NOTICE FOR CALLING THE QUOTATION/TENDER

OFFICE OF THE CHAIRMAN
DEPARTMENT OF CHEMICAL ENGINEERING
ALIGARH MUSLIM UNIVERSITY
ALIGARH – 202002

D.No./1163/DS/ChED/18-19

M/s..................................................
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Dated: 05.02.2019

Sealed Quotations/Bids (One Technical & One Financial separately) are invited from manufacturers or their authorized dealers for the following equipment which should be sealed by the bidder in separate covers duly super scribed and both these covers are to be put in a bigger cover, which should also be sealed and duly super scribed, on the terms and conditions printed on Page No. 5.

Quotation should reach this office on or before 15.02.2019 by 3.00 P.M.

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<th>S. No.</th>
<th>Particulars</th>
<th>Specifications</th>
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| 1.     | Fluidized Bed Heat Transfer Unit                    | • Column: Material Borosilicate Glass  
• Heater: Made of Nichrome Wire  
• Air Flow Measurement: By Orifice meter & manometer  
• Control panel comprising of Digital Temp. Controller: PID Controller, 0 to 199.9°C  
  Digital Temperature indicator: 0 to 199.9°C, with multi-channel switch  
  Temperature sensors: RTD PT-100 type-3Nos.  
  standard make on/off switch, Mains Indicator etc. |
| 2.     | Unsteady State Heat Transfer Unit                   | • Water Bath: Material- stainless steel, Capacity-8 lit. (Approx.)  
  Stirrer for Bath: SS impeller with shaft coupled to a FHP motor.  
• Heater: Nichrome wire heater  
• Test Cylinder: One each of Stainless Steel & Brass.  
• Control Panel comprises of:  
  Digital Temp. Controller: PID Controller, 0-199.9°C, (For Water Bath)  
  Digital Temp. Indicator: 0-199.9°C,  
  Temperature Sensors: RTD PT-100 type  
  Standard make On/Off switch, Mains Indicator etc. |
|        | Two Phase Heat Transfer Unit                        | • Boiling/Condensation Cylinder: Material: Borosilicate  
  Glass Length: 300 mm OD: 75mm approx  
  Fitted with sealed caps with pressure gauge and safety valve.  
• Pressure gauge : Bourdan type, (0 to 2) kg/cm²  
• Water Flow Measurement : Rotameter, (10 – 100) LPH  
• Temperature Sensor : RTD PT-100 type  
• Control panel comprising of:  
  Digital Temperature Controller: PID Controller, 0-199.9°C.  
  Energy meter: Digital Type for power measurement.  
  Digital Temperature Indicator: 0-199.9 °C, with multi-channel switch  
  Standard make on-off switch, mains indicator etc. |
3. Absorption In Packed Bed
- Column: Borosilicate Glass Dia. 55 mm, Length 750 mm (approx.)
- Packing: Borosilicate Glass Raschig Ring
- Feed Circulation: By compressed air.
- Pressure Regulator: (0-2) kg/cm².
- Pressure Gauge: Bourdon type
- Flow measurement: Rotameters (One each for feed, air & CO₂).
- Feed Tank: Material Stainless Steel, Capacity 20 Litres.
- Collecting Tank: Material Stainless Steel, Capacity 10 Litres.

4. Mass Transfer With & Without Chemical Reaction (Solid-Liquid)
- Reactor: Material Stainless Steel, Capacity 2 Litres. (approx.)
- Water Bath: Material Stainless Steel, Double Wall, insulated with Ceramic fibre 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.
- Control panel comprises of: RPM Indicator: Digital, Non-contact type. Digital Temp. Controller: PID Controller, 0-199.9°C (for hot water tank)
  Standard make on/off switch, Mains Indicator & fuse etc.
  The setup is to be provided with Peltizer & compatible spanner

Chemical Reactor Service Unit (With Data Logging Facility)
- Feed Tanks: 2 Nos. Capacity 5 Litres. (each)
- Feed Circulation: By Peristaltic Pump (2Nos.)
- Temperature Controller: PID Controller, 0-199.9°C
- Heater: Nichrome wire Heater.
- Hot water Circulator: With water tank and pump to circulate water.
- Product Analysis: By using Electronic Sensor, Output 4-20 mA.
- Temperature Measurement: By Temperature Transmitter, RTD PT-100 Type. Output 4-20 mA. Piping: Stainless steel & Silicon pipe.
  Control panel comprises of
  with Standard make on/off switch, Mains Indicator etc.

Plug Flow Tubular Reactor (Coiled Tube Type)
Reactor: Material Stainless steel, Capacity 0.4 Litres. (Approx.) Whole assembly is to be fixed on a base plate, which can be installed on service unit.

5. Continuous Stirred Tank Reactor (CSTR)
- Reactor: Material SS, Capacity 0.5-1.5 Litres. (Approx.)
- Agitator: Variable speed with speed control facility
- Impeller: Material Stainless Steel, 4 Square bladed (1 No.)
- Baffles: 4 Nos., Detachable.
- Heating Coil: Material Stainless Steel for heating purpose.
  Whole assembly is to be fixed on a base plate, which can be installed on service unit.

Batch Reactor
- Reactor: Material Stainless Steel, Capacity 1 Litre. (approx.) Agitator: Variable speed with speed control facility
- Impeller: Material Stainless Steel, 4 Square bladed (1 No.)
- Baffles: 4 Nos., Detachable.
- Heating Coil: Material Stainless Steel, for heating purpose.
  Whole assembly is to be fixed on a base plate, which can be installed on service unit.
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<tr>
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<th>Combined Flow Reactor</th>
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<td>6.</td>
<td>• Reactor 1: Helical Coil Tube Type, Capacity 1 Litre approx. made of stainless steel 304 grade.</td>
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<td>• Reactor 2: CSTR made of stainless steel 304 grade, Capacity 1 Litre (approx).</td>
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<td>• Stirrer for CSTR: Stainless Steel Impeller and shaft coupled with FHP motor</td>
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<td>• Feed Tank (2Nos.): Material Stainless Steel, Capacity 20 Litres.</td>
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<td>• Feed circulation: By compressed air.</td>
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<td>• Flow Measurement: Rotameter 2 Nos. (One each for Reactants).</td>
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<td>• Piping: Stainless Steel and PU pipe</td>
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<td></td>
<td>• Pressure Regulator: 0-2 Kg/cm²</td>
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<td>• Pressure Gauge: Bourdon type 0-2 Kg/cm²</td>
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| 7. | Losses In Pipe Fittings Apparatus                                                          |
|    | • Smooth Pipe: 3 Pipes (ID: 3 mm to 30 mm).                                               |
|    | • Roughened Pipe: 1/2" BSP.                                                                |
|    | • Smooth Bend: 90 Degree.                                                                  |
|    | • Sudden Enlargement                                                                      |
|    | • Sudden Contraction                                                                       |
|    | • Gate Valve                                                                               |
|    | • Ball Valve                                                                               |
|    | • Globe Valve                                                                              |
|    | • Water Circulation: ½ HP Pump, Crompton make.                                             |
|    | • Sump Tank: Capacity 50 Litres.                                                           |
|    | • Stop Watch: Electronic.                                                                  |
|    | Control Panel Comprises of Standard make On/Off Switch, Mains Indicator, etc.             |

| 8. | Flow Through Annular Pipe                                                                 |
|    | • Pipe Test Section: Length 1.25 m (approx.) Material SS                                  |
|    | • Annular: Inner Pipe OD 25 mm (approx.) Material SS                                       |
|    | • Outer Pipe ID: 35 mm (approx.) Material SS                                               |
|    | • Pr. Drop Measurement: U-Tube Manometer                                                  |
|    | • Water Circulation: FHP Pump, 0.5 HP, Single Phase, Crompton make                        |
|    | • Sump Tank: Capacity 50 Litres.                                                          |
|    | • Stop Watch: Electronic.                                                                 |
|    | Control Panel Comprises of: Standard make On/Off Switch Mains Indicator, etc.             |

| 9. | Boiling Experimental Setup                                                                 |
|    | • Transparent pressure vessel                                                              |
|    | a. Volume of pressure vessel: 2 to 3 Litres                                               |
|    | b. maximum pressure: 4 bar                                                                  |
|    | c. Flow rate (cooling water): 0 to 1.5 L/min                                                |
|    | d. Temperature: 0 to 100°C                                                                  |
|    | • Evaporation of water with help of heating element and condensation with tube coil        |
|    | • System should have sensors for pressure, flow rate and temperature with digital on board display |
|    | • Heater power should be adjustable                                                        |
10. Free & Forced Convection Experimental Setup

- Should consist of vertical duct (Height of Duct: 0.5 to 1 m) with axial fan/blower for air supply.
- Transparent section on the air duct to visualize heating element
- Minimum of 3 different heating elements cylinder, plate and tube bundle with more than 10 tubes.
- Thermocouples to measure air temperature on upstream, downstream and surface temperature of the heating element.
- Temperature measurement range: 0-300 °C
- Continuously adjustable airflow rate.
- The air velocity should be measured by anemometer (velocity range: 0-10 m/s)
- Power of the heating elements (easily interchangeable heating elements) should be continuously adjustable.
- Heating elements should be operable outside the air duct for natural convection study.
- Should have display of temperatures, heating power and airflow velocity.
- With computer interfaced data acquisition system and related software.

Note:
1. Mention Separate price for air Compressor 1 HP, 4CFM with automatic switch
2. Mention Separate price for CO₂ Cylinder with pressure regulator.
3. The entire water tank should be of SS 304 Grade.
4. Equipment should be upgradeable for Data Logging Facility in the future if required.
5. Bidder has to quote for all the items in the bid otherwise the bid will be rejected.
6. Only typed quotations/tenders bearing GSTIN on original letter head will be entertained.
7. Cutting/handwriting on quotations/tenders will not be accepted.
8. For the equipment with data logging facility separate price for computers with specification (minimum core i5) should be mentioned.
TERMS & CONDITIONS

1. Goods are required to be dispatched F.O.R. i.e. Department of Chemical Engineering, A.M.U., Aligarh in the name of the Chairman, Department of Chemical Engineering, Aligarh Muslim University, Aligarh.

2. The Department has the right to accept the rates of some or all the articles required. The Department reserves the right to reject any or all the quotations without assigning any reason or to allot full or part of the supply to one or more Firms.

3. Payment shall be made against bill.

4. Minimum Turnover should not be less than 6.00 Crore in the last three consecutive years, Balance Sheets should be attached along with the bid otherwise the bid is liable to be rejected.

5. The goods have to be supplied within 15 days otherwise the order shall be treated as cancelled. For goods supplied after the stipulated period must be supported with regular sanction of extension of the period by the competent authority.

6. In case goods are not according to specifications, the cost of returning them shall be borne by the supplier.

7. The rate should be kept open /valid for a period of two months from the date of quotations were opened.

8. The quotations containing uncalled for remarks are liable for rejection.

9. The firm registered with Sales Tax Authority should mention GSTIN.

10. The discount rebate admissible, if any, may be quoted.

11. The rate of GST including Surcharge along with concession admissible to educational institute may be specified.

12. Inclusive GST rates will not be accepted and tenders/quotation will be cancelled.

13. Rates quoted must include all types of taxes and other possible/hidden expenses. No other charges will be considered later. All the accessories required should be included in the prices.

14. Firm supplier must itself register in the Central Purchase Office, A.M.U., Aligarh or with Directorate General of Supplied and Disposals (DGS&D) and a certified copy of such Registration be enclosed.

15. All items should be under 02 year’s comprehensive onsite warranty.

16. Manual and sample calculations are to be submitted along with the offer of technical evaluation. Result should be reproducible during demo of the equipment at our Department otherwise bid will be rejected.

17. Literature of original catalogue or internet printout of the product be attached.

18. Sample/Demo (if needed) is required.

Chairperson
Chemical Engineering Department
A.M.U., Aligarh