MARTHANDAM COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

FLUID MECHANICS AND MACHINERY LABORATORY

Major Equipments Available in the Lab

Sl.No	Name of the Equipments	Specification	Quantity
1	Venturimeter & Orificemeter Test Rig	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 Venturimeter size: 25mm Throat dia: 14.79mm Flow constant: 8.12 $x10^{-4}$ Orificemeter size: 25mm Orifice dia: 16.77 mm Flow constant: 1.095 x^{10-3} Measuring area in collecting tank: 0.5x0.5 m^2	01
2	Orifice & Mouth Piece Tank apparatus	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 Orifice & mouth piece size: 15mm & 20mm Mouth piece l/d ratio: 1 Orifice plate l/d ratio: 2.5 Measuring area in collecting tank: 0.5x0.5 m^2	01
3	Pitot Tube apparatus	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 **Air blower** 50mm size 0.5 hp 2800 rpm Single phase: 230 v ac supply Pipe size: 50mm	01
4	Bernoulli's Theorem apparatus	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 Area of measuring tank: 0.3x0.3 m^2 Datum head z: 0	01

5	Pipe friction & Losses in Bends & Elbows apparatus	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 Length between pressure tappings: 3 meters Measuring area: 0.5 xo.5 m^2 Pipe size: 15mm	01
6	Rotometer test rig	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 Rotometer size: 15mm Rotometer: 250-2500 lph range Internal area of measuring tank: 0.3x 0.3 m^2	01
7	Open channel apparatus	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 Width of channel (w): 0.3 mm Hook gauge: 300mm range Area of measuring tank: 0.3 x 0.3 m^2	01
8	Metacentric height apparatus	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 Ship model steel tank Area: 400 x 400 m^3	01
9	Single speed Centrifugal Pump Test Rig	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 Size: 1” x 1” Power: 1 hp, single phase, 2880 rpm Brand & model: CRI, ACM 24 Energy meter constant n: 1200 rev/kw.hr Datum head z: 0.6 m Supply voltage: 400 volts Area of measuring tank: 0.5x0.5 m^2 Motor efficiency: 0.8	01
10	Submersible Pump Test Rig	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 Measuring area: 05x0.5 m^2 H: efficiency of motor 0.5 Energy meter constant: 1200 rev/kw.hr Speed: 2800 rpm Pump size: 40mm	01

11	Multistage Centrifugal Pump Test Rig	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 Brand model: DUI, 2 stage Power: 5hp, 3 phase, 1440 rpm Electric motor: Kirloskar “B” class Volts 415, kw: 3.7 Measuring area: 0.5x0.5 m^2 Energy meter constant: 1200 rev/kw.hr	01
12	Reciprocating Pump Test Rig	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 Pump size: 1’x ¾” Power: 1 hp, single phase, 1420 rpm Brand & model: Suguna Stroke length of piston (l): 45mm Diameter of piston: 40mm Energy meter constant: 1200 rev/kw.hr Datum head z: 0.6 m Pump speed: 285 rpm Motor efficiency: 0.8 Area of measuring tank: 05x0.5 m^2	01
13	Gear oil Pump Test Rig	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 Brand: suguna Energy meter constant: 1200 rev/kw.hr Datum head z: 0.6 m Measuring area in collecting tank: 0.3x0.3 m^2 Single phase, speed: 1420 rpm	01

14	Pelton Turbine Test rig	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 **Technical specification** Rate supply head: 25-35 meters Discharge: 500 lpm Normal speed: 1000 rpm Power output: 1 kw Jet diameter: 21mm (maximum) Pitch circle diameter: 260mm Jet ratio: 12 approximate **Supply pump set** Rate head: 36 meters Discharge: 500 lpm Normal speed: 2900 rpm Power required: 5 hp Size: 65mm x 50mm Type: high speeed centrifugal, single, suction volute Brand & model: cri, 5h3 No of buckets: 18 nos Brake drum diameter: 200mm Rope diameter: 15mm **Flow measuring unit** Siz eof venturimeter: 50mm Diameter ratio: 0.5916 Area ratio: 0.35 Throat diameter: 29.55mm Inlet cone angle of venturimeter: 20^0 Diverging cone angle of venturimeter: 10^0 Pressure gauge: 0.4 kg/cm^2- 2nos Venturimeter constant: k' value: $3.183x10^{-3}$ **Ball bearing unit** In the casing : 6205.1 In the bearing pedestal: 1205.1 **Oil seals used** In the casing : 45.74.10-10 nos	01

15	Francis Turbine Test Rig	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 **Technical specification** Rate supply head: 8 meters Discharge: 1000 lpm Rate speed: 250 rpm Power output: 1 kw Run away speed: 1750 rpm Runner diameter: 160mm No of guide vanes: 10 P.c.d guide vanes: 230mm Brake drum diameter: 300mm Rope brake diameter : 15mm **Ball bearing used** In the casing 6308 (or its equivalent)-1 In the bearing : 1308 (or its equivalent)-1 **Oil seals used (CMCO brand)** Shaft sealing : OM457510- 2nos Guide vane seal : OM153510-10 nos **Flow measuring unit** Inlet diameter of orificemeter : 80mm Orifice diameter: 60mm Pressure gauges: 0.2 kg/cm^2- 2nos Meter constant for orificemeter: k= 9.11 x 10^{-3} h in m of water **Suppl y pump set** Rate head : 8 meters Discharge: 1200 lpm Normal speed: 1440 rpm Power required: 5 hp Size of pump : 100mm x 75mm Type: centrifugal medium speed, single suction valve Pump brand & model cri : LH3	01

16	Kaplan Turbine Test Rig	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 **Technical specification** Rate supply head: 5 to 8 meters Discharge: 1500 lpm Rate speed: 1000 lpm Power output: 1kw Run away speed: 1750 rpm Runner outside dia: 150mm Hub diameter: 78mm No of runner blades: 4 No of guide vanes: 10 P.c.d guide vanes: 230mm Brake drum diameter: 300mm Rope brake diameter: 15mm **Flow measuring unit** Size of vbenturimeter : 150mm Area ratio: 0.45 Orifice diameter: 100.62mm Pressure gauge: double column differential type Orificemeter constant q= 2.3652 x 10^{-2} p [q: k p] p in m of water **Ball bearing used** In the casing : 6308 – 1 noS In the casing thrust bearing : C 209- 1 noS In the bearing pedestal : 1308- 1 noS **Oil seales used** Shaft sealing : 45.75.10- 2 nos Guide vanes seal: 16.35.10- 10 nos **Supply pump set** Rate head: 9 meters Discharge: 1500 lpm Normal speed: 1440 lpm Power required: 7.5 hp Size of pump : 150 mm x150mm Type : medium speed, centrifugal, single suction volute Brand & model: CRI	01

17	5 hp pump set	Name of the supplier: Diwyalaxmi Udyog Industries Date of purchase: 05.07.2011 3.75 kw size: 65 x 50 Pump & model: cri lh3 Power: 5hp, 2900 rpm	01

COURSES OFFERED

Sl.No	Odd Sem (Course code & Name)	Class	Even Sem (Course code & Name)	Class
1	-	-	CE8381 - Strength of Materials and Fluid Mechanics and Machinery Laboratory	II Mech

CE8381 STRENGTH OF MATERIALS AND FLUID MECHANICS AND MACHINERY LABORATORY

OBJECTIVE

1. To study the mechanical properties of metals, wood and spring by testing in laboratory.

2.To verify the principles studied in fluid mechanics and machinery theory by performing experiments in laboratory.

OUTCOMES:

On completion of the course, the student is expected to be able to

CO1. Determine the tensile, torsion and hardness properties of metals by testing

CO2. Determine the stiffness properties of helical and carriage spring

CO3. Apply the conservation laws to determine the coefficient of discharge of a venturimeter and findingthe friction factor of given pipe

CO4. Apply the fluid static and momentum principles to determine the metacentric height and forces due to impact of jet

CO5. Determine the performance characteristics of turbine, rotodynamic pump and positive displacement pump.

STRENGTH OF MATERIALS

LIST OF EXPERIMENTS

1. Tension test on mild steel rod

2. Torsion test on mild steel rod

3. Hardness test on metal (Rockwell and Brinell Hardness)

4. Compression test on helical spring

5. Deflection test on carriage spring

FLUID MECHANICS & MACHINES LABORATORY

LIST OF EXPERIMENTS

1. (a) Determination of coefficient of discharge of a venturimeter

(b) Determination of friction factor for flow through pipes

2. (a) Determination of metacentric height

(b) Determination of forces due to impact of jet on a fixed plate

3. Characteristics of centrifugal pumps

4. Characteristics of reciprocating pump

5. Characteristics of Pelton wheel turbine