TENDER DOCUMENT

TENDER FOR THE PURCHASE OF

Equipments for Chemical Engineering Lab (CRE Lab Experiments)

UNDER

TWO BID SYSTEM

NO. 1057-17/CHE-HOD/Deptt/PS

CHECK LIST

DULY FILLED CHECK LIST TO BE ATTACHED WITH THE TECHNICAL BID

Sl. No.	Particulars	Check Mark
1	Whether EMD / Tender Fees attached?	Yes/ No
2	Whether technical specifications of the quoted equipment attached?	Yes/ No
3	Whether catalog of the equipment attached?	Yes/ No
4	In case of authorized agent/distributor whether certificate/ authorization letter for the same issued by the manufacturer attached?	Yes/ No
5	Whether tender document along with all Annexures (B to G) duly signed & stamped by the authorized signatory attached?	Yes/ No
6	Whether affidavit duly attested by the Oath Commissioner/Executive Magistrate regarding non-black listing of supplier attached?	Yes/ No
7	Whether list of Institutes/Organizations where the quoted model of equipment supplied by the tenderer in India is attached?	Yes/ No
8	Whether split rates of each sub units are quoted?	Yes/ No
9	In case of foreign suppliers quoting directly, whether, the name of Indian agent mentioned?	Yes/ No
10	Whether compliance sheet duly filled in, signed & stamped attached?	Yes/ No
11	Whether warranty certificate duly filled in, signed & stampeled attached?	Yes/ No
12	Whether AMC certificate duly filled in, signed & stampeled attached?	Yes/ No

List of Annexures

भारतीय प्रौद्योगिकी संस्थान रोपड़
INDIAN INSTITUTE OF TECHNOLOGY ROPAR
नंगल रोड, रूपनगर, पंजाब-140001/Nangal Road, Rupnagar, Punjab-140001
Ph. 01881-242193, e-mail: purchase@iitrpr.ac.in

NO. 1057-17/CHE-HOD/Deptt/PS 26/03/2018

Notice Inviting Quotation

IIT Ropar intends to purchase the following equipments. You are, therefore, requested to send your sealed offer in Two Bid System as per the instructions given below:

Sl. No.	Description	Quantity
1	**Equipments for Chemical Engineering Lab (CRE Lab Experiments)** **(Detailed specifications of above items as per Annexure-A)**	As per Annexure - A

1. Schedule of EMD :

1	**Last Date and Time of receipt of tender :**	**17.04.2018 up to 03:00 PM.**
2	**Opening of Technical Bids on :**	**17.04.2018 at 03:30 PM.**
3	**Tender Fee**	**₹500.00**
4	**Earnest Money Deposit (EMD)**	**₹54,000.00**

2. Tender Fees and EMD:

Tender Fees & EMD to be submitted in shape of DD/BG/TDR favouring 'The Registrar, IIT Ropar' payable at Ropar alongwith the Technical Bid. Offers without EMD shall not be considered.

3. Two Bid System :

(a) Technical bid consisting of all technical details alongwith commercial terms and conditions and EMD; and

(b) Financial bid indicating item-wise price for the items mentioned in the technical bid.

Technical bid and financial bid should be sealed in separate covers duly superscribed and both these sealed covers are to be put in a bigger cover which should also be sealed and duly superscribed as "Technical Bid for the supply of "Equipments for Chemical Engineering Lab (CRE Lab Experiments)" and "Financial Bid for the supply of "Equipments for Chemical Engineering Lab (CRE Lab Experiments)" Due on < Last date and time >. Technical bids shall be opened at the first instance and evaluated by technical committee. At the second stage financial bids of the only technically qualified bidders shall be opened for financial evaluation and ranking before awarding the contract. Mixing price bid with technical bid will disqualify your bid for further evaluation.

4. Submission of tender:

Offers addressed to the 'Registrar, IIT Ropar' and valid for 90 days should reach the office of 'The Registrar, IIT Ropar, Room No. 125 on or before the last date and time. Tenders received late shall not be considered.

5. Bidding:

a). Either the Indian agent on behalf of the Principal/OEM or Principal/OEM itself can bid.

b). If an agent submits bid on behalf of a Principal/OEM, the same agent shall not submit a bid on behalf of another Principal/OEM in the same tender for the same item/product.

All offers other than those from the Principal/OEM should be supported by an authority letter from the manufacturer authorizing the supplier to tender on their behalf. In case of manufacturer a certificate or a copy thereof to the effect that the bidder is a manufacturer of the equipment must be accompanied with the technical bid prepared as per 'Annexure – B'.

6. Opening of Bids:

Technical bids will be opened as per the above schedule in the presence of bidders or their authorized representatives whosoever may wish to attend. In case the due date of receipt/opening of the quotation/s (technical/price) is declared a holiday in the Institute, then, the due date of receipt/opening of the quotations shall be the next working day at the same time.

7. Price Bid:

Price bid should be prepared as per 'Annexure – E'.

8. Rates Comparison:

Bidders are requested to send their rates on FOR, IIT Ropar basis in case of indigenous items and on FOB/FCA basis in case of imported items with separately mentioning CIF/CIP charges. Rates comparision will be made on Net Price (Including Freight/ Insurance/Installation/Taxes/Duties etc.) if offers are received both for indigenous and import items. If offers are received only for import items then comparison will be made on FOB/FCA basis. Rates of available foreign currency will be taken from RBI website as on the opening of the technical bids for the purpose of conversion in Indian rupees.

9. Spares:

The spare parts/wear & tear consumables, if any, required for trouble free operation of equipment to be quoted separately giving the full nomenclature, rate, quantity and shelf life of each item.

10. Indigenous items:

The items which can/are to be provided indigenously may be listed separately.

11. Parts of Equipments:

Where the equipment is composed of several subunits/components, the rate should be quoted for each subunit/component. The Institute reserves the right to increase or decrease the number of subunits/components and number of equipment according to its requirements. The rates in ambiguous terms will render the quotation liable to rejection. The words “Not quoting” should be clearly written against any item of equipment for which the tenderer is not quoting.

12. Payment Terms:

Payment will be made to the supplier through following modes.

a). Indigenous goods:

NEFT/Cheque/Demand Draft : 90% payment within 30 days of delivery/receipt of the items at IIT Ropar and the remaining 10% after satisfactory installation/ inspection of the equipment at IIT Ropar and on the submission of performance bank guarantee equivalent to 10% of order value valid for warranty period + 3 months .

b). Imported goods:

Letter of credit/Telegraphic Transfer/Sight Draft – 90% payment will be made through LC/TT/SD and balance 10% after successful installation/ inspection of the equipment at IIT Ropar and submission of performance bank guarantee for 10% of order value, either by the principal company or by their Indian agent valid for warranty period + 3 months.

Bank charges occured outside India will be borne by the beneficiary.

13. Acceptance of Terms & Conditions:

Bidders must confirm the acceptance of all the terms and conditions of this NIQ. Any non-acceptance or deviations from the terms and conditions must be clearly mentioned. However, tenderers must note carefully that any conditional offer or any deviation from the terms and conditions of this NIQ may render the quotation liable for rejection.

14. Service Manual/Curcuit Diagram

It is specifically required that the bidders will supply all the operating & service manuals and circuit diagrams alongwith the equipment.

15. Power Supply:

The equipment should be quoted only for 220 volts and 50Hz electricity supply. The extra requirement of line voltage, current rating etc. and the optimum climate and environment required for the equipment must be stated precisely. Voltage stabilizers/ isolation transformers/CVT/UPS etc., as may be required shall be listed separately. The full technical specifications and literature in respect of the voltage stabilizer etc., must be furnished.

16. Guarantee/Warranty and AMC:

Duly signed and stamped certificate of at least 3 year comprehensive onsite warranty as per Annexure-G should be attached with the technical bid. Successful firm will be required to agree for payment of penalty for exceeding permissible downtime during Guarantee / Warranty period. Annual Maintenance Contract charges for 3 years after the expiry of warranty period should be quoted as per Annexure-H. The rates of AMC will be taken into consideration while making rates comparison.

17. Country of origin:

Country of origin of the quoted item should be mentioned in the offer in case of imported item.

18. Customs Duty or Excise Duty:

IIT Ropar is exempted from the payment of Customs Duty/Excise Duty. CDEC/EDEC with DSIR certificate will be provided along with the order (If applicable).

19. Service Facility:

Bidder should mention about the service set up in India and how capable they are to provide after sales services.

20. Training:

If required, should be included in your offer without any extra cost.

21. Banker's details:

Name and address of the banker of your company should be mentioned.

22. Reference of supply:

Name and contact details of the premier educational Institutes where the quoted equipment has been installed in India should be attached as per Annexure-F during the last 5 years. Copies of at least two purchase orders may be attached(If possible). IIT Ropar reserves the right to inspect the equipment for its actual performance in any of the listed Institute. The list of installations with contact details for the last 5 years must be provided.

23. Arbitration

In the event of failure to carry out the contractual obligations, within the stipulated period or extended period and determination of the contract for any reason, violation of warranties etc. the IIT Ropar shall have the right to carry out the unfinished obligation at the exclusive cost and risk of the bidder/firm, after due notice and the difference so accrued shall be recoverable from the bidder/firm.

23.2 The provision of the Arbitration and Conciliation Act, 1996 or as at the relevant time and of rules framed there under and any statutory modifications thereof shall be deemed to apply and be incorporated in this agreement.

23.3 Upon every or any such reference, the cost of any incidentals to the reference and award(s) respectively shall be at the reasonable discretion of the Arbitrators or in the event of their not agreeing, of the Umpire appointed by them who may determine the amount thereof or direct the same to be fixed as between solicitors and client or as between parties and shall direct by whom and in what manner the same shall be borne and paid.

23.4 Panel of arbitrators will be provided by IIT Ropar out of which the bidder will have to select one.

23.5 The bidder shall have no objection if the officer who has dealt with the case at any stage is nominated as an arbitrator. Further, that one of the arbitrator's shall be Accounts Expert.

23.6 In case of vacancy being caused due to resignation, death or incapacity of the arbitrator(s) to function as such, the same shall be provided in the aforesaid manner and the new arbitrator(s) shall proceed from the stage at which vacancy is caused.

24. Jurisdiction:

The Courts of Ropar alone will have the jurisdiction to try any matter, dispute or difference between the parties arising out of this tender/contract. It is specifically agreed that no Court outside and other than Ropar court shall have jurisdiction in the matter.

25. Force Majuere:

Any failure of omission or commission to carry out the provision of this contract by the supplier shall not give rise to any claim by one party, one against the other, if such failure of omission or commission arises from an act of God; which shall include all acts of natural calamities such as fire, flood, earthquake, hurricane, or nay pestilence or from civil strikes, compliance with any statute and/or regulations of the Government, lockouts and strikes, riots, embargoes or from any political or other reason beyond the supplier's control including war (whether declared or not) civil war or stage of insurrection, provided that notice of the occurrence of any event by either party to the other shall be given within two weeks from the date of occurrence of such an event which could be attributed to Force Majuere conditions.

26. Risk & Cost

In the event of failure to carry out the contractual obligations, within the stipulated period or extended period and determination of the contract for any reason, violation of warranties etc. the IIT Ropar shall have the right to carry out the unfinished obligation at the exclusive cost and risk of the bidder/firm, after due notice and the difference so accrued shall be recoverable from the bidder/firm.

27. The material found defective upon opening by the supplier representative in presence of Central stores personnel/indenter of IIT Ropar or not as per tendered specifications will be lifted back at the cost and risk of the supplier. The material lying in the IIT Ropar premises would be at supplier's risk and cost.

28. Liquidated Damages:

In case the firm fails to execute the supply as per the purchase order in whole or in part as per the terms and conditions of PO, IIT Ropar can impose the penalty @1% per week of the undelivered stores, subject to a maximum of 10%. It will also be open to the institute to procure the required item(s) from any other source at the risk and expense of the firm.

29. Relocation:

The supplier has to stand guaranted for the relocation of supplied equipment once the permanent campus of IIT Ropar gets ready for operation. Transportation of the equipment will be provided by the Institute.

Note: The Director, IIT Ropar reserves the right to accept/reject any or all tenders without assigning any reasons thereof and also to reject the material if the same is not found conforming to the specifications, with further right to affect risk and cost of the purchases.

Registrar

Annexure-A

DETAILED TECHNICAL SPECIFICATIONS

1) ISOTHERMAL BATCH AND SEMI-BATCH REACTOR:

The set-up should be able to perform a non-catalytic homogeneous liquid phase reaction under isothermal condition in batch and semi-batch mode. The complete set up must consist of a Reactor fitted in a constant temperature water bath, stirrer for reactor and water bath, feed tank, peristaltic pump, valves and sample collection port.

It should be capable of:

- Saponification reaction study in batch and semi-batch mode.
- To determine the Reaction Rate Constant.

TECHNICAL SPECIFICATIONS:

Sl. No.	Items	Details specifications
1.	Reactor	MOC: Stainless steel 304 Grade Capacity: 2 litres Reactor should be designed properly with all safety provisions
2.	Stirrer	Impeller: Stainless steel impeller Motor: shaft coupled with FHP motor, 1/12 HP and 200 RPM or equivalent with speed controller
3.	Water bath (with suitable capacity)	MOC: Stainless steel 304 Grade Double wall and insulated with ceramic wool or equivalent
4.	Heater	Nichrome wire heater or equivalent
5.	Feed Tank (1 No.)	MOC: Stainless steel 304 Grade Capacity: Approx. 20 litres
6.	Feed Pump (1 No.)	Peristaltic Pump • Max RPM: 10-196 rev/min (With direct digital display readout) • Flow rate: 25 ml to 480 ml/min with 5 mm I.D. tubing • MOC: Anodised Aluminium with transparent Polycarbonate ARM cover,

		Rotor MOC: Stainless Steel, Rollers: Carbon Filled Nylon • Accuracy: +/-2 % • Differential Pressure: up to 2.5 kg/cm^2 • Supply: 230 v, 50 Hz. Single phase AC • On/off switch with built in indication for AC mains control
7.	Piping	Stainless Steel and PU pipe Pipe and pipe fitting should be of Stainless Steel 304 or higher grade: Size 1/4"
8.	Base plate and dust cover	Base plate must be of stainless steel 304 Grade and dust cover should be provided along with set-up
9.	Valves	Ball valves, compatible to 1/4" pipe
10.	Control Panel	PID controller with standard make on-off switch, Mains Indicator etc.
11.	Temperature sensor	RTD PT-100 type or better
12.	Cage structure	An Aluminium Profile Rigid Structure painted with industrial PU Paint
13.	Instruction manual	An ENGLISH instruction manual consisting of experimental procedures, block diagram, and troubleshooting etc. should be provided along with the Apparatus.

UTILITIES REQUIRED

Sl. No.	**Items**	**Details specifications**
1	Electricity	Single Phase, 220 V AC, 50 Hz, 5-15 Amp combined socket with earth connection. Earth voltage should be less than 5 volts
2	Water	Required.

2) PLUG FLOW TUBULAR REACTOR (STRAIGHT TUBE TYPE):

The set-up should be able to perform a non-catalytic homogeneous reaction under ambient condition in plug flow tubular reactor. The complete set up must consist of a straight tube type plug flow reactor kept horizontally and inclined upward at outlet, two feed tanks, peristaltic pumps, valves and sample collection port.

It should be capable of:

- Saponification reaction study in straight tube plug flow reactor.
- To determine the Reaction Rate Constant.

TECHNICAL SPECIFICATIONS:

Sl. No.	Items	Details specifications
1.	Reactor	MOC: Borosilicate Glass OD: 32 mm ID: 25 mm Length: approx. 120 cm Reactor should be designed properly with all safety provisions
2.	Feed Tank (2 Nos.)	MOC: Stainless steel 304 Grade Capacity: 20 litres
3.	Feed Pump (1 No.)	Peristaltic Pump • Max RPM: 10-196 rev/min (With direct digital display readout) • Flow rate: 25 ml to 480 ml/min with 5 mm I.D. tubing • MOC: Anodised Aluminium with transparent Polycarbonate ARM cover, Rotor MOC: Stainless Steel, Rollers: Carbon Filled Nylon • Accuracy: +/-2 % • Differential Pressure: up to 2.5 kg/cm^2 • Supply: 230 v, 50 Hz. Single phase AC • On/off switch with built in indication for AC mains control
4.	Piping	Stainless Steel 304 Grade and PU pipe
5.	Cage structure	An Aluminium Profile Rigid Structure painted with industrial PU Paint
6.	Instruction manual	An ENGLISH instruction manual consisting of experimental procedures, block diagram, and

troubleshooting etc. should be provided along with the Apparatus.

UTILITIES REQUIRED

Sl. No.	Items	Details specifications
1	Electricity	Single Phase, 220 V AC, 50 Hz, 5-15 Amp combined socket with earth connection. Earth voltage should be less than 5 volts
2	Water	Required.

3) R.T.D. STUDIES IN CONTINUOUS STIRRED TANK REACTOR with DATA LOGGING FACILITIES:

The set-up should be able to study the exact behaviour of continuous stirred tank reactor by using RTD. The complete set up must consist of a continuous stirred tank reactor fitted with suitable stirrer, one feed tank, peristaltic pump, valves, tracer injection port and sample collection port.

It should be capable of:

- To plot RTD curve for continuous stirred tank reactor.
- To determine the Dispersion Number.

TECHNICAL SPECIFICATIONS:

Sl. No.	Items	Details specifications
1.	Reactor	MOC: Stainless steel 304 Grade Capacity: 2 litres Reactor should be designed properly with all safety provisions
2.	Stirrer	Stainless steel 304 Grade impeller and shaft coupled with FHP motor with speed controller
3.	Feed Tank (1No.)	MOC: Stainless steel 304 Grade Capacity: Approx. 20 litres
4.	Feed Pump (1No.)	Peristaltic Pump • Max RPM: 10-196 rev/min (With direct digital display readout) • Flow rate: 25 ml to 480 ml/min with 5 mm I.D. tubing • MOC: Anodised Aluminium with transparent

		Polycarbonate ARM cover, Rotor MOC: Stainless Steel, Rollers: Carbon Filled Nylon • Accuracy: +/-2 % • Differential Pressure: up to 2.5 kg/cm^2 • Supply: 230 v, 50 Hz. Single phase AC • On/off switch with built in indication for AC mains control
5.	Piping	Stainless Steel 304 Grade and PU pipe
6.	Base plate and dust cover	Base plate must be of stainless steel 304 Grade and dust cover should be provided along with set-up
7.	Tracer Injection port	Tracer injection port should be located in the feed line of the reactor
8.	Control Panel	Standard make on off switch, Mains Indicator etc.
9.	Data logging software	The software should enables user to ➢ Log the real time experimental data and tabulate the experimental/sample reading according to the requirement of experiment. ➢ User should have a control on data logging, printing the stored data and preparing spread sheets in Excel. ➢ Flexible graph plotting facility should also be available in the software
10.	Cage structure	An Aluminium Profile Rigid Structure painted with industrial PU Paint
11.	Instruction manual	An ENGLISH instruction manual consisting of experimental procedures, block diagram, and troubleshooting etc. should be provided along with the Apparatus.

UTILITIES REQUIRED

Sl. No.	**Items**	**Details specifications**
1.	Electricity	Single Phase, 220 V AC, 50 Hz, 5-15 Amp combined socket with earth connection. Earth voltage should be less than 5 volts
2.	Water	Required.

4) PLUG FLOW TUBULAR REACTOR WITH RTD STUDIES:

The set-up should be able to perform a non-catalytic homogeneous reaction under ambient condition in plug flow tubular reactor & to study the behaviour of plug flow tabular reactor by using RTD. The complete set up must consist of a helical coil tube type plug flow reactor with one feed tank, peristaltic pumps, valves, tracer injection port and sample collection port.

It should be capable of:

- Saponification reaction study in Plug Flow Tubular Reactor.
- To determine Reaction Rate Constant.
- To plot RTD curve for Plug Flow Reactor
- To determine the Dispersion Number.

TECHNICAL SPECIFICATIONS:

Sl. No.	Items	Details specifications
1.	Reactor	Type: Helical coil tube Type MOC: Stainless steel 304 Grade Capacity: 0.5-1.0 litres or equivalent Reactor should be designed properly with all safety provisions
2.	Feed Tank (2 Nos)	MOC: Stainless steel 304 Grade Capacity: Approx. 20 litres
3.	Feed Pump	Peristaltic Pump for each reactant • Max RPM: 10-196 rev/min (With direct digital display readout) • Flow rate: 25 ml to 480 ml/min with 5 mm I.D. tubing • MOC: Anodised Aluminium with transparent Polycarbonate ARM cover, Rotor MOC: Stainless Steel, Rollers: Carbon Filled Nylon • Accuracy: +/-2 % • Differential Pressure: up to 2.5 kg/cm^2 • Supply: 230 v, 50 Hz. Single phase AC • On/off switch with built in indication for AC mains control
4.	Piping	Stainless Steel 304 Grade and silicon pipe
5.	Tracer Injection port	Tracer injection port should be located near the feed inlet of reactor

6.	Stop watch	Electronic water resistant stopwatch with ± 0.01% accuracy and 24 hrs time range of reliable company
7.	Base plate and dust cover	Base plate must be of stainless steel 304 Grade and dust cover should be provided along with set-up
8.	Cage structure	An Aluminium Profile Rigid Structure painted with industrial PU Paint
9.	Instruction manual	An ENGLISH instruction manual consisting of experimental procedures, block diagram, and troubleshooting etc. should be provided along with the Apparatus.

UTILITIES REQUIRED

Sl. No.	Items	Details specifications
1.	Electricity	Single Phase, 220 V AC, 50 Hz, 5-15 Amp combined socket with earth connection. Earth voltage should be less than 5 volts
2.	Water	Required.

5) R.T.D. STUDIES IN PACKED BED REACTOR:

The set-up should be designed to study the axial diffusion and dispersion of fluid in packed bed by using RTD. The complete set up must consist of three glass columns packed with two types of packing materials (e.g. Rasching Rings, glass beads/barrel saddles etc.) and of two different sizes with one feed tank, peristaltic pump, valves, liquid distributor (fitted at the bottom of the column), tracer injection and sample collection ports. First and second columns should be of same size and packed with different Packings to study the effect of Packing. Third column must be of different size and packed with same packing material as in second column to study the effect of diameter.

It should be capable of:

- To plot RTD curve for Packed Bed Reactor.
- To determine the Dispersion Number.
- To study the effect of Packings and column diameter on dispersion.

TECHNICAL SPECIFICATIONS:

Sl. No.	Items	Details specifications
1.	Reactor Column (3 Nos.)	MOC: Borosilicate Glass 1&2 column: Diameter: 50 mm, Length: should be around 1 m. 3rd column: Diameter: 74 (approx) mm, Length: should be around 1 m.
2.	Packing materials	2 different packing materials like Rasching rings (size~8-10mm) and glass beads/ barrel saddles (size~4-5mm)
3.	Feed Tank (1 No.)	MOC: Stainless steel 304 Grade Capacity: Approx. 20 litres
4.	Feed Pump (1 No.)	Peristaltic Pump • Max RPM: 10-196 rev/min (With direct digital display readout) • Flow rate: 25 ml to 480 ml/min with 5 mm I.D. tubing • MOC: Anodised Aluminium with transparent Polycarbonate ARM cover, Rotor MOC: Stainless Steel, Rollers: Carbon Filled Nylon • Accuracy: +/-2 % • Differential Pressure: up to 2.5 kg/cm^2 • Supply: 230 v, 50 Hz. Single phase AC • On/off switch with built in indication for AC mains control
5.	Piping	Stainless Steel 304 grade and Silicon pipe
6.	Tracer Injection port	Tracer injection port should be located near the lower end of reactor column
7.	Sample collection ports	Sample collection port should be located at three different locations/heights from the bottom of the reactor column
8.	Stop watch	Electronic water resistant stopwatch with ± 0.01% accuracy and 24 hrs time range of reliable company
9.	Base plate and dust cover	Base plate must be of stainless steel 304 Grade and dust cover should be provided along with set-up
10.	Cage structure	An Aluminium Profile Rigid Structure painted with industrial PU Paint

11.	Instruction manual	An ENGLISH instruction manual consisting of experimental procedures, block diagram, and troubleshooting etc. should be provided along with the Apparatus.

UTILITIES REQUIRED

Sl. No.	Items	Details specifications
1.	Electricity	Single Phase, 220 V AC, 50 Hz, 5-15 Amp combined socket with earth connection. Earth voltage should be less than 5 volts
2.	Water	Required.

6) ANNULAR UV PHOTO REACTOR:

The set-up should be able to perform parameter study under batch/continuous flow condition for a photo catalytic reaction using a UV source provided in the form of an UV tube. The complete set up must consist of a Reactor with inside reflecting surface, an UV source, feed tank, peristaltic pump, valves and sample collection ports.

It should be capable of:

- To calculate the first order rate constant for the photo catalytic oxidation of formic acid.

TECHNICAL SPECIFICATIONS:

Sl. No.	Items	Details specifications
1.	Reactor	MOC: Borosilicate Glass and Stainless steel 304 Grade with inside reflective surface Capacity: Effective volume of the reactor should be around 1-1.5 litres Reactor should be designed properly with all safety provisions
2.	UV source	An UV source of 16 W or equivalent, surrounding glass/quartz cylinder should be placed centrally in the reactor
3.	Feed Tank (1 No.)	MOC: Stainless steel 304 Grade Capacity: Approx. 5 litres
4.	Feed Pump (1 No.)	Peristaltic Pump • Max RPM: 10-196 rev/min (With direct digital display readout) • Flow rate: 25 ml to 480 ml/min with 5 mm I.D. tubing • MOC: Anodised Aluminium with transparent Polycarbonate ARM cover,

		Rotor MOC: Stainless Steel, Rollers: Carbon Filled Nylon • Accuracy: +/-2 % • Differential Pressure: up to 2.5 kg/cm^2 • Supply: 230 v, 50 Hz. Single phase AC • On/off switch with built in indication for AC mains control
5.	Piping	Stainless Steel 304 grade and PU pipe
6.	Sampling ports	Sampling points should be provided at inlet & outlet of reactant line
7.	Control Panel	Control panel should consist of a standard make on-off switch, Mains Indicator, fuse, power supply to UV source etc.
8.	Cage structure	An Aluminium Profile Rigid Structure painted with industrial PU Paint
9.	Instruction manual	An ENGLISH instruction manual consisting of experimental procedures, block diagram, and troubleshooting etc. should be provided along with the Apparatus.

UTILITIES REQUIRED

Sl. No.	**Items**	**Details specifications**
1	Electricity	Single Phase, 220 V AC, 50 Hz, 5-15 Amp combined socket with earth connection. Earth voltage should be less than 5 volts
2	Water	Required.

7) KINETICS OF DISSOLUTION OF BENZIOC ACID:

The set-up should be able to perform the kinetics study of dissolution of benzoic acid in water. The complete set up must consist of a reactor fitted with a jacketed heater, a variable speed mixer, baffles, and a pelletizer.

It should be capable of:

- To study the Kinetics of dissolution of Benzoic Acid.

TECHNICAL SPECIFICATIONS:

Sl. No.	Items	Details specifications
1.	Reactor	MOC: Stainless steel 304 Grade Capacity: Approx. 1 litre Reactor should be designed properly with all safety provisions
2.	Stirrer	Stainless steel 304 Grade impeller and shaft coupled with FHP motor
3.	Jacketed Heater	Nichrome wire heater or better
4.	Pelletizer	Pelletizer should be of 1 inch diameter and 2 inch height made of S.S. 304 grade with spanner of compatible size
5.	Piping	Stainless Steel 304 Grade and PU pipe
6.	Base plate and dust cover	Base plate must be of stainless steel 304 Grade and dust cover should be provided along with set-up
7.	Control Panel	Standard make on off switch, Mains Indicator etc.
8.	Cage structure	An Aluminium Profile Rigid Structure painted with industrial PU Paint
9.	Instruction manual	An ENGLISH instruction manual consisting of experimental procedures, block diagram, and troubleshooting etc. should be provided along with the Apparatus.

UTILITIES REQUIRED

Sl. No.	Items	Details specifications
1.	Electricity	Single Phase, 220 V AC, 50 Hz, 5-15 Amp combined socket with earth connection. Earth voltage should be less than 5 volts

2.	Water	Required.

8) VAPOUR-LIQUID EQUILIBRIUM:

The set-up should be able to study the vapor-liquid equilibrium of an organic solvent. The complete set up must consist of a distillation still with a heating element connected with an electrical Dimmerstat for varying the heat input, a condenser, cooling water tank, temperature sensors, and a Refractometer etc.

It should be capable of:

- To determine the vapor Liquid Equilibrium curve of an organic solvent, e.g. CCl_4, Toluene etc.

TECHNICAL SPECIFICATIONS:

Sl. No.	Items	Details specifications
1.	Distillation still	MOC: Stainless steel 304 Grade Capacity: Approx. 1 litre The distillation still should be well insulated by proper insulation materials e.g. ceramic wool or better and should be designed properly with all safety provisions
2.	Condenser	Concentric Tube type
3.	Heater	Nichrome wire heater or better
4.	Temperature Sensors	RTD PT-100 type or equivalent
5.	Cooling Water Tank	MOC: Stainless steel 304 Grade Capacity: Appox. 15 litres
6.	Cold Water circulation	Using Polyproplene FHP Pump
7.	Piping	Stainless Steel 304 Grade and PU pipe
8.	Base plate and dust cover	Base plate must be of stainless steel 304 Grade and dust cover should be provided along with set-up
9.	Control Panel	Control panel should consist of a Digital Voltmeter (0-300 Volt), a Dimmer stat (0-230 V, 2A.) and a Digital Temperature Indicator (0-200 ºC) with multi-channel switch, Standard make on-off switch, Mains Indicator etc.

10.	Cage structure	An Aluminium Profile Rigid Structure painted with industrial PU Paint
11.	Instruction manual	An ENGLISH instruction manual consisting of experimental procedures, block diagram, and troubleshooting etc. should be provided along with the Apparatus.

UTILITIES REQUIRED

Sl. No.	**Items**	**Details specifications**
1.	Electricity	Single Phase, 220 V AC, 50 Hz, 5-15 Amp combined socket with earth connection. Earth voltage should be less than 5 volts
2.	Water	Required.

9) REFRIGERATION TEST BENCH:

The set-up should design to demonstrate the basic principal of a refrigeration cycle. The complete set up must consist of a test bench for the study of thermodynamics of vapor Compression refrigeration cycle, a compressor, a condenser, a evaporator, rotameters, pressure gauges, temperature sensors, and safety control etc.

It should be capable of:

- To Study the Vapor Compression refrigerator cycle
- To Calculate Co-efficient of performance.

TECHNICAL SPECIFICATIONS:

Sl. No.	**Items**	**Details specifications**
1.	Compressor	Type: Reciprocating type hermitically sealed compressor Make: Emerson Copeland make or equivalent Capacity: Approx. 1/2 Ton The compressor should be designed properly with all safety provisions
2.	Condenser	Air cooled compatible to compressor with condenser cooling fan of compatible capacity and with permanent lubricated motor
3.	Evaporator	MOC: Stainless steel 304 Grade Evaporator must be insulated with ceramic wool/P.U.F or equivalent
4.	Refrigerant	R-134-A type or better

5.	Agitator	Compatible capacity
6.	Expansion Device	Capillary Tube of compatible capacity
7.	Temperature Sensors	RTD PT-100 type or equivalent
8.	Pressure Gauges	Digital pressure gauges should be provided to measure the suction & discharge pressure
9.	Rotameters	Make: Eureka or better Range: Approx. 5-50 LPH
10.	Safety Control	Overload and over current protectors for compressor and Time delay circuit with Low/high voltage auto-cut.
11.	Piping	Stainless Steel 304 Grade and PU pipe
12.	Accessories	All other accessories like Hand shut off valves, filter drier and Thermostat (Danfoss make or equivalent) should be provided
13.	Base plate and dust cover	Base plate must be of stainless steel 304 Grade and dust cover should be provided along with set-up
14.	Control Panel	Control panel should consist of a Digital Voltmeter (0-500 Volt), a Digital Ammeter (0-20 Amp.) and a Digital Temperature Indicator (0-200 ºC) with multi-channel switch, Standard make on-off switch, Mains Indicator etc.
15.	Cage structure	An Aluminium Profile Rigid Structure painted with industrial PU Paint
16.	Instruction manual	An ENGLISH instruction manual consisting of experimental procedures, block diagram, and troubleshooting etc. should be provided along with the Apparatus.

UTILITIES REQUIRED

Sl. No.	**Items**	**Details specifications**
1.	Electricity	Single Phase, 220 V AC, 50 Hz, 5-15 Amp combined socket with earth connection. Earth voltage should be less than 5 volts
2.	Water	Required.

- **General supply for all experimental set-ups:**

  - The whole well designed set-up should be arranged on a strong rigid Aluminium structure with industrial PU paint.
  - An ENGLISH instruction manual comprising of experimental procedures, block diagrams, installation and operating procedure of software, precautions and maintenance instructions, troubleshooting etc. should be provided along with the apparatus.
  - The experimental set-ups along with the Data-Logging must contain laminated well described process and instrumentation diagram on the panel.

Annexure : B

Technical Compliance Sheet

Specifications	**Compliance of quoted model**	**Compliance of alternate model**	**Remarks (Deviations)**

Annexure: C

FORMAT FOR MANUFACTURER'S AUTHORISATION CERTIFICATE

To,
The Registrar
Indian Institute of Technology Ropar
Nangal Road, Rupnagar-140001

Sub. : Tender for "_____".

Dear Sir,

We,_____, who are established and reputed manufacturers of _____, having factory/office at_____, hereby authorize M/s _____ [name & address of agents/distributors] to bid, negotiate and conclude the order with you for the above goods manufactured by us.

We shall remain responsible for the tender/Agreement negotiated by M/s _____, jointly and severely. No company or firm or individual other than M/s _____ are authorized to bid, negotiate and conclude the order in regard to this business against this specific tender as for all business in the entire territory of India.

An agency commission of ____% included in the FOB price is payable to M/s _____. We hereby extend our full guarantee and warranty as per the terms and conditions of tender for the goods offered for supply against this invitation for bid by the above supplier.

1. _____

2. _____

*specify in detail manufacturer's responsibilities+the services to be rendered by M/s_____ are as under:

i) _____

ii) _____

[Specify the services to be rendered by the agent/distributor] In case duties of the agent/distributor are changed or agent/ distributor is changed it shall be obligatory on us to automatically transfer all the duties and obligations to the new Indian Agent failing which we will ipso-facto become liable for all acts of commission or omission on the part of new Indian Agent/ distributor.

Yours faithfully,

[Name & Signature]
For and on behalf of M/s. _____ [Name of manufacturer]

Note: This letter of authorization should be on the letterhead of the manufacturing concern and should be signed by a person competent and having the power of attorney to bind the manufacturer.

Annexure: D

FORMAT FOR NON BLACKLISTING OF SUPPLIER

I/ We _____Manufacturer/partner/Authorized Distributor/Agent (strike out which is not applicable) of (Supplier) _____ do hereby declare and solemnly affirm that the individual/firm/company is not black-listed by the Union/State Government/Autonomous body.

Deponent

Address _____

I/ We hereby solemnly declare and affirm that the above declaration is true and correct to the best of my knowledge and belief. No part of it is false and nothing has been concealed.

Deponent

Dated: _____

(Note: To be furnished on non-judicial stamp paper duly attested by the Oath Commissioner.)

Annexure: E

FORMAT FOR THE SUBMISSION OF RATES – PRICE BID

(To be submitted on the letterhead of the company/firm)

Name of the Equipment _____

Name of the Manufacturer _____

Make of the Equipment _____

Model Number _____

County of Origin _____

Sl. No.	Particulars	Rate/Unit
1	Cost of the equipment with 3 years comprehensive warranty (FOB value including Indian Agency Commission)	
2	Air freight, Insurance charges etc. (In case of import item)	
3	Total CIF value up to New Delhi Airport (In case of import item)/ Total FOR IIT Ropar value (In case of indigenous item)	
4	AMC charges for 1st year after expiry of warranty	
5	AMC charges for 2nd year after expiry of warranty	
6	AMC charges for 3rd year after expiry of warranty	
7	Percentage of Indian Agency Commission (IAC) payable to the Indian Agent, if any (In case of import item).	
8	FOR charges in Rupees including clearance, loading & unloading, transportation and insurance from New Delhi Airport to IIT Ropar (In case of import item)	
9	Packing dimension of the equipment	
10	Gross weight of the equipment after packing	

This is certified that the rates quoted above are not more than the rates charged from any other Institute/ Department/Organization.

Note:
1. Taxes and other levies, if any are to be clearly specified in the bid.

Annexure: F

PROFORMA FOR USER/CLIENT LIST

Sl. No.	Name & full address of purchaser	Purchase Order No. & Date	No. of Units (Qty)	Model No. with Date of Installation	Contact person with cell, phone and e-mail id

Annexure: G

CERTIFICATE OF WARRANTY

i). I/We certify that the warranty shall be for a period of 3 years comprehensive onsite warranty starting from the date of satisfactory installation, commissioning and handing over of the equipment and of the works conducted therewith covered under the supply order in working order. During the warranty period, I/we shall provide free "after sale service" and the replacement of any part(s) of the equipment or rectification of defects of work of the equipment will be free of cost. The replacement of the parts shall be arranged by us, at our own cost and responsibility. We undertake that the above warranty shall begin only from the date of satisfactory and faultless functioning of the equipment for 60 days at IIT Ropar premises. The benefit of change in dates of the warranty period shall be in the interest of the use/your organization.

ii). During the warranty period, we shall provide at least 3 preventive maintenance visits.

iii). Uptime Guarantee: During the warranty period, we will be responsible to maintain the equipment in good working conditions for a period 328 days (i.e. 90% uptime) in a block of 365 days.

a). All complaints will be attended by us within 2 weeks of receipt of the complaint in our office.

b). In case there is delay of more than 2 weeks in attending to a complaint from our side then you can count the number of days in excess of the permissible response time in the downtime. The above said response time of 2 weeks for attending to a complaint by us will not be counted in the downtime.

c). Penalty: We shall pay a penalty equivalent to 0.1 % of the FOB value of the equipment for every week or part thereof delay in rectifying the defect.

Note: The right to accept the reason (s) for delay and consider reduction or waive off the penalty for the same shall be at the sole discretion of Director, IIT Ropar

iv. We certify that the equipment being/quoted is the latest model and that spares for the equipment will be available for a period of at least 10 years and we also guarantee that we will keep the organization informed of any update of the equipment over a period of 10 years.

v. We guarantee that in case we fail to carry out the maintenance within the stipulated period, IIT Ropar reserves the right to get the maintenance work carried out at our risk, cost and responsibility after informing us. All the expenses including excess payment for repairs/maintenance shall be adjusted against the Performance Bank Guarantee. In case the expenses exceed the amount of Performance Bank Guarantee, the same shall be recoverable from us with/without interest in accordance with the circumstances.

vi. We shall try to repair the equipment at IIT Ropar premises itself. However, the equipment will be taken to our site on our own expenses in case it is not possible to repair the same at IIT Ropar. We shall take the entire responsibility for the safe custody and transportation of the equipment taken out for repairs till the equipment is rehabilitated to the IIT Ropar after repair Any loss of equipment or its accessories under its charge on account of theft, fire or any other reasons shall be at our sole risk and responsibility which will be compensated to IIT Ropar for such losses at the FOB/CIF value for the damaged/lost equipment/part, including accessories.

vii. We undertake to perform calibration after every major repair/breakdown/taking the equipment for repair out of IIT Ropar premises.

viii. In case of extended warrantee, we undertake to carry out annual calibration of the equipment.

ix. We guarantee that we will supply spare parts if and when required on agreed basis for an agreed price. The agreed basis could be an agreed discount on the published catalogue price.

x. We guarantee to the effect that before going out of production of spare parts, we will give adequate advance notice to you so that you may undertake to procure the balance of the life time requirements of spare parts.

xi. We guarantee the entire unit against defects of manufacture, workmanship and poor quality of components.

Annexure: H

TERMS AND CONDITIONS OF THE SERVICE CONTRACT

1. During the service contract period, the firm shall provide at least 3 preventive maintenance visits per year and attended to all emergent and break-down calls.
2. The service contract charges must be quoted separately for each year strictly as under and quoting of rates in ambiguous terms or in percentage terms etc. shall render the tender liable to rejection :
3. Rate for 1st year = _____ (Rupees in words).
   Rate for 2nd year = _____ (Rupees in words).
   Rate for 3rd year = _____ (Rupees in words).
4. The service contract charges should be quoted only for services and travel cost etc. and should not include the cost of any replacement parts/components which shall be arranged by the IIT ROPAR at its own cost.
5. In each block of 365 days during the entire service contract period the firm will be responsible to maintain the equipment in good working condition for a period 328 days (i.e 90% uptime). The time taken by the IIT ROPAR in providing to the firm the spare parts shall not count towards the down time. All the complaints will be attended by the firm within 2 working days of the dispatch of the complaint to their office. In case there is delay of more than 2 working days in attending to a complaint then the number of days in excess of the permissible response time shall be counted in the downtime. In case total downtime exceeds the permissible downtime a fine equivalent to double the service contract charges shall be recovered from the firm on per day basis.
6. The right to accept the reason(s) for delay and consider reduction or waive off the penalty for the same shall be at the sole discretion of Registrar, IIT Ropar.
7. We undertake to carry out annual calibration of the equipment.
8. We undertake to perform calibration after every major repair/breakdown/taking the equipment for repair out of IIT Ropar premises.
9. The replaced parts shall remain the property of the IIT Ropar.
10. The firm shall try to repair the equipment at IIT Ropar itself. However, the equipment may be taken to their site, on their own expenses if in case it is not possible to repair the same at IIT Ropar. The firm shall take the entire responsibility for the safe custody and transportation of the equipment taken out for repairs till this is handed over the purchaser after repair. Any loss of equipment or its accessories on account of theft, fire or any such reasons shall be the sole risk and responsibility of the firm who will compensate the IIT Ropar for such losses at FOB value of the damaged/lost equipment/part including accessories.
11. During the service contract period the parts/components that may be needing replacement shall made available by the IIT Ropar at their own expenses and all import formalities, payment of customs duty etc., shall be complied with/borne by the IIT Ropar.
12. All service contract charges will be invoiced twice in each year. The payment of the invoice will be made afterwards.
13. No price revisions will be accepted by the IIT Ropar during the entire tenure of the service contract agreement.