system.

List of Experiments

- Interfacing of LED’s & DC Motor with 8051 microcontroller
- Study arduino architecture and its programming
- Develop a circuit for blinking LED & Pulse Width Modulation using Arduino
- Develop a circuit to interface Arduino with Sensor (Temperature Sensor or Ultrasonic Sensor or PIR Sensor)
- Develop a circuit to interface Arduino with Actuator (12V Solenoid Valve or 12V DC Motor)
- Demonstrate wireless communication to control the LED
- Demonstrate to setup the clod platform & log temperature and humidity data on the platform.

10. Machine Shop

56. Machine Shop

The Machine Shop is crucial for mechanical engineering students, offering hands-on training that bridges theoretical knowledge with real-world application. Through operating lathe, drilling, shaping, and milling machines, students gain:

- Practical Skills: Mastery of machining processes, essential for manufacturing industries.
- Understanding of Materials: Insight into how different materials respond to various machining operations.
- Problem-Solving: Experience in troubleshooting machining challenges and enhancing precision.
- Industry Readiness: Exposure to tools and techniques used in production environments, making students more competitive in the job market.

This lab empowers students to develop the practical competencies needed for careers in mechanical engineering and manufacturing.

Machines in Machine Shop

 **57. Lathe Machine**	The workshop is equipped with 22 lathe machines, which are essential for various machining operations. A lathe machine is primarily used for rotating a workpiece to perform operations such as turning, facing, threading, and knurling. It enables precise shaping of metal, wood, and other materials by removing excess material with cutting tools. These machines are integral to the students' learning experience, helping them develop a strong foundation in manufacturing and machining processes that are widely used in industrial applications.
 **58. Vertical Slotting Machine**	A vertical slotting machine, also known as a slotter, is used to create vertical slots, grooves, and keyways in metal or other solid materials. It operates by moving a cutting tool vertically up and down while the workpiece is held stationary on the table. This machine is particularly useful for machining internal surfaces and irregular shapes that are difficult to process with other machines. In a student workshop setting, the vertical slotting machine provides hands-on experience in precision machining and teaches important concepts of mechanical shaping and cutting.

59. Milling Machine

A milling machine is a versatile tool used for shaping and cutting materials by moving a rotating cutting tool across the workpiece. It performs a range of operations, such as drilling, slotting, gear cutting, and contouring. Milling machines can work on complex surfaces and intricate designs, making them essential for precision engineering.

60. Radial Drilling Machine

A radial drilling machine is a specialized tool used for drilling holes in large and heavy workpieces that cannot be easily moved. The machine features a rotating arm (radial arm) that can be adjusted both vertically and horizontally, allowing the drill head to reach various positions on the workpiece without repositioning it. This flexibility makes it ideal for drilling, boring, and reaming operations on large surfaces.

Uses:

- Drilling precise holes in large components.
- Boring and tapping threads in metal or wood.
- Reaming holes to achieve high accuracy.
- Performing angular drilling by tilting the arm.

This machine helps students understand the complexities of drilling operations and prepares them for large-scale industrial applications.

61. Shaping Machine

A shaping machine is designed for producing flat surfaces, grooves, slots, and keyways by moving a single-point cutting tool in a linear motion across the workpiece. The workpiece remains stationary while the tool moves back and forth, removing material during the forward stroke. Shaping machines are ideal for machining small to medium-sized parts with simple shapes.

Uses:

- Producing flat and angular surfaces.
- Cutting slots and grooves.
- Forming keyways in shafts.
- Machining irregular shapes that are difficult to handle with other machines.

For students, using a shaping machine helps develop a fundamental understanding of linear machining processes and precision in creating basic geometric shapes used in engineering components.

11 Welding Shop

62. Welding Shop

The Welding Shop is an essential facility where students learn various welding techniques used in fabrication and assembly of metal components. It is equipped with different types of welding machines, each suited for specific processes.

Machines used:

- Arc Welding Machine: Uses an electric arc to melt and join metals.
- TIG Welding Machine: Utilizes a tungsten electrode and inert gas to produce high-quality welds on thin materials.

The Welding Shop gives students hands-on experience in various welding methods, enhancing their practical skills for industrial applications and preparing them for roles in manufacturing and fabrication.

12. Carpentry Shop

63. Carpentry Shop

The Carpentry Shop is a dedicated space where students learn woodworking techniques and craftsmanship. It is equipped with various tools and machines used to shape, cut, and join wood for building structures, prototypes, or furniture.

Common tools and machines include:

- Hand Saws and Chisels: For precise cutting and shaping.
- Planers: Used to smoothen and level wooden surfaces.
- Wood Lathes: For turning wood into round shapes.
- Drilling Machines: For creating holes in wood.
- Band Saws: For cutting intricate shapes and curves.

In this shop, students gain hands-on experience in basic carpentry, developing skills that are applicable in construction, design, and manufacturing. They also learn safety procedures and the importance of accuracy in craftsmanship.

13 Fitting Shop

64. Fitting Shop

The Fitting Shop in the Mechanical Engineering department is a specialized facility designed for hands-on training in the principles of fitting, assembly, and maintenance of mechanical components. This workshop provides students with practical experience in precision measurement, machining, and assembly techniques essential for their engineering careers.

Services and Training Offered:

- Instruction on various fitting techniques and tools
- Hands-on experience for fitting operations like filing, cutting, etc.
- Projects involving the assembly and disassembly of mechanical systems

Facilities:

- Workbenches equipped with hand tools
- Precision measuring instruments (calipers, micrometers)
- Machines for cutting, shaping, and assembling components

Our skilled instructors provide guidance on best practices, safety protocols, and quality assurance methods, ensuring students develop a thorough understanding of mechanical fitting processes. The Fitting Shop is an integral part of the curriculum, bridging theoretical knowledge with practical skills essential for future engineers.

14 Project Based Learning Lab (PBL)

65. Project Based Learning Lab

The Project-Based Learning Laboratory, a cutting-edge facility is developed by Mechatol Product Engineering Solutions Pvt Ltd, Pune. This lab is designed to empower mechanical engineering students by providing them with a dynamic space for hands-on project work and innovation.

Key Features:

- State-of-the-Art Equipment: Access to advanced tools and technologies for prototyping and testing.
- Collaborative Environment: A vibrant space that encourages teamwork and creative problem-solving.
- Real-World Applications: Engage in projects that reflect industry standards and address real engineering challenges.

Here, students can turn their ideas into reality, working on diverse projects that enhance their skills and prepare them for the workforce. The lab is not just a workspace; it's a hub of creativity and learning, where theoretical knowledge meets

practical application.

15 Project Lab (Vehicle Development)

66 Project Lab (Vehicle Development)

The Vehicle Development Project Lab, a specialized facility dedicated to the design and creation of innovative vehicles for competitions like BAJA. This lab is a hub of creativity and engineering excellence, where students engage in hands-on projects that challenge their skills and push the boundaries of vehicle technology.

Key Highlights:

- Cutting-Edge Tools: Access to machinery and equipment for vehicle fabrication and testing.
- Team Collaboration: A collaborative environment that fosters teamwork and encourages knowledge sharing among peers.
- Competition Readiness: Focused on developing vehicles that meet the rigorous standards of prestigious competitions, enhancing students' practical engineering experience.

In this lab, students not only learn the technical aspects of vehicle design but also gain valuable insights into project management and innovation.

16. Metrology Lab

67. Metrology Lab

The Metrology Laboratory, a vital facility dedicated to the science of measurement in engineering. This lab provides students with hands-on experience in precision measurement techniques, essential for ensuring quality and accuracy in manufacturing and design.

The Metrology Lab prepares students for careers in various industries by enhancing their skills in measurement and quality assurance.

Equipment

68. Profile Projector

The Profile Projector is an essential tool for precision measurement and inspection in engineering applications.
This projector is ideal for inspecting complex geometries and ensuring precise measurements in various engineering processes.

Specifications:

Make: ACCURATE SALES & SERVICES PVT. LTD.
Model Number: VPP 300
Screen Diameter: 300 mm
Magnification: 10 X
Transverse Movement:

- X Axis: 25 mm
- Y Axis: 25 mm
- Z Axis: 110 mm

Least Count of Transverse: 0.01 mm
Angular Measurement: 360°
Halogen Bulb: 24 volt, 150 watt
Dimensions (L x W x H): 900 x 400 x 940 mm
Work Stage Size (Top Plate): 140 mm x 135 mm

List of other equipment:
Surface Plate: 450 x 450 mm
Vernier Caliper: Fine adjustment; Size 0-200 mm / Least Count 0.02 mm, Mitutoyo make
Outside Micrometer: Size 25-50 mm / Least Count 0.01 mm, Mitutoyo make
Surface Roughness Tester: Model SJ 201, Mitutoyo make
Spirit Level: RSK Japan make, 150 x 0.02 mm, block type
Outside Micrometer: Size 0-25 mm / Least Count 0.01 mm, Mitutoyo make
Outside Micrometer: Size 25-50 mm / Least Count 0.01 mm, Mitutoyo make
Dial Indicator: Least Count 0.01 mm, Mitutoyo make
Dial Indicator: Least Count 0.001 mm, Mitutoyo make
Dial Gauge Stand: Mitutoyo make, No. 7001
Slip Gauge Set: 87 pieces, grade 'O', Mitutoyo make
Outside Micrometer: Size 0-25 mm / Least Count 0.001 mm, Mitutoyo make
Sine Bar: Indian make
Sine Centre: Indian make, 200 mm
Screw Thread Micrometer
Measuring Tip: For Screw Thread Micrometer
Gear Tooth Vernier Caliper
Monochromatic Light Source
Optical Flat: 50 mm

Bevel Protractor