Proposal
for
Extension of Autonomous Status

List of Lab Equipment's
Department of Mechanical Engineering

Amritsar Group of Colleges, Amritsar

(Autonomous College since 2014)

(NAAC Grade "A" in 3rd Cycle)

AMRITSAR GROUP OF COLLEGES NAAC Grade "A" 3rd Cycle | Autonomous College	**INDEX**	**Department of Mechanical Engineering**

AMRITSAR GROUP OF COLLEGES NAAC Grade "A" 3rd Cycle | Autonomous College under Autonomous Category | (Since 2014) Conferred by UGC	**Applied Thermodynamics Lab**	**Mechanical Engineering**

Applied Thermodynamics Lab

Picture of the Lab (Outside – showing the name plate)

Picture of the Lab (Inside – showing a wider view of the lab)

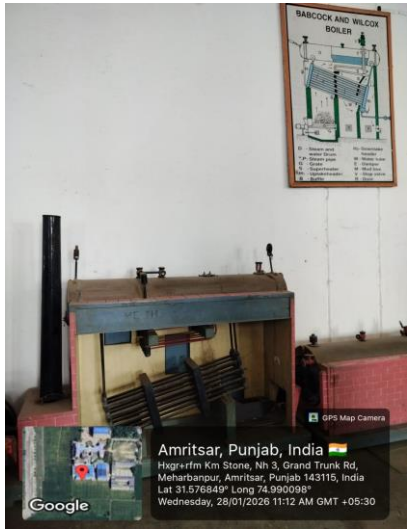
AMRITSAR GROUP OF COLLEGES NAAC Grade "A" 3rd Cycle | Autonomous College under Autonomous Category | (Since 2014) Conferred by UGC	**Applied Thermodynamics Lab**	**Mechanical Engineering**

Details of the Laboratory Equipment's

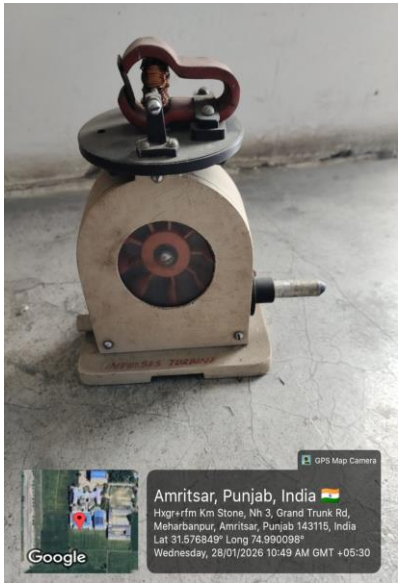
S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Single Cylinder four Stroke water cooled diesel engine	**Description:** A single-cylinder, four-stroke, water-cooled diesel engine used to demonstrate the working and performance characteristics of compression ignition engines, including power output, fuel consumption, and thermal efficiency under controlled laboratory Conditions. **Specifications:** • **Engine type**: Single cylinder, four stroke, compression ignition • **Fuel used**: Diesel • **Cooling system**: Water cooled • **Number of cylinders**: 1 • **Operating cycle**: Four stroke (suction, compression, power, exhaust) • **Ignition system**: Compression ignition • **Speed range**: Constant / variable speed (lab scale)	1		 ..

2	Multi Cylinder four stroke petrol engine	**Description:** A motorized triaxial shear testing This engine test rig is used for conducting detailed performance analysis of a multi-cylinder four-stroke petrol engine. It allows measurement of parameters such as speed, load, fuel consumption, and thermal efficiency under controlled conditions **Specifications:** • **Engine type**: Multi-cylinder, 4-stroke petrol engine • **Cooling**: Water cooled • **Instrumentation**: RPM, load, temperature, fuel flow • **Dynamometer**: Electrical / hydraulic • **Power range**: Lab-scale automotive engine • **Application**: Performance & emission testing	1		

3	Lancashire boiler	**Description:** The Lancashire boiler is a horizontal, fire-tube type, internally fired boiler used to generate steam at moderate pressure. It consists of a large cylindrical shell with two internal fire tubes through which hot gases pass. It is mainly used in power plants and industries for steam generation and to study boiler construction and heat transfer. **Specifications:** • **Type**: Fire tube boiler • **Orientation**: Horizontal • **Firing**: Internally fired • **Number of fire tubes**: Two • **Working pressure**: Up to 15 bar • **Fuel used**: Coal / solid fuel • **Water circulation**: Natural	1		

4	Babcock & Wilcox Boiler	**Description :** The Babcock & Wilcox boiler is a horizontal, water-tube boiler used for generating high-pressure steam. Water flows inside inclined tubes while hot gases pass outside, allowing efficient heat transfer. It is widely used in thermal power plants due to its high efficiency and safety. **Specifications:** • **Type**: Water tube boiler • **Orientation:** Horizontal • **Firing:** Externally fired • **Tube arrangement:** Inclined water tubes • **Working pressure:** Up to 40 bar • **Steam capacity**: High • **Water circulation**: Natural • **Application**: High-pressure steam generation.	1		

5	Steam Engine	**Description:** This equipment is a working demonstration model of a single-cylinder steam engine. It is used to show how thermal energy of steam is converted into mechanical energy through the reciprocating motion of a piston, connecting rod, and crankshaft. **Specifications:** • **Type**: Horizontal steam engine (demo) • **Cylinder**: Single cylinder • **Flywheel**: Metal • **Valve gear**: Slide valve • **Housing**: Transparent acrylic cover • **Application**: Heat engine study	1		

6	Impulse Turbine	**Description :** This model represents an impulse type hydraulic turbine, commonly known as a Pelton wheel. It is used to demonstrate how kinetic energy of a high-velocity water jet is converted into mechanical energy by striking turbine buckets **Specifications:** • **Turbine type**: Impulse (Pelton) • **Runner**: Bucket-type wheel • **Nozzle**: Single jet • **Working fluid**: Water • **Shaft**: Steel • **Power range**: Demonstration scale • **Application**: Hydraulic machines lab	1		

7	Four Stroke Petrol Engine	**Description**: This cut-section model represents a four-stroke petrol engine and clearly shows internal components such as piston, valves, camshaft, spark plug, and crankshaft. It is used to demonstrate the four strokes—intake, compression, power, and exhaust—allowing students to understand valve timing and engine operation in detail.. **Specifications :** • **Engine type**: Single cylinder, 4-stroke SI engine • **Fuel**: Petrol • **Ignition**: Spark plug • **Cooling**: Air cooled (model) • **Stroke cycle**: Intake, Compression, Power, Exhaust • **Material**: Cast iron / aluminium cut section • **Application**: Engine theory demonstration	1		

8	Two Stroke Diesel Engine	**Description:** This cut-section model demonstrates the working of a two-stroke diesel engine, highlighting scavenging, fuel injection, and power generation within a single crankshaft revolution. It is used to explain constructional features, working cycle, and differences between two-stroke and four-stroke engines. **Specifications:** • **Engine type**: Single cylinder, 2-stroke CI engine • **Fuel:** Diesel • **Ignition**: Compression ignition • **Cooling**: Water cooled (model representation) • **Stroke cycle**: Power + scavenging • **Application**: IC engines lab	2		

9	Two Stroke Petrol Engine	**Description:** A two-stroke petrol engine is an internal combustion engine that completes one power cycle in two strokes of the piston. It uses petrol as fuel and spark ignition for combustion. Due to its simple construction and high power-to-weight ratio. **Specifications:** • **Engine type**: Single cylinder, two stroke • **Fuel used**: Petrol • **Cooling system**: Air cooled / water cooled • **Power cycle**: Completed in one crankshaft revolution • **Lubrication**: Petrol-oil mixture • **Application**: Two-wheelers, small machines	1		

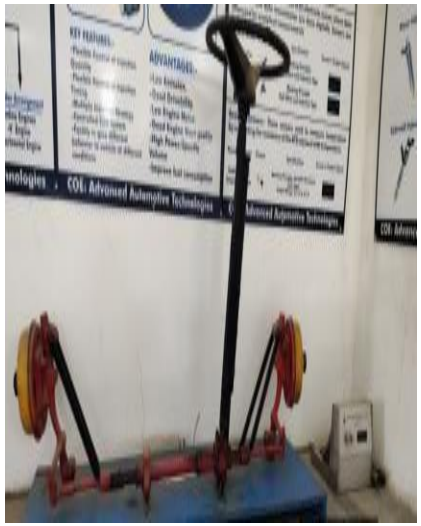
Note: This proforma must include all types of laboratory equipment, including computer systems, licensed software, projectors, smart screens, and other ICT-enabled teaching–learning resources.

Automobile Engineering Lab:

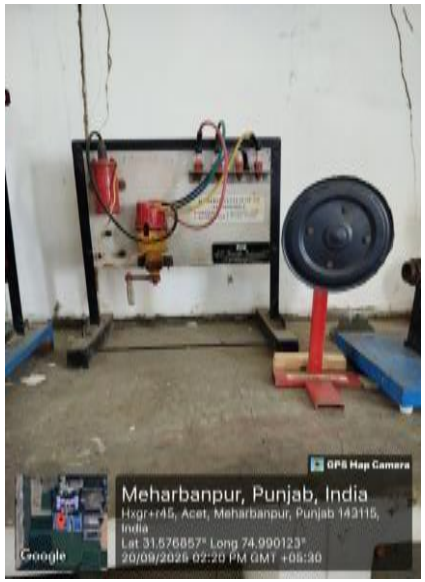
Picture of the Lab (Outside – showing the name plate)

Picture of the Lab (Inside – showing a wider view of the lab)

Details of the Laboratory Equipment's

S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Steering Wheel Mechanism	**Description:** The Steering Wheel Mechanism is a laboratory demonstration setup used to study the basic working of an automobile steering system **Specifications:** • Type: Manual steering wheel mechanism (demonstration model) • Steering wheel: Mild steel / cast iron • Steering column: Mild steel • Linkage system: Mechanical linkage (tie rods) • Number of wheels: Two • Operation: Manual • Mounting: Base-mounted on rigid frame • Power supply: Not required	1		

2	Hydraulic Braking System	**Description:** The Hydraulic Braking System is a laboratory demonstration setup used to study the working principle of hydraulic brakes used in automobiles **Specifications:** • Type: Hydraulic braking system (demonstration model) • Principle: Pascal's law • Brake actuation: Hydraulic (manual lever) • Brake fluid: DOT brake fluid • Main components: Master cylinder, wheel cylinder, brake drum/disc • Wheel type: Single demonstration wheel • Operation: Manual • Power requirement: Not required	1		

3	Model of Ignition system	**Description:** The Model of Ignition System is a laboratory demonstration setup used to study the working of the ignition system in spark-ignition (petrol) engines **Specifications:** Type: Pool Boiling Heat Transfer Apparatus • Type: Spark ignition system (demonstration model) • Power source: Battery / DC supply • Main components: Ignition coil, distributor, spark plug, switch • Operating principle: Electromagnetic induction • Ignition control: Mechanical / electrical switching • Operation: Manual / electrically operated • Application: Automobile engineering laboratory • Power requirement: Low-voltage DC supply	1		

4	Differential System	**Description:** The Differential System is a laboratory demonstration model used to study the working of an automobile differential **Specifications:** • Type: Automobile differential (demonstration model) • Main components: Crown wheel, pinion, bevel gears, axle shafts • Gear type: Bevel gears • Operation: Mechanical • Material: Mild steel / cast iron • Mounting: Bench-mounted frame • Power requirement: Not required (manual demonstration)	1		

5	Gear Box	**Description:** The Gear Box is a laboratory demonstration model used to study the working of an automobile transmission system. **Specifications:** • Type: Manual gearbox (demonstration model) • Main components: Input shaft, output shaft, gear sets, bearings • Gear type: Spur / helical gears • Number of gears: Multiple forward gears and one reverse • Operation: Mechanical • Material: Mild steel / cast iron • Mounting: Frame-mounted • Power requirement: Not required (manual demonstration)	1		

6	CRDI Engine	**Description**: The CRDI (Common Rail Direct Injection) Engine is a modern diesel engine system used in automobile laboratories to study advanced fuel injection technology. **Specifications:** • **Type:** Diesel engine with CRDI system • **Fuel injection:** Common rail direct injection • **Injection pressure:** High pressure (up to ~1600–2000 bar) • **Control system:** Electronic Control Unit (ECU) • **Main components:** High-pressure pump, common rail, injectors, sensors • **Cooling system:** Water-cooled • **Fuel:** Diesel			

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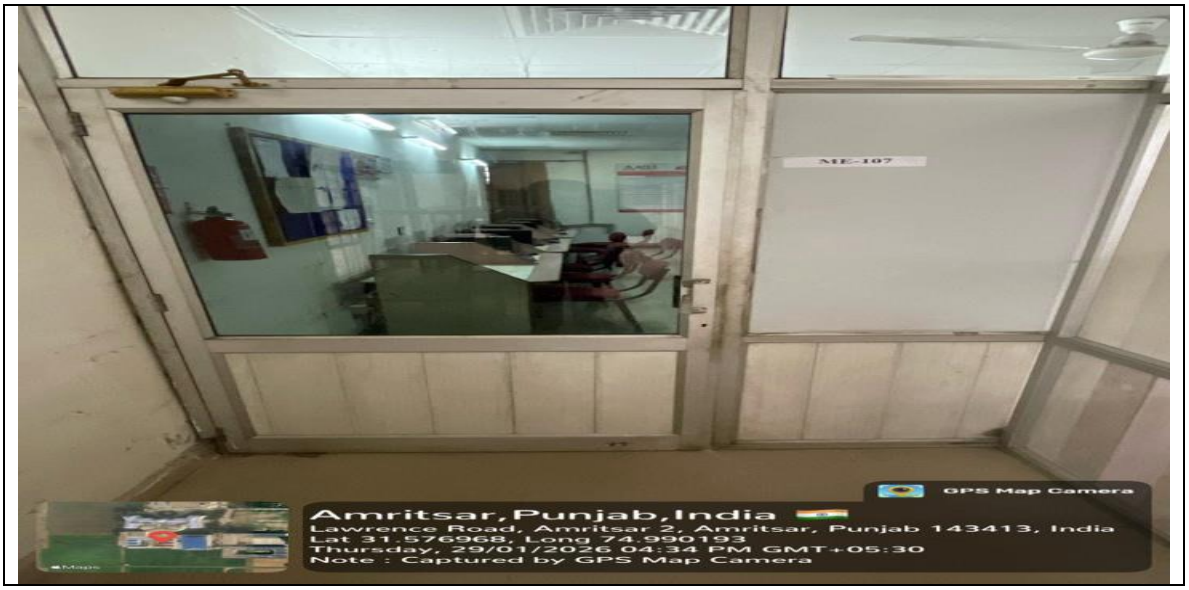
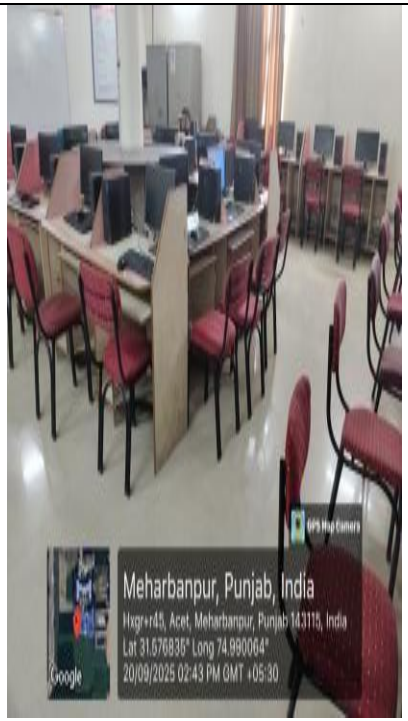
CAD/CAM Lab

Picture of the Lab (Outside – showing the name plate)



Picture of the Lab (Inside – showing a wider view of the lab)

Details of the Laboratory Equipment's

<table>
<tr><th>S. N.</th><th>Name of Equipment</th><th>Description / Specification of the Equipment</th><th>Quantity</th><th>Normal Picture</th><th>Geotagged Picture</th></tr>
<tr><td>1</td><td>Computer Systems with Graphics Cards</td><td>Description: A CAD/CAM Lab is a specialized facility that uses Computer-Aided Design (CAD) and Computer-Aided Manufacturing (CAM) technologies to design and produce precise components.
Specifications:
<table>
<tr><th>S. No.</th><th>Component Name</th><th>Quantity</th></tr>
<tr><td>1</td><td>Processor Intel Core i3 10100 10th Gen (4.3 GHz)</td><td>30</td></tr>
<tr><td>2</td><td>HDD Western Digital 7200 rpm 3.5 inch 1 TB</td><td>30</td></tr>
<tr><td>3</td><td>SSD ADATA 256 GB</td><td>30</td></tr>
<tr><td>4</td><td>Graphics Card Nvidia GT710 2 GB</td><td>30</td></tr>
<tr><td>5</td><td>RAM Hynix 4 GB</td><td>30</td></tr>
<tr><td>6</td><td>RAM Crucial 8 GB</td><td>15</td></tr>
<tr><td>7</td><td>Motherboard</td><td>30</td></tr>
</table></td><td>30</td><td>  </td><td> 

..</td></tr>
</table>

	Lenovo	
8	LCD 19 inch Lenovo	30
9	Cabinet Lenovo Black	30
10	Keyboard Lenovo USB	30
11	Mouse Lenovo USB	30
12	Power Cables	60
13	HDMI Cables	30

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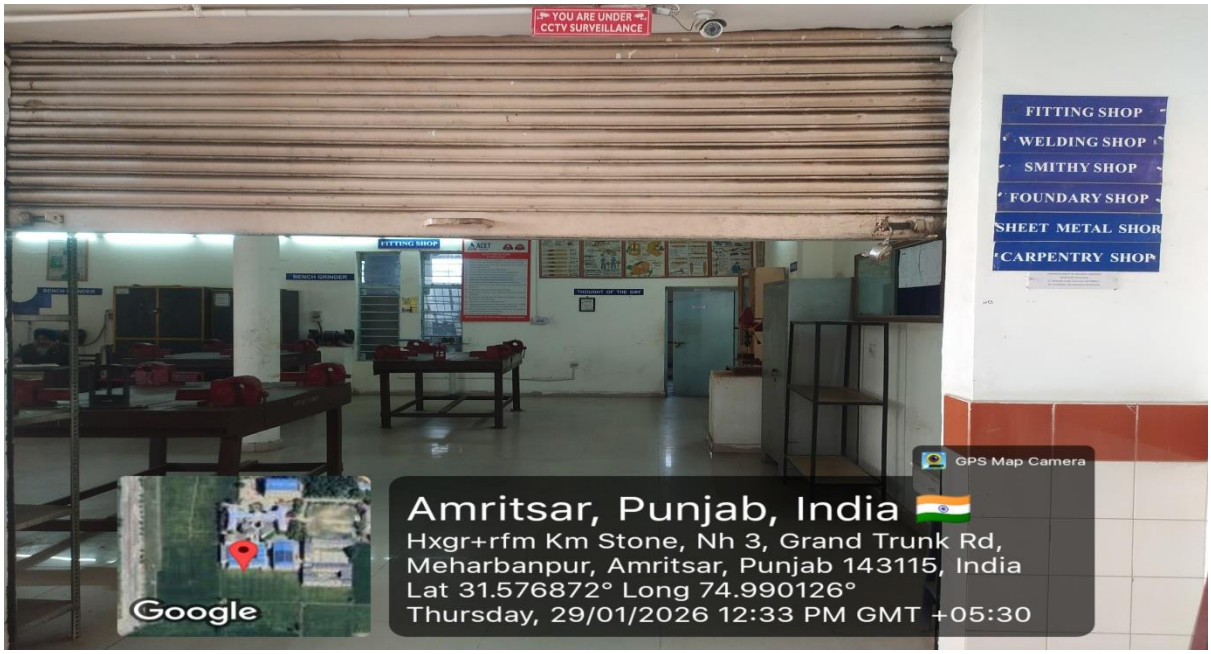
Carpentry Shop:

Picture of the Lab (Outside – showing the name plate)



Picture of the Lab (Inside – showing a wider view of the lab)

Details of the Laboratory Equipment's

S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Carpentry hand tools	**1. Hand Saw** **Description:** Used for cutting wood along or across the grain. **Specification:** Blade length 450–600 mm; hardened steel blade; wooden/plastic handle. **2. Jack Plane** **Description:** Used for smoothing, leveling, and shaping wooden surfaces. **Specification:** Length 350–400 mm; cast iron/steel body; adjustable steel blade. **3. Try Square** **Description:** Used to check and mark right angles (90°). **Specification:** Blade length 150–300 mm; steel blade. **4. Chisel** **Description:** Used for cutting and shaping wood, especially joints. **Specification:** Blade width 6–25 mm; high carbon steel blade. **5. Wooden Mallet** **Description:** Used to strike chisels without damaging handles. **Specification:** Hardwood head; handle length about 250–300 mm. **6. Claw Hammer** **Description:** Used for driving and removing nails.	-		

		Specification: Weight 0.5–0.75 kg; steel head; wooden/fiberglass handle. **7. Marking Gauge** **Description:** Used to mark parallel lines on wood surfaces. **Specification:** Wooden/metal body; adjustable steel pin; scale up to 150 mm. **8. Screwdriver** **Description:** Used for tightening or loosening screws. **Specification:** Flat or Phillips tip; blade length 100–200 mm; insulated handle.			
2	Carpenter bench	**Description:** A carpenter bench is a sturdy worktable used to support and hold wooden workpieces during carpentry operations such as cutting, planning, chiseling, and assembly. **Specification:** Made of hardwood or heavy timber; length 1.5–2.5 m; width 600–900 mm; height about 750–850 mm; fitted with woodworker's vice, bench stops, and tool tray.	3		

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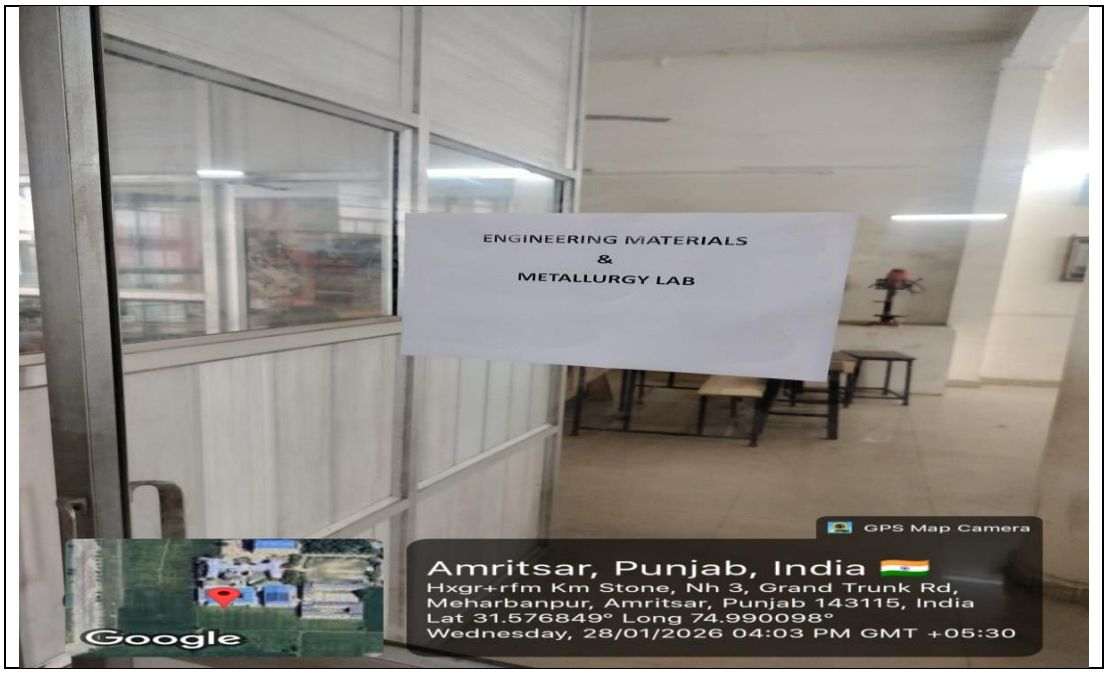
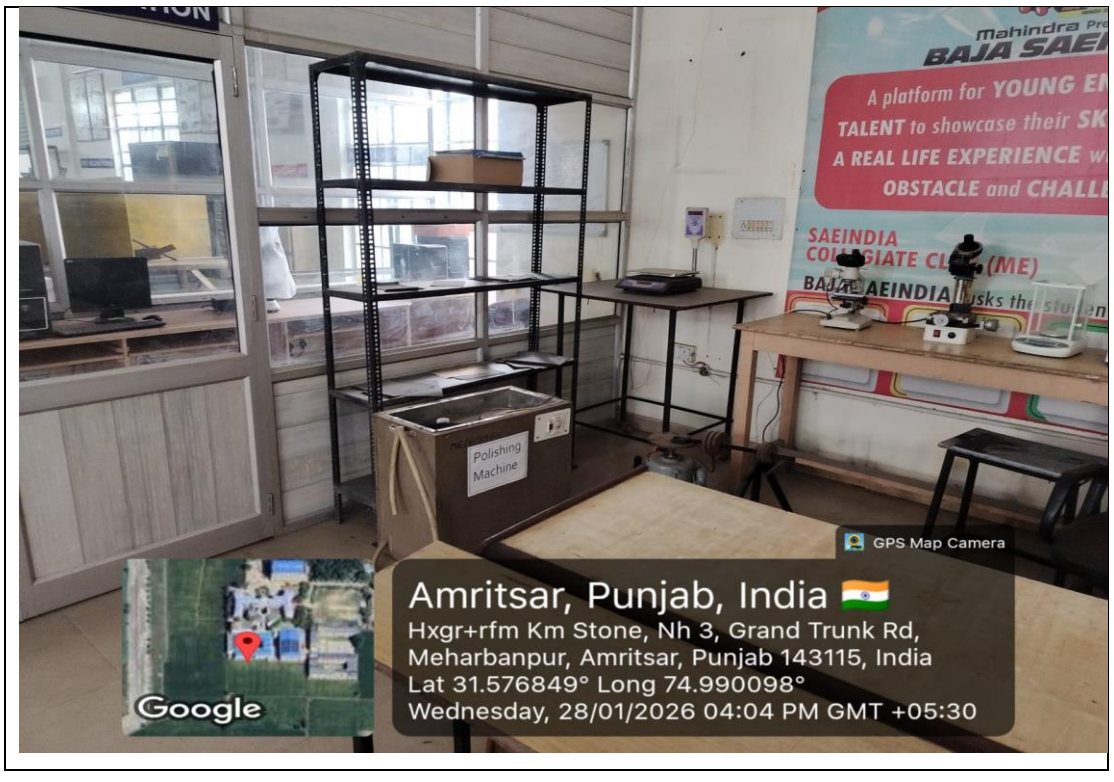
Engineering Material & Metallurgy Lab:

Picture of the Lab (Outside – showing the name plate)



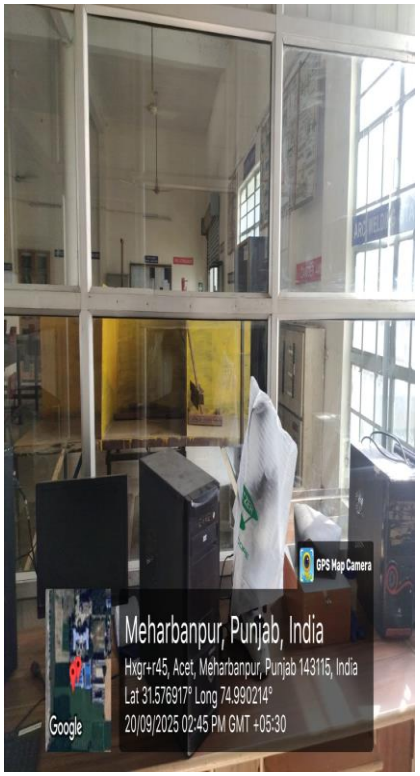
Picture of the Lab (Inside – showing a wider view of the lab)

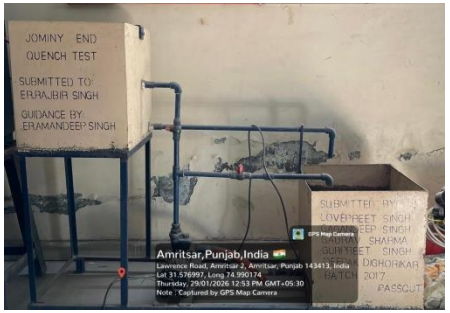


Details of the Laboratory Equipment's

S. No.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Muffle Furnance	**Description: A** muffle furnace is a high-temperature laboratory furnace used for heat treatment and thermal processing of materials**.** It provides a controlled and uniform heating environment by isolating the material from direct flame and combustion gases**.** **Specifications:** • **Type:** Electrically operated laboratory muffle furnace • **Maximum Operating Temperature:** 1000°C – 1200°C (varies by model) • **Temperature Control:** Digital / PID temperature controller • **Heating Elements:** Kanthal or Nichrome wire elements • **Chamber Material:** High-grade ceramic / refractory insulation • **Outer Body:** Mild steel with powder-coated finish • **Power Supply:** 230 V AC, 50 Hz, single phase • **Heating Method:** Indirect electric heating (no direct flame) • **Temperature Uniformity:** ±5°C within the chamber • **Door Type:** Front-loading insulated door	1		

2	Speciman Mounting and Polishing	**Description: A** polishing machine is a laboratory equipment used to obtain a smooth, mirror-like surface finish on metal specimens before microscopic examination.it is mainly used during metallographic sample preparation**.** **Specifications:** • **Type:** Single-disc metallographic polishing machine • **Disc Diameter:** 200–300 mm (approx.) • **Disc Material:** Cast iron / aluminum / polishing cloth mounted disc • **Speed:** 600–1500 rpm. • **Drive:** Electric motor driven • **Motor Power:** 0.25 – 0.5 HP • **Power Supply:** 230 V AC, 50 Hz, single phase • **Abrasive Media Used:** Alumina powder, diamond paste, emery paste • **Body Material:** Mild steel cabinet with protective enclosure • **Control:** ON/OFF switch • **Application:** Metallographic specimen preparation in EMM lab	1		

3	Metallurgical Microscope	**Description** A metallurgical microscope is an optical instrument used to examine the microstructure of metals and alloys. It works on the principle of reflected light illumination, as metallic specimens are opaque and cannot be observed using transmitted light. **Specifications:** • **Type:** Optical metallurgical microscope • **Illumination:** Reflected light (incident illumination) • **Eyepiece Magnification:** 10× • **Objective Lenses:** 5×, 10×, 20×, 50× (typical) • **Total Magnification Range:** 50× to 500× • **Light Source:** LED / halogen lamp • **Focusing:** Coarse and fine focusing knobs • **Stage:** Mechanical stage for specimen holding • **Body:** Rigid metallic body with vibration stability • **Power Supply:** 230 V AC, 50 Hz	1		

4	Jominy End Quench Test Machine	**Description** The Jominy End Quench Test Machine is used in metallurgy and material science laboratories to determine the hardenability of steel**.** Hardenability indicates the ability of steel to harden to a certain depth when quenched, which is different from hardness. **Specifications:** • **Type:** Jominy End Quench Test Apparatus • **Test Standard:** ASTM A255 / IS 3848 • **Specimen Position:** Vertical mounting • **Quenching Medium:** Water • **Frame Material:** Mild steel / stainless steel • **Control System:** Manual valve control	1		

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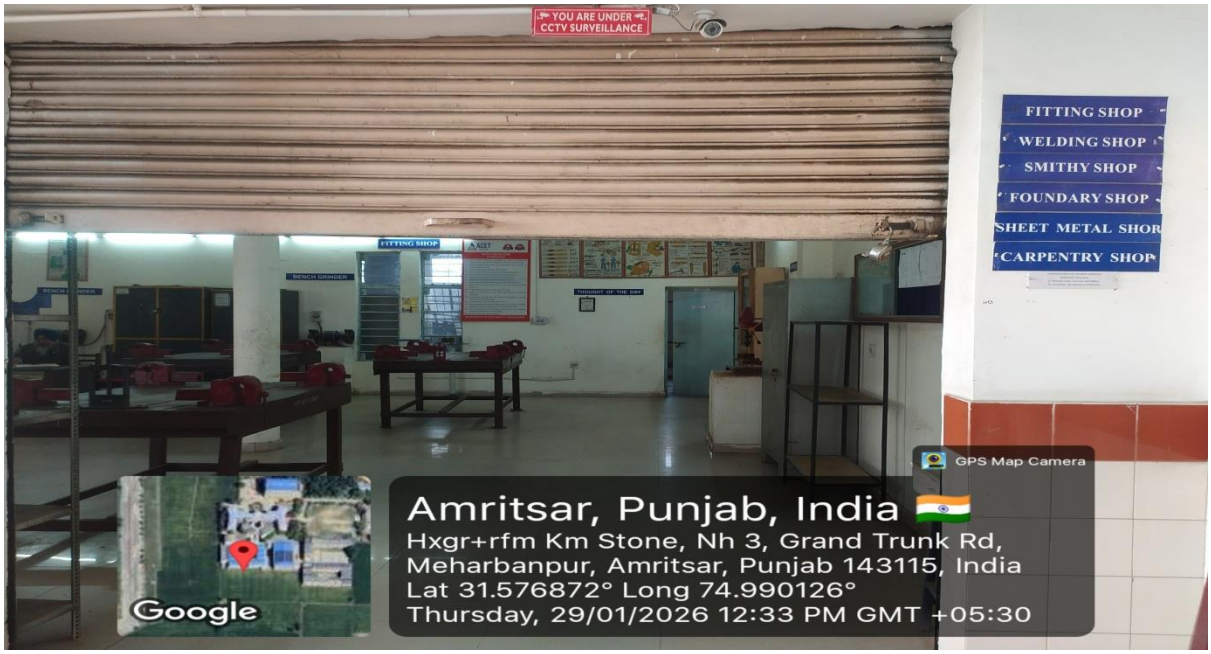
Fitting Shop:

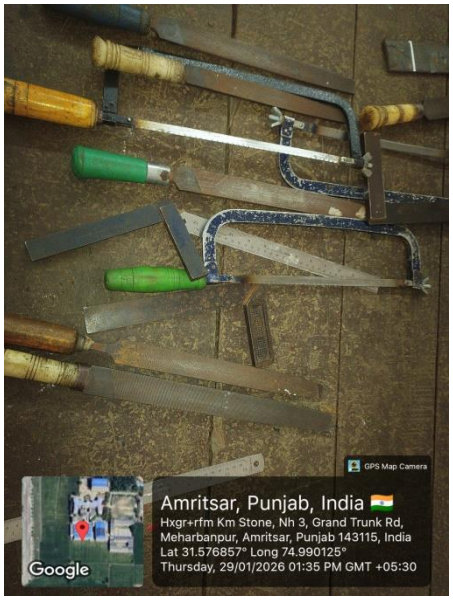
Picture of the Lab (Outside – showing the name plate)



Picture of the Lab (Inside – showing a wider view of the lab)

Details of the Laboratory Equipment's

S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Bench Vice	**Description:** A bench vice is a work-holding device fixed to a workbench, used to firmly hold wooden or metal workpieces during operations such as sawing, filing, drilling, and fitting. **Specification:** Jaw width 100–150 mm; maximum opening 100–200 mm; cast iron or steel body; hardened steel jaws; screw-operated movable jaw with handle.	16		

2	Fitting Hand tools	Hacksaw **Description**: Used for cutting metal bars, rods, and pipes. **Specification**: Frame length 300 mm; high-carbon steel blade. File **Description:** Used for removing excess material and finishing surfaces. **Specification:** Length 150–300 mm; types: flat, round, half-round; high-carbon steel. Chisel **Description:** Used for chipping and cutting metal. **Specification**: Blade width 6–25 mm; hardened steel; hexagonal/round shank. Ball Peen Hammer **Description:** Used for striking tools and shaping metal. **Specification**: Weight 0.25–0.75 kg; forged steel head; wooden/fiberglass handle. Try Square **Description**: Used to check squareness and mark 90° angles. **Specification**: Blade length 150–300 mm; steel blade with stock. Scriber **Description**: Used for marking lines on metal surfaces. **Specification**: Length 150–200 mm; hardened steel; pointed ends. Steel Rule **Description**: Used for linear measurements. Specification: Length 150–300 mm; **stainless steel**; graduation in mm.	-		

3	Drilling Machine	**Description:** A drilling machine is a machine tool used to produce circular holes in solid materials using a rotating cutting tool called a drill bit. It can also be used for operations like reaming, tapping, countersinking, and spot facing. **Specification:** Drill capacity 10–25 mm; spindle speed range 100–3000 rpm; motor power 0.5–2 HP; vertical column type; adjustable worktable; electric motor driven.	3		

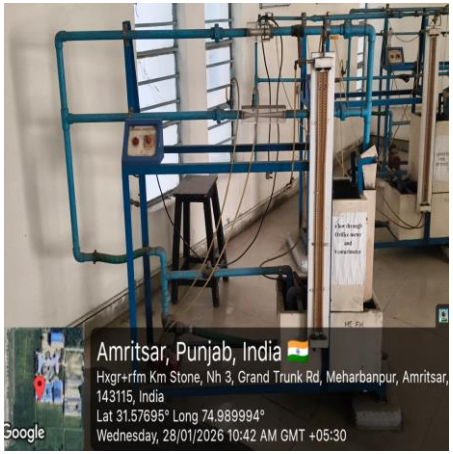
Note: This proforma must include all types of laboratory equipment, including computer systems, licensed software, projectors, smart screens, and other ICT-enabled teaching–learning resources.

Fluid Mechanics Lab:

Picture of the Lab (Outside – showing the name plate)

Picture of the Lab (Inside – showing a wider view of the lab)

Details of the Laboratory Equipment's

S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Venturi meter & Orifice Apparatus	**Major Components** ➢ Venturi meter (convergent–divergent type) ➢ Orifice meter with interchangeable orifice plate ➢ Transparent manometer tubes / multi-tube manometer ➢ Centrifugal water pump ➢ Sump tank with recirculation system **Technical Specifications** ➢ Working Fluid: Water ➢ Pipe Material: PVC / MS ➢ Venturi Throat Diameter: Typically 12–20 mm ➢ Inlet Pipe Diameter: 25–40 mm ➢ Orifice Diameter: 10–20 mm (removable) ➢ Power Supply: 230 V, Single Phase, 50 Hz	1		

2	Bernoulli's Theorem Apparatus	**Major Components** ➢ Converging–diverging test section (transparent) ➢ Multiple pressure tapping points ➢ Vertical piezometer tubes (multi-tube) ➢ Centrifugal pump ➢ Sump tank **Technical Specifications** ➢ Working Fluid: Water ➢ Test Section Material: Acrylic / Transparent plastic ➢ Number of Pressure Tapping's: 6–10 points ➢ Piezometer Tube Range: 0–300 mm of water ➢ Pipe Diameter: 20–40 mm (varying section) ➢ Pump Capacity: 0.5 HP centrifugal pump	1		
3	Pitot tube Apparatus	**Major Components** ➢ Pitot tube (movable / fixed type) ➢ Transparent manometer / differential manometer ➢ Flow pipeline with test section ➢ Centrifugal pump	1		

		Technical Specifications ➢ Working Fluid: Water ➢ Pitot Tube Material: Brass / Stainless Steel ➢ Pipe Diameter: 25–40 mm ➢ Manometer Type: Single / Differential manometer ➢ Manometer Range: 0–300 mm of water ➢ Pump Capacity: 0.5 HP centrifugal pump			
4	Reynold's Apparatus	**Major Components** ➢ Transparent test pipe (glass/acrylic) ➢ Dye injection system with reservoir ➢ Constant head water tank ➢ Flow control valve ➢ Centrifugal pump ➢ Sump tank with recirculation **Technical Specifications** ➢ Working Fluid: Water ➢ Test Section Material: Glass / Acrylic (transparent) ➢ Internal Pipe Diameter: 10–20 mm ➢ Test Section Length: 800–1000 mm (approx.) ➢ Flow Regime Range:	1		

		Laminar to turbulent ➢ Reynolds Number Range: Up to ~10^5 ➢ Pump Capacity: 0.25–0.5 HP centrifugal pump			
5	Pipe line Friction Apparatus Pipe Fitting Friction	**Major Components** ➢ Centrifugal pump with motor ➢ Closed-loop piping system (PVC / GI) ➢ Test pipe section (smooth pipe) ➢ Pipe fittings (elbow, bend, valve, etc.) ➢ Differential manometer / pressure tapping points **Specifications** ➢ Pump power: 0.5 – 1 HP ➢ Pipe material: PVC / GI ➢ Pipe inner diameter: 15–25 mm ➢ Test pipe length: ~1–2 m ➢ Manometer fluid: Mercury / Colored water ➢ Flow measurement: Volumetric tank (0–50 L)	1		

6	Metacentric Height	**Major Components** ➢ Rectangular floating pontoon ➢ Water tank (transparent acrylic/glass) ➢ Vertical scale with pointer ➢ Movable weights **Specifications (Typical)** ➢ Tank material: Acrylic / Glass ➢ Tank dimensions: ~600 × 400 × 400 mm ➢ Floating body material: Mild steel / Aluminum ➢ Pontoon shape: Rectangular ➢ Weight hanger range: 0–2 kg (incremental)			

Note: This proforma shall include all categories of mechanical laboratory and infrastructure facilities, encompassing core and advanced mechanical laboratory equipment, testing and measuring instruments, machine tools, workshop facilities, safety systems other ICT-enabled teaching–learning resources.

Fluid Mechanics Lab:

Picture of the Lab (Outside – showing the name plate)

Picture of the Lab (Inside – showing a wider view of the lab)

Details of the Laboratory Equipment's

S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Centrifugal Blower	➢ Centrifugal blower with casing and impeller ➢ Electric motor with coupling ➢ Air intake and delivery duct ➢ Orifice meter / flow measuring device ➢ U-tube manometer / pressure gauge ➢ Type: Centrifugal blower ➢ Motor power: 1 – 3 HP ➢ Speed: 2800–3000 rpm ➢ Delivery pressure: Up to 150 mm of water ➢ Air flow rate: 300–1000 m^3/hr	1		

2	Reciprocating Centrifugal Pump Test Rig	**Major Components** ➢ Reciprocating pump ➢ Centrifugal pump ➢ Electric motor ➢ Sump tank ➢ Delivery and suction pipelines ➢ Pressure gauges (suction & delivery) ➢ Pump types: Reciprocating & Centrifugal ➢ Motor power: 1 – 2 HP ➢ Speed: 1440 / 2800 rpm ➢ Discharge range: 10–50 LPM ➢ Maximum head: 15–30 m ➢ Pipe material: GI / PVC	1		

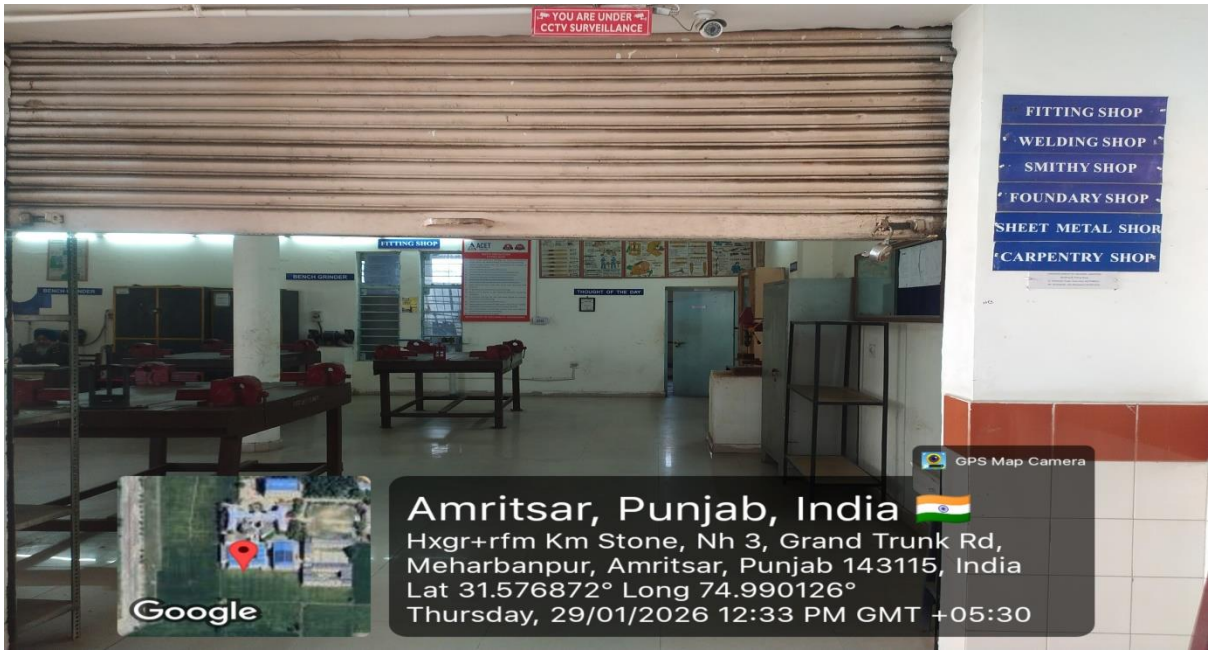
3	Pelton Turbine	**Key Specifications:** ➢ **Type:** Impulse Turbine ➢ **Operating Head:** Typically between 50 meters to 2000 meters. ➢ **Efficiency Range:** 80-90% (varies based on the flow rate and head) ➢ **Design:** Water strikes buckets tangentially, converting kinetic energy into rotational energy. ➢ **Application:** High-head, low-flow hydropower plants (mountainous areas). **Components:** ➢ **Nozzle**: Delivers high-pressure water into the turbine's rotor. ➢ **Buckets**: Specially designed to capture the water jet. ➢ **Runner**: The rotating part of the turbine that transfers energy to the generator. ➢ **Governor**: Regulates turbine speed and controls the flow of water.	1		

4	Francis Turbine	**Key Specifications:** ➢ **Type:** Reaction Turbine ➢ **Operating Head:** Typically between 10 meters to 700 meters. ➢ **Efficiency Range:** 85-90% (can vary based on the turbine design and flow conditions). ➢ **Application:** Suitable for both high and medium head hydropower plants. **Components:** ➢ **Stay Vanes:** Direct water into the runner. ➢ **Guide Vanes:** Control the flow of water entering the turbine and influence the operating conditions. ➢ **Runner:** The rotating part, which is responsible for energy conversion.	1		

Note: This proforma shall include all categories of mechanical laboratory and infrastructure facilities, encompassing core and advanced mechanical laboratory equipment, testing and measuring instruments, machine tools, workshop facilities, safety systems other ICT-enabled teaching–learning resources.

Foundry Shop:

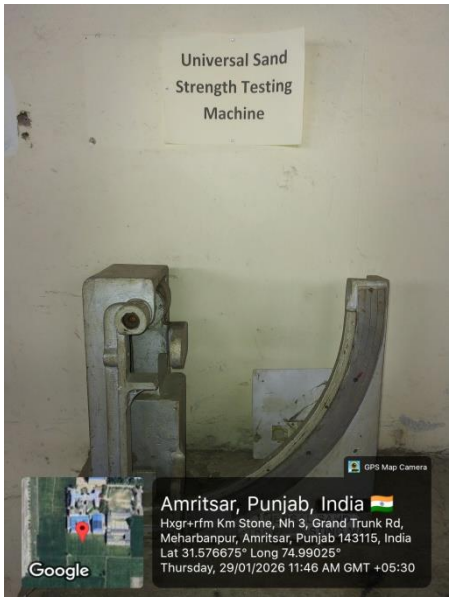
Picture of the Lab (Outside – showing the name plate)

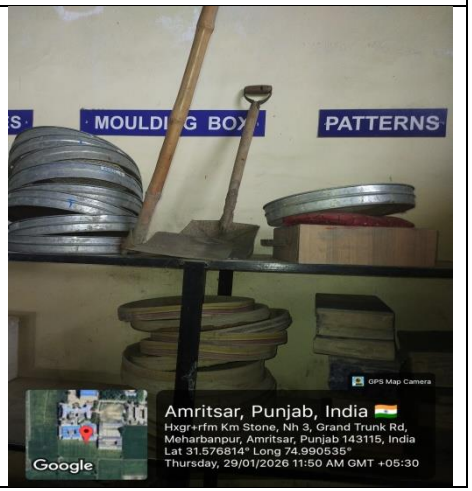


Picture of the Lab (Inside – showing a wider view of the lab)

Details of the Laboratory Equipment's

S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Sand Mullar Machine	**Description:** A sand muller machine is used to mix and prepare molding sand uniformly by thoroughly blending sand, clay, water, and additives to obtain required strength, permeability, and plasticity for foundry molds. **Specification:** Mixing capacity 50–200 kg per batch; rotating pan type; heavy rollers and ploughs; cast iron/steel construction; motor-driven (≈1–3 HP); uniform mixing arrangement.	1		

2	Universal Sand Strength Testing Machine	**Description:** A Universal Sand Strength Testing Machine is used to determine the strength properties of molding sand, such as **compression, shear, and tensile strength**. It helps in assessing the suitability of sand for making strong and defect-free molds in foundry practice. **Specification:** Load capacity up to 500 kg; hand-operated loading mechanism; interchangeable attachments for compression, shear, and tensile tests; robust cast iron body; standard sand specimen size (50 mm diameter × 50 mm height); direct load indication scale.	1		

3	Rotary Sieve Shaker	**Description:** A rotary sieve shaker is used to determine the **grain size distribution of molding sand** by separating sand particles through a set of standard sieves. It helps in evaluating sand fineness, which affects permeability and surface finish of castings. **Specification:** Number of sieves: 6–8 standard sieves; sieve diameter about 200 mm; electrically motor-driven; rotary and tapping motion; cast iron/steel frame; timer-controlled operation; suitable for dry sand testing.	1		
4	Foundry Tools	**1. Rammer** **Description:** Used to compact molding sand in the flask. **Specification:** Wooden/metal body; hand rammer with peen and butt ends; length 300–450 mm. **2. Trowel** **Description:** Used for smoothing and finishing mold surfaces. **Specification:** Steel blade; wooden handle; blade length 100–150 mm. **3. Shovel** **Description:** Used for handling and mixing molding sand. **Specification:** Mild steel blade;	-		

		wooden handle; overall length about 1 m. **4. Slick** **Description:** Used for repairing and finishing mold cavities. **Specification:** Flat/curved steel blade; wooden handle; various sizes. **5. Lifter** **Description:** Used to remove loose sand from deep or narrow cavities. **Specification:** Thin steel blade; bent end; length 200–300 mm. **6. Vent Wire** **Description:** Used to make vent holes in molds for gas escape. **Specification:** Steel wire; diameter 1.5–3 mm; length 300–400 mm. **7. Draw Spike** **Description:** Used to withdraw the pattern from the mold. **Specification:** Steel spike with handle; length about 150–250 mm. **8. Sprue Pin** **Description:** Used to form the sprue in sand molds. **Specification:** Tapered steel/wooden pin; length 150–300 mm.			

5	Pit Furnace	**Description:** A pit furnace is a type of furnace used for melting metals like cast iron, copper, or aluminum. It consists of a pit dug into the ground lined with refractory bricks, where the metal is heated using coal, coke, or other fuels. It is commonly used in foundries for small to medium-scale metal melting. **Specifications (Typical):** • **Type:** Open or closed pit • **Fuel Used:** Coal, coke, charcoal • **Melting Capacity:** 50–200 kg (varies by size) • **Operating Temperature:** 1200–1600°C (depending on metal) • **Construction:** Refractory-lined pit with air supply through tuyeres	1		

Note: This proforma must include all types of laboratory equipment, including computer systems, licensed software, projectors, smart screens, and other ICT-enabled teaching–learning resources.

Heat Transfer Lab:

Picture of the Lab (Outside – showing the name plate)

Picture of the Lab (Inside – showing a wider view of the lab)

Details of the Laboratory Equipment's

S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Heat transfer from fin	**Description:** A laboratory apparatus used to study heat transfer characteristics from extended surfaces (fins) under steady-state conditions. It helps in determining heat transfer rate, temperature distribution, and fin efficiency. **Specifications:** • Type: Heat Transfer through Fins Apparatus • Fins: Metallic fins (rectangular / pin type) • Heating: Electrical heater with regulated power input • Temperature Measurement: Thermocouples with digital indicator • Control: Variac / dimmer stat control • Use: Determination of fin efficiency and effectiveness • Power Supply: 230 V AC, Single Phase	1		

2	Thermal conductivity of insulating slab	**Description:** A laboratory apparatus used to determine the thermal conductivity of insulating materials under steady-state heat flow conditions. Commonly used for insulation performance evaluation. **Specifications:** • Type: Thermal Conductivity Apparatus (Insulating Slab) • Test Specimen: Insulating slab material • Heating: Electrical heater with controlled input • Temperature Measurement: Multiple thermocouples with digital display • Control: Variac / dimmer stat • Use: Determination of thermal conductivity (k) • Power Supply: 230 V AC, Single Phase	1		

3	Pool Boiling Apparatus	**Description:** A laboratory apparatus used to study pool boiling phenomena and boiling heat transfer characteristics. It allows observation of different boiling regimes and determination of boiling heat transfer coefficients. **Specifications:** Type: Pool Boiling Heat Transfer Apparatus • Heating Element: Electrically heated surface immersed in liquid • Temperature Measurement: Digital temperature indicators • Control: Separate heater controls and safety switches • Observation: Boiling behavior through test chamber • Use: Study of nucleate and film boiling • Power Supply: 230 V AC, Single Phase	1		

4	Stefan Boltzman Apparatus	**Description:** An experimental setup used to verify Stefan–Boltzmann law of thermal radiation and determine the Stefan–Boltzmann constant by measuring radiation heat transfer from a heated surface. **Specifications:** • Type: Stefan–Boltzmann Constant Apparatus • Radiating Surface: Electrically heated emitter • Detector: Radiation sensor / thermopile • Measurement: Digital temperature and voltage display • Control: Heater input regulator • Use: Study of radiation heat transfer • Power Supply: 230 V AC, Single Phase	1		

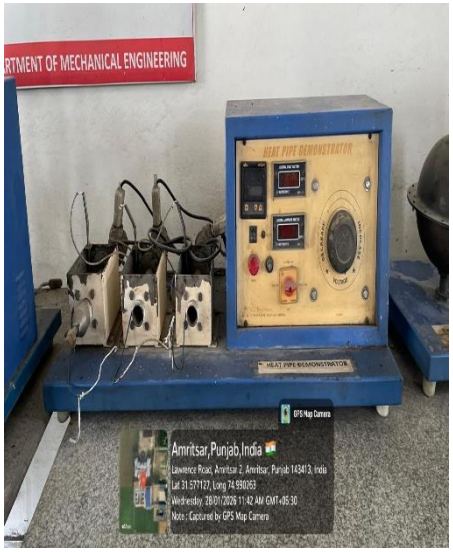
5	Heat transfer through Natural Convection	**Description:** An experimental setup used to study natural (free) convection heat transfer from a heated vertical surface enclosed in a transparent chamber. It demonstrates the effect of temperature difference on convective heat transfer. **Specifications:** • Type: Natural Convection Heat Transfer Apparatus • Test Surface: Electrically heated vertical plate / cylinder • Enclosure: Transparent acrylic chamber • Measurement: Thermocouples with digital temperature display • Control: Heater input through regulator • Use: Determination of natural convection heat transfer coefficient • Power Supply: 230 V AC, Single Phase	1		

6	Thermal Conductivity of Liquids	**Description:** The Thermal Conductivity of Liquids Apparatus is used to determine the thermal conductivity of various liquids under steady-state heat transfer conditions. The setup generally works on the principle of radial heat flow through a liquid layer confined between a heated surface and a cooling surface. **Specifications:** • **Type:** Steady-state heat transfer apparatus • **Heating System:** Electrical heater with regulated power supply • **Temperature Measurement:** Digital temperature indicators / thermocouples • **Control Panel:** Digital voltmeter and ammeter Heater control knob Power ON/OFF switches • **Sample Medium:** Liquids such as water, oil, glycerin, etc. • **Construction:** Metal body with insulated test section • **Operating Voltage:** 220–240 V AC, 50 Hz • **Output:** Thermal conductivity of liquid (W/m·K)	1		

7	Dropwise / Filmwise Condensation	**Description:** The Dropwise / Filmwise Condensation Apparatus is used to study and compare the heat transfer characteristics of dropwise and filmwise condensation of steam on a vertical or inclined condensing surface. **Specifications:** • **Type:** Condensation heat transfer apparatus • **Condensing Surface:** Vertical metallic tube / plate • **Steam Supply:** Boiler or steam generator connection • **Cooling System:** Water circulation through condenser jacket • **Flow Measurement:** Rotameter for cooling water • **Temperature Measurement:** Thermometers / thermocouples at inlet and outlet • **Pressure Measurement:** Pressure gauge for steam • **Control Panel:** Digital temperature indicators Heater and power control switches • **Construction:** Rigid metallic frame with insulated piping • **Operating Voltage:** 220–240 V AC, 50 Hz	1		

8	Thermal conductivity of insulating powder	**Description:** The Thermal Conductivity of Insulating Powder Apparatus is used to determine the thermal conductivity of insulating powders such as sawdust, ash, sand, or other granular insulating materials. **Specifications:** • **Type:** Steady-state heat conduction apparatus • **Test Section:** Spherical metal shell / container for insulating powder • **Heating System:** Central electrical heater with regulated power supply • **Temperature Measurement:** Digital temperature indicators / thermocouples • **Control Panel:** Digital voltmeter and ammeter Heater control knob Power ON/OFF switch • **Sample Materials:** Sawdust, sand, ash, insulating powders • **Construction:** Metallic body with thermal insulation • **Operating Voltage:** 220–240 V AC, 50 Hz	1		

9	Heat transfer in forced convection	**Description:** The Heat Transfer in Forced Convection Apparatus is used to study heat transfer characteristics of air flowing through a heated duct under forced convection conditions. **Specifications:** • **Type:** Forced convection heat transfer apparatus • **Test Section:** Electrically heated circular duct / pipe • **Heating System:** Electrical heater with regulated power supply • **Air Supply:** Centrifugal blower with flow control • **Flow Measurement:** Manometer / orifice arrangement • **Temperature Measurement:** Thermocouples with digital temperature indicators • **Control Panel:** Digital voltmeter and ammeter Heater control knob Power ON/OFF switch • **Construction:** Metallic frame with insulated ducting • **Operating Voltage:** 220–240 V AC, 50 Hz	1		

10	Heat pipe demonstrator	**Description:** The Heat Pipe Demonstrator is used to study the working principle and heat transfer performance of a heat pipe. **Specifications:** • **Type:** Heat transfer demonstration apparatus • **Heat Pipe:** Sealed metallic heat pipe with working fluid • **Heating System:** Electrical heater at evaporator section • **Cooling System:** Air / water cooling at condenser section • **Temperature Measurement:** Digital temperature indicators / thermocouples along heat pipe • **Control Panel:** Digital voltmeter and ammeter Heater control knob Power ON/OFF switches • **Construction:** Rigid metallic base with insulated heater section • **Operating Voltage:** 220–240 V AC, 50 Hz	1		

Note: This proforma must include all types of laboratory equipment, including computer systems, licensed software, projectors, smart screens, and other ICT-enabled teaching–learning resources.

Machine Shop:

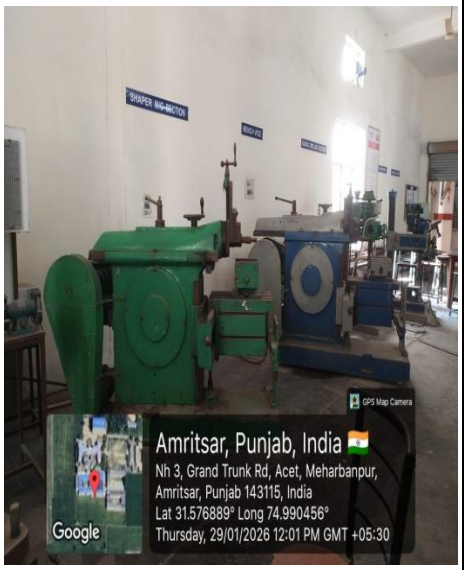
Picture of the Lab (Outside – showing the name plate)

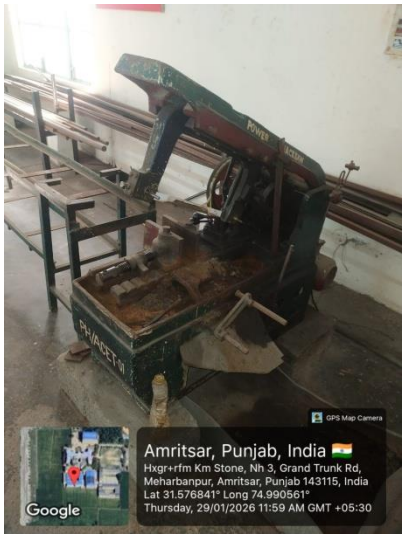
Picture of the Lab (Inside – showing a wider view of the lab)

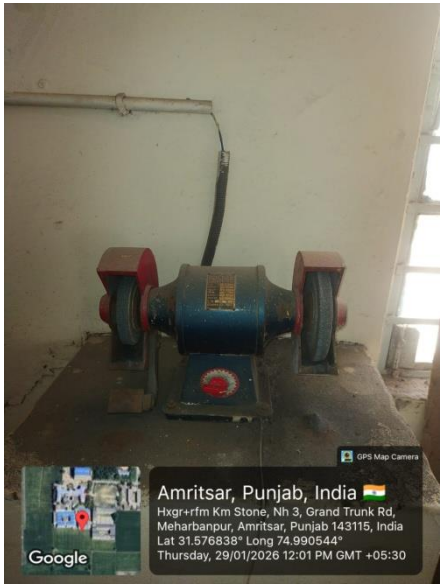
Details of the Laboratory Equipment's

S. No.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Lathe Machine	**Description:** A lathe machine is a fundamental machine tool used in mechanical engineering workshops and laboratories. It works on the principle of rotating the workpiece against a stationary cutting tool to remove material and obtain the required shape, size, and surface finish. **Specification:** • **Type:** Centre lathe (engine lathe) • **Bed Length:** 1.5 m to 2.0 m • **Swing over Bed:** 300–400 mm • **Swing over Cross Slide:** 180–220 mm • **Distance between Centres:** 750–1000 mm • **Spindle Speed Range:** 40–1200 RPM (multiple steps) • **Motor Power:** 2 HP to 5 HP • **Spindle Bore:** 30–40 mm • **Chuck Size:** 3-jaw or 4-jaw, 160–200 mm diameter • **Feed System:** Automatic and manual feed • **Thread Cutting:** Metric and inch threads • **Bed Material:** Cast iron	9		

2	Milling Machine	**Description :** A milling machine is a versatile machine tool used in mechanical engineering workshops and laboratories for removing material from a workpiece using a rotating multi-point cutting tool called a milling cutter **Specification:** • **Type:** Vertical milling machine • **Table Size:** 800 × 250 mm (approx.) • **Table Travel:** Longitudinal (X-axis): 400–600 mm Cross (Y-axis): 200–300 mm Vertical (Z-axis): 350–450 mm • **Spindle Speed Range:** 50–2000 RPM (step or variable speed) • **Spindle Taper:** ISO 30 / R8 • **Motor Power:** 2 HP to 5 HP • **Feed System:** Manual and power feed • **Maximum Load on Table:** 250–300 kg • **Column Type:** Rigid vertical column • **Machine Body Material:** Cast iron	1		

3	Shaper	**Description:** A shaper machine is a machine tool used in mechanical engineering workshops and laboratories for producing flat, angular, and contoured surfaces on metal workpieces. It operates on the principle of reciprocating motion of a single-point cutting tool. **Specification:** • **Type:** Horizontal shaper • **Maximum Length of Ram Stroke:** 300–500 mm • **Strokes per Minute:** 20–80 strokes/min • **Table Size:** 600 × 300 mm (approx.) • **Maximum Height under Ram:** 300–400 mm • **Feed:** Automatic and manual feed • **Type of Drive:** Crank and slotted link mechanism • **Motor Power:** 2 HP to 5 HP • **Vice Capacity:** 150–200 mm • **Tool Head:** Swivel type with clapper box • **Base Material:** Cast iron	2		

4	**Power Hexa**	**Description:** A power hacksaw machine is a mechanically operated metal cutting machine used in mechanical workshops and laboratories for cutting metal bars, rods, pipes, and sections to the required length. **Specification:** • **Type:** Power hacksaw (reciprocating type) • **Motor Power:** 1 HP to 3 HP • **Supply Voltage:** 220–415 V AC • **Frequency:** 50 Hz • **Cutting Stroke Length:** 100–150 mm • **Strokes per Minute:** 60–120 strokes/min • **Maximum Cutting Capacity:** Round bar: up to 100–150 mm diameter Square/rectangular section: up to 100 × 100 mm • **Blade Length:** 300 mm (12 inches) • **Blade Type:** High Speed Steel (HSS) or alloy steel • **Vice Type:** Mechanical / screw-operated vice • **Coolant System:** Manual or gravity feed • **Frame Material:** Cast iron / fabricated steel	1		

5	Bench Grinder	**Description:** A **bench grinder** is a stationary machine tool commonly used in mechanical workshops. It is mainly used for grinding, sharpening, deburring, polishing, and cleaning metal surfaces. **Specifications:** • **Type:** Double-ended bench grinder • **Motor Power:** 0.5 HP to 1 HP • **Supply Voltage:** 220–240 V AC • **Frequency:** 50 Hz • **Speed:** 2800–3000 RPM • **Grinding Wheel Diameter:** 150 mm to 200 mm • **Wheel Type:** One coarse wheel (for rough grinding) One fine wheel (for finishing) • **Base Material:** Cast iron or steel	1		

Note: This proforma must include all types of laboratory equipment, including computer systems, licensed software, projectors, smart screens, and other ICT-enabled teaching–learning resources.

Mechanical vibrations Lab:

Picture of the Lab (Outside – showing the name plate)

Picture of the Lab (Inside – showing a wider view of the lab)

Details of the Laboratory Equipment's

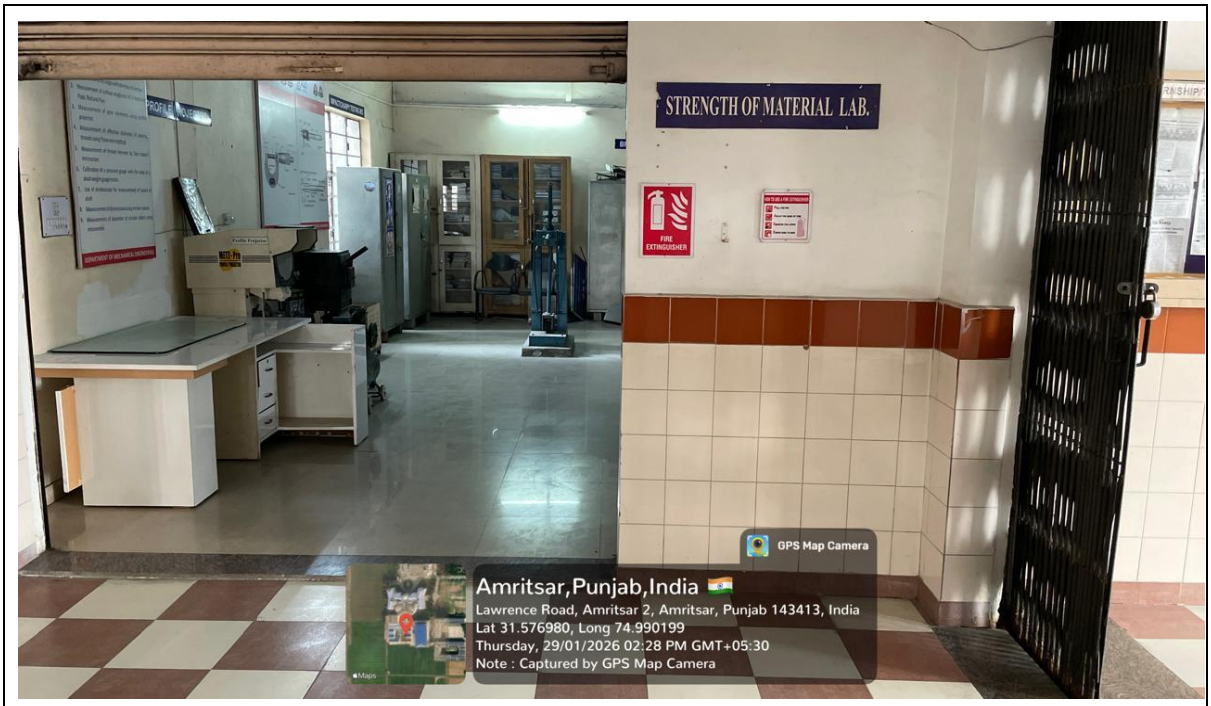
S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Universal Vibration Apparatus	**Description:** The Universal Vibration Apparatus is a motorized laboratory setup used to study transverse vibrations of a stretched string and vibration characteristics of single-degree-of-freedom systems. The apparatus consists of a rigid steel frame supporting a stretched wire/string, an exciter mechanism driven by an electric motor with eccentric mass, and a variable speed control unit. It is primarily used to demonstrate resonance, natural frequency, forced vibrations, and mode shapes. **Specification:** **Type:** Universal Vibration Apparatus (Stretched String & Forced Vibration System) **Frame:** • Heavy-duty MS fabricated rigid frame • Floor-mounted with stable base supports	1		

		Vibrating Element: • Steel wire / string mounted horizontally between two supports • Provision for applying tension using adjustable screw mechanism **Excitation System:** • Electric motor with eccentric mass (mounted at base) • Mechanical linkage to excite transverse vibrations in the string **Frequency Range:** • Variable frequency through motor speed control (approx. 0–50 Hz) **Power Supply:** • 230 V AC, Single Phase			

Note: This proforma must include all types of laboratory equipment, including computer systems, licensed software, projectors, smart screens, and other ICT-enabled teaching–learning resources.

Mechanical Measurements and Metrology Lab:

Picture of the Lab (Outside – showing the name plate)



Picture of the Lab (Inside – showing a wider view of the lab)

Details of the Laboratory Equipment's

S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Profile Projector	**Description:** The Profile Projector is an optical measuring instrument used in metrology laboratories for non-contact inspection of mechanical components. **Specifications:** • **Type:** Optical profile projector • **Magnification:** 10× / 20× / 50× (typical) • **Light source:** Halogen / LED illumination • **Measuring method:** Non-contact optical projection • **Screen:** Ground glass projection screen with cross-hair • **Work table:** X–Y micrometre-controlled stage	1		
2	Vernier calliper	**Description:** The Vernier Caliper is a precision measuring instrument used in metrology and mechanical laboratories to measure external dimensions, internal dimensions, and depths of components accurately. **Specifications:** • **Type:** Vernier calliper • **Material:** Stainless steel	1		

		• **Least count:** 0.02 mm (typical) • **Measuring range:** 0–150 mm (common) • **Measurements:** External, internal, depth • **Scale type:** Main scale and Vernier scale			
3	Dial gauge	**Description:** The Dial Gauge is a precision measuring instrument used to measure small linear displacements, variations, and run-out in mechanical components. **Specifications:** Type: Pool Boiling Heat Transfer Apparatus • **Type:** Dial gauge / Dial indicator • **Measuring range:** 0–10 mm (typical) • **Least count:** 0.01 mm • **Construction:** Plunger type with spring mechanism • **Dial type:** Circular analog	1		

5	Optical microscope	**Description:** An optical microscope (also called a light microscope) is an instrument used to magnify small objects or details that cannot be seen with the naked eye using visible light and a system of lenses **Specifications:** **Magnification** 40× – 1000× (common); can go up to 2000× with spec **Objective Lenses** Usually 4×, 10×, 40×, 100× (oil immersion) **Eyepiece Lens** 10× or 15× **Illumination** LED or halogen light, adjustable intensity **Stage** Mechanical stage with X-Y movement **Focusing** Coarse and fine adjustment knobs **Resolution** 0.2 µm (diffraction-limited) **Working Distance** Depends on objective, typically 0.5 – 25 mm **Condenser** Abbe condenser with iris diaphragm for light control	1		

Note: This proforma must include all types of laboratory equipment, including computer systems, licensed software, projectors, smart screens, and other ICT-enabled teaching–learning resources.

Refrigeration & Air Conditioning Lab:

Picture of the Lab (Outside – showing the name plate)

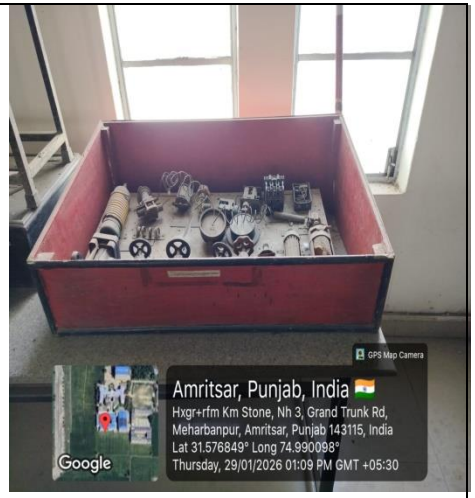
Picture of the Lab (Inside – showing a wider view of the lab)

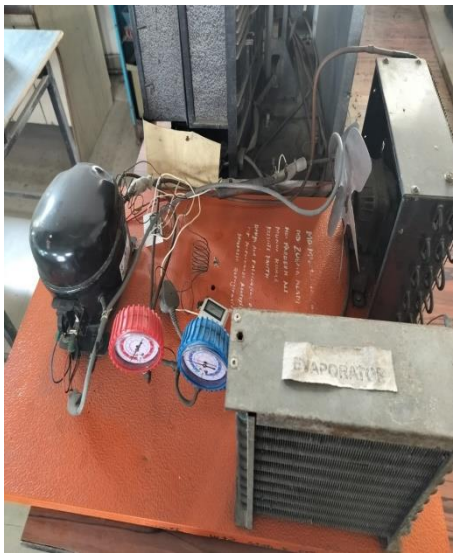
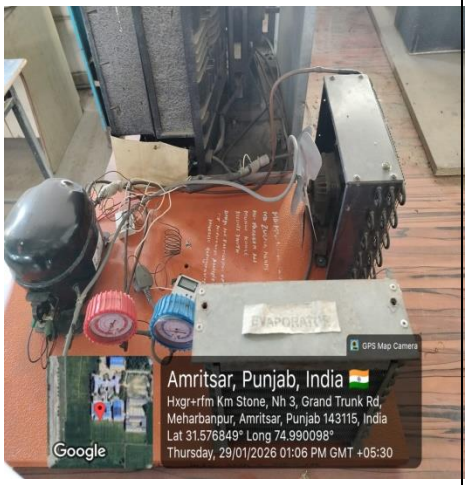
Details of the Laboratory Equipment's

S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Air-Conditioning Test Rig	**Description:** An Air-Conditioning Test Rig is used to study the working performance of an air-conditioning system and to determine cooling capacity, COP, heat added/removed, and psychrometric properties of air. **Specifications:** • **Refrigerant:** R134a / R22 • **Compressor:** Hermetically sealed • **Cooling capacity**: 1 TR • **Air flow measurement:** Anemometer • **Temperature measurement**: Digital thermometers • **Pressure gauges:** LP & HP gauges • **Power supply**: 230 V AC	1		

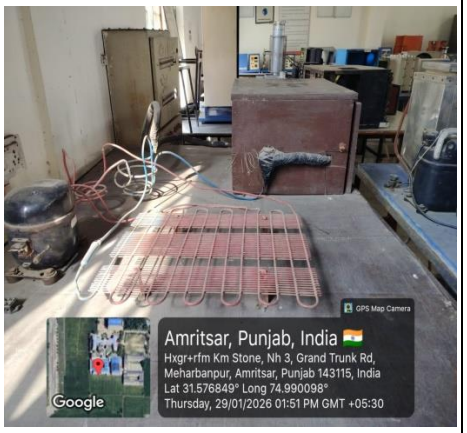
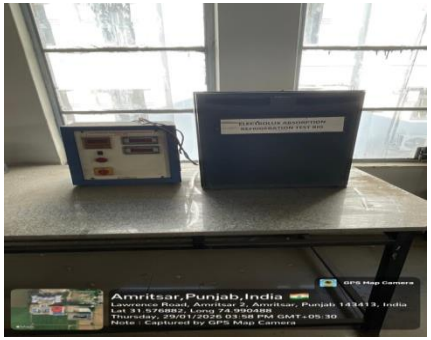
2	Refrigeration Test Rig	**Description:** A Refrigeration Test Rig is used to analyze the performance of a vapour compression refrigeration system and calculate COP, refrigeration effect, and work input**.** **Specifications:** • Type: **Vapour Compression System** • Refrigerant: **R134a** • Compressor: **Reciprocating** • Condenser: **Air-cooled** • Evaporator: **Coil type** • Capacity: **1 TR** • Instrumentation: **Pressure gauges, energy meter**	1		

3	Water Cooled Condenser	**Description**: water-cooled condenser is a heat-rejection device in which water is used as the cooling medium to remove heat from the hot, high-pressure refrigerant vapor coming from the compressor. The refrigerant releases its heat to the cooling water and condenses into liquid form**.** **Specifications:** • Type: Induced / natural draft cooling tower model • Cooling medium: Atmospheric air • Working fluid: Water • Circulation: Recirculating water system • Construction: Mild steel frame with internal sections	1		

4	Ammonia Control Cut Model	**Description:** An Ammonia Control Cut Model is used to demonstrate pressure control, safety devices, and flow regulation in ammonia refrigeration systems. **Specifications:** • Refrigerant: NH_3 • Components shown: Pressure regulator, safety valve • Application: Industrial refrigeration • Model type: Sectional cut-away • **Accuracy:** ±1 HR	1		

5	Capillary Tube Evaporative Condenser Expansions Valve	**(i) Capillary Tube** **Description:** A Capillary Tube is a fixed throttling device that reduces pressure and temperature of refrigerant before entering the evaporator. **Specifications:** • Material: Copper • Inner diameter: 0.5–2 mm • Length: 1–4 m • Control type: Non-adjustable • Application: Domestic refrigerators **(ii) Evaporative Condenser** **Description:** An Evaporative Condenser removes heat using combined action of air and water evaporation, giving higher efficiency. **Specifications:** • Cooling medium: Air + water • Spray system: Water nozzles • Fan type: Axial • Capacity: 5–100 TR • Application: Industrial plants. **(iii) Expansions Valve** **Description:** An Expansion Valve controls the flow rate of refrigerant and maintains proper pressure difference between condenser and evaporator. **Specifications:**	1		

		• Type: Automatic / Thermostatic • Control: Pressure / temperature • Material: Brass • Application: AC & refrigeration systems.			
6.	Hermetically Sealed Reciprocating compressor	**Description:** A Hermetically Sealed Reciprocating Compressor houses the motor and compressor in a sealed shell, preventing refrigerant leakage. **Specifications:** • Type: Reciprocating • Cooling capacity: 0.5–2 TR • Refrigerant: R134a • Lubrication: Internal • Power supply: Single phase	1		

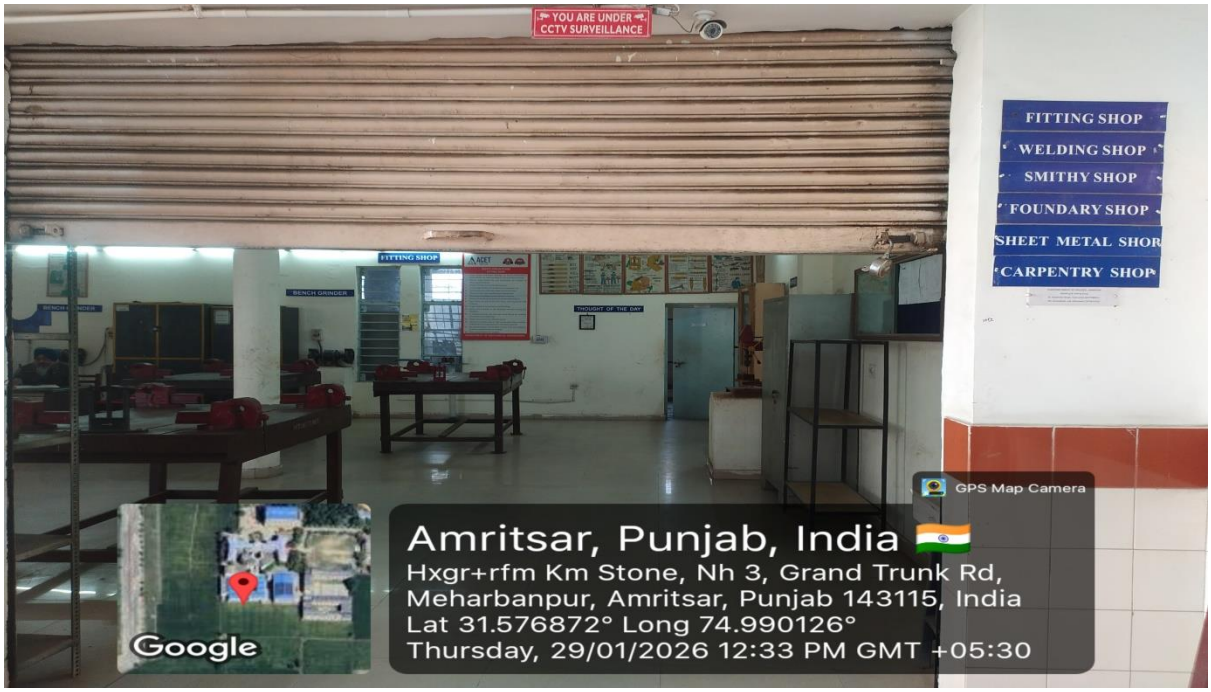
7	Thermostatic Expansion Valve	**Description:** A Thermostatic Expansion Valve regulates refrigerant flow based on superheat at evaporator outlet. **Specifications:** • Sensing bulb: Copper • Control parameter: Temperature • Superheat range: 4–8°C • Application: AC systems	1		
8	Electrolux Refrigeration Test Rig	**Description:** An Electrolux Refrigeration Test Rig works on the vapour absorption refrigeration system using heat energy instead of mechanical work. **Specifications:** • Refrigerant: Ammonia • Absorbent: Water • Heat source: Electric heater • Capacity: Small scale • Application: Domestic absorption refrigerators	1		

9	Shell and Tube Condenser	**Description:** A Shell and Tube Condenser transfers heat from refrigerant to water through tubes enclosed in a shell. **Specifications:** • Cooling medium: Water • Material: Copper tubes, steel shell • Capacity: 5–50 TR • Application: Central AC plants.	1		

Note: This proforma must include all types of laboratory equipment, including computer systems, licensed software, projectors, smart screens, and other ICT-enabled teaching–learning resources.

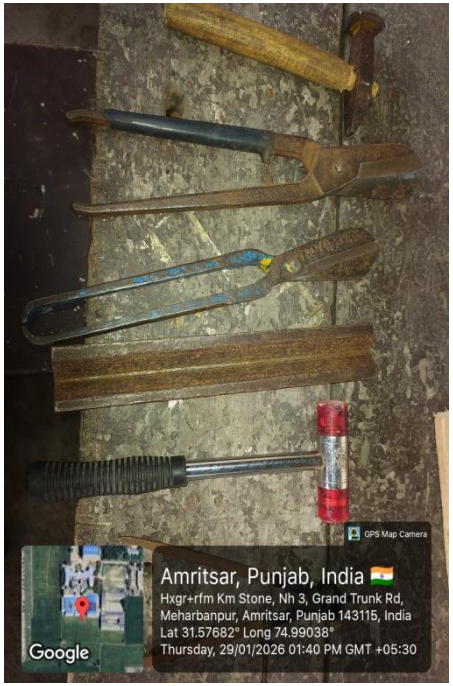
Sheet Metal Shop:

Picture of the Lab (Outside – showing the name plate)



Picture of the Lab (Inside – showing a wider view of the lab)

Details of the Laboratory Equipment's

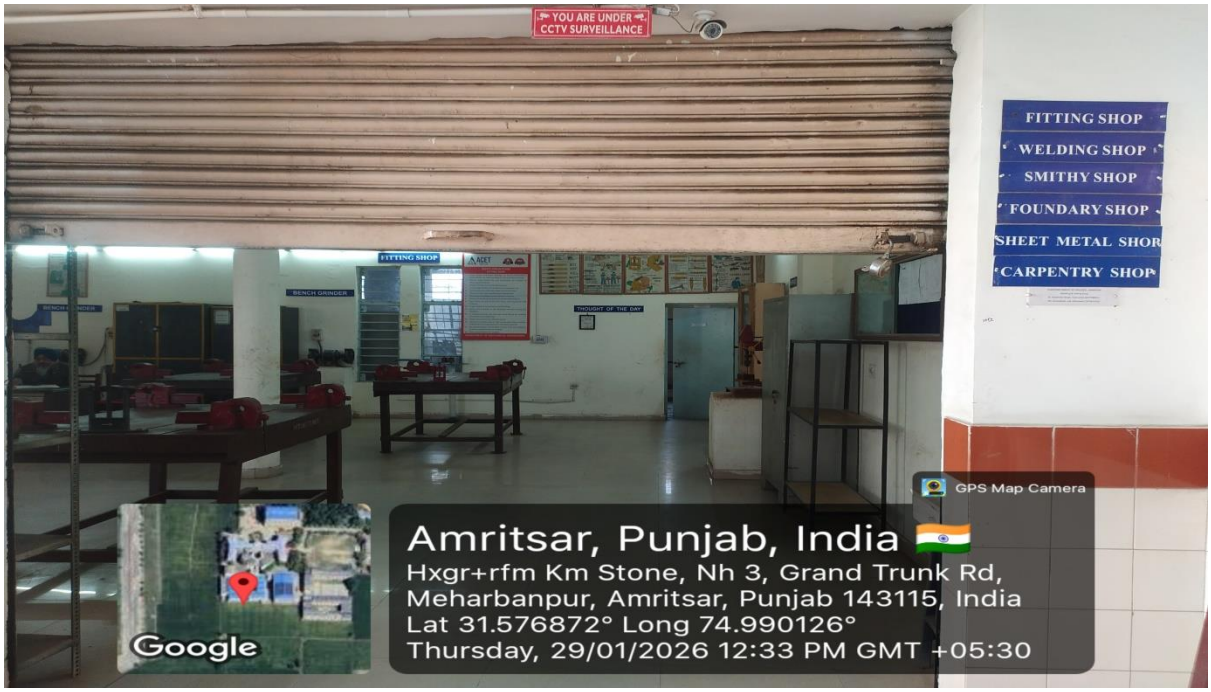
S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Sheet metal hand tools	**1. Steel Rule** **Description:** Used for measuring and marking sheet metal. **Specification:** Length 150–300 mm; stainless steel; mm graduations. **2. Scriber** **Description:** Used to mark layout lines on sheet metal. **Specification:** Length 150–200 mm; hardened steel; pointed tip. **3. Snips (Hand Shears)** **Description:** Used for cutting thin sheet metal. **Specification:** Length 200–300 mm; hardened steel blades. **4. Ball Peen Hammer** **Description:** Used for bending and shaping sheet metal. **Specification:** Weight 0.25–0.5 kg; forged steel head; wooden handle. **5. Wooden / Rawhide Mallet** **Description:** Used for forming sheet metal without surface damage. **Specification:** Hardwood/rawhide head; handle length 250–300 mm. **6. Stake** **Description:** Used as a support tool for bending and forming operations. **Specification:** Made of hardened steel; various shapes.	-		

		7. Punch **Description:** Used for making holes in sheet metal. **Specification:** Diameter 3–10 mm; hardened steel; flat or hollow type. **8. Seaming Pliers** **Description:** Used for bending and forming seams and flanges. **Specification:** Jaw width 40–80 mm; steel body with insulated handles.			
2	Shearing Machine	**Description:** A shearing machine is used to cut sheet metal accurately in straight lines by applying a high shearing force between a fixed blade and a moving blade. It is commonly used for cutting sheets to required sizes in sheet metal work. **Specification:** Cutting capacity up to 1–3 mm thickness (MS); blade length 600–1200 mm; hand-operated or power-operated; hardened steel blades; rigid cast iron/steel frame; adjustable back gauge.	1		

Note: This proforma must include all types of laboratory equipment, including computer systems, licensed software, projectors, smart screens, and other ICT-enabled teaching–learning resources.

Smithy Shop:

Picture of the Lab (Outside – showing the name plate)

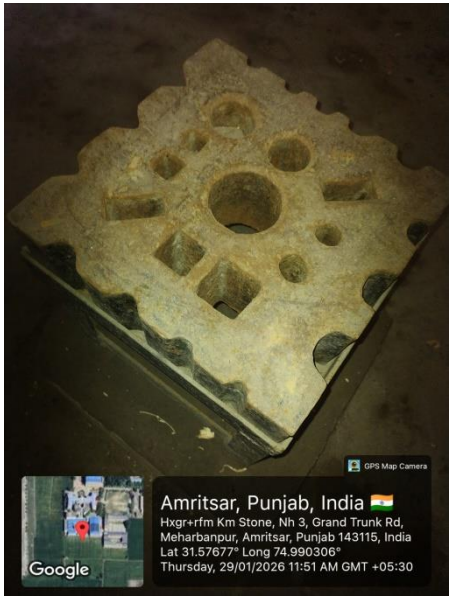


Picture of the Lab (Inside – showing a wider view of the lab)

Details of the Laboratory Equipment's

S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Open Hearth Furnace	**Description:** A pit-type hearth furnace is used in foundry and heat-treatment shops for **heating, melting, and holding ferrous and non-ferrous metals** before casting or forging operations. It provides uniform heating and is suitable for small to medium batches. **Specification:** Maximum operating temperature 800–1200 °C; fuel-fired or electrically heated; refractory-lined hearth; mild steel outer shell; blower-assisted combustion; suitable for batch operation.	6		

2	Anvil	**Description:** An anvil is a heavy metal block used as a support for forging, shaping, bending, and straightening hot or cold metal using hammers. It provides a hard, rigid surface essential for smithy and foundry operations. **Specification:** Material: cast steel or wrought iron with hardened steel face; weight 50–150 kg; flat working face with horn and heel; square and round holes for tools; mounted on a rigid base.	6		

3	Swage block	**Description:** A swage block is a heavy cast iron or steel block with various shaped holes and grooves, used for **bending, shaping, forming, and straightening metal** during forging and foundry operations. **Specification:** Material: cast iron or cast steel; square or rectangular block; provided with round, square, and half-round holes and grooves; weight 50–200 kg; mounted on a rigid stand or base.	1		

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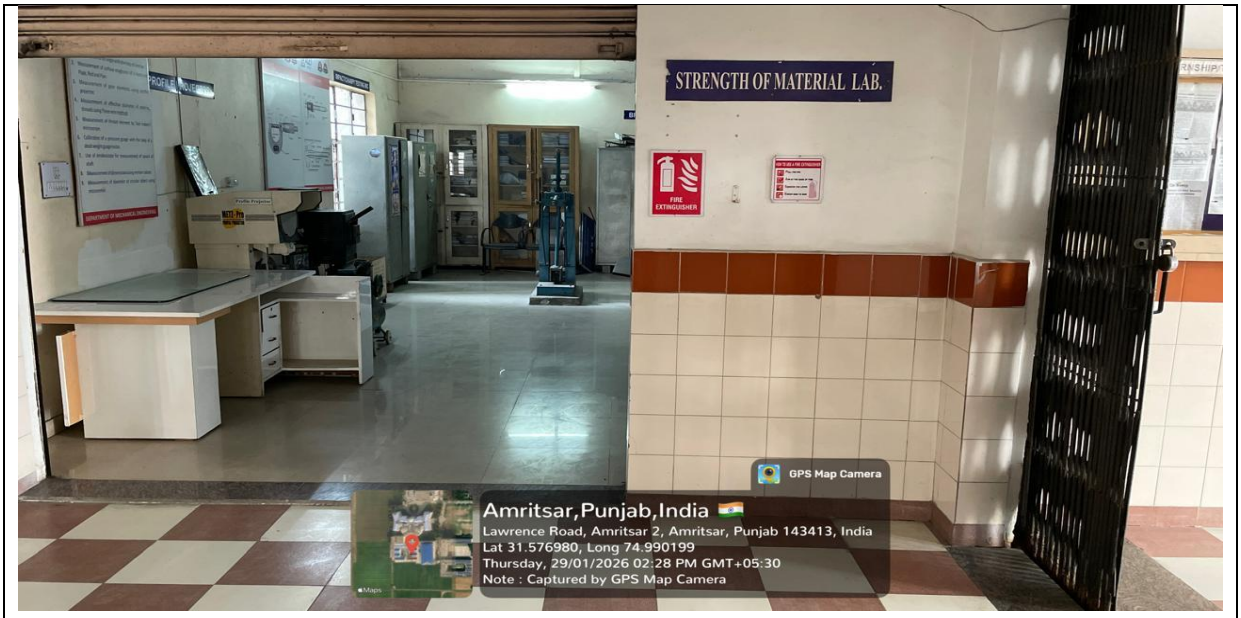
Strength of Materials Lab:

Picture of the Lab (Outside – showing the name plate)



Picture of the Lab (Inside – showing a wider view of the lab)

Details of the Laboratory Equipment's

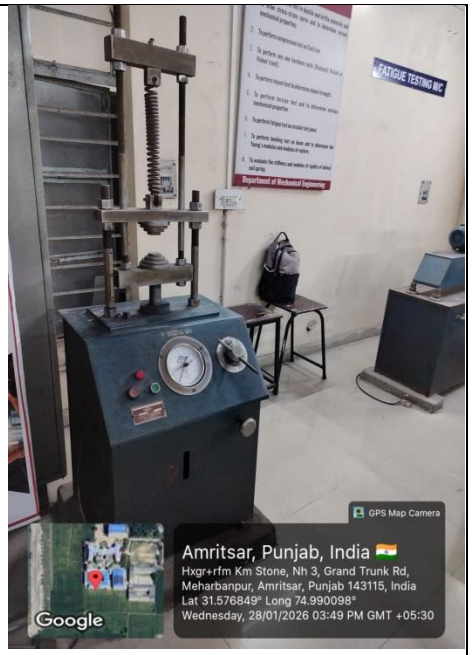
S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Universal Testing Machine (UTM)	**Description:** A Universal Testing Machine is used to determine the mechanical properties of materials under tension, compression, and bending. It helps find yield strength, ultimate tensile strength, breaking strength, and percentage elongation. **Specifications:** • **Capacity:** 100 kN / 200 kN / 400 kN (depends on lab) • **Loading system:** Hydraulic / Screw driven • **Load measurement:** Load cell / Pressure gauge • **Crosshead speed:** Variable • **Accuracy:** ±1% • **Power supply:** 230 V AC • **Standards followed:** ASTM / IS codes	1		

2	Torsion Testing Machine	**Description:** A Torsion Testing Machine is used to test materials under twisting (torsional) load. It determines shear stress, modulus of rigidity, and torque vs angle of twist**.** **Specifications:** • Capacity: 50 Nm / 100 Nm / 200 Nm • Torque measurement: Dial gauge / Digital display • Specimen length**:** Up to 500 mm • Angle of twist measurement: Graduated scale / Encoder • Drive**:** Manual / Motorized • Accuracy: ±1%	1		

3	Fatique Testing Machine	**Description:** A Fatigue Testing Machine is used to determine the fatigue strength and endurance limit of materials subjected to repeated or fluctuating loads**.** **Specifications:** • **Type:** Rotating bending fatigue machine • **Speed:** 3000–6000 rpm • **Load range:** 0–100 kg • **Specimen material:** Steel / Aluminum • **Cycle counter:** Digital • **Test standard:** ASTM E466	1		
4	Rockwell Hardness Tester	**Description:** Rockwell Hardness Tester measures hardness based on the depth of penetration of an indenter under load. **Specifications:** • Indenter: Diamond cone / Steel ball • Minor load**:** 10 kg • Major load: 60, 100, 150 kg • Scales: HRB, HRC, HRA • Display: Analog / Digital • Accuracy**:** ±1 HR	1		

5	Brinell Hardness Tester	**Description:** Brinell Hardness Tester determines hardness by measuring the diameter of indentation made by a hardened steel ball. **Specifications:** • Type: Brinell Hardness Tester • Indenter: 10 mm steel ball • Load: 500 kg / 1000 kg / 3000 kg • Dwell time: 10–15 seconds • Microscope: Brinell microscope • Accuracy: ±3%	1		

6.	Impact Testing Machine	**Description:** An Impact Testing Machine determines the impact strength of materials by measuring the energy absorbed during fracture. **Specifications:** • Type: Izod / Charpy • Capacity: 300 J / 450 J • Pendulum weight: 22–25 kg • Specimen size: Standard IS/ASTM • Reading: Analog / Digital • Accuracy: ±1 J	1		

7.	Spring Testing Machine	**Description:** A Spring Testing Machine is used to determine the load vs deflection characteristics of compression and tension springs. **Specifications:** • Capacity: 0–500 N / 0–1000 N • Deflection measurement: Dial gauge • Loading: Manual • Spring type: Compression / Tension • Accuracy: ±1%	1		

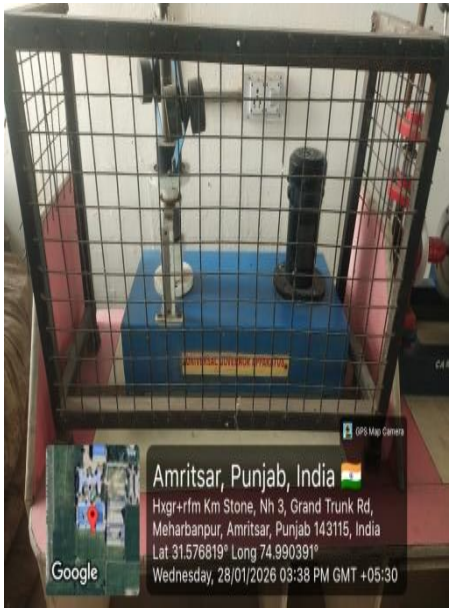
Note: This proforma must include all types of laboratory equipment, including computer systems, licensed software, projectors, smart screens, and other ICT-enabled teaching–learning resources.

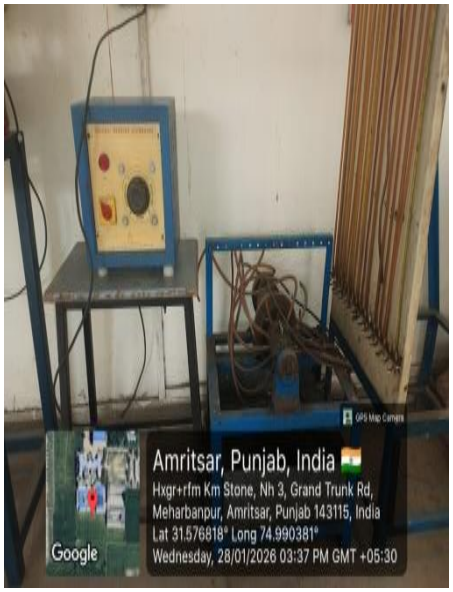
Theory of Machines Lab:

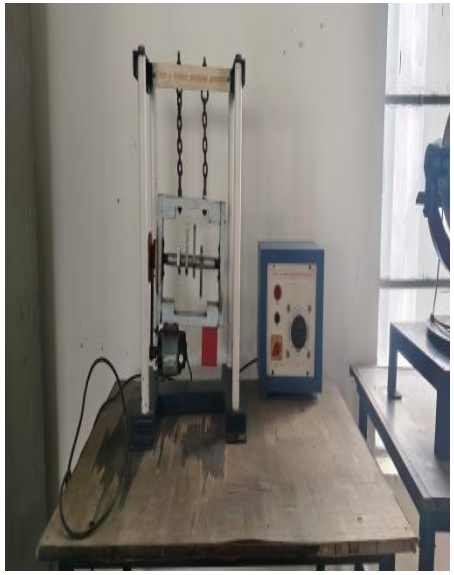
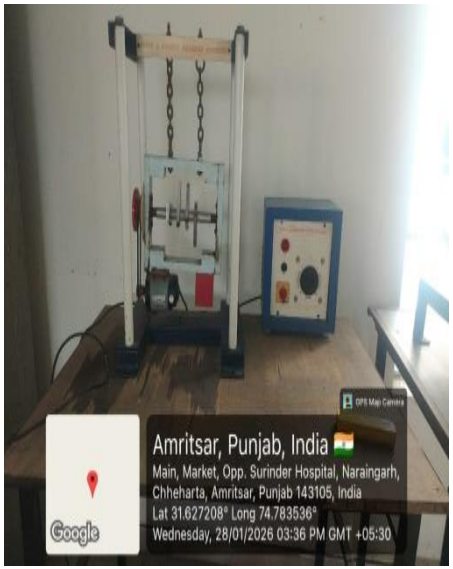
Picture of the Lab (Outside – showing the name plate)

Picture of the Lab (Inside – showing a wider view of the lab)

Details of the Laboratory Equipment's

S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Universal Governor Apparatus Four Bar Link Model	**Description:** The Universal Governor Apparatus with a Four-Bar Link Model is a teaching aid used in mechanical engineering laboratories to demonstrate the working principle of centrifugal governors. It represents the four-bar linkage mechanism used in governor systems to control engine speed automatically by regulating fuel or steam supply. The model helps students visualize the relationship between speed, centrifugal force, and displacement of the governor arms. **Specifications:** **Type:** Four-bar linkage governor model **Application:** Study of centrifugal governor mechanism **Construction:** Rigid metal frame with links, arms, and joints **Material:** Mild steel / aluminum links with steel fasteners **Operation:** Manually or motor-driven (demonstration purpose) **Mounting:** Table-top or bench-mounted model	1		

2	Gear Box Tachometer Journal Bearing Apparatus	**Description:** The Gear Box Tachometer Journal Bearing Apparatus is a laboratory setup used to study the performance characteristics of a journal bearing under different operating conditions. The apparatus consists of a gearbox-driven shaft supported on a journal bearing, with speed measured using a tachometer. It helps in understanding frictional behavior, lubrication effects, temperature rise, and load–speed relationship in journal bearings. **Specifications:** **Type:** Journal Bearing Test Apparatus with Gear Box and Tachometer **Drive:** Electric motor with reduction gear box **Speed Measurement:** Digital / Analog tachometer **Mounting:** Rigid laboratory test frame	1		

3	Static & Dynamic Balancing Apparatus	**Description:** The Static & Dynamic Balancing Apparatus is a laboratory setup used to study the principles of balancing rotating masses. It helps in determining the unbalanced forces and couples in rotating systems and demonstrates methods to achieve both static and dynamic balance for smooth and vibration-free operation. **Specifications** • **Type:** Static and Dynamic Balancing Test Apparatus • **Drive:** Electric motor • **Balancing Method:** Single-plane (static) and two-plane • **Rotor:** Disc / shaft with adjustable masses • **Speed Control:** Variable speed arrangement • **Mounting:** Rigid frame with bearings • **Material:** Steel shaft with aluminum/steel discs	1		

4	Motorized Gyroscope Apparatus	**Description**: The Motorized Gyroscope Apparatus is a laboratory instrument used to study the principles of gyroscopic motion, including gyroscopic couple, precession, and nutation. The rotor is driven by an electric motor, allowing observation of gyroscopic effects under different speeds and loads. **Specifications** • **Type**: Motorized gyroscope apparatus • **Drive:** Electric motor • **Rotor:** High-speed balanced disc • **Speed Control:** Variable speed arrangement • **Mounting:** Gimbal frame with bearings • **Material:** Steel / Aluminum components	1		

5	Cam Analysis Apparatus	**Description:**The Cam Analysis Apparatus is a laboratory setup used to study the motion characteristics of different cam–follower mechanisms. It helps in analyzing displacement, velocity, and acceleration of the follower for various cam profiles and follower types. **Specifications** • **Type:** Cam analysis test apparatus • **Cam Type:** Disc cam with interchangeable profiles • **Follower:** Knife edge / Roller / Flat-faced • **Drive:** Electric motor • **Speed Control:** Variable speed • **Measurement:** Dial gauge / displacement indicator • **Material:** Mild steel	1		

6	Epicyclic Gear Train Apparatus	**Description:** The Epicyclic Gear Train Apparatus is a laboratory demonstration setup used to study the working principle of planetary (epicyclic) gear trains. It helps in understanding relative motion between sun gear, planet gears, ring gear, and arm, and is commonly used to analyze speed ratios and torque transmission. **Specifications:** • **Type:** Epicyclic (Planetary) Gear Train Apparatus • **Components:** Sun gear, planet gears, ring gear, carrier arm • **Material:** Mild steel / Alloy steel gears • **Gear Type:** Spur gears • **Mounting:** Bench-mounted rigid frame	1		

7	Plate Clutch	**Description:** The Plate Clutch is a mechanical power transmission device used to engage and disengage power flow between the driving shaft and the driven shaft. **Specifications:** • **Type:** Single plate clutch (demonstration model) • **Working Principle:** Friction-based torque transmission • **Main Components:** Driving plate, driven plate, friction lining, pressure plate, shaft, operating lever • **Actuation:** Manual lever operation • **Material:** Cast iron / steel plates with friction lining • **Mounting:** Rigid base-mounted demonstration unit	1		

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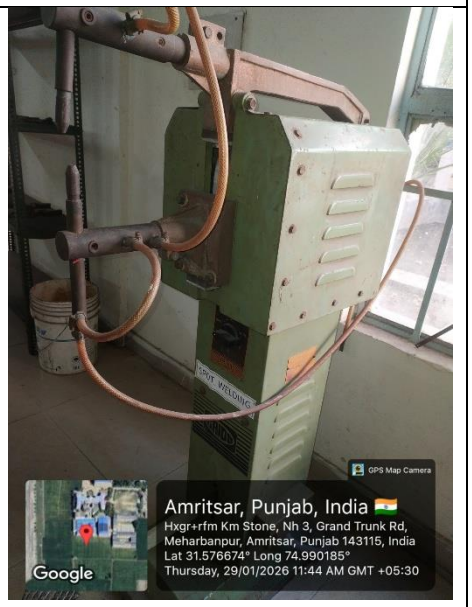
Welding Shop:

Picture of the Lab (Outside – showing the name plate)

Picture of the Lab (Inside – showing a wider view of the lab)

Details of the Laboratory Equipment's

S. N.	Name of Equipment	Description / Specification of the Equipment	Quantity	Normal Picture	Geotagged Picture
1	Spot Welding Machine	**Description** A spot welding machine is a resistance welding device used to join two or more thin metal sheets by applying pressure and electric current at a small point. The heat generated by electrical resistance melts the metal at the contact point and forms a weld nugget. It is widely used in automobile bodies, sheet-metal work, and appliance manufacturing. **Specifications** Type: Resistance spot welding machine Power Supply: Single-phase / Three-phase AC Voltage: 220–440 V Frequency: 50/60 Hz	1		

2	Arc Welding	**Description:** Arc welding is a fusion welding process in which an electric arc is produced between an electrode and the workpiece to generate heat, melting the metal and forming a strong welded joint. **Specification:** Power supply: AC or DC; current range 50–400 A; arc voltage 20–40 V; electrode diameter 2–5 mm; suitable for welding ferrous metals; manual metal arc (MMA) type commonly used.	1		

3	Mig Welding Machine	**Description** A **MIG welding machine (Metal Inert Gas)** uses a **continuously fed wire electrode** and a **shielding gas** (such as argon or CO_2) to produce an electric arc that melts and joins metals. It gives **clean, strong, and smooth welds** and is widely used in **automobile, fabrication, and industrial work**. **Specifications** • **Process:** MIG / GMAW • **Power Supply:** AC / DC (mostly DC) • **Input Voltage:** 220 V / 415 V • **Output Current Range:** 30 – 350 A • **Wire Diameter:** 0.8 mm – 1.2 mm • **Shielding Gas:** Argon, CO_2	1		

4	Gas welding	**Description:** Gas welding apparatus is used to join or cut metals by using a flame produced from the combustion of fuel gas (like acetylene) with oxygen. It is widely used in fabrication, repair, and metalworking. The setup typically includes gas cylinders, regulators, hoses, a welding torch, and safety equipment. The intense flame melts the base metals and filler material to form a strong joint upon cooling. **Specifications (Typical):** • **Fuel Gas:** Acetylene • **Oxidizer:** Oxygen • **Maximum Flame Temperature:** ~3200°C (acetylene-oxygen flame) • **Cylinder Capacity:** Acetylene (10–20 liters), Oxygen (40–50 liters) • **Hose Length:** 3–5 meters • **Torch Type:** Single or dual nozzle for	1		

		welding/cutting • **Working Pressure:** Acetylene 1.5–2 bar, Oxygen 2–3 bar			

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