

Product Catalogue

- TOML-101 Cam Analysis Machine**
- TOML-102 Coriolis Component of Apparatus**
- TOML-103 Epicyclic Gear Train & Holding Torque Apparatus**
- TOML-104 Journal Bearing Apparatus**
- TOML-105 Michell Tilting Pad Bearing Apparatus**
- TOML-106 Motorized Gyroscope**
- TOML-107 Slip & Creep Measurement Apparatus in Belt Drive**
- TOML-108 Static & Dynamic Balancing Apparatus**
- TOML-109 Universal Governor Apparatus**
- TOML-110 Universal Vibration Apparatus**
- TOML-111 Whirling Of Shafts Demonstrator**
- TOML-112 Lathe Tool Dynamometer**
- TOML-113 Milling Tool Dynamometer**
- TOML-114 Drilling Tool Dynamometer**

Universal Governor Apparatus

The set-up is designed to study the working of different governors normally used to control the speed. It consists of a main spindle, mounted vertically on the base plate. This spindle is driven by a variable speed Motor which is also mounted vertically on the same base plate. Any one governor assembly out of four can be mounted on spindle. Speed control unit controls the spindle speed. A graduated scale is fitted to the sleeve to measure the displacement

EXPERIMENTS:

- Determination of characteristic curve of a sleeve position against speed of rotation for all governors
- To study the effect of varying the mass of the center sleeve in Porter and Proell Governor s
- To study the effect of varying the initial spring compression in Hartnell Governor
- To study the determination of characteristics curves of radius of rotation against controlling force

(Actual & Theoretical) for all governors

UTILITIES REQUIRED:

- Power Supply: 230 V AC, Single Phase.
- Floor Space: 1.5 x 1.5 m
- Tachometer to find out RPM

TECHNICAL DETAILS:

- **Governor Mechanism:** Four different types of governor



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Mechanism with spring and weights

1. Watt Governor
2. Porter Governor
3. Hartnell Governor
4. Proell Governor

- **Motor :** Variable speed Motor HP
- **Control Panel:** For speed control of motor.
- **RPM measurement:** Digital RPM Indicator with Proximity Sensor.

Motorized Gyroscope Apparatus

The set up consists of heavy disc mounted on a horizontal shaft, rotated by a variable speed motor. The rotor shaft is coupled to a motor mounted on a triunion frame having bearings in a yoke frame, which is free to rotate about vertical axis. A weight pan on other side of disc balances the weight of motor. Rotor disc can be move about three axis. Torque can be applied by calculating the weight and distance of weight from the center of rotor. The gyroscopic couple can be determined.

EXPERIMENTS:

- Experimental justification of the equation $T = 1 w. wp$ for calculating the gyroscopic couple by observation and measurement of results for independent vibrations in applied couple T and precession wp .
- To study the gyroscopic effect of a rotating disc
- Observation of gyroscopic effect of rotating disc

UTILITIES REQUIRED:

- Electric supply: 230 V AC, Single Phase.
- Bench area: 1m x 1m

TECHNICAL DETAILS:

Product Motorized Gyroscope Apparatus

Disc Dia 300 mm x 12 mm thick precisely balanced which can be rotated in 3 mutually perpendicular axis.

Motor Variable speed of standard make.

RPM

measurement

Digital RPM Indicator with Proximity sensor.

Weights 2 kg, 1 kg, kg

Stop Watch Electronic

Supplied with Speed Control Unit.

Accurately marked scale & pointer to measure precession rate.

Static & Dynamics Balancing Apparatus

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This equipment is designed for carrying out the experiment for balancing a rotation mass system. The apparatus consists of a steel shaft fixed in a rectangular frame. A set of four blocks with a clamping arrangement is provided. For static balancing, each block is individually clamped on shaft and its relative weight is found out using cord and container system in terms of number of steel balls. For dynamic balancing, a moment polygon is drawn using relative weights and angular and axial position of blocks is determined. The block are clamped on shaft is rotated by a motor to check dynamic balance of the system. The system is provided with angular and longitudinal scales and is suspended with chains for dynamic balancing.

EXPERIMENTS:

- To balance the masses statically and dynamically of a single rotating mass system.
- To observation of effect of unbalance in a rotating mass system

UTILITIES REQUIRED:

- Electric supply 0.5 kW, 220V AC, Single Phase

TECHNICAL DETAILS:

- **Drive Motor:** FHP Motor, variable speed, with speed controller
- **Balancing weight :** 4 Nos. with different sized eccentric mass for Varying unbalance

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Epicyclic Gear Train & Holding Torque Apparatus

INTRODUCTION

Gear-train is any combination of gear wheels by which motion is transmitted from one shaft to another shaft. In epicyclic gear-trains, the axes of shafts on which the gears are mounted may move relative to a fixed axis.

EXPERIMENTS

- To measure epicyclic gear ratio between input shaft and output shaft.
- To measure epicyclic gear ratio between input shaft and holding drum.
- To measure input torque, holding torque and output torque.

DESCRIPTION

It consists of two types of epicyclic gear-trains

1. External Type and
2. Internal Type.

➤ **External type Epicyclic Gear Train :** It is a hand driven demonstration model consisting of two bearing blocks, supporting input and out put shafts through the epicyclic gear-train. The input shaft carries on arm and pin on which the compound gear wheel is free to revolve and it meshes with the fixed wheel and the wheel is keyed to the output shaft.

➤ **Internal type Epicyclic Gear Train :** It is a motorised unit consisting a SUN gear mounted on input shaft.

Two plane gears meshes with the annular gear. These planet gears are mounted on a common arm to which output shaft is fitted. Loading arrangement is provided for loading the system and to measure

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holding torque.

SPECIFICATIONS

External type Epicyclic Gear

Train.

Bearing block for input and output shafts are mounted on a base frame.

A gear train with holding drum and a handle.

Internal type Epicyclic Gear

Train.

A compact gear train. (industrial).

Variable speed D.C.shunt motor – 1 HP, 1500 rpm, 230 V.

Rope brake arrangement to measure output torque and holding torque.

Control Panel Digital Ammeter & Voltmeter.

RPM Indicator.

On-Off Switch.

D.C.Dimmerstat for varying speed.

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Universal Vibration Apparatus

DESCRIPTION

VIB-LAB. , is useful to study various experiments and to verify the principles and relations pertaining to study of vibrations.

In this apparatus frame and stand made out of thick

M.S.channels are provided for conducting various experiments

related to vibration. While designing special care is taken for

quick and easy assembly and dismantling of experimental setups.

Digital RPM Indicator is provided for measuring speed of

the exciter unit

EXPERIMENTATIONS

- **Pendulum Experiments**
- **Longitudinal Experiments**
- **Torsional Experiments**

SCOPE OF SUPPLY

1. Universal Frame and stand made out of thick M.S.Channel with powder coating for longer life of the unit.
2. Control Panel consisting of Dimm-erstat, Digital RPM Indicator and ON/OFF, switches and fuses.
3. D.C. variable speed motor (F.H.P.) with exciter unit fixed on the shaft of the motor.
4. Single Pen ordinary type Strip Chart Recorder (for recording vibrations).
5. Damper with arrangement for changing damping.
6. Pen holder and descender assembly for plotting the graph of damping torque vs., depth of damping drum
7. Disc – 3 Nos. for conducting rotor system experiments.

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8. Chucks for gripping wires in simple and compound pendulum and rotor system experiments.
9. Spring steel beam – 2 Nos. for conducting longitudinal vibrations.
10. Spring steel shaft for compound pendulum.

Journal Bearing Apparatus

The apparatus consists of a plain steel shaft excavated in a bearing and directly driven by a FHP Motor. The bearing is freely supported on the shaft and sealed at the motor end. The speed of the motor is controlled accurately by the speed control unit and it can be made run in both directions. Twelve equal-spaced pressure tapping around the circumference and four along the axis are provided and are connected to manometer by PU Tubing so that the pressure head of oil in all tubes can be observed at a time. The bearing can be loaded by attaching weights to the arm supported beneath it.

SCOPE OF EXPERIMENTATIONS:

- To study the pressure profile of lubricating oil at various conditions of load and speed.
- Plotting the Cartesian polar pressure curves.
- To measure the frictional torque and power transmit.

UTILITIES REQUIRED:

- Electric supply 230 V AC, Single Phase.
- Bench area 1.5 x 1.5 x 4 m
- Tachometer to find out RPM of journal.
- Oil SAE 40 about 5 Ltrs.

TECHNICAL DETAILS:

- Journal Diameter 50 mm
- Bearing Diameter 55 mm
- Weights 4 adjustable weights.
- Motor Variable speed FHP Motor
- Control Panel For speed control of motor.
- Manometer 16 Tubes.
- Oil recommended SAE 40

HML-101 Pelton Wheel Turbine Test Rig

HML-102 Francis Turbine Test Rig

HML-103 Kaplan Turbine Test Rig

HML-105 Centrifugal Pump Test Rig

HML-106 Hydraulic Ram Test Rig

HML-107 Multistage Centrifugal Pump Test Rig

HML-108 Reciprocating Pump Test Rig

HML-109 Gear Pump Test Rig

HML-110 Jet Pump Test Rig

HML-111 Axial Fan Test Rig

HML-112 Centrifugal Blower Test Rig

HML-113 Submersible Pump Test Rig

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Pelton Turbine Test Rig

The present set-up consists of a runner. The buckets are mounted on the runner. The water is fed to the turbine, through SS nozzle with a SS spear, by means of Centrifugal Pump, tangentially to the runner. Row of water into turbine is regulated by adjusting the spear position by the help of a given hand wheel The runner is directly mounted on one end of a central SS shaft and other end is connected to a brake arrangement. The circular window of the turbine casing is provided with a transparent acrylic sheet for observation of flow on to the buckets. This runner assembly is supported by rigid MS structure. Load is applied to the turbine with the help of this brake dynamometer so that the efficiency of the turbine can be calculated. Pressure gauge is fitted at the inlet of the turbine to measure the total supply head to the turbine.

EXPERIMENTS:

- To study the operation of a Pelton Wheel Turbine
- To determine the Output Power of Pelton Wheel Turbine
- To determine the Turbine Efficiency

UTILITIES REQUIRED:

- Water Supply and Drain
- Electricity 15 kW, 440V AC, Three Phase
- Floor Area 1.5 x 0.75 m

TECHNICAL DETAILS:

Model Mod-3 Mod-2 Mod-1

Output Power 5 HP 2 HP 1 HP

Discharge 960 LPM (Approx.) 600 LPM(Approx.) 500 LPM(Approx.)

Supply Head 44 m 30 m 25 m

Rope Brake Dynamometer Dia 300 mm. Dia 200 mm. Dia 200 mm.

Sump Tank Capacity 370 Ltrs Capacity 220 Ltrs Capacity 200 Ltrs

Water Circulation Centrifugal

Pump

Capacity 15HP, Three

Phase

Capacity 7.5 HP, Three

Phase

Capacity 5HP, Three

Phase

Speed 1000 RPM (Approx.)

Impeller Material Brass, Bucket type

Nozzle Material Stainless Steel

Spear Material Stainless Steel

Discharge Measurement Pitot Tube with Manometer

Control Panel Starter, Mains Indicator

With Digital Tachometer

Tanks will be made of Stainless Steel

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Francis Turbine Test Rig

The present set-up consists of a runner. The water is fed to the turbine by Means of

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Centrifugal Pump, radially to the runner. The runner is directly mounted on one end of a central SS shaft and other end is connected to a brake arrangement. The circular window of the turbine casing is provided with a transparent acrylic sheet for observation of flow on to the runner. Load is applied to the turbine with the help of brake arrangement so that the efficiency of the turbine can be calculated. A draft tube is fitted on the outlet of the turbine. The set-up is complete with guide mechanism. Pressure and Vacuum gauges are fitted at the inlet and outlet of the turbine to measure the total supply head on the turbine.

EXPERIMENTS:

- To study the operation of a Francis Turbine
- To determine the Output Power of Francis Turbine
- To determine the Turbine Efficiency

UTILITIES REQUIRED:

- Water Supply and Drain
- Electricity 15kW, 440 V AC, Three Phase
- Floor Area 1.5x 0.75 m

TECHNICAL DETAILS:**MODEL Mod-3 Mod-2 Mod-1****Output Power** 5 HP 2 HP 1HP**Discharge** 2600 LPM (Approx.) 1500 LPM (Approx.) 1200 LPM (Approx.)**Supply Head** 18m 12m 10m**Rope Brake type****Dynamometer**

Dia 300 mm. Dia 200 mm. Dia 200 mm.

Sump Tank Capacity 450 Ltrs. Capacity 290 Ltrs. Capacity 250 Ltrs.**Water Circulation Centrifugal Pump**

Capacity 15 HP Three Phase.

Capacity 7.5 HP Three Phase.

Capacity 5 HP Three Phase.

Speed 1500 RPM (Approx.)**Runner** Having Curved Vanes**Discharge Measurement** Pitot Tube with Manometer.**Control Panel** Mains Indicator**With Digital Tachometer** Tanks will be made of Stainless Steel

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Kaplan Turbine Test Rig

The present set-up consists of a scroll casing housing a runner. Water enters the turbine through the stationary guide vanes and passes through the runner axially. The runner has a hub and airfoil vanes, which are mounted on it. The water is fed to the turbine by means of Centrifugal Pump. The runner is directly mounted on one end of a central SS shaft and other end is connected to a brake

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arrangement. A transparent hollow cylinder made of acrylic is fitted in between the draft tube and the casing for observation of flow. Load is applied to the turbine with the help of rope brake arrangement so that the efficiency of the turbine can be calculated. The set-up is supplied with control panel. A draft tube is fitted on the outlet of the turbine. The set-up is complete with guide mechanism. Pressure and Vacuum gauges are fitted at the inlet and outlet of the turbine to measure the total supply head on the turbine.

EXPERIMENTS:

- To study the operation of Kaplan turbine.
- To determine the Output Power of Kaplan Turbine.
- To determine the turbine efficiency

UTILITIES REQUIRED:

- Electricity 3 kW, 220V AC, Single Phase
- Floor Area 1.5 x 0.75 m
- Tachometer

TECHNICAL DETAILS:

MODEL Mod-3 Mod-2 Mod-1

Output Power 3 HP 2 HP 1 HP

Discharge 5000 LPM (Approx.) 4000 LPM (Approx.) 3500 LPM (Approx.)

Supply Head 8 m 6 m 5 m

Rope Brake type

Dynamometer

Dia 300 mm. Dia 200 mm. Dia 200 mm.

Sump Tank Capacity 600 Ltrs. Capacity 460 Ltrs. Capacity 400 Ltrs.

Water Circulation Centrifugal

Pump

Capacity 15 HP Three

Phase.

Capacity 10 HP Three

Phase.

Capacity 7.5 HP Three

Phase.

Speed 1500 RPM (Approx.)

Runner with adjustable curved vanes

Discharge Measurement Pitot Tube with Manometer.

Control Panel Starter, Mains Indicator

With Digital Tachometer Tanks will be made of Stainless Steel

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Centrifugal Pump Test Rig

Set up consists of a centrifugal pump coupled with electrical motor, supply tank, measuring tank & pipe fittings for closed loop water circulation. Pressure and Vacuum gauges

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are connected on delivery and suction side of pump for the purpose of measurement. The flow rate of water is measured using measuring tank and stop watch provided.

EXPERIMENTS:

➤ To determine overall efficiency and pump efficiency of the centrifugal pump.

➤ To plot Head vs. Discharge, Pump efficiency vs.

Discharge

FEATURES:

➤ Closed loop water circulation

➤ Compact & stand-alone set up

➤ Stainless Steel tanks and wetted parts

➤ Superb Painted structure

➤ Simple to operate & maintain

UTILITIES REQUIRED:

➤ **Electric supply** Provide 230 +/- 10 VAC, 50 Hz, single phase

electric supply with proper earthing.

(Neutral – Earth voltage less than 5 VAC.) 5A, three pin socket with switch for pump.

➤ **Water supply** Tap water connection ½" BSP

TECHNICAL DETAILS:

Product Centrifugal Pump Test Rig

Pump Capacity 1 HP Speed 2800 RPM (max.), Head 12m(max.), Make Kirloskar

Drive DC motor with DC drive along with non-contact type digital RPM indicator

Supply Tank Capacity 120 Ltrs. MOC SS

Measuring Tank Capacity 75 Ltrs. MOC SS fitted with Piezometer Tube & scale

Piping GI / PVC

Stop Watch Electronic

Control Panel With required electrical instrumentation

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Reciprocating Pump Test Rig

Apparatus consists of a close circuit through which water is circulated

continuously by means of a double acting reciprocating pump of 25 mm x 20 mm

coupled to a 1.0 H.P. capacity A.C. motor to make the supply from sump tank. Pump is provided with air

vessels. Max head of the pump is 5 Kg/cm². A sump tank of 80 cm long, 40 cm wide and 30 cm high

fabricated S.S. sheet is provided with the apparatus. A drain valve of 15 mm size is provided in the bottom of tank.

Discharge of water can be collected by the help of a collecting tank of 40 cm x 40 cm and 40 cm high Inside

of the tank is lined with FRP. The tank is provided with gauge glass tube, flow diverting arrangement and a

drain valve of 25 mm size.

Complete G.I. piping system with foot valve, vacuum gauge and pressure gauge (located at suitable places)

with necessary fittings are provided with the apparatus. A regulating valve is provided on the downstream

side of the circuit to regulate the flow.

EXPERIMENTS:

➤ To determine the efficiency of the pump.

FEATURES:

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- Self contained water circulation unit.
- Pump giving adequate flow for meaningful experiments.
- Capacity of water - 90 lit. approx.
- Electrical supply - Single phase, 1.0 H.P. Cap.
- Comprehensive Instruction Manual covers experiment presented in the form of a full laboratory report.
- Space saver as collecting tank is mounted over the sump tank.
- The inside surface of the tank is provided with FRP to minimize the problem of corrosion.
- Space requirement: Floor area 1.8 m x 1.0 m x 1.5 m approx.

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Gear Oil Pump Test Rig

Set up consists of a gear pump having a pair of meshed gears coupled with electrical motor, supply tank, measuring tank & pipe fittings for closed loop oil circulation. Pressure and Vacuum gauges are connected on delivery and suction side of pump for the purpose of measurement. The flow rate of water is measured using measuring tank and stop watch provided.

EXPERIMENTS:

- To determine overall efficiency and pump efficiency of the gear pump.
- To plot Head vs. Discharge, Pump efficiency vs. Discharge

FEATURES:

- Closed loop circulation
- Compact & stand-alone set up
- Stainless Steel tanks and wetted parts
- Superb Painted structure
- Simple to operate & maintain

UTILITIES REQUIRED:

- **Electric supply** Provide 230 +/- 10 VAC, 50 Hz, single phase electric supply with proper earthing. (Neutral – Earth voltage less than 5 VAC.) 5A, three pin socket with switch for pump.
- **Oil supply** Oil @ 30 liters

TECHNICAL DETAILS:

Product Gear Pump Test Rig

Pump Gear pump with pair of meshed gears Capacity 1 HP , Speed 1500 RPM (max.), Head 5 kg/cm² (max.)

Drive DC motor with DC drive along with non-contact type digital RPM indicator

Supply Tank Capacity 30 Ltrs. MOC SS

Measuring Tank

Capacity 20 Ltrs. MOC SS fitted with Piezometer Tube & scale

Piping GI / PVC

Stop Watch Electronic

Control Panel With required electrical instrumentation

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Ram Test Rig

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Apparatus consists of a close circuit through which water is circulated continuously by means of a centrifugal pump of 25 mm x 25 mm with 0.5 H.P. motor to make the supply from sump tank. A sump tank 125 cm long, 80 cm wide and 40 cm high fabricated on M.S. angle frame with 3 mm thick M.S. sheet is provided. Inside of the tank is lined with FRP. A drain valve of 15 mm size is provided in the bottom of the tank.

A supply tank 50 cm x 50 cm and 100 cm high fabricated with S.S. sheet with over flow arrangement, gauge glass tube and 15 mm size drain valve is provided. Inside of the tank is lined with FRP. The tank has the provision for fixing the supply pipe of 50 mm dia of which other end is connected to the ram. The tank is supported on a stand fabricated from M.S. angle.

For the supply head of 2.5 m, the discharge head of the ram will be 15 m (approx.) the discharge will be 360 LPH.

A pressure gauge is provided with a regulating valve on the delivery side of the ram (delivery pipe is of 15 mm dia) so that much greater head of water can be observed and obtained by the adjustment of the shifting valve provided in the ram assembly. Lifted water can be collected by the help of a collecting tank of 30 cm x 30 cm and 30 cm high. The tank is provided with gauge glass tube, flow diverting arrangement and a drain valve of 25 mm size.

Waste water can be measured by the help of another collecting tank. The tank is provided with gauge glass tube, flow diverting arrangement and a drain valve of 15 mm size.

Necessary G.I. piping system & flexible pipe of suitable size, necessary fitting and control valve are provided with the apparatus.

EXPERIMENTS:

- To determine the efficiency of ram.

FEATURES:

- Compact & stand-alone set up
- Stainless Steel tanks and wetted parts
- Superb Painted structure
- Simple to operate & maintain

HTL-101 Calandria Evaporator

HTL-102 Double/Triple Effect Evaporator

HTL-103 Drop wise/Film wise Condensation Apparatus

HTL-104 Emissivity Measurement Apparatus

HTL-105 Experimental Water Cooling Tower

HTL-106 Finned Tube Heat Exchanger

HTL-107 Heat Pipe Demonstrator

HTL-108 Heat Transfer from a Pin Fin

HTL-109 Heat Transfer in Agitated Vessel

HTL-110 Heat Transfer in Forced Convection

HTL-111 Heat Transfer in Natural Convection

HTL-112 Heat Transfer through Composite Walls

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HTL-113 Heat Transfer through Lagged Pipe
HTL-114 Open Pan Evaporator
HTL-115 Parallel/Counter Flow Heat Exchanger
HTL-116 Separating and throttling calorimeter
HTL-117 Shell & Tube Heat Exchanger
HTL-118 Single Effect Evaporator
HTL-119 Stefan Boltzmann's Apparatus
HTL-120 Thermal Conductivity of Insulating Powder
HTL-121 Thermal Conductivity of Insulating Slab
HTL-122 Thermal Conductivity of Liquids
HTL-123 Thermal Conductivity of Metal Rod
HTL-124 Unsteady State Heat Transfer Unit
HTL-125 Vertical & Horizontal Condenser (Steam to Water)
HTL-126 Vertical & Horizontal Condenser (Water to Water)

Thermal Conductivity of a Metal Rod Apparatus

The experimental set up consists of metal bar, one end of which is heated by an electric heater while the other end of the bar projects inside the cooling water jacket. A cylindrical shell filled with the asbestos insulating powder surrounds the middle portion of the bar. The temperature of the bar is measured at different sections. Heat Input to the heater is given through Variac and measured by Digital Voltmeter & Digital Ammeter. By varying the heat input rates, wide range of experiments can be performed. Water under constant head condition is circulated through the jacket and its flow rate and temperature rise is noted.

EXPERIMENTS:

- To plot the temperature distribution along the length of Bar
- To determine the thermal conductivity of given bar at various temperatures

UTILITIES REQUIRED:

- Water supply 3 lit/min (approx.)
- Drain
- Electricity Supply: 1 Phase, 220 V AC 2 Amp.

TECHNICAL DETAILS:

Product Name Thermal Conductivity of a Metal Rod Apparatus

Metal Bar Material Copper Length : 450 mm Dia : 25mm

Insulating Powder shell Length 250 mm Dia : 200mm

Cooling Water Jacket Length 75mm Dia : 100mm

Heater Nichrome Wire.

Water Flow measurement Measuring cylinder & Stopwatch.

Temperature Sensors RTD PT: 100 type (8 Nos.)

Control panel

Digital Voltmeter: 0300 Volt.

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Digital Ammeter: 02 Amp.

Variac : 0230 V, 2 A,

Digital Temp. Indicator: 0199.9°C, with multichannel switch.

On/off switch, Mains Indicator etc.

The whole setup is mounted on a powder coated base plate.

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Thermal Conductivity of Insulating Powder Apparatus

Insulating Powder Apparatus is designed to determine the thermal conductivity of insulating powder. The Apparatus consists of two thin walled concentric copper spheres. Inner sphere houses Nichrome Wire heating coil. Insulating powder is filled between the spheres. Heat flows radially outwards. Temperature sensors at proper positions are fitted to measure surface temperatures of spheres. Heat input to the heater is given through a Variac and measured by Digital Voltmeter & Digital Ammeter. By varying the heat input rates, wide range of experiments can be performed.

EXPERIMENTS:

- Determination of thermal conductivity of insulating powder
- Comparison of thermal Conductivity of insulating powder at different temperatures

UTILITIES REQUIRED:

- Electricity Supply: 1 Phase, 220 V AC, 2 Amps.

TECHNICAL DETAILS:

Product Name Thermal Conductivity of Insulating Powder Apparatus

Inner Sphere Dia. 100mm

Outer Sphere Dia. 200mm

Heater Nichrome Wire

Temperature Sensors RTD PT100 type (10 Nos.)

Control panel: Digital Voltmeter: 0300 Volt.

Digital Ammeter: 02 Amp.

Variac: 0230 V, 2 A

Digital Temperature Indicator: 03000 C, with multichannel switch,

On off switch, Mains Indicator etc.

The whole setup is mounted on a power coated base plate

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Thermal Conductivity of Insulating Slab (By Guarded Hot Plate Method) Apparatus

The setup is designed to determine thermal conductivities of insulating materials in the form of slabs. The apparatus consists of main central heater and ring guard heater, sandwiched between the specimens. Cooling plates are provided on the either side of the specimen. Two identical specimens are

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clamped between heater ensures unidirectional heat flow through specimen. The whole assembly is kept in chamber and insulated by ceramic wool insulation around the setup.

EXPERIMENTS:

- Determination of Thermal conductivity of insulating Material in the form of slab Study of variation of thermal conductivity of the material with temperature

UTILITIES REQUIRED:

- Water supply 5 lit/min (approx.)
- Drain.
- Electricity Supply: I Phase, 220 V AC, 2 Amps.

TECHNICAL DETAILS:

Product Name Thermal Conductivity of Insulating Slab (By Guarded Hot Plate Method) Apparatus

Specimen Dia 180 mm (approx) Thickness: 12 mm (approx).

Central Heater Dia 100 mm sandwiched between copper plates.

Ring Guard Heater Width 35 mm sandwiched between copper rings.

Cooling chamber Made of Aluminum for water circulation. 2 Nos.

Insulation Ceramic wool

Temperature Sensors RTD PT100 type (6 Nos.)

Control Panel: Digital Voltmeter: 0300 Volt.

Digital Ammeter: 02 Amp,

Variac: 0230 V, 2 A, (2 Nos.) One each for central & ring guard heater,

Digital Temperature Indicator: 0199.90C, with multichannel switch,

On off switch, Mains Indicator etc.

MS Cabinet to accommodate the slab assembly.

The whole setup is mounted on a powder coated base plate

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Thermal Conductivity of Liquids Apparatus

The present apparatus is designed to determine thermal conductivities of different liquids.

The apparatus consists of a heater. The heater heats a thin layer of liquid. A cooling plate

removes heat through liquid layer, ensuring unidirectional heat flow. Temperature is measured across the liquid layer and complete assembly is properly insulated. A proper arrangement for changing the liquids is

provided. The whole assembly is kept in chamber.

EXPERIMENTS:

- Determination of Thermal conductivity of different liquids and to make a comparative study
- Study of variation of thermal conductivity of different liquids with temperature

UTILITIES REQUIRED:

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- Water supply 5 lit/min (approx.)

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- Drain. .
- Electricity Supply: 1Phase, 220 V AC, 2 Amps.

TECHNICAL DETAILS:

Product Name Thermal Conductivity of Liquids) Apparatus

Liquid Chamber Dia 170 mm (approx) Height : 22 mm (approx)

Heater Dia 100 mm, sandwiched between copper plates

Insulation Ceramic Wool

Cooling chamber Made of Aluminum for water circulation

Temperature Sensors RTD PT100 type (6 Nos.)

Control panel Digital Voltmeter: 0300 Volt,

Digital Ammeter: 02 Amp,

Variac: 0230 V, 2 A,

Digital Temperature Indicator: 0199.9°C, with multichannel switch,

On/Off switch, Mains Indicator etc.

Valves are provided for drain, charging& overflow line to make system flexible.

MS Cabinet to accommodate the slab assembly

The whole set up is mounted on a powder coated base plate

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DS

Heat Transfer from a Pin Fin Apparatus

The setup is designed to study the heat transfer in a pin fin. It consists of pin type fin fitted in duct. A fan is provided on one side of duct to conduct experiments under forced draft conditions. Airflow rates can be varied with the help of damper provided in the duct. A heater heats one end of fin and heat flows to another end. Heat input to the heater is given through Variac. Digital Temperature Indicator measures temperature distribution along the fin.

EXPERIMENTS

- To study temperature distribution along the length of fin in both Free & forced convection
- Comparison of theoretical temperature distribution with experimentally obtained distribution

UTILITIES REQUIRED

- Electricity Supply: 1 Phase, 220 V AC, 5 Amps.
- Table for setup support

TECHNICAL DETAILS

Product Name Heat Transfer from A Pin Fin Apparatus

Fin Material Brass Size : 12.5 mm (approx.) 15 cm long (approx.)

Duct Made of MS

Fan Standard make

Heater Band type, Nichrome Wire

Temperature Sensors RTD PT100 type (6 Nos.), 5 for pin and 1for duct temperature.

Control panel Dimmerstat : 0230 V, 2 A,

Digital Temperature Indicator: 0300°C, with multichannel switch,

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On/Off switch, Mains Indicator etc

The whole setup is mounted on a powder coated base plate

Heat Transfer in Natural Convection Apparatus

The setup consists of a brass tube fitted in a rectangular duct in a vertical fashion. The duct is open at the top and bottom, and forms an enclosure and serves the purpose of undisturbed surrounding. One side of the duct is fitted with a transparent good quality Acrylic window for visualization. An electric heating element is kept in the vertical tube that in turns heats the tube surface. The heat is lost from the tube to the surrounding air by natural convection. The temperature of the vertical tube is measure by Temperature Sensors and displayed by a Digital Temperature Indicator with multichannel switch. The heat input to the heater is measured by a Digital Ammeter and a Digital Voltmeter and is varied by a Variac. The tube surface is polished to minimize the radiation losses.

EXPERIMENTS

- To determine average heat transfer coefficient

UTILITIES REQUIRED

- Electricity Supply: I Phase, 220 V AC, 2 Amps.
- Table for setup support

TECHNICAL DETAILS

Product Name Heat Transfer in Natural Convection Apparatus

Test Section Dia: 38 mm (approx).

Length : 500 mm (approx)

Heater Nichrome Wire.

Temperature Sensors RTD PT100 type (7 Nos.)

Control panel : Digital Voltmeter: 0300 Volt.

Digital Ammeter: 02 Amp.

Variac : 0230 V, 2 A,

Digital Temperature Indicator: 0300°C, with multichannel switch,

On/Off switch, Mains Indicator etc

Powder coated duct of MS to accommodate the assembly with front window of Acrylic.
The whole setup is well designed and arranged on a powder coated structure.

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Heat Transfer in Forced Convection Apparatus

The apparatus consists of Blower unit fitted with the test pipe. Nichrome wire heater surrounds the test section. Four Temperature Sensors are embedded on the test section, two placed in the air stream at the entrance and exit of the test section to measure the inlet and outlet air temperature. Test pipe is connected to the delivery side of the blower along with the Orifice to measure flow of air through the pipe. Constant heat flux is given to pipe by an electric heater through a Variac and measured by Digital Voltmeter and Digital Ammeter.

EXPERIMENTS

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- To determine average surface heat transfer coefficient for a pipe losing heat by forced convection.
- Comparison of heat transfer coefficient for different airflow rates and heat flow rates.
- To plot surface temperature distribution along the length of pipe

UTILITIES REQUIRED

- Electricity Supply: 1 Phase, 220 V AC, 10Amp.
- Floor area of 1.2mx 0.5m

TECHNICAL DETAILS

Product Name Heat Transfer in Forced Convection Apparatus

Test section Dia : 28 mm (approx.)

Length : 400 mm (approx.)

Blower FHP of Standard make

Heater Nichrome Wire.

Air Flow measurement Orificemeter & Manometer

Temperature Sensors RTDPT100 type (6 Nos.)

Control panel: Digital Voltmeter: 0300Volt,

Digital Ammeter: 02Amp,

Variac : 0230 V, 2 A,

Digital Temperature Indicator: 0300°C, with multichannel switch,

On off switch, Mains Indicator etc.

A good quality painted rigid MS Structures provided to support all the parts

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Emissivity Measurement Apparatus

The present Setup is designed to measure the emissivity of test plate. The test plate comprises of a mica heater sandwiched between two circular plates. Black plate is identical with test plate, but its surface is blackened. As all the physical properties, dimension and temperature are equal; heat losses from both plates will be same except radiation loss. Hence the input difference will be due to difference in emissivity. Both plates are supported on individual brackets in a wooden enclosure with one side glass to ensure steady atmospheric conditions. Temperature Sensors are provided to measure the temperature of each plate and surrounding. Supply is given to heaters through separate Variac so that temperatures of both can be kept equal and is measured with Digital Voltmeter and Digital Ammeter.

EXPERIMENTS:

- Determining the Emissivity of a test plate.
- Study the variation of emissivity of test plate with respect to absolute temperature.

UTILITIES REQUIRED:

- Electricity Supply: 1Phase, 220 V AC, 4 Amps.
- Table for setup support

TECHNICAL DETAILS:

Product Name Emissivity Measurement Apparatus

Test plate Dia. 160mm

Black Plate Dia. 160mm

Heater (2Nos.): Nichrome Wire Heater. (One each for test plate and black plate)

Temperature Sensors RTD PT100 type (3 Nos.)

Control panel Digital Voltmeter: 0300Volt,

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Digital Ammeter: 02Amps,
DPDT Selector switches: For Digital Voltmeter & Digital Ammeter,
Variac: 0230 V, 2 A, (2 Nos.) (One each for test plate and black plate)
Digital Temperature Indicator: 0300°C, with multichannel Switch,
On/Off switch, Mains Indicator etc

Cabinet to accommodate the slab assembly with front window of glass/acrylic
The whole setup is mounted on a powder coated base plate.

\

Stefan Boltzman's Apparatus

The apparatus is designed to determine, the Stefan Boltzmann constant.

The apparatus

consists of a hemisphere fixed to a Bakelite plate, the outer surface of which forms the jacket to heat it. Hot water to heat the hemisphere is obtained from a hot water tank, which is fixed above the hemisphere. The copper test disc is introduced at the center of hemisphere. The temperatures of hemisphere and test disc are measured with the help of temperature sensors.

EXPERIMENTS:

➤ Determination of Stefan Boltzmann constant and study the effect of hemisphere temperature on it

UTILITIES REQUIRED:

➤ Electricity Supply: I Phase. 220 V AC, 2 kW.

➤ Table for setup support

TECHNICAL DETAILS:

Product Name Stefan Boltzman's Apparatus

Hemisphere Dia.200 mm (approx.) made of Copper

Jacket Dia.250 mm (approx.) made of Stainless Steel

Test Disc Size 20 mm Dia. x 1.5mm thickness made of Copper

Water Tank Stainless steel 12 Ltrs. cap

Heater Nichrome wire immersion heater

Temperature sensors RTD PT100 type 2 Nos.

Control panel Digital Temperature Controller: 0 to 199.9°C (for water tank),

Digital Temperature Indicator: 0 to 199.9°C with multi-channel switch,

On/off switch. Mains Indicator etc.

The whole setup is well designed and arranged on a powder coated structure.

\

Heat Pipe Demonstrator Apparatus

It is a superconducting device and involves the transfer of heat by boiling and condensation of a fluid and hence transfer of heat takes place under nearly isothermal condition. In this apparatus the comparison of heat pipe with the copper pipe as good conductor of heat and with the stainless steel pipe as same material of construction is made. It consists of three identical cylindrical conductors In respect of geometry. One end of these is heated electrically while there are small capacity tanks acting as heat sinks at the other end. The unit consists of a heat pipe a copper pipe and a stainless steel pipe. Temperature sensors are embedded along the length to measure the temperature distribution

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and the heat transfer rate is noted in terms of the temperature rise in the heat sink tanks. The performance of the heat pipe as a superconducting device can be studied well in terms of the temperature distribution along the length at a given instant and can be compared with other two members. Nearly isothermal temperature distribution and fast rise of temperature in heat sink tank reveals the heat pipe superiority over the conventional conductors.

EXPERIMENTS:

- To demonstrate the super thermal conductivity of Heat Pipe and to compare its working with best conductor i.e. Copper pipe & Stainless steel pipe as same material of construction.
- To plot the temperature v/s time response of three pipes
- To plot the temperature distribution along the length of three pipes

UTILITIES REQUIRED:

- Electricity Supply: 1Phase, 220 V AC, 4 Amp
- Table for setup support

TECHNICAL DETAILS**Product Name Heat Pipe Demonstrator Apparatus Pipes**

1st Heat pipe made of stainless steel

2nd Made of copper.

3rd Made of Stainless steel.

Size: 32 mm dia, 350 mm length (Approx.)

Heat Sink Material Stainless steel

Working fluid in heat pipe Distilled water

Heater Nichrome Wire Band Type (3Nos.)

Temperature Sensors RTD PT100 type 12 Nos.

Control panel

Digital Voltmeter: 0300 Volts.

Digital Ammeter. : 0.2 Amp.

Variac : 0230 V, 4 A,

Digital Temperature Indicator: 0200°C, with multichannel switch,

On off switch, Mains Indicator etc,

The whole setup is mounted on a Powder Coated Base plate.

\

Cross Flow Heat Exchanger Apparatus

The cross flow heat exchanger is air-to-air type heat exchanger. On both hot and cold sides, air flow is generated by centrifugal blowers. Hot air is obtained by passing air over a bank of finned tubes. The air then flows to heat exchanger section i. e. a bank of finned tubes. Hot air flows through tubes while cold air flows over the tubes at right angle to hot air. The experiments can be conducted over various air flow rates and air temperatures to determine LMTD, heat transfer rates and effectiveness of heat exchanger.

EXPERIMENTS:

- To determine the water side overall heat transfer coefficient on a **cross-flow heat exchanger**

UTILITIES REQUIRED:

- Electricity Supply: 1Phase, 220 V AC, 3 kW
- Floor area 3 m x 2m

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Product Name Cross Flow Heat Exchanger Apparatus

Heat Exchanger Finned tubes. 17mm. I. D., 20mm. O. D., 0.5mtr. long tube with 50mm. O. D. fins - 25 Nos.

Centrifugal blower on hot and cold sides

Finned air heaters 1 Kw each 3nos.

Air flow control arrangement at blower suction.

Multichannel Digital temperature indicator to measure temperature of air at inlet and outlet of heat exchanger.

\

Parallel Counter Flow Heat Exchanger Apparatus

Heat exchanger is devices in which heat is transferred from one fluid to another. The apparatus consists of a concentric tube heat exchanger. Hot water flows through inner tube in one direction only and cold water flows over the inner tube in outer tube. Direction of cold fluid flow can be changed from parallel or counter to hot water so that unit can be operated as parallel or counter flow heat exchanger. Flow rates of hot and cold water are measured using Rotameter. A magnetic drive pump is used to circulate the hot water from a re-cycled type water tank, which is fitted with heaters and Digital Temperature Controller.

EXPERIMENTS:

- To calculate the following parameters both for parallel and counter flow arrangement.
- To find the rate of heat transfer
- To calculate the LMTD
- Overall heat transfer co-efficient.
- To compare the performance of Parallel and Counter flow heat exchanger

UTILITIES REQUIRED:

- Water supply 10 lit/min (approx.) and drain
- Electricity Supply: 1Phase, 220 V AC, 3 kW
- Floor area 2 m x 0.6m

TECHNICAL DETAILS:

Product Name Parallel Counter Flow Heat Exchanger Apparatus

System Water to Water

Length of Heat Exchanger 1.6 m(approx.)

Outer Tube Material Stainless steel, ID 27.5mm, OD 33.8 mm (approx).

Inner Tube OD 12.7mm (approx)

Water Flow Measurement Measuring cylinder & Stop Watch with Rotameter (2Nos.) one each for cold & hot fluid

Hot Water Tank Made of Stainless steel Insulated with ceramic fiber wool.

Hot Water Circulation Magnetic Pump made of Polypropylene to circulate Hot Water.

Maximum working temperature is 85°C.

Heaters Nichrome wire heater (2 Nos.)

Temperature Sensors RTD PT-100 type 6 Nos.

Control panel Digital Temperature Controller: 0-199.9°C (For Hot Water Tank),

Digital Temperature Indicator: 0-199.9°C,with multi-channel switch,

On/Off switch, Mains Indicator etc

A good quality painted rigid MS Structure is provided to support all the parts

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Heat Transfer in Two Phase Apparatus

It provides visualization of two phases of liquid viz. boiling and condensation. The liquid is R-11 in which a hot cylinder is immersed. The boiling of liquid can be observed over heater surface up to nucleate boiling phase. Condenser coil is provided at the top of the cylinder, over which the vapor is condensed to liquid. A pressure of the vapor and water flow in condenser is measured by a pressure gauge & Rotameter. Dimmer stat provides control of heater surface temperature and thermometer notes liquid temperature, inside glass cylinder.

EXPERIMENTS:

➤ To study the **two phases heat transfer**

unit

UTILITIES REQUIRED:

➤ Electricity Supply: 1Phase, 220 V AC, 3

kW

➤ Floor area 2 m x 1m

TECHNICAL DETAILS:

Product Name Heat Transfer in Two Phase Apparatus

Dimmer 0-230v, 2 Amps. Capacity for heater control.

Thermometer To measure liquid R-11 temperature.

Borosilicate glass cylinder containing R-11 liquid, with heater immersed in liquid and condenser coil at the top.

A Rotameter for water flow measurement.

Multichannel digital Temperature Indicator.

Pressure gauge for vapor pressure.

Pressure switch to switch off the heater at set pressure.

Valve to control water flow rate.

Voltmeter and Ammeter for heater input measurement.

KOM-101 Cam & Followers Apparatus

KOM-102 Combined Coil & Belt Friction Apparatus

KOM-103 Crank & Connecting Rod Model

KOM-104 Crank & Slotted Mechanism

KOM-105 Double Stage Helical Gear/ Herringbone Gear

KOM-106 Epicyclic Gears

KOM-107 Four Bar link Mechanism

KOM-108 Gear Tooth Profile Generation Apparatus

KOM-109 Helical Spring Apparatus

KOM-110 Inversion of Four Bar Mechanism

KOM-111 Kinematic Pairs

KOM-112 Oscillating Cylinder Mechanism

KOM-113 Pantograph Mechanism

KOM-114 Pawl & Ratchet Mechanism

KOM-115 Peauciller Mechanism

KOM-116 Reciprocating Engine Mechanism/Slider Crank Mechanism

KOM-117 Scotch Yoke Mechanism

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KOM-118 Screw Jack Apparatus
KOM-119 Single Stage Helical Gear
KOM-120 Single Stage Spur Gear/Simple Train of Gears
KOM-121 Slider Crank Mechanism Apparatus
KOM-122 Three Stage Spur Gear/Compound Train of Gears
KOM-123 Two Stage Spur Gear/Compound Train of Gears
KOM-124 Watt Mechanism
KOM-125 Wit worth Quick Return Mechanism
KOM-126 Worm Gear

Combined Coil & Belt Friction Apparatus

Apparatus consists of a metallic pulley of 30 cm diameter with two grooves, one for rope and the other for belt. At back side of the pulley, a circular wooden disc is provided with graduation at 10o interval. A rotating pulley is fixed at the circumference of the scale. Apparatus is supplied complete with one belt and a rope. The apparatus is mounted on a heavy vertical stand.)

Inversion of Four Bar Mechanism

Model is made up of aluminum and other metallic parts. Model is mounted on a wooden board of size 90 x 60 cm. Angular and linear scales are provided to find the displacement of points in links. Following mechanism will be on the board.

- a. Locomotive Coupling Bar Mechanism, or link mechanism
- b. Beam Engine Mechanism
- c. Ackerman steering gear mechanism

Kinematic Pairs

Model consists of different types of pair viz sliding pairs, turning pair, rolling pair (two types), screw pair (two types), spherical pair, completely constrained motion, gear wheels and two types of links. All pairs mounted on a wooden board.)

Oscillating Cylinder Mechanism

Metallic model mounted on the wooden board

Wit worth Quick Return Mechanism

Metallic model mounted on the wooden board

Reciprocating Engine Mechanism

Metallic model mounted on the wooden board

Bevel Gear

Single Stage Bevel Gear. The model is mounted on a wooden board

Worm Gear

The model is mounted on a wooden board.

\

Single Stage Spur Gear/Simple Train of Gears

Model is having teeth parallel to the axis of gears. The model is mounted on a wooden board

Screw Jack Apparatus

Apparatus consists of a metallic machined screw with a pitch of 5 mm carrying a double flanged turned table of about 20 cm dia. Screw jack is fitted on a heavy C.I. base and is supplied complete with 2 adjustable pulleys, cord and hooks

Epicyclic Gear Box/Sun & Planet Type

An all metallic model consists of a sun gear, arm and a planetary gear inside a casing

MS-101 Specimen Mounting Press

MS-102 Metallurgical Microscope with CCTV facility (with Branded 14" Color TV)

MS-103 Metallurgical Microscope

MS-104 Jominey End Quench (All Stainless Steel Tanks)

MS-105 Profile Projector (with Inbuilt power supply)

MS-106 Abrasive Disc Cut Off Machine

MS-107 Metallurgical Polishing Machine Single disc

MS-108 Double Disc Polishing Machine

Abrasive Disc Cut Off Machine

General purpose abrasive saw suitable for site use. Supplied with abrasive disc suitable for metal-cutting but will cut concrete with correct blade fitted. Trigger operated, 2200W motor and hardened

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gears give smooth transmission of power. Fitted with mitre vice.

TECHNICAL DETAILS:

- General purpose abrasive saw suitable for site use.
- Supplied with abrasive disc suitable for metal-cutting but will cut concrete with correct blade fitted.
- Trigger operated, 2200W motor and hardened gears give smooth transmission of power.
- Coolant Tank with 20 liters capacity
- Coolant Recirculation Pump

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Double Disc Metallurgical Polishing Machine

We offer premium quality range of double desk polishing machine extensively used for polishing metallographic samples. Procured from our reliable vendors these are provided with double disc, driven by high torque DC motor. The paper holding band and water faucet enhances dry/wet grinding and assist in final lapping. Used for microscopic observation to study metal structures, these machines are finely polished to ensure smooth, scratch free and mirror like appearance that enable accurate metallographic interpretation.

TECHNICAL DETAILS:

-
- Motor Capacity: ½ Hp AC
- Discs Diameter: 8 inch each
- Supply: 15 Amps, 230V, Single phase

Metallurgical Microscope with CCTV

We offer premium quality array of upright metallurgical microscope. Designed in compliance with international quality standards these are extensively used for microscopical observation of surfaces of non-transparent object. The body of microscope comprises the co-axial focusing system provided with pre- focusing lever, large knob and tension adjustment ring. There is Quadruple nose piece on ball bearing and the mechanical stage is 274mmX274mm with co-axial controls on ball bearing guide ways.

EYE PIECE

- Wide field eyepiece 10X (Paired) FOV 18mm

OBJECTIVES

- Plan Achromatic 10X
- Plan Achromatic 20X
- Plan Achromatic 40X

ILLUMINATOR

- The reflected light illuminator has 6V-20W halogen lamp with intensity control knob.
- 6V/20W Halogen tungsten bulb

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Digital Heat Treatment Furnace

Light weight with ceramic fibre woolled insulation (instead of brick insulation). The outer casing is made of double walled thick P.C.R.C. sheet, reattached with thick perforated sheet on the bottom portion, powder coated. Heating elements are made of KANTHAL "A-1" wire and backed by high temperature cerwool insulation, which avoids loss of energy. Digital Temperature controller unit consists of Energy Regulator, fitted in front of furnace with two pilot lamps. To work on 220/230 volts. Maximum Temp.

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is 1200°C and working Temp. 1100°C

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Jominy End Quench Apparatus

Our extensive range of **Jominy End Quenching Apparatus** is high on demand in market for its high efficiency and durability. This apparatus is used for determining the harden ability of steel by a Quench Test experiment which enables the lab technocrat to know about the harden ability characteristics of different alloying elements. Designed as per Indian and International Standards the standard specimen from furnace is placed in the apparatus for quick end quench under standard water jet and nozzle diameter.

FEATURES

- Quick transfer of specimen to quenching fixture withinspecific time with the special tong.
- Quenching Fixture designed strictly as per BS / SAE withspecifications like 45 degree angle of top plate, quenching distance, jetstopper release just before quenching etC
- Motorised Water Circulation with storage & test tank

UTILITIES REQUIRED:

- Electric supply 0.5 kW, 220V AC, Single Phase
- Water supply Tap water connection ½" BSP
- Floor Area with Drain facility

TECHNICAL DETAILS:

- Jominy specimen EN8, 9, 12, 30, 31, 36, 353, 354, 724 ETC (any one of these).
- S.S. fixture for Jominy moulds
- Special Tong

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Profile Projector

We are engaged in manufacturing and supplying of a superior quality range of Profile Projectors. The offered products are compact and economically priced models. These are suitable for variegated measurements and inspections. Specially designed for Auto-ancillaries and Engineering Colleges, these focus through rack and pinion system.

UTILITIES REQUIRED:

- **Electric supply** Provide 230 +/- 10 VAC, 50 Hz, single phase electric supply with proper earthing. (Neutral – Earth voltage less than 5 VAC.) 5A, three pin socket with switch

TECHNICAL DETAILS:

- Screen -200 mm dia with cross line, 360" rotatable
- Magnification -10x, 20x, 40x and 80x
- Work stage -150x 150 mm with X-4 movement of 25x25mm
- Micrometer -Zero adjustment, 25mm graduation, with least count 0.005mm
- Working Distance -30 mm approx under 10x

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magnification
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Metallurgical Hot Mounting Press

Mounting Press is designed user friendly for efficient and quality production of the specimen mounts. The Press has rigid construction complete enclosed body and elegant look. Design of the heater, operation ease, good quality hydraulic integrated jack. One can produce absolutely consolidated embedded single specimen mount with good finish, out of this mounting press. This machine has manual operation with lever.

FEATURES:

- Higher results in measuring Image Analyses study.
- Temperature controller for setting heat cycle.
- Buzzer System for completion of process.
- Thermocouple Inside for indication of heat produce.
- Standarized Pressure Dial Guage (Optional)

UTILITIES REQUIRED:

- **Electric supply** Provide 230 +/- 10 VAC, 50 Hz, single phase electric supply with proper earthing. (Neutral – Earth voltage less than 5 VAC.) 5A, three pin socket with switch for pump.
- **Oil supply** Oil @ 30 liters

TECHNICAL DETAILS:

Product Metallurgical Hot Mounting Press

DESCRIPTION SE MHMP 01

Operation Manual with lever

Mould Diameter 25/32/40 mm

Heater 750 Walts

Hydraulic Jack 6-8 Tons

Thermocouple 1 No.

Working on 220vA.C

Temp. Range 0-300° C

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Belt Polisher/Grinder

BP Series belt polishers is designed for initial rough grinding, with Vt and V2 hp motor. The grinder has rigid construction complete enclosed body with full cover mask in its base. Dynamically well balanced rollers made up of aluminium material

TECHNICAL DETAILS:

- Working on 220V in single phase
- Operation -Manual Belt -100/915 mm Endless Belt
- Pulleys -Balanced aluminium pulleys
- Polishing Motor Power ¼ H.P Single / Single Phase
- ½ H.P Single Phase Motor

ME 01 Angular Position Measurement System

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ME 02 Flapper Nozzle Systems
ME 03 Inductive Pick up Module
ME 04 Level Measurement Setup
ME 05 Load Cell Setup
ME 06 LVDT Setup
ME 07 Pressure Transducer/Transmitter Modules
ME 08 Rotary Encoder Setup
ME 09 Speed measurement Setup
ME 10 Strain Gauge Setup
ME 11 Temperature Measurement Setup
ME 12 Vibration Measurement Setup

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Email: info@dineshscientific.com, dineshvr@gmail.com

RACL-101 Air Conditioning Test Rig

RACL-102 Refrigeration Test Rig

RACL-103 Vapor Absorption Test Rig

RACL-104 Ice Plant Test Rig

RACL-105 Mechanical Heat Pump Test Rig

RACL-106 Water Cooler Test Rig

RACL-107 Cascade System Test Rig

RACL-108 Vortex Tube Test Rig

RACL-109 Cut-Section Models Of Various Compressors

RACL-110 Display Board Containing Various Controls & Components Used In RAC Lab.

Vapor Compression Refrigeration Test Rig

The REFRIGERATION test rig works on simple vapour compression refrigeration cycle and uses R134a as a refrigerant. It is environment friendly. The system is fabricated such that students can observe and study vapour compression cycle, its component principle & working. The arrangement of parts such that, all the parts are visible and working can be easily understood.

EXPERIMENTS:

- To study various components and controls used on vapor compression cycle.
- To evaluate the tonnage capacity of the air conditioning system by enthalpy difference method.
- To evaluate actual; & theoretical C.O.P of vapor compression cycle.
- To plot actual refrigeration cycle on P-H Chart.

TECHNICAL DETAILS:

Refrigeration System

Cooling Capacity 450 Watts at rated test conditions* (1/8 TR)

Compressor

1/4 HP Hermetically sealed. Make: Emerson Climate

Technologies Ltd. /or Danfoss Ltd;/or Tecumseh Products India

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Ltd./ or any equivalent make.

Condenser Forced convection air cooled.

Condenser fan Axial flow type.

Drier/ filter Molecular sieve type.

Expansion device Capillary tube

Evaporator Direct expansion type. Shell & Coil type provided

Accumulator Copper / M.S. shell suction line accumulator provided.

Refrigerant R-134 a.

Controls & indicators

Pressure indication

2 nos. dial type pressure gauges; one for suction and the other for discharge pressure.

Temperature indication Multi-channel LED digital temperature indicator.

Refrigerant flow indication Glass tube rotameter.

Electrical System

Supply 220-240 Volts, 50 Hz, 1 phase.

Input power 1.0 kW.

Rated current 4.5 Amps.

Operating switches Main switch & piano type switches for compressor & heater

Indicating lamps Provided for compressor.

Energy-meters Provided for compressor.

Construction

Material Panel : 1.2 mm thick CRCA

Outer finish Powder coating

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Water Cooling Tower Test Rig

Cooling tower is a apparatus which transfers heat from a circulating water stream. Thus, transferring the heat deception to the maximum extent.

Further, this will enable the student the actual visualization of the cooling tower operation.

EXPERIMENT:

- To study cooling tower and find its efficiency

UTILITIES REQUIRED:

- Electricity 1 kW, 220V AC, Single Phase
- Floor Area 1.5 x 0.75 m

TECHNICAL DETAILS:

Tower size C.S.-0.3m(length) x 0.3m(breath) x 1.2m(height)

Blower 1Hp Crompton motor

Orifice meter Thick 3mm *25mm Id/10mm Id

Rotameter 100 -1000 LPH

Heater 1 KW (1No)

Control Panel 1 phase AC supply/Panelized electric control

Calibrated water outlet measuring tank

Hg/Alcohol in glass thermometers, measuring water temperature at 5 position.

Dry bulb & wel bulb thermometer 2 sets/0-50C

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Ice Plant Test Rig

The Ice Plant Test rig works on simple vapour compression refrigeration cycle and uses R134a or R 404 A as a refrigerant. These are environment friendly. The system is fabricated such that students can observe and study ice formation process. It is also useful to understand working of vapour compression system, its performance and controls used. The arrangement of parts such that, all the parts are visible and working can be easily understood.

EXPERIMENT:

- To Study various components and controls used in Ice Plant
- To Study capacity of Ice plant
- To calculate C.O.P of System
- To plot system performance on P-H chart

TECHNICAL DETAILS:

Refrigeration System

Ice production Capacity 25 kg in a day of 24 hrs.

Number of ice cans 4nos

Ice qty per can 0.6Kg

Ice production per batch 2.4 Kg

Cycle time per batch 2 hrs

After attaining brine temperature of -5 deg C, ice cans will be loaded.

Compressor Hermetically sealed. Emerson/ Tecumseh/ Danfoss or equivalent make.

Condenser Forced convection air cooled

Condenser fan Axial flow type

Evaporator Immersed (Refrigeration grade copper tube)

Direct expansion type; 3/8" OD x 35'

Drier/ filter Provided; Molecular sieve type

Expansion device Capillary tube

Insulation 65 mm thick, Polyurethane foam (PUF)

Primary Refrigerant R 134a

Secondary Refrigerant Ethylene Glycol Solution

Control Panel Temperature Temperature indicator with 6 no. of selector points provided

Pressure 2 Nos. for suction and discharge

Brine Thermostat Provided

Supply 230 Volts, 50 Hz, 1 phase.

Input power 400 Watts.

Rated current 3.0 Amps

Stirrer Motor Provided .

Energy-meter For compressor provided.

Construction Outer body 1.2 mm thick CRCA

Brine Tank SS304

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Air Conditioner Test Rig

The A.C. test rig works on simple vapour compression refrigeration cycle using R 134 a as a refrigerant. The system is fabricated such that student can study all the air conditioning processes. It is also useful to understand working of all the components of system, their performance and control etc. All the components are mounted on the display board, so that students can observe their working easily.

EXPERIMENTS:

- To evaluate actual and theoretical C.O.P. of the system.
- To plot the refrigeration cycle on P-H & T-S charts.
- To plot the psychrometric processes on psychrometric charts.

TECHNICAL DETAILS:

Refrigeration System

Capacity 0.30 TR @Rated test conditions

Compressor

Hermetically sealed. Make :Emerson Climate Tech./ Tecumseh Products India Ltd./ Danfoss Ltd./or any equivalent make.

Condenser Forced convection air cooled.

Condenser fan Axial flow.

Drier/ filter Provided.

Expansion device Capillary Tube.

Evaporator Forced convection air cooled.

Evaporator Fan Axial Flow Type

Dehumidifier or Reheater 1000 Watts; Finned Type.

Humidifier Provided

Refrigerant R-134 a.

Controls & indicators

HP / LP Cut-out Alco/ or Danfoss / Castle or equivalent make.

Temperature 6 Channel facility with digital display.

Pressure 2 Nos.; Dial type pressure gauges.

Refrigerant Flow Glass tube Rotameter provided.

Air temperature DBT & WBT measurement by sling psychrometer.

Air flow measurement By inclined tube manometer.

Electrical System

Supply 220-240 Volts, 50 Hz, 1 phase.

Input power 1.2 kW.

Rated current 5.5 Amps.

Indicating lamps Provided for compressor and heater.

Energy-meters Range 0-20 A; provided for Compressor

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Construction

Material Panel: 1.2 mm thick CRCA

Outer finish Powder coating

SOM-101 Universal Testing Machine

SOM-102 Impact Testing Machine (Izod & Charpy Test)

SOM-103 Rockwell cum Brinell Hardness Testing Machine

SOM-104 Spring Testing Machine

SOM-105 Torsion Testing Machine

SOM-106 Fatigue Testing Machine

SOM-107 Ericson Sheet Metal Testing Machine

SOM-108 Creep Testing Machine

THR-101 2 Stroke 1 Cylinder Petrol Engine Test Rig with Rope Brake Dynamometer

THR-102 4 Stroke 1 Cylinder Petrol Engine Test Rig with Rope Brake Dynamometer

THR-103 4 Stroke 4 Cylinder Petrol Engine Test Rig with Rope Brake Dynamometer

THR-104 4 Stroke 4 Cylinder Petrol Engine Test Rig with Hydraulic Brake Dynamometer

THR-105 4 Stroke 4 Cylinder Petrol Engine Test Rig with Electrical Dynamometer

THR-106 4 Stroke 1 Cylinder Diesel Engine Test Rig with Rope Brake Dynamometer

THR-107 4 Stroke 1 Cylinder Diesel Engine Test Rig with Electrical Dynamometer

THR-108 4 Stroke 4 Cylinder Diesel Engine Test Rig with Rope Brake Dynamometer

THR-109 4 Stroke 4 Cylinder Diesel Engine Test Rig with Hydraulic Brake Dynamometer

THR-110 4 Stroke 4 Cylinder Diesel Engine Test Rig with Electrical Dynamometer

THR-111 Single Stage Air Compressor Test Rig

THR-112 Double Stage Air Compressor Test Rig

THR-113 2 Stroke Diesel Engine Demonstrational Sectioned Model

THR-114 2 Stroke Petrol Engine Demonstrational Sectioned Model

THR-115 2 Stroke 1 Cylinder Petrol Engine (Actual Engine Cut Section)

THR-116 4 Stroke 1 Cylinder Diesel Engine (Actual Engine Cut Section)

THR-117 4 Stroke 1 Cylinder Petrol Engine (Actual Engine Cut Section)

THR-118 4 Stroke 3 Cylinder Diesel Engine (Actual Engine Cut Section)

THR-119 4 Stroke 3 Cylinder Petrol Engine (Actual Engine Cut Section)

THR-120 4 Stroke Diesel Engine Demonstrational Sectioned Model

THR-121 4 Stroke Petrol Engine Demonstrational Sectioned Model

THR-122 Orsat Gas Analysis Apparatus

2 Stroke Petrol Engine Demonstrational Sectioned Model

All parts in aluminium alloy and metal. Ignition is shown by means of miniature bulb. Carburetor and fuel supply are sectioned. Model is with a crank handle for manual operation. Mounted on polished base, with printed diagram.

4 Stroke Petrol Engine Demonstrational Sectioned Model

All parts in aluminium alloy and metal. Ignition is shown by means of miniature bulb. Carburetor and fuel supply are sectioned. Model is with a crank handle for

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manual operation. Mounted on polished wooden base, with printed diagram.

2 Stroke 1 Cylinder Petrol Engine (Actual Engine Cut Section)

Original dissected, Two stroke single cylinder petrol engine of a scooter. Consisting of carburetor, fuel tank, silencer etc. Complete with all salient parts sectioned for study of the various components and their functions.

4 Stroke 1 Cylinder Petrol Engine (Actual Engine Cut Section)

Original dissected, Four stroke single cylinder petrol engine of a motor cycle. Consisting of carburetor, fuel tank, silencer etc. Complete with all salient parts sectioned for study of the various components and their functions.

4 Stroke 3 Cylinder Petrol Engine (Actual Engine Cut Section)

Original dissected, Four stroke ythree cylinder petrol engine of a Car. Consisting of carburetor, fuel tank, silencer etc. Complete with all salient parts sectioned for study of the various components and their functions.

2 Stroke Diesel Engine Demonstrational Sectioned Model

All parts made in aluminium alloy and metal. Ignition is shown by means of miniature bulb. Fuel supply is also sectioned. Model is with a crank handle for manual operation. Fitted on polished wooden base, with printed diagram.

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4 Stroke Diesel Engine Demonstrational Sectioned Model

All parts made in aluminium alloy and metal. Ignition is shown by means of miniature bulb. Fuel supply is also sectioned. Model is with a crank handle for manual operation. Fitted on polished wooden base, with printed diagram.

4 Stroke 1 Cylinder Diesel Engine (Actual Engine Cut Section)

Original dissected, 5-6 H.P. diesel engine which shows all essential parts moving freely at proper sequence by giving rotation to fly wheels. Engine consists of injection, fuel filter, lubrication oil pump, air cleaner, silencer, centrifugal governor valve mechanism etc. Complete with all salient parts sectioned for study of the various components and their functions.

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4 Stroke 3 Cylinder Diesel Engine (Actual Engine Cut Section)

Original dissected, Four stroke Four cylinder Diesel engine of a Car. Consisting of carburetor, fuel tank, silencer etc. Complete with all salient parts sectioned for study of the various components and their functions.

ORSAT GAS ANALYSIS APPARATUS (Without Chemicals)

For the determination of CO₂, CO and O₂ particularly in fuel and furnace gases. Comprising of levelling bottles, 100 ml, gas burette with outer jacket, three absorption pipettes manifold with glass stop cocks in wooden case with sliding doors.

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2 Stroke 1 Cylinder Petrol Engine Test Rig with Rope Brake Dynamometer

Consisting of:

- **Petrol Engine:** A two stroke single cylinder petrol engine developing about 3 HP at 3000 RPM variable speed with standard accessories
- **Loading Device:** A rope brake arrangement with a brake drum (air cooled) fitted on the engine shaft. Brake stand arrangement provided with spring balance and screw rod with handle wheel.
- **Fuel Measuring Arrangement:** Consisting of fuel tank, fuel piping from fuel tank to engine, measurement of fuel consumption by a burette and a three way cock connecting tube.
- **Air Intake and Exhaust Gas Measurement:** A S.S. tank, mounted on iron stand, fitted with suitable orifice plate, manometer, temperature sensor for measuring the air intake temperature is provided. A temperature sensor is also provided to measure the exhaust gas temperature.
- **Panel board:** All the temperature sensor measuring device and manometer are mounted on panel board.

4 Stroke 1 Cylinder Petrol Engine Test Rig with Rope Brake Dynamometer

Consisting of:

- **Petrol Engine:** A Four stroke single cylinder petrol engine (Hero Honda) developing about 2.5 HP at 3000 RPM variable speed with standard accessories.
- **Loading Device:** A rope brake arrangement with a brake drum fitted on the engine shaft provided with cooling water arrangement for brake drum. Brake stand arrangement provided with spring balance, a set of dead weights and screw rod with handle wheel. Brake stand arrangement is mounted alongwith the engine on

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substantial base plate.

- **Fuel Measuring Arrangement:** Consisting of fuel tank, fuel piping from fuel tank to engine, measurement of fuel consumption by a burette and a three way cock connecting tube.
- **Air Intake and Exhaust Gas Measurement:** A S.S. tank, mounted on iron stand, fitted with suitable orifice plate, manometer, temperature sensor for measuring the air intake temperature is provided. A temperature sensor is also provided to measure the exhaust gas temperature.
- **Panel board:** All the temperature sensor measuring device and manometer are mounted on panel board.

4 Stroke 4 Cylinder Petrol Engine Test Rig with Rope Brake Dynamometer

Consisting of:

- **Petrol Engine:** A Four stroke Four cylinder petrol engine developing about 10.0 HP at 1500 RPM variable speed with standard accessories. Engine is provided with self starter, Battery, dynamo, lubrication oil filter, fuel pump, ignition coil, exhaust silencer, choke control and throttle control. The engine is provided with switches for conducting Morse test.
- **Loading Device:** A Rope Brake Dynamometer complete with a weighing gear, dead weight in kgm suitable for testing the engine at variable speeds. The engine and rope brake dynamometer are directly coupled on substantial base plate.
- **Fuel Measuring Arrangement:** Consisting of fuel tank, fuel piping from fuel tank to engine, measurement of fuel consumption by a burette and a three way cock connecting tube.
- **Air Intake and Exhaust Gas Measurement:** A S.S. tank, mounted on iron stand, fitted with suitable orifice plate, manometer, temperature sensor for measuring the air intake temperature is provided. A temperature sensor is also provided to measure the exhaust gas temperature.
- **Preparation of energy balance for above engine.** Exhaust gas calorimeter with temperature sensors, water meter is also provided to plot heat balance sheet. Cooling water arrangement is also provided for measuring the heat carried away by the cooling water consisting of suitable inlet and outlet piping with temperature sensors.
- **Panel board:** All the temperature sensor measuring device and manometer are mounted on panel board. It also consists of ignition and starting switch, fuse unit Pilot lamp, throttle control switch, choke control switch, and switch assembly for cutting off each cylinder for conducting morse test

4 Stroke 4 Cylinder Petrol Engine Test Rig with Hydraulic Brake Dynamometer

Consisting of:

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- **Petrol Engine:** A Four stroke Four cylinder petrol engine developing about 10.0 HP at 1500 RPM variable speed with standard accessories. Engine is provided with self starter, Battery, dynamo, lubrication oil filter, fuel pump, ignition coil, exhaust silencer, choke control and throttle control. The engine is provided with switches for conducting Morse test.
- **Loading Device:** A Hydraulic Dynamometer complete with a weighing gear, dead weight in kgm suitable for testing the engine at variable speeds. The engine and hydraulic Dynamometer are directly coupled on substantial base plate.
- **Fuel Measuring Arrangement:** Consisting of fuel tank, fuel piping from fuel tank to engine, measurement of fuel consumption by a burette and a three way cock connecting tube.
- **Air Intake and Exhaust Gas Measurement:** A S.S. tank, mounted on iron stand, fitted with suitable orifice plate, manometer, temperature sensor for measuring the air intake temperature is provided. A temperature sensor is also provided to measure the exhaust gas temperature.
- **Preparation of energy balance for above engine.** Exhaust gas calorimeter with temperature sensors, water meter is also provided to plot heat balance sheet. Cooling water arrangement is also provided for measuring the heat carried away by the cooling water consisting of suitable inlet and outlet piping with temperature sensors.
- **Panel board:** All the temperature sensor measuring device and manometer are mounted on panel board. It also consists of ignition and starting switch, fuse unit Pilot lamp, throttle control switch, choke control switch, and switch assembly for cutting off each cylinder for conducting morse test

4 Stroke 4 Cylinder Petrol Engine Test Rig with Electrical Dynamometer

Consisting of:

- **Petrol Engine:** A Four stroke Four cylinder petrol engine developing about 10.0 HP at 1500 RPM variable speed with standard accessories. Engine is provided with self starter, Battery, dynamo, lubrication oil filter, fuel pump, ignition coil, exhaust silencer, choke control and throttle control. The engine is provided with switches for conducting Morse test.
- **Loading Device:** An Electrical Dynamometer complete with a weighing gear, dead weight in kgm suitable for testing the engine at variable speeds. The engine and Electrical Dynamometer are directly coupled on substantial base plate.
- **Fuel Measuring Arrangement:** Consisting of fuel tank, fuel piping from fuel tank to engine, measurement of fuel consumption by a burette and a three way cock connecting tube.
- **Air Intake and Exhaust Gas Measurement:** A S.S. tank, mounted on iron stand, fitted with suitable orifice plate, manometer, temperature sensor for measuring the air intake temperature is provided. A temperature sensor is also provided to measure the exhaust gas temperature.
- **Preparation of energy balance for above engine.** Exhaust gas calorimeter with temperature sensors, water meter is also provided to plot heat balance sheet. Cooling water arrangement is also provided for measuring the heat carried away by the cooling water consisting of suitable inlet and outlet piping with temperature sensors.

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- **Panel board:** All the temperature sensor measuring device and manometer are mounted on panel board. It also consists of ignition and starting switch, fuse unit Pilot lamp, throttle control switch, choke control switch, and switch assembly for cutting off each cylinder for conducting morse test

4 Stroke 1 Cylinder Diesel Engine Test Rig with Rope Brake Dynamometer

Consisting of:

- **Diesel Engine:** Vertical, totally enclosed, compression ignition, four stroke cycle, water cooled diesel engine. 5.0 HP, 1 500 RPM.
- **Loading Device:** A Rope brake dynamometer is provided with the engine which is directly coupled. with a swinging frame and spring balance to measure the load on the engine.
- **Fuel Measuring Arrangement:** Consisting of fuel tank mounted on a strong stand, measurement of fuel consumption by a burette and a three way cock connecting tube.
- **Air Intake and Exhaust Gas Measurement:** A steel air tank, mounted on iron stand, fitted with suitable orifice plate, manometer, temperature sensor for measuring the intake air temperature is provided. A temperature sensor is also provided to measure the exhaust gas temperature.
- **Panel board:** All the temperature sensor measuring device and manometer are mounted on panel board.

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4 Stroke 1 Cylinder Diesel Engine Test Rig with Electrical Dynamometer

Consisting of:

- **Diesel Engine:** Vertical, totally enclosed, compression ignition, four stroke cycle, water cooled diesel engine. 5.0 HP, 1 500 RPM.
- **Loading Device:** An electrical dynamometer is provided with the engine which is directly coupled. Electrical Motor is attached with a swinging frame and spring balance to measure the load on the engine.
- **Fuel Measuring Arrangement:** Consisting of fuel tank mounted on a strong stand, measurement of fuel consumption by a burette and a three way cock connecting tube.
- **Air Intake and Exhaust Gas Measurement:** A steel air tank, mounted on iron stand, fitted with suitable orifice plate, manometer, temperature sensor for measuring the intake air temperature is provided. A temperature sensor is also provided to measure the exhaust gas temperature.
- **Panel board:** All the temperature sensor measuring device and manometer are mounted on panel board.

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4 Stroke 4 Cylinder Diesel Engine Test Rig with Hydraulic Dynamometer

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Consisting of:

- **Diesel Engine:** A Four stroke four cylinder Diesel engine developing about 10.0 HP at 1500 RPM variable speed with standard accessories. Engine is provided with self starter, Battery, dynamo, lubrication oil filter, fuel pump, ignition coil, exhaust silencer, oil pressure gauge, choke control and throttle control.
- **Loading Device:** A Hydraulic Dynamometer complete with a weighing gear, dead weight in kgm suitable for testing the engine at variable speeds. The engine and hydraulic dynamometer are directly coupled on substantial base plate.
- **Fuel Measuring Arrangement:** Consisting of fuel tank, fuel piping from fuel tank to engine, measurement of fuel consumption by a burette and a three way cock connecting tube.
- **Air Intake and Exhaust Gas Measurement:** A S.S. tank, mounted on iron stand, fitted with suitable orifice plate, manometer, temperature sensor for measuring the air intake temperature is provided. A temperature sensor is also provided to measure the exhaust gas temperature.
- **Exhaust gas calorimeter** with temperature sensors, water meter is also provided to plot heat balance sheet. Cooling water arrangement is also provided for measuring the heat carried away by the cooling water consisting of suitable inlet and outlet piping with temperature sensors.
- **Panel board:** The entire temperature sensor measuring device and manometer are mounted on panel board. It also consists of ignition and starting switch, fuse unit pilot lamp, throttle control switch and choke control switch

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4 Stroke 4 Cylinder Diesel Engine Test Rig with Electrical Dynamometer

Consisting of:

- **Diesel Engine:** A Four stroke four cylinder Diesel engine developing about 10.0 HP at 1500 RPM variable speed with standard accessories. Engine is provided with self starter, Battery, dynamo, lubrication oil filter, fuel pump, ignition coil, exhaust silencer, oil pressure gauge, choke control and throttle control.
- **Loading Device:** An Electrical Dynamometer complete with a weighing gear, dead weight in kgm suitable for testing the engine at variable speeds. The engine and electrical dynamometer are directly coupled on substantial base plate.
- **Fuel Measuring Arrangement:** Consisting of fuel tank, fuel piping from fuel tank to engine, measurement of fuel consumption by a burette and a three way cock connecting tube.
- **Air Intake and Exhaust Gas Measurement:** A S.S. tank, mounted on iron stand, fitted with suitable orifice plate, manometer, temperature sensor for measuring the air intake temperature is provided. A temperature sensor is also provided to measure the exhaust gas temperature.
- **Exhaust gas calorimeter** with temperature sensors, water meter is also provided to plot heat balance sheet. Cooling water arrangement is also provided for measuring the heat carried away by the cooling water consisting of suitable inlet and outlet piping with temperature sensors.
- **Panel board:** The entire temperature sensor measuring device and manometer are mounted on panel board. It also consists of ignition and starting switch, fuse unit pilot lamp, throttle control switch and choke control switch

TRM-101 Babcock and Wilcox Boiler Model

TRM-102 Benson Boiler Model

TRM-103 Cochran Boiler Model

TRM-104 Cornish Boiler Model

TRM-105 Lamont Boiler Model

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TRM-106 Lancashire Boiler Model
TRM-107 Locomotive Boiler Model
TRM-108 Loffler Boiler Model
TRM-109 Velox Boiler Model
TRM-110 Vertical Water Tube Boiler Model
TRM-111 Lever Safety Valve
TRM-112 Spring Loaded Safety Valve
TRM-113 Dead Weight Safety Valve
TRM-114 Combined High Steam and Low Water Safety Valve
TRM-115 Water Gauge Model
TRM-116 Stop Valve Hopkinson Type
TRM-117 Feed Check Valve
TRM-118 Steam Injector
TRM-119 Reducing Valve
TRM-120 Fusible Plugs
TRM-121 Anti-Priming Pipe
TRM-122 Expansion Steam Trap
TRM-123 Float Steam Trap
TRM-124 Green Economizer
TRM-125 Sudgen Super Heater

Lancashire Boiler Model

Steel shell is about 75 cm. long and 22 cm in diameter
Two large tubes known as fire tubes pass from end to end. At the front end of each tube a furnace fire grating is placed and a door is hinged. Brick work, seating and flues are shown in wood work.
The boiler is complete with dead weight safety valve, manhole, mud hole, check valve high steam and low water safety valve, steam and water gauges, regulating draught doors, dampers with counter weights and chimney. The model is approximately one meter in length, 37 cm. in breadth and 45 cm. high. It is specially made dissectible for demonstration purpose.

Cornish Boiler Model

In appearance this boiler model is similar to Lancashire boiler with the difference that one fire tube passes from end to end.

Babcock and Wilcox Boiler Model

It is a water tube boiler. The shell is 15 cm. in diameter and 75 cm, in length and is fitted with a super heater

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and with inclined water tubes over the furnace connected with headers. The model is fitted with stop valve, safety valve, water gauge, steam gauge, manhole, mud hole, regulating draught door, damper with counter weight and chimney. Seating and brick work are shown in wood work. The model is approximately one meter in length 28 cm. in breadth and 77 cm. high.

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Locomotive Boiler Model

The model is specially designed to understand the working of a locomotive steam boiler. The steel shell is of about 20 cm. dia and 60 cm in length. The fire box is provided with a door and gate. The dissected barrel shows its inside view. Hot gases after passing through the fire tubes enter the smoke box with a door, nozzle and the blast pipe. The model is approximately 100 cm in length, 45 cm high and 35 cm in breadth and is complete with whistle, steam dome, safety valve, check valve, steam regulator water and steam gauges.

Cochran Boiler Model

This is the best known vertical type fire tube boiler. The shell is about 25 cm in diameter and 60 cm high. The cylindrical fire box is with a door and gate at its bottom. Hot gases pass from the fuel to the combustion chamber through a short flue pipe and then to chimney through the tubes. At both ends of the tubes, covers are given and tubes can be cleaned.

Vertical Water Tube Boiler Model

It is fitted inside a cylindrical fire box to increase the heating surface and improve the circulation of the water. The fire box is fitted with cross tubes.

Lever Safety Valve Model

An all metallic demonstration model shows the valve seat, fulcrum and lever with adjustable weight.

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Spring Loaded Safety Valve Model

The demonstration model having two separate valves with one lever bearing loaded by a spring.

Dead Weight Safety Valve Model

The valve is resting on the seat at the top of an outlet pipe. The valve and pipe are covered by a case carrying weights hanging freely from the valve.

Combined High Steam and Low Water Safety Valve

Safety valve blows off when the steam pressure exceeds the working pressure. This high steam safety valve is combined with another arrangement that allows the steam to escape as water level falls too low. A properly constructed model fitted on suitable wooden base.

Water Gauge Model

The model is having upper and lower parts are with transparent inserts to make the interior construction visible and are connected by a hollow column. The unit is complete with cock and stuffing's. Mounted on a wooden board.

Stop Valve Hopkinson Type Model

The type has many advantages over ordinary design of junction stop valve. The construction and the method of operating the complicated valve can be easily demonstrated with this all metallic sectional mode.

Feed Check Valve Model

Hopkinson's type, all metallic section cut model. A good design of non-return valve and arrangement for regulating by hand can be easily demonstrated with this all metallic section cut model.

Steam Injector Model

This cut way demonstration model is to understand the system of feeding a boiler with water by direct use of steam. Showing water and steam inlet, overflow valve and overflow outlet. The central screw cut spindle carried valve and the upper end with handle. The steam cone is actuated by rotating the handle. It is fitted on 45 cm high wooden board.

Pressure Gauge Model

This cut way demonstrational model is to understand the system explaining the principle.

Mounted on cast iron base with air nozzle. It is provided with transparent graduated dial to see the inner constructional details of the Bourdon's tube.

Blow Off Cock Model

An all metallic sectioned model mounted on cast iron base.

Reducing Valve Model

The function of this valve is to maintain a constant reduced pressure on the engine side while the higher pressure on the boiler side may be variable. It is a large size section cut model.

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Fusible Plugs Model

A set of three, section cut & properly constructed models mounted on polished wooden base.

Anti-Priming Pipe Model

Model is complete with seating of junction valve. The perforated pipe is about 30 cm long and 4 cm in diameter.

Expansion Steam Trap Model

In this system the advantage is taken of the expansion of materials on heating. The unit is all metallic, section cut, mounted on 40 cm high wooden board.

Float Steam Trap Model

This type is intended to separate water by a float which is raised when it accumulates in the trap, thus opening a valve and permitting water to escape. The model is all metallic section cut and mounted on cast iron base.

Green Economizer Model

It is an all metallic demonstration model to understand the working of a feed water heater. Complete with safety valve, scrapers, chains and pulleys. Flue passage i.e. all brick work is shown in wood work and the model is so dissectible that the inner construction can be seen clearly. The model is having approximately 45 x 30 x 25 cm in size.

Sudgen Super Heater Model

Flue passage and all brick work is shown in wood work and the model is made in such a manner that an inner section view can be seen easily. The overall size is about 30 x 30 x 20 cm.

Separating and Throttling Calorimeter Apparatus

SEPARATING CALORIMETER

It consists of two concentric chambers, the inner chamber and the outer chamber, which communicates with each other through an opening at the top.

As the steam discharges through the metal basket, which has a large number of holes, the water particles due to their heavier momentum get separated from the steam and collect in the chamber. The comparatively dry steam in the inner chamber moves up and then down aging through the annular space between the two chambers and enters the Throttling Calorimeter.

THROTTLING CALORIMETER

It consists a narrow throat (Orifice). Pressure and temperature are measured by pressure gauge and thermometer. The steam after throttling process passes through the heat exchanger and condensate is collected. Steam Generator is also provided to supply the saturated steam (Max) at 2kg/cm² pressure. There is no need of boiler.

SCOPE OF EXPERIMENTATION:

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- To find the dryness fraction of steam

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Single Stage Air Compressor Test Rig

Single Stage Air Compressor Test Rig consists of a Single stage reciprocating type air compressor driven by 2 HP Motor through a belt. The outlet of the air compressor is connected to reservoir (Tank) and suction is connected to another air tank with a calibrated orifice plate and a water manometer. Bellow is fitted on one side of the air tank to regulate the flow. Temperature of inlet air, after single compression, inlet and outlet of second compression and pressure in reservoir and at intermediate stage can be measured by thermometers and gauges.

EXPERIMENTS:

- To calculate the volumetric efficiency
- To calculate isothermal HP
- To calculate compression ratio

UTILITIES REQUIRED:

- Electricity 3 kW, 220V AC, Single Phase
- Floor Area 1.5 x 0.75 m
- Tachometer

TECHNICAL DETAILS:

Compressor: Single Stage, Single Cylinder Capacity 6 CFM max. Working Pressure 10 kg/cm² max.

Make: Toyo/Sony/ELGI / standard available

Drive: 2 HP

Spring Balance Dial type

Manifold Tank Suitable capacity

Flow Measurement Orificemeter with Manometer

Temperature

Sensors

RTD PT :100 type

Air Tank Capacity 145 liters with safety valve, shut off valve

Pressure Gauge Bourdon type

Control Panel Energy measurement Energy meter,

MCB For over load protection,

Digital Temp. Indicator : 0-199.9C, with multi-channel switch,

On/off switch,

Mains Indicator etc.

The whole set-up is well designed and arranged in a good quality painted structure

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Double Stage Air Compressor Test Rig

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Two Stage Air Compressor Test Rig consists of a double stage reciprocating type air compressor driven by 2 HP Motor through a belt. The outlet of the air compressor is connected to reservoir (Tank) and suction is connected to another air tank with a calibrated orifice plate and a water manometer. Bellow is fitted on one side of the air tank to regulate the flow. Temperature of inlet air, after single compression, inlet and outlet of second compression and pressure in reservoir and at intermediate stage can be measured by thermometers and gauges.

EXPERIMENTS:

- To calculate the volumetric efficiency
- To calculate isothermal HP
- To calculate compression ratio

UTILITIES REQUIRED:

- Electricity 3 kW, 220V AC, Single Phase
- Floor Area 1.5 x 0.75 m
- Tachometer

TECHNICAL DETAILS:

Compressor Double Stage, Double Cylinder Capacity 9 CFM max. Working Pressure 15 kg/cm² max.

Make Toyo/Sony/ELGI / standard available

Drive 2 HP

Spring Balance Dial type.

Manifold Tank Suitable capacity.

Flow Measurement Orificemeter with Manometer

Temperature Sensors RTD PT :100 type

Air Tank Capacity 145 liters with safety valve, shut off valve

Pressure Gauge Bourdon type

Control Panel Energy measurement Energy meter,

MCB For over load protection,

Digital Temp. Indicator : 0-199.9C, with multi-channel switch,

On/off switch,

Mains Indicator etc.

The whole set-up is well designed and arranged in a good quality painted structure

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Bomb Calorimeter Apparatus

Used for determination of combustion of heat of calorific value of the fuel & other organic material. Designed as per specification of Institute of Petroleum BS 1016 standard IS no. 1350/1966

Supplied complete with

- Water jacket made of Brass/S.Steel sheet duly nicked chromium plated with Bakelite Lid
- Stainless Steel Bomb Jacket Water Calorimeter Vessel
- Motorized heavy duty stirrer for uniform Circulation Briquette
- Pet tel Press heavy duty Firing unit with illumination
- spanners, magnified glass with nicked nichrome wire & Cotton reel

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- Gas Releasing Valve
 - S.Steel crucible
 - Full feature digital controller
- & Safety device

Application

- Petroleum Industries /
- Department Coal industries /
Department Educational
Institute & Research Lab.

TECHNICAL DETAILS:

- Housing Material :Brass/
S.Steel duly Nickled Chromium plated water jacket S.S vessel S.S. Bomb, Water Vessel
- Optional:Oxygen Cylinder
- Power Consumption:220/230V, AC Supply Single Phase $\pm 10\%$ 50 Hz
- Duty Cycle :Continuous

- ❖ **Applied Mechanics**
- ❖ **Dynamics of Machine**
- ❖ **Kinematics of Machine**
- ❖ **Theory of Machine**
- ❖ **Fluid Mechanics**
- ❖ **Fluid Machines**
- ❖ **Hydraulics**
- ❖ **Heat & Mass Transfer**
- ❖ **Automobile**
- ❖ **I.C.Engines**
- ❖ **Metallurgy**
- ❖ **Material Science**
- ❖ **Metallography**
- ❖ **Refrigeration & Air Conditioning**
- ❖ **Heat Engines**
- ❖ **Thermodynamics**
- ❖ **Steam & Power Generation**
- ❖ **Strength of Materials**
- ❖ **Material Testing Laboratory Apparatus & Instruments**

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