

# MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

No. F5 (322) ST/MNIT/CHEM/2011

Phone : 0141-2713312,2713352

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To,

M/s .....

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## NOTICE INVITING QUOTATIONS

1. Quotations are invited for the supply of Equipments required for Chemical Engineering Department of this Institute as per list attached/given overleaf by **11.01.2012 at 02:00 PM**. The quotations will be opened at **03:00 PM on 11.01.2012**. The covers containing the quotations must be marked **"QUOTATION FOR CHEMICAL ENGGINEERING DEPARTMENT EQUIPMENT DUE ON 11.01.2012 AT 02:00 PM."**

**(TWO BID SYSTEM WILL BE FOLLOWED ALL THE BIDDER ARE REQUIRED TO SUBMIT TECHNICAL AND FINANCIAL BIDS IN SEPARATE ENVELOPS FOR EACH DEPARTMENT. EMD SHOULD BE SUBMITTED WITH THE TECHNICAL BIDS.)**

2. **THE RATES QUOTED SHOULD BE F.O.R. JAIPUR** inclusive of all charges e.g. packing, forwarding local taxes, railway freight, transit insurance, for outside firms and free delivery at Institute stores in the case of local firms. The rates may also be quoted separately "ex-godown/F.O.R. dispatching station. In case of Ex-Godown rates, please mention your packing and forwarding charges. Where there is no mention regarding delivery period in the quotations or where the items are offered ex-stock, the firms will be required to supply goods within one-month time.
3. Quotations should preferably be given only for those articles, which are available ex-stock. Other items should be quoted separately giving the delivery period. Rates of imported goods be quoted excluding custom duty as this institution is exempted from payment of custom duty. The rates of indigenous equipments may be quoted without Excise Duty as this institute is exempted from payment of Excise Duty.
4. As far as possible, quotations should be given for goods of India manufacture and foreign goods, which are readily available. Foreign goods quoted and proposed to be supplied should be covered by normal import quota of the dealer. This institute is exempted from payment of custom duty.
5. Detailed specifications and "make" of each item should be clearly given supported by the illustrated pamphlets wherever possible. Quotations without specifying the make and other particulars may be rejected. The payment will be made after the goods have been received, opened, checked and found to be in order up to our entire satisfaction. The accessories included in the equipment should also be clearly mentioned.
6. Losses or damage in transit will be in to the account of the supplier in case of rates **F.O.R. JAIPUR**. The supplier may, if he so desires, get the goods insured and include such charges in the tendered rate.
7. The payment for the ordered items would be made after the articles have been received and found in order. Normally payment shall be made through a crossed cheque within 30 days of the receipt of goods.

8. Your rates should be valid at least for three months from the last date of receipt of quotations.
9. All legal proceedings, if necessity arises to institute may be any of the parties (Institute or Contractor/Supplier) shall have to be lodged in the courts situated at Jaipur and not elsewhere.
10. The undersigned is not bound to accept the lowest tender and may reject any tender or any part of the tender giving justification for such an action.
11. The rates must be quoted item-wise by giving Serial No. of our enquiry letter.
12. The quotations should preferably be sent duly typed.
13. (a) The Penalty Clause is as under :-

Should the tenderer fail to deliver the goods within the period specified in the tender form the Institute may, at its discretion, allow an extension in time subject to recovery from the tenderer as agreed liquidated damages, and not by way of penalty, a sum equal to the percentage of the value of stores which the tenderer has failed to supply for period of delay as stated below: -

- |       |   |  |
|-------|---|--|
| (i)   | Delay up to one month                                   | 1%   |
| (ii)  | Delay exceeding one month but not exceeding two month   | 2%   |
| (iii) | Delay exceeding two month but not exceeding three month | 5%   |
| (iv)  | Delay exceeding three month                             | 5% for each month and part there of subject to maximum 10% |

(b) In case of failure to supply the goods within the prescribed time and in accordance with the specifications given in the Quotations, the institute shall be free to cancel the order and make purchases from the next higher tenderer or from the open market as the case may be. In that case the loss sustained by the institute shall be recovered from the defaulting supplier. The institute will be at liberty to recover the loss from the permanent earnest money/or any other pending claims of the supplier without prejudice to its general right to affect recovery from the supplier.

14. EARNEST MONEY: A Demand Draft for Rs. @ 2% of the quoted cost only in the name of the Registrar, M.N.I.T. may please be sent along with your tender as Earnest Money **without which no tender shall be considered. Cheques are not accepted as earnest money amount.** No interest is paid by us on the amount of earnest money.
15. Successful bidder will have to furnish. Performance security @ 10% of the equipment cost, valid for one year two month in the form of Bank's Guarantee from Nationalize Bank.

Note Equipments & Software Specification are as per list attached.

- (1) COPY OF last two years purchases Orders in reputed institute such as NIT,s and IIT,s to be enclosed..
- (2) Proof of Single Purchases order in Government Technical institutions worth 15-20 Lakhs.
- (3) The turnover of the firm in last two years should be greater than 1.25 Crore each year.

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Stores & Purchases

S.No	Name of the Equipment with specifications
1.	<p><b><u>FORCED DRAFT TRAY DRYER      01 NOS</u></b></p> <p>Drying Chamber: Insulated double wall chamber approx. size 20 x 20 x 25cm.  Weighing Balance: Digital, 0-500gm with ±0.01 gm resolution.  Hot Air Circulation: By forced draft fan, Arrangement is req. to vary the air flow rate (Air temp: Normal to 80C max).  Heating Chamber: Compatible capacity.  Heater: Nichrome wire heater.  Control panel comprising of Standard make on/off switch, Mains Indicator etc.  The whole set-up needs to be well designed and arranged in a good quality painted structure.</p>
2.	<p><b><u>BATCH CRYSTALLIZER                      01 NOS</u></b></p> <p>Crystallizer (Jacketed Type): Material Stainless Steel, Cap. 2 Ltrs. With conical bottom.  Stirrer: FHP, Variable Speed.  Heater: Nichrome wire heater.  Cooling Water Tank: Material Stainless Steel, Capacity 30 litre fitted with Pump.  Flow measurement: Rotamers for cooling water.  Pump: FHP  Receiving Tank: Material Stainless Steel, Capacity 2 litre with SS sieve  Temperature sensors: RTD PT-100 type  Control panel comprising of digital temperature indicator 0-100°C with multi-channel switch and standard make on/off switch, Mains indicator etc.  The whole setup needs to be well designed and arranged in a good quality painted structure.</p>
3.	<p><b><u>MASS TRANSFER WITH &amp; WITHOUT CHEMICAL REACTION (SOLID-LIQUID) 01 NOS</u></b></p> <p>Reactor: Material stainless steel, Capacity 2 liters (approx.)  Water bath: Material stainless steel, double wall, insulated with ceramic fiber wool.  Heater: Nichrome wire heater  Stirrer: Stainless steel impeller and shaft coupled with DC motor drive for variable speed  Temperature sensors: RTD PT-100 type.  <u>Control panel comprising of</u>  RPM indicator: Digital, non contact type.  Digital temperature controller: 0-100°C for hot water tank.  Standard make on/off switch, Mains indicator and fuse etc.  The setup needs to be provided with Peltizer.  The whole unit needs to be well designed and assembled rigidly on a base plate.</p>
4.	<p><b><u>EXPERIMENTAL WATER COOLING TOWER      01 NOS</u></b></p> <p>Tower: MOC: S.S., (cross section: approx. 6 in x 6 in, Height: 30 inch approx)  Packing: Plastic Raschig ring.  Air Circulation: By forced draft fan, arrangement is req. to vary the air flow rate.  Air flow measurement: Orifice meter with U-tube manometer.  Water flow measurement: Rotameter  Dry and Wet bulb temperature: Measured by temperature sensors. Alternative arrangements for measurement by thermometers are also to be provided.  Hot water supply tank: Material stainless steel, double wall, insulated with ceramic fiber wool, capacity 30 lit, (geyser of required (small) capacity to be provided prior to inlet to the tower to obtain water at 40 to 80 C, this may be the only heating system to avoid batch heating system).  Pump for feed water: Magnetic pump made of Polypropylene.  Temperature sensors: RTD PT-100 type 6 nos.  Control panel comprising of Digital temperature controller: 0-100°C, for hot water tank  Digital temperature indicator: 100°C, multi channel switch with standard make on/off switch, Mains indicator, fuse etc. The whole setup needs to be designed and arranged in a good quality painted structure.</p>

1.	<p><b><u>FIRST-ORDER AND SECOND-ORDER SYSTEM      01 NOS</u></b></p> <p><i>Thermometer Range</i> : 10 – 0 – 100<sup>0</sup>C  <i>Thermometer with thermowell</i> : Range 10 – 0 – 100<sup>0</sup>C  <i>'U' tube manometer</i> : Tube ID 1.6mm  <i>'U' tube manometer</i> : Tube ID 3.75mm  <i>Heating bath</i> : Size 1.25BSP, 315mmL, SS304.  <i>Heater</i> : Size 1.25BSP, 2Coil, 3Kw.  <i>Timer</i> : Model 55C – T8, cyclic.  <i>Beeper</i> : Time setting Range 2-10sec</p>
2.	<p><b><u>MULTIPROCESS TRAINER WITH SCADA SOFTWARE      01 NOS</u></b></p> <p><i>Level transmitter</i> : Type Capacitance, two wire, Range 0–300 mm, Output 4– 20 mA  <i>Differential pressure transmitter</i> : Type Capacitance, two wire, Range 0–200 mm, Output 4– 20 mA linear (2 nos)  <i>Control unit</i> : Interfacing unit with ADC/DAC conversion, No of analog inputs: 4, Analog outputs 1  <i>Communication</i> : RS232  <i>I/P converter</i> : Input 4-20mA, Output 3-15 psig  <i>Control valve</i> : Type: Pneumatic; Size: 1/4", Input: 3–15 psig, Air to close, Characteristics: linear  <i>Supply tank</i> : SS304  <i>Level tank</i> : Acrylic, transparent, cylindrical with 0–100% graduated scale  <i>Rotameter</i> : 16-160LPH (3 nos)  <i>Flow measurement</i> : Orifice meter (3 nos)  <i>Pump</i> : Fractional horse power, type centrifugal (2 nos)  <i>Air filter</i> : regulator Range 0-2.5 kg/cm<sup>2</sup>  <i>Pressure gauge</i> : Range 0-2.5 kg/cm<sup>2</sup> (1 no), 0-7 kg/cm<sup>2</sup>(1 no)</p>
3.	<p><b><u>MULTIVARIABLE LEVEL CONTROL TRAINER with Software      01 NOS</u></b></p> <p><i>Type of control</i> : DDC  <i>Control unit</i> : Interfacing unit with ADC/DAC conversion, No of analog inputs: 4, Analog outputs 1 (2Nos)  <i>Communication</i> : RS232  <i>Level transmitter</i> : Type Capacitance, two wire, Range 0–300 mm,  <i>Rotameter</i> : Output 4–20 mA (4Nos)  <i>Pump</i> : 16-160LPH (4Nos)  <i>Pump drive</i> : Positive displacement dosing pump with adjustable stroke (2Nos)  <i>Supply tank</i> : Variable frequency drive, programmable, input 4-20 mA, output speed 150-1500 RPM  <i>Process tank</i> : SS304  <i>Overall dimensions</i> : Acrylic, transparent, cylindrical with 0–100% graduated scale (4Nos)</p>
4.	<p><b><u>INTERACTING &amp; NON INTERACTING SYSTEM      01 NOS</u></b></p> <p><i>Process Tank</i> : Acrylic cylindrical tanks Inside Diameter 92mm With graduated scale in mm.  <i>Supply tank</i> : SS  <i>Rotameter</i> : Range 10–100 LPH  <i>Pump</i> : FHP Vertical</p>
5.	<p><b><u>SOLID IN AIR DIFFUSION APPRATUS      01 NOS</u></b></p> <p>Diffusion Column : Material Borosilicate Glass  Air flow Measurement : By Rotameter  Table for set-up support  Air compressure 1 HP, 4CFM with standard make motor and automatic switch.  The whole set-up is mounted on a powder coated base plate.</p>

1.	<p><b><u>SEDIMENTATION APPARATUS (MIXER SETTLER) 02 NOS</u></b>  <i>Thickener</i> : Material SS, Dia 500 mm, Height 200 mm  <i>Thickner Agitator</i>: SS impeller with SS Shaft coupled to FHP motor with reduction gearbox.  <i>Slurry Tank</i>: Material SS, Capacity 100 Ltrs  <i>Slurry Tank Agitator</i>: SS Impeller with SS Shaft coupled to FHP Standard Make Motor  <i>Slurry Feed Pump</i>: Gear Pump with FHP motor  <i>Piping system</i>: GI and PVC.  <i>Control panel</i>: On / off switch, Mains Indicator &amp;fuse etc  <b>A good quality painted rigid MS Structure is to be provided to support all the parts.</b></p>
2.	<p><b><u>JAW CRUSHER 02 NOS</u></b>  <i>Jaw</i>: Material Manganese Steel, Size100x150mm  <i>Feed Hopper</i>: Suitable capacity.  <i>Feed Size</i>: 50mm (approx.)  <i>Product discharge size</i>: 5mm to 15mm  <i>Drive</i>: Electric motor, 3 HP.1440 RPM,Single phase Standard Make. Fitted with Triple 'V' belt pulley  <i>Control Panel</i>: Energy measurement: Energy meter Standard make. Starter: 3 HP single Phase, Standard make, MCB: For overload protection  voltmeter Analog, 0-300 V, Standard make On/off switches, mains indicator etc.  <b>The whole set-up is to be well designed and arranged in a good quality painted structure.</b></p>
3.	<p><b><u>CYCLONE SEPARATOR 01NOS</u></b>  <i>Cyclone Separator</i>: Material SS, Dia 100mm  <i>Solid Discharge Silo</i>: Material SS, suitable capacity with discharge control valve.  <i>Blower</i>: ID Fan Blower with 1 HP Crompton Motor  <i>Air Flow Measurement</i>: Venturimeter &amp; Manometer  <i>Pr. Drop Measurement</i>: Manometer  <i>Solids Collector</i> :Transparent PVC container fixed with Cyclone.  <i>Fine Dust Collector</i> : Bag of Nylone cloth fixed on exit of air  <i>Collecting Tray</i>: Material SS , suitable capacity.  <i>Control Panel</i>: On / off switch, Mains Indicator &amp; fuse etc  <b>A good quality painted rigid MS Structure is to be provided to support all the parts.</b></p>
4.	<p><b><u>POWER CONSUMPTION IN FLUID MIXING 01 NOS</u></b>  <i>Tank</i> :Material SS, Dia. 12", Depth 18"  <i>Stirrer</i>: SS Impeller with SS Shaft coupled to Standard make FHP DC Motor and Thyristor controlled DC Drive with Reduction Gear Box  <i>Agitator</i> SS shaft &amp; impellers (i.e. one propeller &amp; one turbine)  <i>Baffles</i>: Material SS , 4 Nos. 2" width (detachable)  <i>Sampling point</i>: 4 Nos. at random locations  <i>Control Panel</i>: RPM Measurement : Digital RPM Indicator, Non Contact type with Proximity sensor. Digital Voltmeter (DC): Standard make,  Ammeter (DC) : Standard make,  On/off switch, Mains Indicator etc  <b>Good quality painted rigid MS Structure is to be provided to support all the parts.</b></p>
5.	<p><b><u>PLATE &amp; FRAME FILTER PRESS 01NOS</u></b>  <i>Frame</i>: 6 Nos.  <i>Plates</i>: 7 Nos.  Size: 200 mm x 200 mm.  Material: Acrylic (MS/SS on request)  <i>Screw Jack Arrangement</i>: For tightening and removing of frames easily.  <i>Filter Medium</i>: Filter Cloth  <i>Filtrate Collection</i>: Tray Material SS, Suitable size.  <i>Slurry Feed Tank</i>: Material SS, Capacity 40 Ltrs.  <i>Slurry Tank Agitator</i>: SS Impeller with SS Shaft coupled to FHP Standard Make Motor and Reduction Gear BI  <i>Slurry Feed Pump</i>: Gear Pump with FHP standard Make motor.  <i>Piping System</i>: GI and PVC  <i>Filtration Rate Measurement</i>: Using measuring tank. Material SS  <i>Pressure Measurement</i>: Bourdon type pressure gauge  <i>Overhead Water Tank</i>: Material SS , Capacity 25 Ltrs  <i>Control Panel</i>: On / off switch, Mains Indicator &amp; fuse etc  <b>Good quality painted rigid MS Structure is to be provided to support all the parts.</b></p>

6.

**ROTARY VACUUM FILTER 01NOS**

*Filter:* Drum of SS, Dia. 300 mm, Length 450 mm

*Mesh:* Material SS, Filter Canvas Cloth

*Zones:* 8 Nos.

*Drive for Drum:* FHP standard make motor coupled to a Reduction Gear Box

*Trough:* Material SS, Compatible capacity

*Trough Agitator:* Material SS driven by FHP slandered make motor with Reduction Gearbox.

*Slurry Tank:* SS, capacity 100 Ltrs.

*Slurry Pump:* Gear Pump with ½ HP standard make motor

*Slurry Tank Agitator:* SS Impeller with SS Shaft coupled to FHP standard Make Motor and Reduction Gear Box

*Filtrate Receiver:* Material SS, Capacity 20 Ltrs. (2 Nos.)

*Vacuum Pump:* Standard make, Liquid Ring type coupled to a 1 HP standard Make Motor

*Piping:* GI and PVC size ½"

*Control panel:* On / off switch. Mains Indicator & fuse etc

**Good quality painted rigid MS Structure is to be provided to support all the parts.**

1.	<p><b><u>HEAT TRANSFER THROUGH COMPOSITE WALLS    01 NOS</u></b>  Slab assembly arranged symmetrically on both sides of heater  <u>Slab Material</u>                      <u>Slab Size</u>  <i>Cast Iron</i> :                      250 mm dia. &amp; 20 mm thick  <i>Bakelite</i> :                      250 mm dia. &amp; 15 mm thick  <i>Press Wood</i> :                      250 mm dia. &amp; 12 mm thick</p> <p><i>Heater</i> : Nichrome wire</p> <p><i>Temperature Sensors</i> : RTD PT-100type (8 Nos.)</p> <p><i>Control panel</i> :  Digital Voltmeter : 0-300 Vol.,  <i>Digital Ammeter</i> .: 0-2 Amp.  Variac : 0-230V, 2A,  <i>Digital Temperature Indicator</i>: 0-200° C, with multi-channel switch, On/off switch, Mains Indicator etc.</p> <p>Cabinet to accommodate the slab assembly, with front window of glass/acrylic</p> <p><b>A good quality painted rigid MS Structure is to be provided to support all the parts.</b></p>
2.	<p><b><u>HEAT TRANSFER IN FORCED CONVECTION    01NOS</u></b>  Test section  <i>Dia</i> : 28 mm (approx.)  <i>Length</i> : 400 mm (approx.)  <i>Blower</i> : FHP of Standard make</p> <p><i>Heater</i> : Nichrome Wire.  <i>Air Flow measurement</i> : Orificemeter &amp; Manometer  <i>Temperature Sensors</i>: RTDPT-100 type(6 Nos.)</p> <p><i>Control panel</i> :  Digital Voltmeter : 0-300Volt,  Digital Ammeter : 0-2Amp,  Variac : 0-230 V, 2 A,  Digital Temperature Indicator: 0-300°C, with multi-channel switch, On off switch, Mains Indicator etc.</p> <p><b>A good quality painted rigid MS Structure is to be provided to support all the parts.</b></p>
3.	<p><b><u>HEAT TRANSFER IN NATURAL CONVECTION    01NOS</u></b>  Test Section  <i>Dia</i> : 38 mm (approx).  <i>Length</i> : 500 mm(approx)  <i>Heater</i> : Nichrome Wire.</p> <p><i>Temperature Sensors</i>: RTD PT-100 type (7 Nos.)</p> <p><i>Control panel</i> :  Digital Voltmeter: 0-300 Volt.,  Digital Ammeter: 0-2 Amp.,  Variac : 0-230 V, 2 A,  Digital Temperature Indicator : 0-300°C,with multi-channel switch, On/Off switch, Mains Indicator etc</p> <p>Powder coated duct of MS to accommodate the assembly with front window of Acrylic.</p> <p><b>A good quality painted rigid MS Structure is to be provided to support all the parts.</b></p>

4.	<p><b><u>EMISSIVITY MEASUREMENT APPARATUS 01NOS</u></b></p> <p>Test plate  <i>Dia</i> : 160mm  <i>Black Plate Dia.</i> : 160mm  <i>Heater (2Nos.)</i> : Nichrome Wire Heater. (One each for test plate and black plate)</p> <p><i>Temperature Sensors</i> : RTD PT-100 type (3 Nos.)</p> <p><i>Control panel</i> :  Digital Voltmeter: 0-300Volt,  Digital Ammeter : 0-2Amps,  DPDT Selector switches: For Digital Voltmeter &amp; Digital Ammeter,  Variacs: 0-230 V, 2 A, (2 Nos.) (One each for test plate and black plate),  <i>Digital Temperature Indicator</i> : 0-300°C, with multi-channel Switch, On/Off switch, Mains Indicator etc</p> <p>Cabinet to accommodate the slab assembly with front window of glass/acrylic  <b>A good quality painted rigid MS Structure is to be provided to support all the parts.</b></p>
5.	<p><b><u>DROPWISE/FILMWISE CONDENSATION APPARATUS 01NOS</u></b></p> <p><i>Steam Generator</i> : 8 Ltrs. (Approx.) made of Stainless steel with 1.5kW heater.  Insulated with ceramic wool.  <i>Pressure Gauge</i> : Bourdon type.  <i>Copper tubes (2 Nos.)</i> : one with natural finish and other nickel polished.  <i>Dia.</i> : 19mm (Approx.)  <i>Length</i> : 170mm (Approx.)  <i>Water Flow measurement</i> : Rotameter.  <i>Condensate Measurement</i> : Measuring Cylinder &amp; Stopwatch  <i>Control valves</i> : one each for Steam, Cooling water &amp; Drain.  <i>Temperature Sensors</i> : RTD PT-100 type (6 Nos.)  <i>Control panel</i> : Digital Temp.  <i>Controller</i> : 0-199.9°C (For Steam Generator),  <i>Digital Temperature</i></p> <p><i>Indicator</i>: 0-199.9°C,with multi-channel switch, On/Off switch. Mains Indicator etc.  <b>A good quality painted rigid MS Structure is to be provided to support all the parts.</b></p>
6.	<p><b><u>PARALLEL /COUNTER FLOW HEAT EXCHANGER (Double Pipe Heat Exchanger) 01NOS</u></b></p> <p><i>System</i> : Water to Water  <i>Length of Heat Exchanger</i> : 1.6 m(approx.)  <i>Outer Tube</i> : Material Stainless steel, ID 27.5mm, OD 33.8 mm (approx).  <i>Inner Tube</i> : OD 12.7mm (approx)  <i>Water Flow Measurement</i> : Measuring cylinder &amp; Stop Watch with Rotameters (2Nos.) one each for cold &amp; hot fluid  <i>Hot Water Tank</i> : Made of Stainless steel Insulated with ceramic fiber wool.  <i>Hot Water Circulation</i> : Magnetic Pump made of Polypropylene to circulate Hot Water.  Maximum working temperature is 85°C.  <i>Heaters</i> : Nichrome wire heater (2 Nos.)  <i>Temperature Sensors</i> : RTD PT-100 type 6 Nos.  <i>Control panel</i> : Digital Temperature Controller: 0-199.9°C (For Hot Water Tank),  <i>Digital Temperature Indicator</i> : 0-199.9°C,with multi-channel switch, On/Off switch, Mains Indicator etc.  <b>A good quality painted rigid MS Structure is to be provided provided to support all the parts.</b></p>
7.	<p><b><u>SHELL &amp; TUBE HEAT EXCHANGER 01NOS</u></b></p> <p><i>System</i> : Water to Water  <i>Shell</i> : Material Stainless steel, Dia. 220 mm, Length 500 mm (Approx.), 25% cut baffles at 100 mm distance 4 Nos.  <i>Tube</i> : ID 13mm, OD 16mm, Length 500 mm (24 Nos.)  <i>Water Flow Measurement</i>: Measuring cylinder &amp; Stop Watch with Rotameters (2Nos.) one each for cold &amp; hot fluid  <i>Hot Water Tank</i> : Made of Stainless steel Insulated with ceramic fibre wool.  <i>Hot Water Circulation</i> : Magnetic Pump made of Polypropylene to circulate Hot Water. Maximum working temperature is 85°C.  <i>Heaters</i> : 2 kW Nichrome wire heater  <i>Temperature Sensors</i> : RTD PT-100 type 5 Nos.  <i>Control panel</i> : 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  <b>A good quality painted rigid MS Structure is to be provided to support all the parts.</b></p>

8.	<p><b><u>HEAT TRANSFER IN AGITATED VESSEL</u> 01NOS</b>  <i>System</i> : Steam to Water  <i>Jacketed Vessel</i> : Material stainless steel fitted with 4 Nos., Baffles Dia. 250, Depth 350 mm (Approx.)  <i>Jacket</i> : Width 25 mm. Insulated with ceramic wool  <i>Helical Coil</i> : Material Copper, OD 16mm, ID 13mm  <i>Agitator</i> : Stainless steel Impeller fitted on a shaft coupled to a DC Motor with Thyristor controlled DC Drive.  <i>Condensate Measurement</i> : Measuring Cylinder &amp; Stopwatch  <i>Water Flow Measurement</i> : Rotameter.  <i>Steam Generator</i> : made of stainless steel fitted with level gauge, pressure Gauge, safety valve, drain and insulated with ceramic wool &amp; cladding with Aluminium foil.  <i>Heaters</i> : Nichrome wire heater (2 Nos.)  <i>Temperature Sensors</i> : RTD PT-100 type 6 Nos.  <i>Control panel</i> : Digital Temperature Controller: 0-199.9°C (For Steam Generator)  <i>Digital Temperature Indicator</i> : 0-199.9°C, with multi-channel switch, On/Off switch, Mains Indicator etc  <b>A good quality painted rigid MS Structure is to be provided to support all the parts.</b></p>
9.	<p><b><u>UNSTEADY STATE HEAT TRANSFER UNIT</u> 01 NOS</b>  <i>Water Bath</i> : Material - stainless steel Capacity-8 lit. (Approx.)  <i>Stirrer for Bath</i> : Stainless Steel Impeller with shaft coupled to a FHP motor.  <i>Heater</i> : Nichrome wire heater  <i>Test Cylinder</i> : 2 nos. stainless steel and brass  <i>Temperature Sensors</i> : RTD PT-100 type  <i>Control panel</i> : Digital Temperature Controller: 0-199.9°C (For Water Bath)  <i>Digital Temperature Indicator</i> : 0-199.9°C, On/Off switch, Mains Indicator etc.  The whole set-up is well designed and arranged on a powder-coated structure.</p>
1	<p><b>Electronic Precision Balance for Laboratory 02 NOS</b>  Capacity: 0 – 120 g, 0.1 mg least count, Pan size: 80 mm dia, Response Time 2/3 sec, Repeatability &lt; + 0.1 mg, covered in a glass enclosure.</p>
2	<p><b>Microcontroller Based Single Beam UV-VIS Spectrophotometer 02 NOS</b>  Provided with Four Nos. Quartz Cuvettes - 1. Spectral- (a) Range: 190 to 900 nm, (b) Bandwidth : 1 nm, © Accuracy : ± 0.1 nm, (d) Readout : 4 digit 7 segment LED Display, (e) Readability : 0.1 nm, 2. Photometric- (a) Range:0 to 2 Abs, (b) Accuracy ± 0.005 Abs. At 1.0 Abs &amp; ± 0.010 Abs. At 1.5 Abs, © Repeatability: ± 0.002 Abs. At 1.0 Abs, (d) Readout of Abs., %T &amp; C. Display : 3½ digit 7 segment LED Display, 3. Light Sources : Deuterium(D<sub>2</sub>) &amp; Tungsten (W) Halogen Lamps, 4. Monochromator: Czerny Turner with High resolution Holographic Grating, 5. Accessories to be supplied with the Instrument : Four Nos. 10 mm path length cuvettes.</p>
3	<p><b>Air Compressor 01 NOS</b>  Capacity: 7.0 cu. ft., working press: 7.0 kg/cm<sup>2</sup> (design pressure: 11 kg/cm<sup>2</sup>), motor: 2 hp, 750 rpm.</p>
4	<p><b>Gas Flow Meter (Wet) 01 NOS</b>  Capacity i) 0 to 5 lpm  ii) 5 to 40 lpm</p>
5	<p><b>RO System for Water for Research Work 01 NOS</b>  Operating pressure 15-100 psi, product flowrate: 15 lpm, inbuilt storage capacity: 25 l than 1 NTU, CaCO<sub>3</sub> hardness: 370 ppm max.</p>

**ASSISTANT REGISTRAR**  
**Stores & Purchases**

