

Punjab Tianjin University of Technology, Lahore (PTUT)



Bidding Documents

**for Purchase of Lab Equipment for Mechanical
Engineering Technology Department**

Bid Reference No:	PTUT/PC/03/2022-23
Package Name:	For Purchase of Lab Equipment For Mechanical Engineering Technology Department
Procurement Procedure & Method:	Single Stage Two Envelope
Bid Opening Venue:	Conference Room PTUT
Last date and time for obtaining of bid documents	28-09-2022, 09:30 A.M.
Last date and time for submission of bid documents	28-09-2022, 10:00 A.M.
Opening of Bid Documents	28-09-2022, 10:30 A.M.

CHECK LIST FOR SUBMISSION OF APPLICATION

(please mark ✓ / or X in relevant boxes)

- | | |
|--|--------------------------|
| 1. Detail of company profile/ Firm/ Contractor etc. Profile | <input type="checkbox"/> |
| 2. Original CDR/Earnest Money /Deposit at call attached with Technical Bid.
(Amounting to Rs.560,000/-) | <input type="checkbox"/> |
| 3. Original Tender fee Amounting Rs.2,800/- | <input type="checkbox"/> |
| 4. Affidavit on stamp paper Rs: 100/- | <input type="checkbox"/> |
| 5. Evidence of Company/ Firm/ Sole proprietorship. | <input type="checkbox"/> |
| 6. Copy of National Tax No. | <input type="checkbox"/> |
| 7. List of All Mandatory required documents | <input type="checkbox"/> |
| 8. List of documents required in Technical Evaluation criteria | <input type="checkbox"/> |
| 9. Price offer on Bidder's letter head as of Financial Evaluation Criteria. | <input type="checkbox"/> |
| 10. Active Tax Payer List (ATL) | <input type="checkbox"/> |
| 11. Provincial Sales Tax Number | <input type="checkbox"/> |
| 12. Integrity Pact duly signed on stamp paper of Rs.100/- | <input type="checkbox"/> |

TENDER DOCUMENT

Procurement Notice

PURCHASE OF LAB EQUIPMENT FOR MECHANICAL ENGINEERING TECHNOLOGY DEPARTMENTS FOR PUNJAB TIANJIN UNIVERSITY OF TECHNOLOGY, LAHORE (PTUT).

The Punjab Tianjin University of Technology (PTUT), Lahore intends to purchase of lab equipment for mechanical engineering technology from a well reputed and well-equipped company for supply, install and commissioning of lab equipment of mechanical engineering technology departments.

Interested firms may obtain the signed copy from the office of Project Director (Building and Works), 1st Floor Room No. 120, of university, from 09:00 a.m. to 04:00 p.m. (Monday to Friday) after depositing the Tender Fee of Rs. 2800/- (non-refundable) at BOP, Township (College Road) Branch, Lahore A/c No. 6580064981000010. The Bidding Document is available on websites www.ptut.edu.pk and www.ppra.punjab.gov.pk for information only.

The sealed bids complete in all respect as detailed in bidding documents must reach in the office of Project Director (Building and Works) on or before the last date of submission of bid as indicated on the stamped bid document. The technical proposal will be opened on 28-09-2022 at 10:30 A.M. in the presence of the bidders or their representatives who make them present.

Project Director
Punjab Tianjin University of Technology, Lahore
Ph. 042-99332570

AFFIDAVIT (Stamp paper of Rs: 100/-)

We do hereby confirm that we have carefully read the requirements and instructions of this bidding document and all the terms & conditions of supply, we also do hereby confirm as follows:

1. That, M/s ____ shall abide by all the instructions/conditions of the bidding documents and in addition the other conditions and PTUT rules and regulations, all other special instructions given time to time and enforced PPRA Rules.
2. That, M/s ____ is not blacklisted by any Government/ Semi-Government Department/ Agency/ Autonomous Bodies in any part of Pakistan.
3. That the information given in the application form and bidding documents is correct. In case any of this information is proved incorrect, PTUT reserves the right to reject the bid beside forfeiting the Bid Security and may initiate suitable legal action which may include blacklisting of the Bidder.

Name: _____

Signature: _____

Designation: _____

Stamp: _____

Instructions for the Bidders / TOR's

1. PTUT Lahore invites sealed bids from Company/ Organization registered. Income Tax, NTN/ Sales Tax/ PST etc. Registration Certificates must be provided and should have proven record of providing supply to large government / semi government and other organizations etc. (to be verified by the clients). Company/ Organization should attach valid copies of certificates issued by relevant departments. Bids must be submitted in a sealed envelope clearly marked " Purchase of Lab Equipment For Mechanical Engineering Technology Department" for the university latest by 28-09-2022 on or before 10:00 A.M. in the office of Project Director (Building and works) 1st Floor Room No. 120, of PTUT Lahore.
2. Bidding shall be conducted through Open Competitive Bidding **Single Stage Two Envelope** procedures as per Rule No. 38 (a) of PPRA Rules, 2014, and is open to all eligible bidders as defined in the bidding document.
3. The bidder shall seal the original Technical and Financial bid (separately sealed) into a single envelope. The Bidder shall seal the bids in envelopes, duly marking the envelopes as "Technical" & "Financial". The single sealed envelope containing both sealed bids should be clearly marked "Tender for Purchase of Lab Equipment for Mechanical Engineering Technology Department for PTUT".
The inner envelopes shall also indicate the name and address of the Bidder to enable the bid to be returned unopened in case it is declared "late". No bid may be modified after the deadline for submission of bids. No bid may be withdrawn in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Bid Form. Withdrawal of a bid during this interval may result in the Bidder's forfeiture of its bid security
4. The bidders are requested to give their best and final prices as no negotiations are permissible as per PPRA Rules and regulations
5. Proposal submitted must contain company profile, detail of offices operating in Pakistan with addresses & telephone numbers, total no. of employees, number of years in business, list of present/ past clients, proof of company as legal entity, Affidavit indicating that the company has never been blacklisted by any government/semi government or other organizations etc.
6. Price quoted shall remain valid for a period of 90 days from the closing date of bid submitted. However, bidders are encouraged to extend the validity of their bid (if required). The rates quoted should be in Pak rupee (PKR) and inclusive of all applicable government taxes.
7. The Bid submitted must be accompanied by Bid Security of (Rs. 560,000/-) (Refundable) in the shape of CDR/ Pay Order/Demand Draft from a Scheduled Bank in favor of Punjab Tianjin University of Technology, Lahore. Bids submitted without CDR / Pay Order/ Demand Draft will not be considered and rejected straight away.

8. Bid Security of unsuccessful bidders shall be refunded on the finalization of the contract / tender.
9. Bid security of successful bidder shall be refunded on provision of 10% performance guarantee and signing of agreement within 10 days after the issuance of work order.
10. The bid should be properly page numbered along with Index; Separators should be used for differentiation of various documents.(As indicated in Check list)
11. Bidders are also required to state, the name, job title, contact number (landline, Mobile) and email address of the authorized representative through whom all communications shall be made until the process has been completed.
12. PTUT will not be responsible for any costs or expenses incurred by bidders in connecting with the preparation or delivery of bids.
13. PTUT shall not pay any security deposit or advance payment.
14. The Bidder will be fully responsible in case of misconduct caused by the company personnel/ supply.
15. If two or more bidders quoted equal rate in bid, then the contract will be awarded to the one gaining higher marks in the technical evaluation.
16. Contract will be made between PTUT and company on judicial paper of 0.25% of Contract value that will be provided by the successful bidder.
17. The bid of all bidders will be opened publicly at a time, date and venue specified in tender/ advertisement) observing SOPs of COVID-19.
18. The lowest responsive/ evaluated bid shall be accepted.
19. Violations to the instruction of the bidding documents will lead to a penalty of up to 10% of the Contract Value. Delayed delivery will lead to fine @ 0.05% per day or up to a maximum of 10% of the contract value. All fines and penalties will be deducted by the PTUT from the payments of the Company.
20. Bidder/ Supplier shall be responsible for all the taxes/ duties/ transportation charges required to be paid under relevant law.
21. The Bidder/ Supplier will be fully responsible to provide satisfactory supply/ services at PTUT.
22. Joint venture/ consortium is not eligible for this tender.
23. In case bidder desires to quote higher specification, the same should be provided in the respective column of the form of bid against the specific item. The Bidder should quote only one brand/ model/ make of each item.

24. Country of manufacturing, Brand / Model of each & every item must be provided in the bid against the specific item with all its relevant literature attached.
25. In case items quoted by the bidder are of higher or better specification, that are duly verified by the technical evaluation committee of PTUT, his/ her bid will be treated responsive.
26. PTUT can verify any or all documents/ information submitted by the bidder. In case of bogus documents and wrong information the same would not be considered for evaluation and the bid will be rejected. PTUT reserves the rights of imposing penalty as per clause 19 of this document.
27. The Procurement Committee shall have the right to inspect and/ or test the goods to confirm their conformity with respect to specifications mentioned in the work Order.
28. Should any inspected or tested goods fail to conform to the specifications, PTUT shall reject them, and bidder shall replace the rejected goods at its own cost.
29. Bidders should clearly indicate the Name and Full Address of their Principals in favor of which L.C. shall be opened. Also a certificate in original is required showing that bidder is an authorized dealer (preferably sole agent) for the bidding equipment.
30. The bidders must submit Performa invoice in original form/shape from their principals duly signed and clearly indicating:
 - i. The complete specifications of each item as per tender document,
 - ii. The name of the manufacturer and country of origin along-with a certificate (as under) authorizing them to quote on their behalf.

“This is to certify that M/s _____ have obtained quotation from us against invitation to tender due on _____ and we have agreed to supply/manufacture the equipment strictly in accordance with the specifications laid down in the said invitation to tender”.
- 31. Pre-bid meeting (if required) will be scheduled and communicated to bidders.**
32. Successful Bidders will provide following items:
 - i. Supplier’s signed invoice should show separate value of each item duly signed in ink bearing the Bidder’s stamp.
 - ii. Signed & stamped packing list should show measurement, quantity and weight of packages & their numbers.
 - iii. Freight memo.
33. Copy of LC, Bill of landing shall be provided to PTUT and the same can be verified by PTUT Independently. In case found guilty, the supplier will bear the cost of equipment and allied in addition to forfeiture of performance guarantee.

34. Transportation cost from dry port to PTUT Premises, Custom duty, insurance cost and other similar costs shall be specified and quoted separately in addition to the price of the equipment as specified in price schedule/ Financial bid form.
35. The Earnest Money/CDR shall be returned to the technically disqualified Bidders with their unopened/ sealed financial bid.
36. If the acceptance of tender issued during the validity period of the tender is not accepted by the bidder, the Earnest Money/CDR shall be forfeited and the equipment purchased will be at the risk and expense of the bidder.
37. In case the offer is withdrawn, amended or revised during the validity period during the tender process, the Earnest Money/CDR/Performance money shall be forfeited.
38. In case, the bidder fails to execute the contract strictly in accordance with the terms and conditions laid down in the contract, the Performance guarantee deposited by the bidder shall be forfeited and the equipment purchased will be at bidder's risk and expense.
39. PTUT will get the equipment inspected at PTUT, Lahore premises and reject the equipment, if not found according to the given specifications.
40. After Sale, service and supply of spare parts must be guaranteed for a period of five years.
41. Delivery period will be four months (120 days) from the date of work order. Suppliers may however, quote their best delivery period.
42. PTUT reserves the right at the time of award of contract to increase or decrease the quantity of equipment
43. In case of any material is found in non-conformity to the specifications provided in the tender, either on account of inferior quality, defective workmanship, faulty design, faulty packing; or is short supplied, wrongly supplied, the supplier is bound to replace such material free of charge or pay the full cost of replacement.
44. Grievance (if any) against the tendering process shall be entertained up to 10 days after announcement of lowest bidder over PPRA. Any grievance received after this duration shall not stand valid/entertained.
45. The bidder is bound to supply the whole quantity in a single consignment within the due date.

Rejection/ Acceptance of the Tender

The Client shall have the right, at its exclusive discretion to reject any or all tender(s), cancel the Tendering process at any time prior to award of formal work order, without assigning any reason or any obligation to inform the Bidder of the grounds for the Client's action, and without thereby incurring any liability to the Bidder and the decision of the Client shall be final.

The Tender shall be rejected if any of the following occurs:

- i. It is substantially non-responsive
- ii. Received without original bid security attached with technical bid
- iii. Received after the time and date fixed for its receipt
- iv. The offer is ambiguous
- v. The offer is received by fax or e-mail
- vi. The offer is from a black listed firm
- vii. Offer received with shorter validity than required
- viii. The offer is not conforming to requirements indicated in the tender documents
- ix. Any conditional offer
- x. It is submitted in other than prescribed forms, documents / by other than specified mode; or it is incomplete, un-sealed, un-signed, partial, conditional, alternative, and late; or it is subjected to interlineations / cuttings / corrections / erasures / overwriting.
- xi. The Bidder submits more than one Tenders;
- xii. The Bidder refuses to accept the corrected Total Tender Price; or The Bidder has a conflict of interest with the Client;
- xiii. Not attaching Integrity Pact on Stamp paper of Rs.100/- with the technical bid
- xiv. The client has the right to forfeit the CDR in case the bidder violates any instructions to bidders of this document.
- xv. The bid security will be forfeited, in case of withdrawal of bid after opening of bids

BIDDING FORMS

BID SUBMISSION FORM

Date: _____
No: _____

To, [Client Address]

Having examined the bidding documents including, the receipt of which is hereby duly acknowledged, we, the undersigned, offer for, “Purchase of **lab equipment for mechanical engineering technology department** for PTUT” in conformity with the said bidding documents.

We undertake, if our Bid is accepted, to deliver the services in accordance with the delivery schedule specified.

In case our bid is accepted, we will obtain and submit the CDR or any other form acceptable to the client in a sum equivalent to 10% of the contract price for the due performance of the contract, in the form prescribed by the client.

We agree to abide by this Bid for a period up to 90 days fixed for Bid opening and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

Until a formal Contract is prepared and executed, this Bid, together with your written acceptance thereof and your notification of award, shall constitute a binding Contract between us.

We understand that you are not bound to accept the lowest or any bid you may receive.

Dated this _____ day of _____ 2022.

[Signature]

[in the capacity of]

Duly authorized to sign Bid for and on behalf of Company

Mandatory Requirements-

Bidder must furnish following information:

Sr. No.	Criteria	Requirement
1.	Evidence of Company/Firm/ Sole proprietorship	Mandatory
2.	Certificate of valid Income Tax Registration Certificate.	Mandatory
3.	Compliance to the Checklist attached for bid submission	Mandatory
4.	Affidavit on attested stamp paper that the bidder is not black listed by the Provincial or Federal Government Department, Agency, Organization or autonomous body anywhere in Pakistan.	Mandatory
5.	Meeting the specification of items as specified in Form-II of the quoted items	Mandatory

It is mandatory to fulfill above stated requirements for all bidders. Any bidder not fulfilling above criteria will be considered as non- responsive bidder and will not be taken into consideration for Technical and Financial Evaluation. However, the technically qualified bidder with lowest rates will be awarded the work order (subject to fulfillment of all required conditions of bidding document & PPRA Rules, 2014).

Technical Evaluation Criteria
**TECHNICAL EVALUATION CRITERIA FOR PURCHASE OF MECHANICAL LAB
EQUIPMENT**

Sr. No.	Technical Criteria	Maximum Marks
1.	No. of clients (5 Marks per client)	20
2.	Work Order of similar nature of similar or higher value (5 marks for each work order)	20
3.	Number of Employees on Company Payroll, Attach List No. of employees greater than 10 = 20 marks 5 to 10 = 15 marks Less than 5 =10 marks	20
4.	Age of Company (2 Marks per year)	10
5.	Income Tax return for last 2 years (5 marks each year)	10
6.	Offices held in Pakistan in various cities, Attach List (01 Marks per office across Pakistan)	05
7.	Broachers/Catalogue of quoted items	05
8..	Annual amount Credited in PKR in bank statement for last Financial year Less than Rs. 5,000,000/- = 0 Marks 5,000,000-10,000,000= 5 Marks More than 10,000,000= 10 Marks	10
Total		100

- i. Obtaining 60 out of 100 Marks are compulsory to be technically qualified. All bids will be evaluated on basis of above given evaluation criteria and the bidders who do not obtain 60 marks as per above mentioned evaluation criteria will be considered as technically non- responsive bidders and will not be taken into consideration for Financial Evaluation. However technically qualified bidders (Responsive to Evaluation Criteria) will be considered as responsive bidder, and among technically responsive and qualified bidders, the bidder with lowest rates will be awarded the contract (subject to fulfillment of all required conditions of bidding document & PPRA Rules, 2014).

Technical Proposal Submission Form on the letter head of the firm
(Part of Technical Bid Envelope)

[Location, Date]

To

Project Director B&W,

PTUT Lahore.

Dear Sir,

We, the undersigned, offer to provide the _____ in accordance with your Request for proposal / bidding document.

We also confirm that the Government of Pakistan / Punjab has not declared us, or any, ineligible on charges of engaging in corrupt, fraudulent, collusive or coercive practices. We furthermore, pledge not to indulge in such practices in competing for or in executing the Contract, and we are aware of the relevant provisions of the bidding Document.

We understand you are not bound to accept any Proposal you receive.

Authorized Signature

Name and Designation of Signatory

Name of Firm and Address

Technical Bid (Specifications and Schedule of Requirement)

Must be filled separately on the letterhead of the firm

(Part of Technical Bid Envelope)

Having examined the bidding documents the receipt of which is hereby duly acknowledged, we, the undersigned, offer to supply, install, and commission the following items in conformity with the below mentioned required specification mentioned against each item.

S/N	Item Name	Specifications	Quantity	Country of Manufacturing	Quoted Brand/ Model
1	ITEM NO 1: RAC LAB				
2	ITEM NO 2: MECHANICS OF MACHINES / STATIC AND DYNAMIC				
3	ITEM NO 3: THEORY OF MACHINES				
4	ITEM NO 4: STRENGTH OF MATERIALS/ MECHANICS OF MATERIAL				
5	ITEM NO 5: HEAT TRANSFER / THERMODYNAMICS				
6	ITEM NO 6: FLUID MECHANICS LAB				
7	ITEM NO.7: WORKSHOP PRACTICE LAB				
8	ITEM NO.8: MACHINE SHOP LAB”				

- i.** Bidder can quote for each item.
- ii.** Financial Evaluation will be carried out on each item basis. Work award will be issued on each item basis to the lowest evaluated and technically qualified bidder.
- iii.** Bidder must quote proper brands and models of the required items, bidders without quoting proper brand / model will be rejected.

The Contract / Completion of Work duration shall be maximum 120 days, starting from the date of issuance of work order.

Date: _____

Place: _____

Authorized Signature
 (In full and initials)
 Name and Designation of Signatory
 Name of Firm and Address

Financial Proposal Submission Form on the letter head of the firm
(Part of Financial Bid Envelope)

[Location, Date]

To

Project Director B&W,
PTUT Lahore.

Dear Sir,

We, the undersigned, offer to provide the _____ in accordance with your request for proposal / bidding documents and our attached Financial Proposal is for the sum of (insert amount in words and figures).

Our financial proposal shall be binding upon us up to expiration of the validity period of the Proposal.

We also declare that the Government of Pakistan / Punjab has not declared us or any Sub-Contractors for any part of the Contract, ineligible on charges of engaging in corrupt, fraudulent, collusive, or coercive practices. We, furthermore, pledge not to indulge in such practices in competing for or in executing the Contract and are aware of the relevant provisions of the bidding Document.

Authorized Signature

Name and Designation of Signatory

Name of Firm and Address

8	ITEM NO.8: MACHI NE SHOP LAB”																
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Grand Total in figures (Inclusive of all types of applicable Taxes)

Grand Total in words (Inclusive of all types of applicable Taxes)

NOTE: Please read carefully before filling of above-mentioned columns.

- i. Any fresh tax/ charges imposed or exempted (both conditions) notified after the bid opening date by any federal/ provincial governments, will be adjusted/ accepted as per rules / laws.
- ii. Missing or Incomplete filling of all the subject columns of this Financial Proposal will not be considered and should result in disqualification.
- iii. Financial Proposal evaluation will be conducted under the Punjab Procurement Rules 2014 (Amended till date). The Price evaluation will include all duties, taxes and expenses etc. In case of any exemption of duties and taxes made by the Government in favor of the Purchaser, the contractor shall be bound to adjust the same in the Financial Proposal.
- iv. The quantity of items can be increased/ decreased and the cost of increase/ decrease will be adjusted accordingly.
- v. Prices quoted by the bidder shall remain fixed and valid until completion of the Contract performance and will not be subject to variation on account of escalation.
- vi. Unit Price will govern for arithmetic check and corresponding Grand Total” X” after arithmetic check will determine lowest bidder.
- vii. If there is discrepancy between words and figures the small amount will prevail.
- viii. Quoted items must be legally imported in Pakistan after paying all taxes. (Where Applicable)
- ix. Standard Warranty (Where Applicable).
- x. Bidder can quote for each item.
- xi. Financial Evaluation will be carried out on each item basis. Work award will be issued on each item basis to the lowest evaluated and technically qualified bidder.
- xii. Bidder must quote proper brands and models of the required items, bidders without quoting proper brand /model will be rejected.

The Contract / Completion of Work duration shall be maximum 120 days, starting from the date of issuance of work order.

Date: _____

Place: _____

Authorized Signature

(In full and initials)

Name and Designation of Signatory

Name of Firm and Address

(Seal & Signature of Company)

Note: No cutting or overwriting is allowed. Any cutting or overwriting may lead to rejection of the financial bid.

GENERAL PARTICULARS OF APPLYING FIRM

Firms' Information	
Name of Firm/ Company	
Complete Postal Address	
Phone Number	
Contact Person/ Designation	
Mobile Number	
E-Mail Address	
Fax Number	
Type of Organization	
Place of Incorporation/ Registration	
Year of Incorporation /Registration	
Validity	
National Tax Number	

General Terms and Conditions

1. Inspection of Items

The procuring agency may reject the delivered items which fail to conform to the technical specification, in any tests or inspection and the contractor shall replace the rejected goods/ items within prescribed time provided by the PTUT, free of cost. The inspection or tests shall be conducted at the premises of the PTUT. Where conducted at the premises of the contractor, the contractor shall provide all-reasonable facilities and assistance, which may include access to drawing, production data and online verification from official web site of the manufacturer, to the inspectors, at no charge to the procuring agency. The purchaser's post-delivery right to inspect, test and, where necessary, reject the goods shall in no way be limited or waived by reason of pre-delivery inspection, testing, or passing of the goods

2. Currency:

Firm and final rates should be in Pak Rupees.

3. Delivery, Installation & Commissioning

The contractor is responsible for delivery, installation & commission as per work order at its own risk and cost within 120 days of issuance of work order. In case of poor response/ coordination from the field formations regarding delivery, installation & commissioning, the contractor is required to inform to Project Director (B&W) office of university in writing for the solution of the same

4. Arbitration

In case arising of any dispute between the procuring agency and the contractor after the work order, the dispute should be resolved through the representatives of both parties otherwise the decision of Vice Chancellor will prevail over the version of both parties.

5. Blacklisting

The procuring agency may, for a specified period, debar or prohibit the contractor from participating in any public procurement process of the procuring agency, if the bidder or contractor has:

- (a) Acted in a manner detrimental to the public interest or good practices.
- (b) Consistently failed to perform his obligation under the contract.
- (c) Not performed the contract up to the mark; or
- (d) Indulged in any sort of corrupt practice.

Blacklisting mechanism will be followed as per Punjab Procurement Rules 2014.

6. Miscellaneous

Any point which is not mentioned in the term and conditions contained in the bidding documents. shall be decided in the light of the provisions laid down in Punjab PPRA rule 2014 amended till date.

7. Termination for Default:

The Procurement Committee without prejudice to any other remedy for breach of Contract, by written notice of default sent to the bidder, may terminate this Contract in whole or in part if:

1. The bidder fails to provide services within the period(s) specified in the Contract, or within any extension thereof granted by the Vice Chancellor.
2. The successful bidder fails to deliver lab equipment as per specifications mentioned in the bid.
3. The successful bidder fails to perform any other obligation(s) under the Contract.

4. The bidder, in the judgment of the Procurement Committee has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.
8. **Force Majeure:**

Majeure means an act of nature or an event beyond the control of the Supplier and not involving the Supplier's fault or negligence directly or indirectly purporting to mis-planning, mismanagement and/or lack of foresight to handle the situation. Such events may include but are not restricted to acts of the Procuring Agency in its sovereign capacity, wars or revolutions, fires, floods, earthquakes, strikes, epidemics, quarantine restrictions and freight embargoes. If a Force Majeure situation arises, the Supplier shall promptly notify the Procuring Agency in writing with enough and valid evidence of such condition and the cause thereof. The Grievances Committee shall examine the pros and cons of the case and all reasonable alternative means for completion of work order under the Contract and shall submit its recommendations to the Vice chancellor. However, unless otherwise directed by the Procuring Agency in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical and shall seek reasonable alternative means for performance not prevented by the Force Majeure event.
9. **Termination for Insolvency:**

The Procuring Agency may at any time terminate the Contract by giving written notice of 30 days' time to the Supplier if the Supplier becomes bankrupt or otherwise insolvent. In this event, termination shall be without compensation to the Supplier, provided that such termination shall not prejudice or affect any right of action or remedy which has accrued or shall accrue thereafter to the Parties.
10. **Acceptance of tender**

As per provisions of Rule (55) of Punjab Procurement Rules, the Purchaser shall issue the work order to the successful bidder, at least after 10 days of announcement of bid evaluation reports (Ref. Rule-37 of PPRA Rules) and prior to the expiry of the original validity period or extended validity period of the Tender. The successful Bidder must submit performance guarantee @ 10% of the final contract amount, along with letter of acceptance and sign formal contract on stamp paper within 10 days after the issuance work order. Bid Security of successful bidder will be released on receipt of performance guarantee The Performance guarantee will be released after 12 months of completion of all supplies, installation and commission, training, and performance period as per contract agreement.
11. **Repeat Order**

The contractor may provide Machinery & Equipment on repeat order (15% of the original procurement order) under the provision of Punjab Procurement Rules 2014, if asked for.
12. **Packing & Condition of the Machinery/ Equipment**

All Machinery/ Equipment supplied must be in original form/ packing. All Machinery/ Equipment must be genuine, brand new, non-refurbished in any way, as per required specification, and imported (If any) through proper channel
13. **Comprehensive Warranty/ After Sale Service**

Bidders must provide one-year free comprehensive onsite warranty, which must include labor, parts replacement, and any sort of other related service. Warranty period will be started after completion of scope of work including training to staff
14. **Training of the Staff**

In case of specialized items, supplier will provide necessary training to the PTUT staff/ faculty free of cost at PTUT at mutually agreed date.

(CONTRACT AGREEMENT)

DRAFT FORM FOR AWARD OF CONTRACT

Package Ref No. _____

This agreement is made in the presence of the witnesses named below on this ____ day and ____ month of 2022 at _____ between Punjab Tianjin University of Technology, Lahore (PTUT) (hereinafter called “the Purchaser”) and M/s. _____. (Here in after called “the Supplier”). Whereas the Purchaser invited bids for supply of _____ and has accepted a bid by the Supplier for the supply of _____ in the sum of Rs: (Rupees _____ only) [contract price in words and figures] (hereinafter called “the Contract Price”).

Now this agreement witnesses as follow:

1. In this agreement words and expressions shall have the same meanings as are respectively assigned to them in the bid document referred to.
 2. The following documents shall be deemed to form and be read and construed as part of this agreement, viz., the:
 - (a) Invitation to bid as publicized/ advertised by the Purchaser.
 - (b) Bidding document as bought from the Purchaser.
 - (c) Specifications of items
 - (d) Form of Bid
 - (e) Undertaking submitted by the bidders along with the bid papers.
 - (f) work order for supplying the selected items etc.
 - (g) General conditions regarding procurement as given in the bidding documents and
 - (h) This contract agreement as executed between the Purchaser and the Supplier.
 - (i) The Bid Security and the Performance Guarantee
 3. Supplier is responsible for installation, supplying and training of all ordered items at the PTUT without any extra cost.
 4. Supplier is responsible for replacement of defective items (if any) at his cost.
 5. Warranty 12 months from the date of supply/ successful installation/training to staff related to the equipment supplied.
 6. The purchaser will make the full/ partial payment after successful inspection of the equipment as per work order.
 8. Supplier will supply the ordered items within 120 days from the date of the work order. If required, the supplier can request to the purchaser, by providing proper justification, to extend the delivery period.
 9. Purchaser will release the Performance money after 12 months from the date of supply of the equipment to the purchaser.
 10. All disputes or differences between the parties in connections with or arising out of this agreement shall be settled through arbitration in accordance with the provisions of Punjab Procurement Rules 2014 through the re-presentators of both parties otherwise the decision of Vice Chancellor will prevail over the version of both parties.
- In witness whereof, the parties have hereinto set their respective hands and seals the day and the year hereinto before set forth.

Purchaser/ PTUT:

1. Name: _____ Designation: _____ Signatory: _____

2. Name: _____ Designation: _____ Signatory: _____

Supplier/ PTUT:

1 Name: _____ Designation: _____ Signatory: _____

2 Name: _____ Designation: _____ Signatory: _____

WITNESS:

1. Name: _____ Designation: _____ Signatory: _____

2. Name: _____ Designation: _____ Signatory: _____

Draft Integrity Pact on Stamp paper of Rs.100/- (To be attached with Technical Bid)

The lowest evaluated successful bidder shall sign and stamp the below mentioned Integrity Pact for the procurement contracts exceeding Rupees 10 million.

Failure to provide such integrity pact shall make the bidder non-responsive.

Contract No. _____ Dated _____

Contract Value: [To be filled in at the time of signing of Contracts]

Contract Title: _____

_____ [Name of supplier] hereby declares that it has not obtained or induced the procurement of any contract, right, interest, privilege or other obligation or benefit from Government of Punjab (GOP) or any administrative subdivision or agency thereof or any other entity owned or controlled by GOP through any corrupt business practice.

Without limiting the generally of the foregoing, [name of supplier] represents and warrants that it has fully declared the brakeage, commission, fees etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give anyone within or outside Pakistan either directly or indirectly through any natural or jurisdiction person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder's fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from GOP, except that which has been expressly declared pursuant hereto.

_____ [Name of Supplier] certifies that it has made and will make full disclosure of all agreements and arrangements with al person in respect of or related to the transaction with GOP and has not taken any action to circumvent the above declaration, representative warranty.

_____ [Name of Supplier] accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representative and warranty. It agrees that any contract, right, interest, privilege or other rights and benefit obtained or procured as aforesaid shall, without prejudice to any other rights and remedies available to GOP under any law, contract or other instrument, be voidable at the option of GOP.

Notwithstanding any rights and remedies exercised by GOP in this regard, [name of Supplier] agrees to indemnify GOP for any loss or damage incurred by it on account of its corrupt business practice and further pay compensation to GOP in an amount equivalent to ten time the sum of any commission, gratification, bride, finder's fee or kickback given by name [name of Supplier] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from GOP.

Name of Buyer:

Name of Seller/ Supplier:

Signature

Signature

[Seal]

[Seal]

Items Specification and Quantities Required

ITEM NO.1 "RAC LAB"

Part	Description	SPECIFICATIONS	Qty.
A	HVAC System Trainer	<p>Specification</p> <ul style="list-style-type: none"> • Effect of typical air conditioning system components on the conditioning of room air • Air conditioning system with open air duct. • Air conditioning system with air cooler, steam humidifier, fan, air preheaters and repeaters. • All components can be switched on and off individually. • Determination of the air flow by differential pressure measurement using an inclined tube manometer. • Combined sensors for the air humidity and temperature before and after each stage. • Sensor for the pressure and temperature of the refrigerant. • Refrigerant R134a, CFC-free. <hr/> <p>Technical Data</p> <p>Steam humidifier Power consumption: 2x 250W, Steam capacity: 500g/h, switchable in three stages</p> <p>Fan Max. volume flow: 810m³/h, dpmax: 420Pa,</p> <p>Condensing unit Power consumption: 950W at 5/25°C</p> <p>Cabinet Cabinet for measuring and maintaining the HVAC condition according to ASHRAE standards for summers and in winters</p> <p>Measuring ranges Differential pressure (air flow): 0~100Pa, Temperature: 5x 0~100°C, 4x - 100~400°C Humidity: 5x 0~100%, Pressure (refrigerant): -1~16bar (low side; -1~24bar (high side) Flow rate (refrigerant): 8~102L/h,</p> <p>Software DAQ software that can work with any window.</p>	1
B	Cooling Tower Trainer	<p>Experiments</p> <ul style="list-style-type: none"> • General Operating Procedures of Cooling Tower. • General Observation of the Forced Draught Cooling Tower. • End State Properties of Air and Steady Flow Equations. • Investigation of the Effect of Cooling Load on Wet Bulb Approach. • Investigation of the Effect of Air Velocity on Wet Bulb Approach and Pressure Drop through the Packing. • Investigation of the Relationship between Cooling Load and Cooling Range. • Measurement of water and air flow rates temperature and humidity. • Cooling tower performance. 	1

		<p>SpecificationsBench top unit Water propeller pump, maximum flow of water of 120-600L/h Air propeller with a fan with speed control (145m/h. Max, 3000rpm) Heating resistance (60°Cmax.): 2kw Water tank (14 liter capacity), with water level gauge On/off level switch for filling the tank Flow meter: range: 0-7 liter/min Inclined manometers: 0.5-3in Temperature sensor: 4x -100°C~400°C Temperature sensor: 2x 0~100°C Relative humidity: 2x 0~100% DAQ system that can work with any window</p>	
C	<p>Compression Refrigeration Cycle Demonstration Unit</p>	<p>Specification</p> <ul style="list-style-type: none"> • Typical compression refrigeration system with piston compressor, thermostatic expansion valve, evaporator and condenser (each in the shape of a pipe coil). • 2 manometers with pressure scale for the refrigerant show the values of the refrigerant on the high and low pressure sides. • 2 water-filled tanks with temperature sensor to demonstrate the cooling and heating effect. • Pressure switch to protect the compressor. • Sight glass to monitor the aggregate state of the refrigerant • Refrigerant R134a, CFC-free. <p>Technical Data Compressor Power consumption: 104W at 5/40 °C Refrigeration capacity: 278W at 5/40 °C Suction side (low pressure) Pressure: -1~16bar Temperature: -100~400°C Delivery side (high pressure) Pressure: -1~25bar Temperature: -100~400°C Tank 2x 1700ml DAQ software that can work with any widow.</p>	1
ITEM NO. 2 “MECHANICS OF MACHINES / STATIC AND DYNAMIC”			
Part	Description	SPECIFICATIONS	Qty.
A	Fundamentals of Statics	<p>Specifications</p> <ul style="list-style-type: none"> • 2 Lever rods with 50mm gird 600mm & 400mm lengths • Wide range of mountings: cables, rods, pulleys, pivot bearings and the like. • 2 weight sets. • Spring balance. <p>Technical Data WXH: 600x700 mm Line grid: 50 mm Spring balance Measuring range: 10kg: graduation: 50g Weights 2x 0.5N 6x 5N 2x 2N</p>	1

		1x1N 2x 0.5N	
B	Forces in Jib Crane	<p>Specifications</p> <ul style="list-style-type: none"> • The wall mounted crane consists of a compression jib, and a tension tie which is adjustable, and both incorporate a linear, direct reading spring balance to measure the forces in them. • A load hanger applies loads through the junction of the two. • Folds flat when not in use. Jib and ties re-adjustable to the original length. • Set of weights. • Comprehensive technical manual. • Set of slotted weights included. <p>Technical Data</p> <p>Spring balance for tensile forces Tensile force: 0-10kg Graduation: 50g Force gauge Compressive force: 0-100N Graduation: 0.5N Weights: 4x 2kg, 1x 1kg, 1x 1N (hanger)</p>	1
C	Forces in Simple Bar Structure (Roof Truss)	<p>Specification:</p> <p>3 node disks, 2 of which serving as supports 3 bars, each fitted with a leaf spring element and dial gauge. 2 fixed bar lengths, 1 variable bar length. 5 different angles adjustable between bars. Storage system to house the components</p> <p>Technical Data:</p> <p>Fixed bar: L=440mm. adjustable bar: L=440, 622, 762mm. Angle between bars:60°-60°-60°/45°-90°-45° 30°-120°-30°/30°-30°-120°. Dial gauge. Weights 1x 1N (hanger), 1x 10N, 2x 20N.</p>	1
D	Bearing Friction	<p>Specifications</p> <ul style="list-style-type: none"> • 3 different bearing materials for sliding bearing shells. • Stainless steel shaft. • Flywheel of galvanised steel. • Drive by cable drum and weight set. • Base plate <p>Technical Data</p> <p>Bearing material Gun metal, Cast Iron, PTFE Grooved ball bearing: type 6203 Bearing journal of shaft: d=17mm</p> <p>Flywheel d=300mm Weight: 22.2kg</p> <p>Weights 1x 1N (hanger) 5x 1N 1x 2N 3x 5N</p>	1

E	Shearing Force & Bending Moments	<p>Specifications</p> <ul style="list-style-type: none"> • Position of hinge at 1/3 span. • 2 bearing supports. • Loading of beam by 1 to 3 point loads. • Force gauges to indicate shear force and determine bending moment. • Adjuster nuts for horizontal alignment of beam. • Steel rule to determine positions of point loads. <p>Technical Data</p> <p>Beam Total length: 1000mm Span: 800mm</p> <p>Measuring Ranges Bending moment via force gauge and lever arm Lever arm: 100mm Force gauge: -50....+50N Bending moment: -50....+50N Shear force: -50....+50N Steel rule: 1000mm, graduations: 1mm</p> <p>Weight set 3x 0.5N (hangers) 12x 1N 9x 5N Max. Weight load per hanger: 20N</p>	1
F	Centre of Gravity	<p>Technical Data:</p> <ul style="list-style-type: none"> • Bob Material: PMMA o 6 Types: Circle, Isosceles, Triangle, Trapezium, and Semicircle etc. • Plumb Bob with string. 	1
G	Pulley & Block (To be used with Fundamental of Statics)	<p>Specification:</p> <p>Pulley layout and cable routing clearly visible</p> <ul style="list-style-type: none"> • Pulley blocks: with 4 or 6 pulleys; differential block with roller chain • Cable pulleys made of Anodized Aluminum ball bearing-mounted <p>Specification:</p> <ul style="list-style-type: none"> • Nylon cord: $d=2\text{mm}$ • Roller chain: 6.0x2.8mm approximately • Chain wheels: Number of teeth: 18, 28, 38 • Cable pulleys: Made of anodized aluminum ball bearing-mounted 	1
H	Polygon of Forces Apparatus	<p>Specifications</p> <ul style="list-style-type: none"> • Direct measurement of forces. • Adjustable lines of action of forces. • Concurrent & Non-concurrent coplanar forces. • Calibrated Weights. • User Manual with Sample Readings. <p>Technical Data: Circular Disc: Dia=450mm, 360 protractor, Adjustable 3 hanger pulleys. Set of Weights,</p>	1

		Experimental Manual.	
I	Belt and Cord Friction Apparatus	<p>Specifications: The wall mounted apparatus consists of a pulley, 3 belts and 2 load hangers. Pulley graduated in 15 degree intervals. The aluminium alloy pulley of approx. 150mm diameter has machined grooves to suit the three belts. The three belts are vee, rope and flat. An Instruction manual for student and lecturer provided. Set of weights.</p>	1

ITEM NO.3 "THEORY OF MACHINES"			
Part	Description	SPECIFICATIONS	Qty
A	Crank and Connecting Rod	<p>Specification</p> <ul style="list-style-type: none"> • Benchtop experiment on crank drives, with either fixed or swivelling cylinder. • Ball bearing mounted crank disc, anodised aluminium, 3 different crank radii. • Connecting rod black anodised aluminium with 3 different lengths. • Painted base plate with metal carrying handles. <p>Technical Data</p> <p>Crank radius 25mm 37.5mm 50mm</p> <p>Connecting rod length 120mm 140mm 160mm</p>	1
B	Four Bar Chain	<p>Specifications</p> <ul style="list-style-type: none"> • Benchtop experiment on the kinematic behaviour of a four bar chain, Grashof set • Anodised aluminium discs, ball bearing mounted • Aluminium rods, black anodised • 3 different crank radii • 3 different swing radii • 4 different connecting rod lengths <p>Technical Data</p> <p>Crank radius 25mm- 37.5mm -50mm</p> <p>Swing radius 50mm-100mm -200mm</p> <p>Connecting rod length 160mm -180mm -200mm -220mm</p>	1
C	Whitworth Quick Return Apparatus	<p>Specifications</p> <ul style="list-style-type: none"> • Benchtop experiment on the uneven reciprocating motion of Whitworth's quick return • Crank radius 46mm, slider radius 55mm, connecting rod length 145mm • Slider crank and connecting rod mounted on ball bearings <p>Technical Data</p> <p>Drive crank radius: 46mm Slider radius: 55mm</p>	1

		Axle offset drive slider: 30mm Connecting rod length: 145mm	
D	Spur Gear Trains Apparatus with frame	<p>Specifications</p> <ul style="list-style-type: none"> • Gearing mechanisms • 4 Cobalt Colored steel gear wheels • 2 anodised aluminium cable pulleys • Ball bearing-mounted gear wheels and pulleys • Anodised aluminium base plate. <p>Technical Data</p> <p>4 gear wheels (Standard) 2x D=126mm, 84 teeth 2x D=42mm, 28 teeth modulus: m=2mm One Gear Set as Compound</p>	1
E	Bevel Gear Train Apparatus with frame	<p>Specifications</p> <ul style="list-style-type: none"> • Bevel Gear Mounted on HDF with Drive Handle and transmission scale on both ends. • Gear are made of Steel. • Nickel / Galvanized Iron parts. 	1
F	Wheel and Axle	<p>Experiments</p> <ul style="list-style-type: none"> • Equilibrium of moments. • Demonstration and student experiment on the equilibrium of moments. • 2 pulleys made of anodised aluminium. • 2 sets of weights. • Ball bearing mounted steel shaft. • Anodised aluminium base plate. <p>Technical Data</p> <p>Pulley diameter D=75mm, D=150mm Weights 2x 0.5N (hanger), 4x 0.5N, 4x 1N, 4x 2N, 4x 5N Base plate wxh: 330x380mm</p>	1
G	Wheel and Differential Axle	<p>Specifications</p> <ul style="list-style-type: none"> • 3 pulleys made of anodised aluminium • 2 sets of weights • Ball bearing mounted steel shaft • HDF Laminated Base Plate <p>Technical Data</p> <p>Pulley diameter(Standard) D=250mm D=100mm D=50mm Loose pulley D=80mm Set of weights 2x 0.5N (hanger) 4x 0.5N 4x 1N 4x 2N 4x 5N</p>	1

H	Spur Gear Lifting	<p>Specifications</p> <ul style="list-style-type: none"> • Gearing mechanisms • 4 Cobalt Colored steel gear wheels • 2 anodised aluminium cable pulleys • Ball bearing-mounted gear wheels and pulleys • Anodised aluminium base plate. <p>Technical Data</p> <p>4 gear wheels (Standard) 2x D=126mm, 84 teeth 2x D=42mm, 28 teeth modulus: m=2mm One Gear Set as Compound</p>	1
I	Worm and Wheel Apparatus	<p>Specifications</p> <ul style="list-style-type: none"> • Bronze worm gear wheel • Steel worm • 2 Aluminium side drums • Double transmission ratio • Worm, worm gear wheel and pulleys ball bearing-mounted HDF base plate <p>Technical Data</p> <p>Side drum diameter On worm shaft: d=100mm, 120mm On worm gear wheel shaft: d=120mm Worm drive Axle base: Φ80mm Transmission ratio: 30:1 & 36:1 Modulus: m=3~4mm Number of gears: 1 Power Transmission: 30 & 36 Weights on worm shaft 1x 0.5N (hanger) 2x 0.5N 2x 1N 2x 2N 2x 5N Weights on worm wheel 1x 1N (hanger) 1x 10N 3x 20N</p>	1
J	Winch	<p>Specifications</p> <ul style="list-style-type: none"> • Drum and driving wheel made of aluminum, gear wheels made of POM • 2 sets of weights • Safety catch prevents reversal of direction of rotation • Anodised aluminum base plate 	1

		<p>Technical Data Drum diameters Driving: 220mm Driven: 115mm Gear wheels Small: 12 teeth Large: 60 teeth Module:2mm each Total transmission ratio: 10 Sets of weights Drum 1x50N, 2x20N, 1x10N Driving wheel 1x5N, 4x2N, 2x1N, 2x0.5N, 1x0.5N (guide rod)</p>	
K	Rolling Disc on Inclined Plane	<p>Specifications</p> <ul style="list-style-type: none"> • Experimentally determine the mass moments of inertia. • Rolling experiments on an inclined plane with height adjustment and three-point support. • Goniometer and spirit levels ensure precise alignment. • Measure the time and the acceleration distance. 	1
		<p>Technical Data Roll track Length: max. 1000mm, Angle of inclination: 0o....10o Discs Mass: 380g and 650g, Diameter: 70mm and 100mm Rotary axis Diameter: 10mm, Distance to center of gravity: 10mm</p>	
L	Flywheel Apparatus	<p>Specifications</p> <ul style="list-style-type: none"> • Steel flywheel. • Steel shaft used as drive pulley. • Set of weights. • Ball bearing mounted shaft. • Anodized aluminum base plate <p>Technical Data Bearing material: Gun metal, Cast Iron, PTFE Grooved ball bearing: type 6203 Bearing journal of shaft: d=17mm Flywheel: d=300mm Weights 1x 1N (hanger) 5x 1N 1x 2N 3x 5N</p>	1
M	Simple and Compound Pendulum	<p>Specifications</p> <ul style="list-style-type: none"> • Rod pendulum (physical pendulum) made of stainless steel, mounted on sliding knife edge bearing. • Thread pendulum (mathematical). • Additional weight for rod pendulum, can be moved. • HDF Base plate for wall mounting. 	1

		Technical Data Thread pendulum: 1 thread Nylon cord as thread Different bobs with different size and materials Rod pendulum: Length: 1000mm; D=8mm Mass: 0.39kg Made of Steel Additional weight (steel balls) Dia = 50mm Mass: 0.49kg	
N	Bifilar / Trifilar Suspension	Specifications <ul style="list-style-type: none"> • Quick-action clamp for the suspension cords • Bar made of Stainless Steel • Disk Cylinder made of Stainless Steel • Hollow disk cylinder made of Stainless Steel • Suspension cord length up to 2000mm possible Technical Data Disk Cylinder Dxh: 160 x19mm Hollow Disk cylinder Outer diameter: 160mm Inner diameter: 100mm Height: 41mm	1

ITEM NO.4 "STRENGTH OF MATERIALS/ MECHANICS OF MATERI"AL

Part.	Description	SPECIFICATIONS	Qty
a	Torsion Testing 200Nm (Motor Drive)	Specifications <ul style="list-style-type: none"> • Worm drive operated via hand. • Test rod material: mildgear steel, aluminium, brass. • Test rod holder: 19mm AF hex socket. • Test torque measurement using strain gauge measuring shaft. • Angle of twist measured by incremental encoder. • Microprocessor-based measuring technique. Technical Data Test torque: max. 300Nm Test rod length: max. 300mm Test rods, included: 5x mild steel 5x aluminium 5x brass Measuring ranges Torque: 300Nm Angle of twist: 0...360° incremantal resolution: 0.1° Specimens Steel: Length: 95mm; dia: 10mm Brass: Length: 95mm; dia: 10mm Aluminium: Length: 95mm; dia: 10mm	1

<p>b</p>	<p>Fatigue Testing Machine</p>	<p>Specifications</p> <ul style="list-style-type: none"> • Benchtop unit for fatigue strength testing. • 3 cylindrical specimens made of steel, • Special shape specimens for demonstrating the influence of notching and surface finish. • Recording of a stress-number (S-N) diagram. • Adjustment using threaded spindle with hand wheel. • Automatic shut down on specimen fracture by stop switch integrated into the bearing. • Electronic load cycle and revolutions counter with 8-digit digital display. • Speed sensor. <p>Technical Data</p> <p>Motor Speed: 2800rpm Output: 0.37kW Load: 0...300N Single phase electric motor: 230V, 50hz Load cycle counter Electronic 8-digit digital display Test bars: brass and mild steel Length: 110mm Dia: 8mm Specimen holder: hexagonal</p>	<p>1</p>
<p>c</p>	<p>Creep Testing Machine</p>	<p>Specification</p> <ul style="list-style-type: none"> • Table unit for the investigation of the creep behavior of different materials. • Flat specimens made of lead and PP. • Specimen cross-section 2x5mm, measured length 25mm. • Tensile stress range 2.5...35N/mm². • Position measurement gauge 0...10mm, resolution 0.001mm. • Experiments above or below room temperature possible with conditioning box. <p>Technical Data</p> <p>Specimen Material: lead, PP Cross-section: 2x5mm Measured length: 25mm Tensile stress range: 2.5...35N/mm² Displacement measurement Range: 0...10mm Resolution: 0.01mm Weights: 1x 2.5N (hanger) 1x 2.5N 1x 5N 1x 10N 1x 15N</p>	<p>1</p>

d	Pendulum Impact Tester 25Nm	<p>Specifications: work capacity: 15Nm. 25Nm (with extra weights). Hammer: Weight: 2.05kg and 3.42kg (with extra weights). Extra weights: 4x 0.342kg. Impact velocity: 3.8m/s. Head: 745mm. Notched bar impact specimens: LxW: 10x5mm, 10x10mm. Cross-section at the notch root: 10x8 and 10x5mm. Specimen materials: Automotive steel 9SMn28K. Tempering steel C45k. Structural steel S235JRC+C. Brass CuZn40Pb2.</p>	1
e	Universal Hardness Tester (Vicker, Brinel and Rockwell)	<p>Rockwell scales HRA, HRB, HRC Rockwell testing force 60Gk(588N), 100Kg(980.7N), 150Kg(1471N) Brinell scales HBW1/30, HBW2.5/31.25, HBW2.5/62.5, HBW5/62.5, HBW10/100, HBW2.5/187.5 Brinell testing force 30Kg(294.2N), 31.25Kg(306.5N), 62.5Kg(612.9N), 100Kg(980.7N), 187.5Kg(1839N) Vickers scales HV30, HV100 Vickers testing force 30Kg(294.2N), 100Kg(980.7N) Amplification of microscope 37.5*, 75* Duration time 2~60S Max. height of test piece 170mm Depth of throat 140mm Power AC 220V, 50/60HZ</p>	2
f	Deflection of Beams (without Force Gauges)	<p>Specifications</p> <ul style="list-style-type: none"> • 3 steel beams with different cross-sections. • 3 brass beams with different cross-sections. • 3 aluminum beams with different cross-sections. • 3 MS beams with different cross-sections. • 1 coper beam. • 3 articulated, height-adjustable supports with force gauge range 100N; least count 0.5N. • 2 support with clamp fixing. • Force gauges can be zeroed, peck and tracking function is available in force gauge. • 3 dial gauges to record deformations with three dial gauge supports, dial gauge 0-20mm, least count 0.01mm. • 4 sets of weights with adjustable riders. • Anodised aluminium section frame housing the experiment. <p>Technical Data Weights 4x 0.5N (hangers) 8x 0.5N 8x 1N 8x 2N 8x 5N Beams</p>	1

		<p>Stainless steel: 19x3mm; 19x5mm; 19x6mm Brass: 19x3mm; 19x5mm; 19x6mm Aluminum: 19x3mm; 19x5mm; 19x6mm Mild steel: 19x3mm; 19x5mm; 19x6mm Copper: 19x3mm; 19x5mm; 19x6mm</p>	
g	Torsion of Bars	<p>Technical Data Brass (round) Length: 390mmx1, Diameter: 10mm Length: 690mmx1, Diameter: 10mm Copper (round) Length: 390mmx1, Diameter: 10mm Length: 690mmx1, Diameter: 10mm Aluminum (round) Length: 390mmx1, Diameter: 10mm Length: 690mmx1, Diameter: 10mm Steel (round) Length: 390mmx7, Diameter: 5mm, 6mm, 7mm, 8mm, 10mm, 11mm, 12mm Length: 690mmx1, Diameter: 10mm Weights 1x 0.5N (hanger) 2x 0.5N 2x 1N 2x2N 3x 5N</p>	1
h	Hooke's Law (Extension of Spring)	<p>Specifications</p> <ul style="list-style-type: none"> • Metal stand with integral scale. • Assorted helical spring as tension springs. • Tension springs configured in series or singly. • Load applied to tension spring by a set of weights. <p>Technical Data Helical spring small Diameter: 15mm Spring: 6 Different wire diameters Helical spring big Diameter: 20mm Spring: 6 different wires diameters Scale Length: 1000mm Graduations: 1mm Weights Upto 100N 1x 1N (hanger)</p>	1
i	Young Modulus	<p>Specification</p> <ul style="list-style-type: none"> • Wall unit for experiments on the elastic deformation of metal wires subject to tensile force. • Loading of wires using a set of weights. • Wire length 1000mm. • Wire diameter, 1~ 2mm. • Material: Steel, Aluminium, Brass and Copper. • Load application: direct load. • Measuring device equipped with vernier gauge. 	1

		<p>Technical Data Wire length: 1000mm Wire diameter: 1~2mm Materials: Steel, Cooper, Brass, Aluminium Weights 1x 1N (hanger) 1x 1kg 4x 2kg</p>	
j	Compression of Spring Apparatus	<p>Specifications</p> <ul style="list-style-type: none"> • Wall mounted compact unit to test springs. • Different compression spring supplied (Wire Diameters, length, no of turns). • Load applied to spring using calibrated weights set and hanger. • Integral compression scale (vernier scale). • Adjustable compression indicator. <p>Technical Data Helical spring: 9 Diameter: 1x 24mm, 2x 25mm, 2x 34mm, 1x 35mm, 2x 44mm, 1x 46mm Wire diameter: 3x 1.5mm, 5x 2mm, 1x 2.5mm Weight 1x 1N (hanger) 2x 1N 4x 2N 6x 5N</p>	1
k	Torsion of Spring Apparatus	<p>Specification: Lever with sliding mass to deflect the helical spring. Adjustable distance of the mass to the rotation axis. Angle scale for reading the angle of deflection. Stopwatch to measure the oscillation period. Technical Data: Helical spring. Cross-section: 10x1mm. Spring length: approx. 800mm. Inner radius: 10mm. Outer radius: 50mm. Winding distance: 8.5mm. Sliding mass: 2x 0.5kg.</p>	1

ITEM NO 5. "HEAT TRANSFER / THERMODYNAMICS"

Part .	Description	Specifications	
A	Fundamentals of Temperature Measurements	<p>Specifications:</p> <ol style="list-style-type: none"> 1. Understanding calibration techniques 2. Understanding lead and conduction errors 3. Dynamic response 4. Errors associated with incorrect applications 5. Air humidity <p>Technical Data</p> <p>Thermistor Sensors Type K, J thermocouple Bimetallic thermometer (0°-120°C) Wet and Dry Bulb Thermometer</p>	1
B	Change of State of Gases	<p>Specifications</p> <ul style="list-style-type: none"> • Pump can also be used as vacuum pump. • 5/2-way valve for switching between compression and expansion. • Transparent measuring vessel 2 for investigation of isochoric change of state. • Electrical heater with temperature control in vessel 2 • Sensors for temperatures and pressures. <p>Technical Data</p> <p>Pump Power output:60W Delivery side: 2bar Intake side: 213mbar Temperature measuring range Vessel 1: -100~400°C Vessel 2: -100~400°C Pressure measuring range Vessel 1: 0~4bar gauge Vessel 2: 0~4bar gauge Volume measuring range Vessel 1: 0~3L approx. DAQ software that can work with any windows.</p>	1

C	Marcet Boiler (-1 ~12 Bars) Range	<p>Marcet Boiler consists of mainly the following items:</p> <p>a) Pressure Vessel Capacity: 5 Liters Material: Stainless Steel 304 Design Pressure: 20bar Operating Pressure: 9bar</p> <p>b) Pressure Gauge Type: Bourdon Tube Range: -1 ~ 15 Bar</p> <p>c) Electrical Heater Power: 1000W ~ 3000W (3 heater of 1000W each) Type: Immersion Type Safety: High temp cut-off by means of a temperature controller. High pressure cut of by means of a digital pressure switch. High pressure relief of steam by means of pressure saftey valve.</p> <p>d) Temperature Sensor Type: Thermocouple - K Type Range: -100~400oC Type: analog Range: 0~350oC</p> <p>e) Safety Features Press Relief Valve (set at 13 bar), Temperature Controller (set at 185.0oC) Software DAQ software that can work with any windows.</p>	1
D	Engine Cut Model 2 Stroke Petrol Real	<p>Specifications:</p> <ul style="list-style-type: none"> • Petrol Engine 2 stroke single cylinder, • Working/Running Model, • Cut properly to show all parts, • Handle for operation. • Mounted on Solid Base, • With Labeled diagram • Instruction Manual • The engine is operated manually through a crank handle. 	1
E	Engine Cut Model 4 Stroke Petrol Real	<p>Specifications:</p> <p>Petrol Engine 4 stroke single cylinder, Working/Running Model, Cut properly to show all parts, Handle for operation. Mounted on Solid Base, With Labeled diagram. The engine is operated manually through a crank handle. Instruction Manual Included.</p>	1
F	Engine Cut Model 4 Stroke Diesel Real	<p>Specifications:</p> <ul style="list-style-type: none"> • Petrol Engine 4 stroke single cylinder, • Working/Running Model, • Cut properly to show all parts, Handle for operation. • Mounted on Solid Base, 	1

		<ul style="list-style-type: none"> • With Labeled diagram. • With Instruction manual. • The engine is operated manually through a crank handle. 	
G	Combustion Laboratory Unit (Dual Fuel) Gas/Light Oil	<p>Specifications</p> <p>(a) Burner (imported)</p> <p>Light oil Output: 80.7 to 163.8 kW Fuel consumption: 6.8 to 13.8 Kg/h.m³</p> <p>Fuel gas Output: 80.7 to 163.4kW Fuel consumption: 8.1 to 16.4 Kg/h.m³</p> <p>Self-aspiration fuel pump: Calibration pressure 12 kg/cm² Gas pressure: 12-23 mbar Electrical power supply: 220v – 50Hz Motor at 2860rpm: 170 to 185W Capacitor: 6.3 uF Ignition transformer: 10kV - 30mA Flame control: UV sensor Air adjustment: Manual Nozzle: 1.75 to 3.5 all type as long as 60 solid cone</p> <p>(b) Combustion/ Observation chamber Cylindrical chamber 460 x910mmlong with watercooled walls. Fitted with observation ports, watercooled sampling probe.</p> <p>(c) Control Manual control for air, oil, gas and cooling water</p> <p>(d) Instrumentation The unit is fitted with necessary sensors with digital indicator for measuring flowrate of air, oil, gas and cooling water, temperature of cooling water and pressure of gas.</p> <p>Software DAQ software that can work with any windows.</p>	1
H	Free and Forced Convection	<p>Specifications</p> <ul style="list-style-type: none"> • Investigate heat transfer in the air duct by forced convection. • Study of free convection. • Air duct with axial fan. • 3 heating elements with different geometries. • Continuously adjustable heating power and fan power. • Display of temperatures, heating power and air velocity. • Display of temperatures, heating power and air velocity in the software • Microprocessor-based, data acquisition, system operation <p>Technical Data</p> <p>Air duct Flow cross-section: 120x120mm Height: 1000mm Heating elements Temperature limitation: 90oC Pipe bundle Number of tubes: 20 Heating power: 150W Heat transfer area: 0.001m²</p>	1

		<p>Axial fan Max. flow rate: 500m³/h Max. pressure difference: approx. 950Pa Power consumption: 90W Measuring range Air velocity: 0~10m/s Temperature: 4x -100~400oC Heating power: 0~100W Fins Number of fins: 7 Heating power: 150W Heat transfer area: 0.14m² Flat surface Heating power: 150W Surface area: 0.013m² Software DAQ software that can work with any windows.</p>	
I	Thermal & light Radiation Heat Transfer Unit	<p>Specifications: (a) Light Source Consist of a bulb rated at 60 Watt, to produce a well distributed light using an acrylic filter. (b) Heated Surface Consist of a heating aluminium plate rated with Matt Black Finish. (c) Target Plate Consist of three types Polished, Grey and Matt Black with bolt-on temperature sensor. (d) Aperture Consist of two plates with insulation on one side of the surface.</p>	1
J	Heat Conduction Study Unit (Linear & Radial)	<p>Specifications a) Linear Module Consists of the following sections: i) Heater Section Material: Brass Diameter: 25mm ii) Cooler Section Material: Brass Diameter: 25mm iii) Interchangeable Test Section Insulated Test Section with Temperature Sensors Array (Brass) (Diameter = 25mm, Length = 30mm) Insulated Test Section (Brass) (Diameter = 16mm, Length = 30mm) Insulated Test Section (Stainless Steel) (Diameter = 25mm, Length = 30mm) Insulated Test Section (aluminum) (Diameter = 25mm, Length = 30mm) b) Radial module Material: Brass Diameter: 110mm Thickness: 6mm Radial module contains 6 temperature sensor at 10mm internals Linear module contains 9 temperature sensor at 10mm internals</p>	1

		<p>c) Measuring ranges Temperature: -100~400oC Heater power: 0~150W DAQ software that can work with any windows.</p>	
K	Unsteady State Heat Transfer	<p>Specifications A bench top unit designed to allow experiments on unsteady state heat transfer.</p> <p>a) Water Bath</p> <ul style="list-style-type: none"> • 30 liters insulated stainless steel tank with top plate and mounting for solid shapes holder. • The heating is by a 3.0kW electric heater with thermostat control while the water circulation is by a centrifugal pump with controlled flow rate. <p>B) Solid Shapes</p> <ul style="list-style-type: none"> • 7 Pieces of solid specimens made of brass and stainless steel are supplied. The three different shapes are solid sphere, rectangular slab and long solid cylinder. Each solid shape has a built-in temperature sensor at the centre. <p>Software DAQ software that can work with any windows.</p>	1

ITEM NO.6 “FLUID MECHANICS LAB”

part	Item Name	Description	Qty.
a	Hydraulic Bench	<p>Specification</p> <ul style="list-style-type: none"> • Closed water circuit with storage tank, pump and measuring tank • Measuring tank divided in two for volumetric flow rate measurements • Measuring beaker with scale for very small volumetric flow rates • Measurement of volumetric flow rates by using a stopwatch • Work surface with integrated flume for experiments with weirs • Work surface with inside edge for safe placement of the accessory and for collecting the dripping water • Storage tank, measuring tank and work surface made of GRP. <p>Technical Data</p> <p>Centrifugal Pump (New and Imported) Power consumption: 500~746W Max. flow rate: more than 100L/min Max. head: 32m Storage tank capacity: 175L</p> <p>Measuring Tank At large volumetric flow rates: 40L At small volumetric flow rates: 7L</p> <p>Flume LxWxH: 510x165x170mm Measuring beaker with scale for very small volumetric flow rates Content: 5L Stopwatch: Measuring range: 0...9h 59min 59sec</p>	1

b	Hydrostatic Pressure	<p>Specification</p> <ul style="list-style-type: none"> • Determination of force on surface under hydrostatic pressure. <p>Technical Data</p> <p>Water tank</p> <p>Inclination angle: 0~90o</p> <p>Content: 1.8L</p> <p>Quadrant inner radius: 100mm</p> <p>Quadrant outer radius: 200mm</p> <p>Effective area of force: 75x100mm</p> <p>Lever arm: Max. Length: 0~250mm</p> <p>Weights: Balancing weight: 250g, Sliding weight: 250g</p>	1
c	Flow Visualization	<p>Specification</p> <ul style="list-style-type: none"> • Demonstration of potential flow in a Hele-Shaw cell for visualizing flow lines. • Flow around models: cylinder, square, rectangle, guide vane profile, various models for changes in cross-section. • Modelling the flow around contours without models by overlaying parallel flow with sources or sinks. • Water as flowing medium and ink as contrast medium. • Hele-Shaw cell made of two glass plates arranged in parallel with narrow gap. • Upper glass plate, hinged for swapping models. • Bottom plate with cross-shaped water connections for generating sources/sinks, can be combined as required. • Grid in the panel for optimal observation of the streamlines. • Flow velocity, water inlet and water outlet in sources/sinks as well as dosage of the contrast medium can be adjusted by using valves. <p>Technical Data</p> <p>1 glass plate</p> <p>LxW: 338x395mm</p> <p>Distance between the plates: 2~3mm</p> <p>Bottom plate with eight water connections for sources/sinks</p> <p>Models</p> <p>8 drag bodies</p> <p>steam line shape, aerofoil shape, car shape, round shape, triangular shape, square shape, semi shape, balloon shape</p> <p>Material: acrylic</p> <p>Thickness: 2~3mm</p> <p>Injection of the contrast medium (ink)</p> <p>12 nozzles</p> <p>Tank for contrast medium: 1.7liter</p> <p>No of Valves: 8 for Source and 8 for Sink</p>	1

d	Orifice Discharge	<p>Specification</p> <ul style="list-style-type: none"> • Visualization of laminar and turbulent flows • Determining critical reynold's number <p>Technical Data</p> <p>Visualization tube dia: 10mm</p> <p>Length: 620mm</p> <p>Dye Reservoir: 440ml</p> <p>Measuring Cylinder: 2 liter</p>	1
e	Flowmeter Measurement Apparatus	<p>Specification</p> <ul style="list-style-type: none"> • Primary flow measuring devices, clear plastics • Venturi meter, orifice meter, rotameter • Differential pressure measurement: Water manometer, 8 tubes <p>Technical Data</p> <p>Venturi throat diameter: 16mm</p> <p>Venturi inlet diameter: 26mm</p> <p>Orifice upstream diameter: 26mm</p> <p>Orifice diameter: 16mm</p> <p>Rotameter maximum range: 4-36 ltr/min</p>	1
f	Dead Weight Tester	<p>Experiments</p> <ul style="list-style-type: none"> • Calibrating a Bourdon type pressure gauge. <p>Specification</p> <p>Pressure gauge</p> <p>Diameter: 6" or 150mm</p> <p>Bourdon Tube Pressure Range: 0~400kN/m² Pressure</p> <p>Least Count: 10kN/m²</p> <p>Alternate Scale: PSI / bar</p> <p>Technical Data</p> <p>Material of Piston: Stainless Steel</p> <p>Diameter of the Piston: 17.5mm</p> <p>Area of piston: 240 mm²</p> <p>Mass of piston: Approx.0.5kg</p> <p>Ancillary masses: 1x 0.2 kg, 2x 0.5kg and 4x 1.0 kg</p>	1
g	Centrifugal Compressor Demonstration	<p>Specifications:</p> <ul style="list-style-type: none"> • Adjustable aperture. • Variable fan speed. • LCD display. • Transparent Horizontal and vertical duct. • Temperature sensors. <p>Technical Data:</p> <ul style="list-style-type: none"> • Max flow rate: 20 l/s typical. • Max head: 6 kPa. • Max fan speed: 3000 RPM. • Motor power rating: 250 W. <p>Air Duct:</p> <ul style="list-style-type: none"> • Vertical: 700mm. 	1

		<ul style="list-style-type: none"> • Horizontal: 450mm. • 230V AC 50Hz. 	
h	Axial Flow Fan Apparatus	<p>Specifications: Investigation of the flow rate and differential pressure in the model of an axial fan. Axial fan with drive motor. Adjustable speed. Transparent intake and delivery pipe. Throttle valve to adjust the air flow. Measurement of flow rate, differential pressure, speed and temperature. Display of the measured values using the software.</p> <p>Technical Data: Intake pipe: Inner diameter: D=110mm. Length: L=335mm. Delivery pipe: Inner diameter: D=110mm. Length: L=275mm. Axial fan: Max. Flow rate: 160m³/h. Max. Differential pressure: 80Pa. Nominal speed: 2650rpm. Power consumption: 19W.</p>	1

ITEM NO.7 "WORKSHOP PRACTICE LAB"			
part	Description	Specification	Qty
A	Work Tables	Size: 4'x5'x2'-9" fitted with 4 vices (6" INGCO or Equivalent) Material: Galvanized Iron frame, Wooden Top	10
B	Workshop Apron	Size: Standard Make: 3M or Equivalent	50
	Workshop Glasses	Size: Standard Make: 3M or Equivalent	50
	Safety Helmet	Size: Medium Make: 3M or equivalent	50
	Ear Plugs	Size: Medium Make: 3M or equivalent	200
	First Aid Box	Include first aid Kit	4
	Hacksaw Frame	Size:12" Make: INGCO or Equivalent	50
	Hacksaw Blades	Size:12" Make: INGCO or Equivalent	500

Tri Square	Size: 8" Make: INGCO or Equivalent	50
Rectangular File	Size: 12" Make: INGCO or Equivalent	50
Bastard File	Size: 12" Make: INGCO or Equivalent	50
Square File	Size: 12" Make: INGCO or Equivalent	10
Half Round File	Size: 12" Make: INGCO or Equivalent	10
Round File	Size: 12" Make: INGCO or Equivalent	10
Triangular File	Size: 12" Make: INGCO or Equivalent	10
Inside Caliper	Size: 4" Make: Local/China	20
Outside Caliper	Size: 4" Make: Local/China	20
Divider	Size: 4" Make: Local/China	20
File Carde	Size: 8 inches or more Make: local/china	25
Sand Paper	Grade: Coarse	200
Center Punch	Size: 6"	25
Scriber	Size:6"	25
Steel Rule	Size: 12" Make: INGCO or Equivalent	10
Tool Tray	Size: Large Make: INGCO or Equivalent	50
Venier Caliper (mm)	Size: 300mm Make: China	2
Vernier Caliper (Inches)	Size: 12" Make: China	2
Digital Vernier Caliper	Size: 150mm Make: China	2
Outside Micrometer (mm)	Size: 0-25mm Make: China	4
Cotton Rags	Cotton Rags Good Quality (300kg)	1

c

Cut Off Saw	<p>Voltage: 220-240V~50Hz Single Phase Input power: 3.0KW(4HP) Blade size:405×25.4×3mm No load speed: 2280rpm Max cutting capacity: Steel tube : ϕ135*6mm Angle iron : 100*10mm Channel steel : 126*53mm Steel bar : ϕ50mm Tongs rotary angle:0-45° 12pcs abrasive cutting disc Make: INGCO or Equivalent</p>	1
Angle Grinder	<p>Voltage:220-240V~50/60Hz Input power:1010W No-load speed:5000-12000rpm Disc diameter:125mm Spindle thread:M14 Set of Cutting Discs Make: INGCO or Equivalent</p>	1
Wrench Set	<p>6" (1pc) 8" (1pc) 12" (1pc) 24" (1pc) Make: INGCO of Equivalent</p>	1
Pipe Wrench Set	<p>18" (1pc) 24" (1pc) 48" (1pc) Make: INGCO of Equivalent</p>	1
Aspirator Blower	<p>Voltage: 220V-240V~50/60Hz Input power:600W No-load speed:0-16000rpm Max blowing rate:0-3.5m³/min Variable speed With 1pcs dust bag Make: INGCO or Equivalent</p>	1
Hand Drill	<p>Voltage:220-240V~50/60Hz Input power:680W No-load speed:0-3000rpm Max.drilling capacity:13mm Variable speed Froward/Reverse switch Hammer function Make: INGCO or Equivalent</p>	2
Hand Tool Set	<p>147pcs handtools set include: 1pcs 200mm Half round steel file 1pcs 40cm Spirit level 1pcs 300g Machinist hammer 1pcs 300mm Hacksaw Frame 1pcs 5M Steel measuring tape 1set 9pcs Hex key size:1 .5 / 2 / 2.5 / 3 / 4 / 5 / 6 / 8 / 10 1pcs 7"Combination Pliers 1pcs 6" Long nose pliers 1pcs 6"Diagonal cutting pliers Make: INGCO of Equivalent</p>	1
Spanner Set	<p>8pcs Flexible Ratchet Spanner Set High quality Cr-Mo Ratchet Size:8-19mm 8mm,10mm,12mm,13mm,14mm,15mm,17 mm,19mm Make: INGCO or Equivalent</p>	1

	Soldering Iron	Voltage:220-240V~50/60Hz Input power:60W Preheat.time:3~5minuters Straight, tip head Make: INGCO or Equivalent	2
	Heat Gun	Voltage:220V-240V~50/60Hz Input power:2000W stage 1:500L/min stage 2:300L/min stage 3:500L/min make: INGCO or Equivalent	2
	Hammer Set	Claw Hammer (1pc) Weight:8oz/220g Ball Peen Hammer (1pc) Weight:24oz/660g Ball Peen Hammer (1pc) Weight:48oz/1300g Make: INGCO or Equivalent	10
	Glue Gun	Volts:220-240V~50/60Hz Input power:30W Gluing capacity:3-5g/min Glue stick diameter:7mm With 2pcs 100mm glue sticks Make: INGCO or Equivalent	2
	Electric Hoist	Voltage:220V-240V~50Hz Input power:900W Lifting weight:250Kgs(Single line) 500Kgs(Double line) Lifting height:18m(Single line),9m(Double line) Lifting speed:8m/min(Single line),4m/min(Double line) Upper and lower limit device Emergency stop switch Thermal protection terminal Make: INGCO or Equivalent	1
	Cordless Scre Driver	Voltage:8V Hex Shank:1/4" No-load speed:220/min Max.torque:6N.m Torque settings:15+1 Integrated work light Charge level indicator With 1pc 2Hr charger Make: INGCO or Equivalent	1
	AC/DC Clamp Meter	Display :6000 counts LCD with backlight DC Current: 60A/600A AC Current: 60A/600A AC Voltage:6V/60V/600V DC Voltage:600mV6V/60V/600V Resistance Make: INGCO or Equivalent	1
	Wood Chisel Set	4 pcs Wood Chisel Set Width:6mm,12mm,19mm,25mm Length:140mm	2
d	Round Material	Size: Dia 1.5"x4" Material: M.S	200
	Strip Material	Size: 4"x4"x1/8" Material: M.S	200

ITEM NO.8 "MACHINE SHOP LAB"

part.	Description	Specifications	Qty
A	Lathe Machine with Accessories	Total Length 04.5ft [1350 mm] Whole Machine length Bed Width 09" [225 mm] Total width of bed frame V-V Center Height 08" [200 mm] Half center of the total Height bed from to headstock Spindle Bore 1.5" [32 mm] Headstock spindle hole for shaft moving Swing Over Bed 16" [400 mm] Work piece turning dia over the bed frame Swing Over Cross slide 10" [250 mm]	2

		<p>Work piece turning dia over the cross slide. Spindle Speeds 08 Nos 04- Double Slow, 04- Single Fast Thread range MM 16" [400 mm] Work piece turning dia over the bed frame Thread range Inches 16" [400 mm] Work piece turning dia over the bed frame Led Screw TPI 16" [400 mm] Type of Led Screw Thread " 2TPI OR 4TPI" Tail Stock MT MT-2 Morse Taper in tailstock quill. Make: :Local</p> <p>Standard Accessories: Electric Motor, Follow Rest, Steady Rest, Electric Reverse/Forward Switch, One piece of Dead Center, One Safety Motor Belt Covers, Safety Google, Set of Couplings, Thread Indicator, Tool Post Handle, Dial</p> <p>Special Accessories: 4-Jaws Chuck,3-Jaws Chuck, Electric Motor, Face Plate, Keyway Milling Attachment, Grinding Attachment, Bull Nose Pipe Center, Tool Kit Dial Indicator (2 Nos.) Set of external tools (Nos.) Internal tools (10 Nos.)</p>	
b	Universal Milling Machine	<p>Table Size: 1050x230mm Table working: 600x250x450mm Gear Speed Arbor: 9 (150-1800 rpm) Vertical Speed: 4 (800-3500 rpm) Motor: Vertical 1400 rpm, 3phase Motor: Arbor 900 rpm, 3 phase Make: Local</p> <p>Accessories: 3 Jaws Chuck 5", Universal Vice 8", Indexing Head, Rotary Table, Tool Kit, Lubrication System, Splash guard,</p>	1
c	Bench Drill	<p>Voltage:220-240V~50Hz Input power:750W Max.drilling capacity: 20mm No-load speed: 180-2770rpm Spindle speed settings: 16 Column diameter: 70mm Table size: 290x290mm</p>	1
d	Bench Drill	<p>Voltage:220-240V~50Hz Input power:350W Max. drilling capacity:13mm No-load speed: 580-2650 rpm Spindle speed settings:5 Spindle travel:50mm Column diameter:46mm Adjustable working table Table size:160*160 mm Make: Ingco or equivalent</p>	1
e	Pedestal Tool Grinder	<p>Size: 8 inches Make: INGCO or Equivalent</p>	1
f	Power Hack Saw	<p>Blade Size: 18" With Coolant System Make: Local/China</p>	1

g

Milling Cutter Set

End mill 3mm, 4mm, 6mm, 8mm, 10mm, 12mm, 14mm, 16mm
(16Pcs),
Face mill 63mm (5Pc)
Ball cutter Standard (5Pcs)
Slab mill Standard (1Pc)
Side-and-face cutter 2mm (5Pcs)
Involute gear cutter 22mm (5Pcs)
Hollow mill Standard (3Pcs)
Shell mill 50mm (2Set)
Roughing end mill 8mm, 10mm, 25mm (3Pcs),
Dovetail cutter 1*45, 1.5*60, 4*45, 6*45, 10*60 (5Pcs)
Wood ruff cutter 10mm, 16mm, 22mm (3Pcs),
Make: USA/Europe

1