TENDER PROPOSALS

Tender# 16/07-03

Lab. Equipment

NATIONAL TEXTILE UNIVERSITY – FAISALABAD

M/S_____

This tender was advertised in Daily Nawa-e- Waqet (July 28, 2016) & Daily Dawn (July 28, 2016), PPRA website dated July 16, 2016 and University website. The advertisement is as; under:

National Textile University, Faisalabad
Tender Notice No. 16/07-03
Lab. Equipment

1. National Textile University, Faisalabad invites two stage-two envelope *{PPRA Rule 36(d)}* bids in sealed envelopes from the original Manufacturers, their Authorized Agents/Distributers and GST & Income Tax registered firms for the purchase of the following twenty nine (**29**) Lab. Equipment (Quantity one each) on **C&F** basis. Detail is in tender document.

Name of Equipment
1-Washing Fastness Tester), **2**-Light Fastness Tester, **3**-Crockmeter, **4**-Wascator, **5**-Twist Tester, **6**-Sample Rapid Conditioner, **7**-Fabric Formaldehyde content tester, **8**-Lab Air Conditioning Systems, **9**-Kawabata Automatic Tensile and Shear Tester, **10**-Multipurpose Fabric Hand Evaluation Tester, **11**-Multipurpose Flammability Tester, **12**-Fabric Drape Tester, **13**-Fiber Microtome, **14**-Backup UPS,**15**-Digital Weighing Balance, **16**-Yarn Sample Spin System (Lab-scale), **17**-Composite Polishing Machine, **18**-Strain gauge kit, data acquisition system with 20 channels, **19**-Fabric Crease Recovery Tester, **20**-Heavy Duty Universal Tensile Tester, **21**-Digital Elmadorf Tear Tester, **22**-Digital Bursting Strength Tester, **23**-Martindale Pilling and Abrasion Tester, **24**-Random Tumble Pilling Tester, **25**-Laboratory Compressor, **26**-Differential Scanning Calorimeter, **27**-Coup Cut Resistance Tester, **28**-Gas chromatograph–mass spectrometer (GCMS), **29**-High Performance Liquid Chromatography (HPLC).

2. Interested eligible bidders may obtain the Bidding Document from the office of Convener Purchase or Tender Document may be downloaded from the official website of NTU **(www.ntu.edu.pk)**. The fee of Tender Document is non-refundable **Rs.1000/-** (One thousand only). The tender document fee will be accepted in shape of Pay order/Demand Draft **drawn on Faisalabad** in the name of "National Textile University, Faisalabad".
3. Eligible firms will submit their bids along with **2%** earnest money of the total quoted price in sealed envelope of Financial Bid in the shape of CDR/Bank Draft in favors of National Textile University, Faisalabad, **drawn on Faisalabad**.
4. Sealed bids should reach in the office of Convener Purchase by or before **12:00 noon on 16-08-2016.** Bids received within the stipulated time and date will be opened by the Purchase Committee in the Meeting Room of NTU Faisalabad on the **same day at 12:30 pm** in the presence of the Bidders or their authorized representatives.
5. Bidders may visit the University during working hours (Monday to Friday) or may contact with Dr. Rashid Masood +92 41 9230081-5 /203 for any technical queries.

Dr. Zahid Rizwan
Convener Purchase
041-9230081-85 (Ext. 159)
National Textile University, Sheikhupura Road, Faisalabad-37610
www.ntu.edu.pk

1. General Information:

i. National Textile University (NTU), Faisalabad invites sealed bids from original Manufacturers, their Authorized Agents and Suppliers in Pakistan registered with Income Tax & Sales Tax Department for the supply of 29 (Twenty nine) Lab. Equipment.

ii. Interested eligible bidders may obtain the Bidding Document from the office of Convener Purchase or may be downloaded from the official website of NTU **(www.ntu.edu.pk)**. The fee of tender document is non-refundable **Rs.1000/-** (One thousand only). The tender document fee will be accepted in shape of Cash/Pay order/Demand Draft **drawn on Faisalabad** in the name of "National Textile University, Faisalabad". Tender fee can be submitted in a separate envelope.

2. Deadline and Procedure for Bids:

i. Tender Proposals under "Two stage-two envelope {PPRA Rule 36(d), see this rule at the end of this document**}** (Technical & Financial Bids) will be received on **16-08-2016 till 12:00** noon in National Textile University, Faisalabad.

ii. Technical Bids will be opened in presence of authorized representatives of the bidding firms on the same day **(16-08-2016) at 12:30 pm** at Meeting Room, National Textile University, Faisalabad.

iii. Technically successful bidders will be requested to present their product in the presence of technical committee of NTU. The time, date and venue will be informed in advance to present the product. Multimedia / Laptop will be provided for the presentation. Bidders will bring 06 copies of technical brochure at the time of presentation.

iv. First, 2^{nd}, 3^{rd}, 4^{th},…….. option(s) of any complete equipment or its any part may be presented at the time of product presentation.

But this will not be applicable after the revised (final) technical specifications. Only first quoted option will be considered for final financial comparative statement for the healthy competition.

(Note: please present your all optional accessories)

v. More detailed and final specifications as per requirement of NTU will be provided by the technical committee after the product presentation.

vi. The financial bids will be opened in the presence of representatives of the technically evaluated successful bidding firms. The time, date and venue will be informed in advance to open the financial offers.

3. Bidder's Eligibility and Qualification:

i. Bidding firm must be registered with tax authorities (Sale Tax & Income Tax) and will submit the certificates of registration.

ii. Original manufacturer's authorized distributors/sole agents will provide certificate for participation in the tender from their principle manufacturer(s).

iii. Bidders are required to submit the certificate along with their offer i.e. "Certified that the prices quoted in the tender are firm, final and are not in excess of printed price list of the manufacturer in country of origin and in case of any discrepancy is noticed subsequently bidder hereby undertakes to make goods any loss to the University."

iv. An Affidavit duly attested by the Oath Commissioner/Notary Public showing that the firm is not **Black-listed** from any Govt./Semi Govt. Department of the Pakistan.

v. Bidder will provide Address of nearest office to Faisalabad (mandatory) and Web page address (optional).

vi. Users list of quoted items for the last two years.

4. **Sealed 'Technical & Financial Bid' :**
    i. Technical & Financial Bids must be sealed (separately) with covering letter. There must be clearly mentioned on each envelope "**Technical proposal" / "Financial Proposal".**
5. **Conditional Tender:**
    i. Any condition(s) imposed by the bidder will not be accepted**.**
6. **Bid Security** (PPRA Rule-25):
    i. Bidders must be accompanied by a Bid Security **@ 02%** of the quoted bid price in the shape of Pay Order / CDR in favor of National Textile University, Faisalabad. **In case of failure tender document will not be entertained.**
7. **Performance Guarantee** (PPRA rule 39):
    i. An amount of **06%** will be deducted as a performance Guarantee from the bill and shall be retained for the period of **one year** from the date of commissioning/installation of machine/equipment.

8. **Taxes/Duties:**
    i. All Govt. Taxes/Duties will be paid by NTU and should not be included in the financial offer.
    ii. All clearing and insurance charges will be paid by NTU and should not be included in the financial offer.

9. **Bid Validity Period:**
    i. All pricing shall be guaranteed not to increase, based on an order placed. The offer should be valid for 120 days from the date of opening of the tender.
10. **Commissioning/Installation/Training:**
    i. Commissioning, Installation and testing (at full capacity) of all the equipment will be provided by the bidder.
    ii. Training (on site) will be provided by the bidder for the operation, maintenance and troubleshooting etc.
11. **Country of Origin and Packing:**
    i. The equipment/items must be **brand new** and complete in all respects with original packing of manufacturer and strictly conforming to the given specifications. Country of origin and model must be mentioned in technical proposal.
12. **Prices:**
    i. The foreign principles/manufactures/distributers/agents/supplier/bidder should quote price of Equipment on **C&F basis at Faisalabad Dry Port** *OR* **Faisalabad Air Port.**
    ii. The bidder/supplier should quote unit price of each main machine/equipment.
    iii. The bidder/supplier should quote unit price of each optional accessory, however all such prices will be incorporated in the price of main equipment/machine as named in the given equipment list (01 - 29) for the price comparative statement.

    Example: (Serial # 1: Washing Fastness Tester)

Suppose C&F Price of main machine/equipment	= 100 USD
Suppose C&F Price of accessory #1 (as per requirement of NTU)	= 13 USD
Suppose C&F Price of accessory #2 (as per requirement of NTU)	= 8 USD
Suppose C&F Price of accessory #3 (as per requirement of NTU)	= 5 USD
Total C&F of the main machine/equipment (for financial competition)	= 126 USD

13. **Notification of Award:**

i. The university will award the contract to the technically successful bidder whose tender has been determined to be substantially responsive and has been determined as the lowest financial proposal.
ii. In case the offer is withdrawn, amended or revised during the validity period of the tender, the earnest money will be forfeited.

14. Warranty and availability of Spare Parts:

i. The equipment/items or any part must be BRANDED (originally manufactured & assembled) & complete in all respects with original manufacturer's packing and strictly conforming to given specifications. Any used part/component (inner or outer) will not be accepted.
ii. Warranty: support & service (free of cost) should not be **less than one year** otherwise offer will not be considered. Warranty period will be started from the date of *operational work of the equipment on site.*
iii. All expenditures {technical, personnel, any transportation (National/International) or any type of charges of repair/replacement of any part(s) of the item(s)/equipment during Warrantee period will be borne by the supplier/bidder.
iv. After sale, supply of spare parts must be guaranteed on payment for a period of 2nd and 3th year (after the expiry of Warranty period that is **one** year).

15. Conformity with the given Specifications:

i. Equipment/items will be inspected at NTU through an authorized Surveyor in the presence of the supplier/their representative. Equipment/or any part will be rejected if not found according to the given specifications.
ii. In case any material is found not in conformity with the specifications provided in the tender, either on account of inferior quality, defective workmanship, faulty design, faulty packing or is short supplied, or wrongly supplied, the supplier will replace the short supplied wrongly supplied, faulty or defective part/material free of charges including transport charges etc. or pay the full cost of replacement.
iii. In case of failure on the part of supplier to supply the equipment's as per specifications / quantity within the stipulated time (without extension/approval from the competent authority i.e. Rector of NTU), a penalty at least 0.25% but not exceeding 10% per month will be imposed after the approval of competent authority. Tender with any cuttings, over writings and erasing shall not be entertained.

16. Payments:

i. The Payment will be made on the availability of funds (approvals from Government planning agencies, other relevant authorities and University management). If payment is delayed (from Government planning agencies, other relevant authorities and University management) due to any reason; no extra interest/mark-up will be paid to the supplier/bidder.

17. Mandatory Signature & Stamp:

i. Bidder or its authorized representative must sign & stamp each page of the bid documents (technical & financial). Also bidder/supplier will provide the certificate that is provided in this document named as Certificate (Mandatory).

18. Letter of Credit (L./C.):

i. L./C. will be arranged by the University. All necessary documents for opening LC will be provided by the bidder/supplier, very carefully to avoid any type of confusion / or delay in supply of items/equipment.

19. Rights of the University:

i. The University reserves the right to reject any or all bids with assigning reason(s).
ii. The University reserves the right to ignore or waive off minor irregularities or errors in any offer.

iii. **If there is any conflict, it is a fundamental term of the Tender that the Bidders acknowledges and accepts that the terms and conditions of the University shall prevail.**

iv. The University reserves the right to award the Contract to one bidder or divide it among several bidders.

v. The University reserves the right to cancel the offer of the Bidder whose bid has been found financially to be the lowest if it is revealed to the University that the Bidder does not have the capability or financial resources or facilities to carry out the contract in accordance with the terms and conditions of this Tender Documents.

vi. The University undertakes to use its best endeavors to hold confidential any information provided by you in your tender submission documents. If you wish not to disclose any of the information to other bidders/suppliers/manufacturers etc because of its sensitivity. You should identify/specify (in black and white) reason(s) for its sensitivity. Your given reason(s) (for its sensitivity) will be approved the Technical committee of NTU.

vii. The University will display the official comparative statement on the notice board for which such date will be notified to all bidders accordingly.

20. Breach of Contract:

i. In case of breach of warranty or Contract, the damages suffered by the University shall be recovered from the Contractor out of any payment due to the Contractor and / or in accordance with the terms and conditions of the Contract Performance Bond mentioned without notice to the Contractor.

21. Force Majeure:

i. The Contactor shall not be liable for any additional cost or for liquidated damages for delay or any failure to perform the Contract arising out of force majeure or cause beyond his/her control including acts of God, or of the public enemy. The Contractor shall within ten (10) days from the beginning of such delay notify the University in writing of the causes of the delay. The University shall ascertain the facts and the extent of the delay and extend the time for completing the supplies as in its judgment the findings justify.

22. Legal proceedings:

i. The law of Pakistan shall govern the contract and the tender documents. Any dispute arising out shall be decided by Competent Authority of the University.

Price quotation table (sample)

COMPONENT	**Price in Pak Rupees (C & F basis Faisalabad Dry port OR Faisalabad Airport)**
Price of Each Item (Please quote separate table of every item/equipment)	
On site Training for Personnel (Yes/No)	
Total purchase cost	
Quotation in soft copy/ CD Yes/No	

Snapshot of PPRA Rule-36(d)

36. Procedures of open competitive bidding.- Save as otherwise provided in these rules the following procedures shall be permissible for open competitive bidding, namely:-

(d) *Two stage – two envelope bidding procedure.-*

First Stage:

(i) the bid shall comprise a single package containing two separate envelopes. Each envelope shall contain separately the financial proposal and the technical proposal;

(ii) the envelopes shall be marked as "FINANCIAL PROPOSAL" and "TECHNICAL PROPOSAL" in bold and legible letters to avoid confusion;

(iii) initially, only the envelope marked "TECHNICAL PROPOSAL" shall be opened;

(iv) the envelope marked as "FINANCIAL PROPOSAL" shall be retained in the custody of the procuring agency without being opened;

(v) the technical proposal shall be discussed with the bidders with reference to the procuring agency's technical requirements;

(vi) those bidders willing to meet the requirements of the procuring agency shall be allowed to revise their technical proposals following these discussions;

(vii) bidders not willing to conform their technical proposal to the revised requirements of the procuring agency shall be allowed to withdraw their respective bids without forfeiture of their bid security;

Second Stage:

(viii) after agreement between the procuring agency and the bidders on the technical requirements, bidders who are willing to conform to the revised technical specifications and whose bids have not already been rejected shall submit a revised technical proposal and supplementary financial proposal, according to the technical requirement;

(ix) the revised technical proposal along with the original financial proposal and supplementary financial proposal shall be opened at a date, time and venue announced in advance by the procuring agency:

Provided that in setting the date for the submission of the revised technical proposal and supplementary price proposal a procuring agency shall allow sufficient time to the bidders to incorporate the agreed upon changes in the technical proposal and to prepare the required supplementary financial proposal; and

(x) the procuring agency shall evaluate the whole proposal in accordance with the evaluation criteria and the bid found to be the lowest evaluated bid shall be accepted.

CERTIFICATE (Mandatory)

I (authorized official)…….. On behalf of (Company name) ……..……solemnly declare that I have read all the terms and conditions of this tender document (Tender No. 16/07-03 for National Textile University Faisalabad), carefully. I also undertake the responsibility that all the given information in tender proposal against the above said tender are correct.

Signature ……... Company stamp. Date: _____

1. Specifications for Washing Fastness Tester (Launderometer)

S.N.	Characteristic	Description
1	Material	Stainless steel
2	Wash pots	12
3	Controls	Proper control and display of temperature, time, rate of increase of temperature, water level and rotations of containers.
4	Wash pot	550 mL (8 slots) and 1200 mL (8 slots)
5	Interface	Touch screen with built-in programs for common standards such as ISO, AATCC and GB. Provision of developing and saving newer standards
6	Standard test options	Comply with common standards such as AATCC 28/61, BS 1006 C01-C05, ISO 105, GB and custom standards such as those by M&S, NEXT and Woolmark. Offered standards should include FTM S 191 METHOD 5610, AATCC 61, AATCC 86, AATCC 132, AATCC 190, ISO 105-C01, ISO 105-C02, ISO 105-C03, ISO 105-C04, ISO 105-C06, ISO 105-C08, ISO 105-C09, ISO 105-E03, ISO 105-E12, M&S C4A, M&S C5, M&S P3B, M&S C10A, M&S C11, M&S C26, M&S C37, M&S C49A, M&S P137, NEXT 2 NEXT 2A, NEXT 3, NEXT 3A, NEXT 5, IWSTM 7, IWSTM 115, IWSTM 177, IWSTM 193, IWSTM 199, IWSTM 240, IWSTM 241, AATCC 190, ISO 105-D01, M&S C12A, ISO 105-C05, FTM S 191 METHOD 5622, FTM S 191 METHOD 5614, ISO 105-C10, GB 3921, GB 5711, GB 12490, M&S P12A, JIS L0850, JIS L0879
7	Compulsory Accessories	550 mL (08) washpots along with Gaskets 1200 mL (08) washpots along with Gaskets Teflon Gasket for 550ml container or Washpot(pack of 20) Teflon Gasket for 1200ml container or Washpot(pack of 20) Stainless steel balls (200) Stainless steel discs (50) Rubber balls (200) Test cylinder seals (16)
8	Reference	Reference of labs currently using the instrument

2. Specifications for Light Fastness Tester

S.N.	Characteristic	Description
1	Lamp	Xenon arc lamp according to ISO, AATCC and EN standards
2	Reference lamp	Calibrated xenon reference lamp
3	Cooling system	Preferably Air cooled
4	Exposure area	According to ISO, AATCC and EN standards
5	Irradiance Monitoring System	Efficient radiometer for irradiance monitor
6	Irradiance (300-400nm) Range	Setting and control of irradiance for 340nm, 420nm, 300-400nm or Lux
7	Test Chamber Humidity Range	Setting and control of relative humidity (Ambient – 95% RH) with efficient system
8	Test Chamber Temperature Range	Ambient – preferably upto 60 ˚C Setting and control of air temperature
9	Black Standard Temperature Range	Ambient – preferably upto 70 ˚C. Setting and control of Black Panel Temperature; uninsulated (BPT) or insulated (BST)
10	Water Reservoir Capacity	Preferably almost 30 liters
11	Water Consumption (ISO 105-BO2 Normal)	0.9 L/hr
12	Air and water purity	Dust filters for intake air Water purity indicator
13	Software and Display	Touch display control panel with control of all test parameters Pre-programmed test methods for ISO, AATCC and other common standards Possibility for developing custom methods
14	Standards	AATCC 16, AATCC 169, ASTM C1442, ASTM D2565, ASTM D3424, ASTM D4303, ASTM D4355, ASTM D4459, ASTM D4798, ASTM D5071, ASTM D6551, ASTM D6695, ASTM D7869, ASTM D904, ASTM E1596, ASTM G151, ASTM G155, FLTM BI 160-01, GME 60292, GMW 14162, GMW 3414, ISO 105-B02, ISO 105-B04, ISO 105-B06, ISO 105-B10, ISO 12040, ISO 16474-2, ISO 3917, ISO 4892-1, ISO 4892-2, JASO M346, MIL-STD 810F, MIL-STD 810G, PV 1303, PV 3929, SAE J2412, SAE J2527, VDA 621-429, VDA 621-430, VDA 75202, VW PV 3930
15	Compulsory Accessories	All sample holders for complete frame to meet above test standards Water purification system
16	Reference	Reference of labs currently using the instrument

3. Specifications for Crockmeter

S.N.	Characteristic	Description
1	Cycle counting	Accurate and Automatic (electronic)
2	Sample holder	Convenient mechanism to hold the sample without wrinkles and creases
3	Display	Proper display and control of parameters
4	Standards	Should comply with common textile standards such as AATCC 8, AATCC 165, ISO 105-X12, ISO 105-D02, M&S C8, M&S C8A, M&S C25, M&S C52, NEXT 6, NEXT 10, GB /T 3920, GB /T 5712
5	Reference	Reference of labs currently using the instrument

4. Specifications for Wascator

S.N.	Characteristic	Description
1	Capability	Lab washing and extraction
2	Dry load capacity	Upto 6.5 kg
3	Spin Speed	Upto 1100 rpm
4	Water supply	Hot and cold
5	Minimum water pressure	1.5 bar
6	Maximum water pressure	4 bar
7	Maximum inlet water temperature	60 ˚C
8	Water level	Possibility to set the water level using the height of water as well as its weight
9	Drain	Minimum 75 mm diameter, with drain position no more than 150 mm above base
10	Drum	Drum should be suspended in machine to avoid the need for special foundation
11	Standards	Should comply with all common standards with pre-programmed settings for most of them. Such as for ISO 5077, ISO 6330, M&S P1, M&S P1A, M&S P1B, M&S P1C, M&S P3A, M&S P3B, M&S P4, M&S P4A, M&S P4B, M&S P4C, M&S P5A, M&S P12, M&S P12A, M&S P12B, M&S P99A, M&S P91, M&S P114, M&S P134, M&S P134A, NEXT 7, NEXT 7A, NEXT 7B, NEXT 11, NEXT 12, NEXT 24, NEXT 30, NEXT 30A, NEXT 34, NEXT 36A, IEC 456. Allowance for possibility to develop, save and run newer programs
12	Reference	Reference of labs currently using the instrument

5. Specifications for Twist Tester

S.N.	Characteristic	Description
1	Twist and its direction determination	Using – Single untwist-retwist method – Double untwist-retwist method – Slippage method – Direct counting method – Multiple untwist-retwist method Determination of Twist and direct calculation of twist multiplier Reference in USTER® STATISTICS global benchmarks
2	Units	– Twist: T/m or T/” – Twist direction: Z or S
3	Standards	Comply with common standards including ISO 2061, ASTM D1422, ASTM D1423, BS 2085, DIN 53832
4	Reference	Reference of labs currently using the instrument

6. Specifications for Sample Rapid Conditioner

S.N.	Characteristic	Description
1	Conditioning	Fast sample conditioning 5-10 minutes, 25 minutes for up to 25 samples along with lighting option
2	Standard nominal fixed temperature	21 °C
3	Temperature range	10 to 90 °C
4	Temperature precision	+/- 0.5 °C
5	Standard nominal relative humidity	65 % RH
6	Humidity fluctuation	± 1.5 % RH
7	Recovery time after opening the temperature	Max. 5 min
8	Capacity	Upto 100 samples
9	Inner volume	115 litres
10	Controls	Setting, display and control of parameters through efficient electronic system. Morever, there should be constancy in controls, chamber uniformity and sensor accuracy
11	Reference	Reference of labs currently using the instrument

7. Specifications for fabric Formaldehyde content tester

S.N.	Characteristic	Description
1	Capability	Capable to test • Free formaldehyde • Released formaldehyde
2	Operations	• Built-in formaldehyde extraction mechanism where formaldehyde on fabric is transferred into a solution which is delivered in sealed test tubes. The process must be carried out through an efficient system with pre-programmed parameters and timing according to selected method. • Mechanism for conditioning of solution to form colored complex with subsequent cooling • Mechanism for measuring the test liquid through a photometer
3	Standards	EN ISO 14184-1, EN ISO 14184-2, AATCC Test 112
4	Reference	Reference of labs currently using the instrument

8. Specifications for Lab Air Conditioning Systems

S.N.	Characteristic	Description
1	Operation and Capacity	Direct expansion air cooled air conditioning system to fulfill the standard requirements for area of 5600 cu.ft. • Uniform conditions throughout the area (may be through ducting if needed) • Silent operation (preferably up to 80 db) • Energy efficient • Variable-speed high efficiency fully hermetic discharge gas cooled scroll compressor operating on R410A
2	Control and display of environmental conditions	Proper electronic system for control and display of environmental conditions
3	Standards	ISO 187, ISO 139, ASTM D1776, DIN 53802, ERT 60-1, ITMF PGA
4	Installation and warranty	Installation to meet the standards Considerable warranty time
5	Reference	Reference of labs currently using the instrument

9. Specifications for Kawabata Automatic Tensile and Shear Tester

S.N.	Characteristic	Description
1	Operation	• Tensile and Tear testing with standard Kawabata protocol • Tensile measurement: Load control method • Shear measurement: Deformation control method • Detector: Resistance wire strain gauge type • Load (full scale): (standard conditions) 50 kg, (high-sensitivity conditions) 20 kg • Standard conditions: 10 kgf (500 gf/cm) • High-sensitivity conditions: 1 kgf (50 gf/cm) *Other selections for measurement condition offered • Tensile strength during shearing (standard conditions): 200 gf (10 gf/cm) (selections for measurement conditions): 100 to 1000 gf (100 gf increments) • Accuracy: ±0.5% or less of full scale • Tensile strain detection Detector: Potentiometer Stretch amount: 2-step switchable, Max. 25 mm (50% tension) / 50 mm (100% tension) Accuracy: ±0.5% or less of full scale • Tensile deformation rate 0.05 to 0.5 mm/sec (0.05 mm/sec intervals) • Shear load detection Detector: Ring-type detector with differential transformer Load (full scale): (standard conditions) 2 kg Accuracy: ±0.5% or less of full scale • Shear strain detection Detector: Potentiometer Shear angle: Max. 8° (50 mm × tan 8° = approx. 7 mm) Standard condition: ±8° Selections for measurement condition: ±0.8 to 8° (0.8° increments) Accuracy: ±0.5% or less of full scale • Shear deformation rate: Constant • Specimen size: Dimensions: 20 cm × 20 cm (standard), Thickness: 2 mm (max.)
3	Services	Standard warranty, installation and operation training
4	Reference	Reference of labs currently using the instrument

10. Specifications for Multipurpose Fabric Hand Evaluation Tester

S.N.	Characteristic	Description
1	Operation	Standard system for measurement of all Hand properties of Fabric including Softness, Stiffness, Smoothness, Relative Hand Value, Drape, Wrinkle recovery Designated by AATCC standard for fabric hand evaluation
2	Reference	Reference of labs currently using the instrument

11. Specifications for Multipurpose Flammability Tester

S.N.	Characteristic	Description
1	Operation	Capable for determination of ignition and flame spread properties of apparel, curtains, drapes, nightwear, toys, protective clothing, technical fabrics, building and other materials. Other included functions • Marker thread switch • Interchangeable test frame • Frame stubs & pins • Heat resistant finish • Automatic ignition • Removable cross piece • Operating lever for robotic arm • Burner to specimen adjustor • Gas flow regulator • Removable debris tray • Burner setting gauges • Tray for accessories
2	Control Module	Convenient and robust Control Module to store test data. Test report may be exported straight to a printer or sent to and stored on a remote PC.
3	Standards	EN ISO 6940, EN ISO 6941, EN ISO 15025, EN 1101, EN 71-2, EN 13772, EN 1102, EN 13722, EN 1624, EN 1103 EN 14878 EN 1625BS5438, BS 7837, BS 5722, BS 5867-2, BS 6249
4	Compulsory Accessories	• Comprehensive range of gas burners to comply with above standards, interchangeable test frames and test materials to comply all standards • Radiator assembly for compliance with BS EN 13772
5	Reference	Reference of labs currently using the instrument

12. Specifications for Fabric Drape Tester

S.N.	Characteristic	Description
1	Operation	Determination of coefficient of drape by tracing a shadow of the draped fabric.
2	Standards	BS 5058, BS EN 9073, AFNOR G07-109, ERT 90-1, UNI 8279, GB /T 23329
3	Compulsory Accessories	Templates with paper rings of diameter 24 cm, 30cm and/ or 36cm
4	Reference	Reference of labs currently using the instrument

13. Specifications for Fiber Microtome

S.N.	Characteristic	Description
1	Operation	Precision microtomy to produce fiber cross sections of varying thickness from 10 microns for microscopic examination, measurement and identification. Compatibility for sample preparation for SEM
2	Standards	ASTM D2130, BS 2043, GB /T 10685, ISO 137, IWSTM 24, GB /T10685
3	Reference	Reference of labs currently using the instrument

14. Specifications for backup UPS

S.N.	Characteristic	Description		
	Output			
1	Power capacity	2.4-3 KW/ 3KVA	4.8-5.4 KW/ 6KVA	8-9 KW/ 10KVA
2	Power Factor	0.8-0.9		
3	Nominal Voltage	230V		
4	Efficiency At Full Load	92.00%		
5	Waveform Type	Sine Wave		
	Input			
6	Nominal Voltage Range	230-240V Single Phase		
7	Frequency	45-65 Hz		
	Miscellaneous			
8	Battery Type	Maintenance free sealed Lead-Acid suspended electrolyte: leak-proof		
9	Control Panel	Multi-function LCD status and control console		
10	Emergency Power Off (EPO)	Yes		
11	After Warranty Void	Yes		
12	Operational On site	Yes		
13	Reference	Reference of labs currently using the instrument		

15. Specifications for Digital Weighing Balance

S.N.	Characteristic	Description
1	Capacity	Minimum 300 gm
2	Accuracy	0.1 mg
3	Internal calibration	Yes (Defined by user). Generate and print calibration reports
4	Communication	Send balance data to Excel or other Windows applications without any data communication software installation required.
5	Standard	Meets requirements of GLP/GMP/ISO9000
6	Reference	Reference of labs currently using the instrument

16. Specifications for Yarn Sample Spin System (Lab-scale)

S.N.	Characteristic	Description
1	Operation	Lab scale spinning system for development of yarn samples with different combinations of natural and synthetic fibers
2	Capability	Capable of making 6-40Ne yarns from all types of fibers
3	Control	Fully computer controlled operation
4	Reference	Reference to labs already using the system

17. Specifications for Composite Polishing Machine

S.N.	Characteristic	Description
1	Operation	• Double platen • Semi-automatic sample preparation • Platen speed: 50-600 rpm (adjustable) • Water supply pressure no greater than 100 PSI • Input power voltage: 220v Should include polishing pad, grinding paste and sand papers
2	Control and display	Digital display speed

18. Specifications for Strain gauge kit, data acquisition system with 20 channels

S.N.	Characteristic	Description
1	Operation	• Individual input cards for strain gage and strain-gage based transducers, thermocouples, sensors • Built-in bridge completion for 120-, 350-, and 1000-ohm strain gages • Maximum scan rate of 10,000 samples per second per channel • Maximum throughput of 200,000 samples per second • Stable, accurate, low-noise signal conditioning • Selectable digital filtering of measurement signals

19. Specifications for Fabric Crease Recovery Tester

S.N.	Characteristic	Description
1	Operation	Standard fabric crease recovery tester in two versions for applying different loads (10N and 19.63N weights) to meet the requirements of European and American standards **Must Include** *European Standards (EN, ISO and M&S)* Loading Device (10N and 19.63N weights) Specimen Tweezers (Metal) Specimen Tweezers (Plastic) Specimen Template 40 x 15mm Specimen Template 50 x 25mm Pack (25 sheets 100 x 150mm) Paper Tissue *American Standards (AATCC)* Loading Device (500g weight) Specimen Tweezers (Metal) Specimen Tweezers (Plastic) Specimen Template 40 x 15mm Specimen Template 50 x 25mm Pack (25 sheets 100 x 150mm) Paper Tissue
2	Standards	AATCC 66, EN 22313, ISO 2313, M&S P22

20. Specifications for Heavy Duty Universal Tensile Tester

S.N.	Characteristic	Description
1	Operation	Complete Machine with extensometer, climatic temperature chamber, all necessary grips and accessories which are compatible to work under climatic temperature chamber (for tensile, 3-point bending and 4 point bending) and for room temperature (Compression Test, Two Rail Shear test and Shear Test) of Laminated Composite, Kevlar and Carbon Yarns and Filaments, Fabrics of Cotton, Kevlar, Carbon, Polyester and Nylon having specimen. • Two Column up to 100 kN Capacity • Work Space: Width 640mm x Height 1355mm • Max Cross Head Speed: Upto 1500 mm/min with set speed accuracy < 0.05 • Electronic measuring system for checking test axis alignment: 3 measurement planes, 4 strain gages per measurement plane, with alignment transducer and amplifier. • Remote Control with Display: One handed operation. Can be used as remote control or o Operating panel, pre-assigned functions Start, Stop, Approach start position, plus open and close specimen grips. 3.2`` graphic display showing measurement channels, machine and test status and keyboard allocations. • User Protection: Safety Shield Mandatory for applications that present potential danger to the operator. • Load Cell: 100kN Xforce type K with 0.5% accuracy from 1000N to 100 kN according to ISO 7500-1 o 1 kN Xforce type HP with 0.5% accuracy from 10 N to 1 kN according to ISO 7500-1
2	Standards	The equipment must include all accessories for performing tests according to the following standards Tensile Test: ASTM D 3039, ISO 527-4, ASTM D 4018 3 Point Bending Test: ISO 14125, EN 2562, ASTM D 7264 4 Point Bending Test: ISO 14125, EN 2562, ASTM D 7264 Compression Test: ISO 3597-3 & 8515 (superseded by ISO 14126), ASTM D 695 Shear Test: ASTM D 7078, ISO 15310 Two rail shear tests: ASTM D 4255
3	Grips and Accessories	Wedge Grips compatible to work under 20°C to 250 °C for Composite Laminates having maximum thickness 12mm Any suitable grips for Kevlar and Carbon yarns (thickness 1 micron to 1mm), Kevlar and Carbon Tows (maximum thickness 10 mm), for Fabrics of Cotton,

Kevlar, Carbon, Polyester and Nylon having specimen thickness 0.1mm-5mm compatible to work at room temperature.

3 Point Flexure fixture compatible to work under 20°C to 250°C for Composite Laminates Flat Strips.

4 Point Flexure fixture compatible to work under 20°C to 250°C for Composite Laminates Flat Strips.

Two Rail Shear compatible to work at room temperature

Compression Test of Compression test for Composite Laminated Specimen suitable for room temperature. the platen diameter must have 136mm and for square platen must have 110x110 mm

Extensometer type multiXtens in conjunction of videoXtens Transverse strain extensometer:

1.	Initial gage Length	10mm
2.	Measurement Range	700mm
3.	Sensor Arm Length	450mm
4.	Resolution	0.03µm @ -70°C to 250°C.
5.	Drag force	≤ 0.02N
6.	Max. Pursuance speed	500mm/min
7.	Max. reverse travel speed	800mm/min
8.	Max. Specimen thickness	30mm
9.	Accuracy grade	0.5 according to ENISO9513
10.	Measurement Path	±10.5mm
11.	To determine Poisson`s Ratio strain extensometer with	by using videoXtens Transverse multiXtens Extensometer.
12.	Extensometer can measure ISO899-2 ,ISO 178, the results according to 3,ISO 37 following standard	ISO 527, ISO604, ISO178 ,ISO899-1, DIN 53504, DIN 53504 ,ISO 527-

Climatic Temperature Chamber:

1.	Temperature Range	20 °C…..250°C
2.	Cooling System	LN_2
3.	Operating Pressure of the cooling medium	0.7…..1.4 Bar
4.	Average head rate (empty)	6.6 °C/min
5.	Average cool rate (empty)	6 °C/min
6.	Chamber Weight	95kg
7.	Outer Dimensions 400x1050x840mm	WXHXD
8.	Inner Dimensions 255x900x360mm	WXHXD
9.	Data for all chambers empty 60204-1, EN 6101-1, IEC 101- DIN 50011	According to EN 2-010, BS 2771-1,

		Measuring Software compatible for research work and suitable for Academia 1. Preset load. 2. Preset length. 3. Breaking Load. 4. Maintain Load. 5. Capable to display it graphically presentation of all test Software should be Windows based (7/8/10) and user-friendly. 1. Auto measurement of specimen extension at fracture point for the auto calculation of Elongation % at various gauge lengths. Including axial, transverse measurement through multiXtens in conjunction with contact and non- contact extensometer 2. Auto calculation of, Proof stress or Yield point / Strength, Elastic Limit, Modulus of Elasticity, Modulus of shear, Modulus of Rigidity & Reduction in area%. 3. Provision for storage of data and retrieval of results. 4. Unlimited re-installation of software. 5. Data transfer / communication through USB, Blue tooth & RS 232 serial. 6. User password authentication and other standard safety features. Education Module

21. Specifications for Digital Elmadorf Tear Tester

S.N.	Characteristic	Description
1	Operation	• Automatic Electronically controlled device with versatile tear testing options • Electronic braking (electromagnetic) and two button release • Controlled and measurements with a microprocessor • Pendulum and verification weights of 8N, 16N, 32N, 64N, and 128N (5 grade measuring range) • Accurate measurements thanks to the angular encoder • Testing range of 128 N • Adjustable pendulum balance • Stable platform • Capability to save standard and custom made test methods • Units display: mN, cN, N, g, Kg, oz, LB Included with analysis and results output software, Series of testing weights with highest capacity and Pendulum Kit
2	Standards	ASTM D1424, ASTM D5734, BS 4468, DIN 53862, DIN 53128, ISO 1974, ISO 9290, ISO 13937-1, M&S P29, NEXT 17, AFNOR G07-149, ASTM D689, WSP 100.1, ASTM D1922, ISO 4674-2, EN 21974, GB /T 455, JIS P8116, TAP PI T414, UNI 6444, GB /T 11999, ISO 6383-2, JIS k7128-2, AATCC GMW

22. Specifications for Digital Bursting Strength Tester

S.N.	Characteristic	Description
1	Operation	• Pneumatic operation • Pressure capacity: 200 PSI • Test area: Upto 100 cm^2 • Interchangeable test bells (30 mm, 30.5 mm, 31 mm, 35.7 mm, 79.8 mm, 113 mm) and clamping rings, automatically detected by instrument to avoid errors • Automatic correction for diaphragm pressure • Adjustable clamping pressure to eliminate specimen slippage • Automatic flow rate adjustment to achieve burst in required time • Preprogrammed software • Included with Footswitch, Booster/ Regulator and air storage tank • 7.1 cm^2, 7.3 cm^2, 7.55 cm^2, 10 cm^2, 50 cm^2, 100 cm^2 Test kits • Software to program special sequences such as cyclic testing or stretch and hold testing • Rubber Diaphragms - Standard (Pack of 10) • Rubber Diaphagms – Heavy Duty (Pack of 10)
2	Standards	ASTM D3786, EDA NA 80.4, ISO 13938-2, NEXT 22, WOOLMARK TM 29, M&S P27, GB /T 7742.2

23. Specifications for Martindale Pilling and Abrasion Tester

S.N.	Characteristic	Description
1	Operation	• 6 position tester with option to increase the positions • Electronic operation • Ease of sample removal • Programmer for pre-programming batches, totalizer counter, individual station counter, selectable speeds • Standard sample holders • 9 Kpa and 12 Kpa weights included • Mounting Device for Pilling Sample Sock Abrasion Attachment (6 position) • Mounting Device for Sock Abrasion Sample • 38mm Test Specimen Cutter with cutting mats and 12 spare blades • 140mm Cutter for Abradent & Backing Felt • Abrasion Station Enhancement Kit (6 position) • Acrylic Holder for Abrasion & Pilling Kits • Standard Abradent Fabric (1.6m x 5m) • Felt Discs, 90mm for Pilling Test (pack of 20) • Felt Discs, Woven 140mm (pack of 20) • Felt, Woven (1m x 1.5m) for ISO 12947, 12945-2, & BS EN 13770 • Felt Discs, Nonwoven 140mm (pack of 20) • Felt, Nonwoven (1m x 1.5m) for ASTM & M&S Standards • Backing Foam (4 sheets each 1.5m x 0.5m) • Sample Retaining Rings - For Pilling Heads (pack of 20) • OAKEY Abrasion Sheets F2 for Protective Gloves EN 388 (pack of 20) • Klingspor PL3IB Gritt 180 abrasion paper for EN388, pack of 50 sheets • Silicon Carbide Paper Sheets, P180G for Coated Fabrics EN530 (pack of 25) • Trizact Synthetic Abrasion Discs 35 Microns for controlled abrasion of synthetic fabrics, self-adhesive (pack of 25 - green) • Trizact Synthetic Abrasion Discs 5 Microns for controlled abrasion of synthetic fabrics, self-adhesive (pack of 25 - orange)
2	Standards	BS EN 943, GB /T 4802.2, M&S P140, M&S P19, ISO 12945-2, JIS L1096, ISO 17076-2, ASTM D4966, ASTM D4970, BS 3424, IWSTM 112, EN 343, EN 530, EN 13770, BS EN 15973, ISO 12947, BS 2543, GB /T 13775, GB /T 21196, ISO 20344, ISO 5470-2, IWTO 40, IWSTM 196, BS EN 14605, BS EN 14465, BS EN 14325, JIS L1096, SN 198525, BS 5690, NEXT 18, M&S P140, EN 388, M&S P17, M&S P18C, M&S P19, BS EN 16094, BS EN 388, WSP 020.5.R3 (12), ARCADIA AG 32, ARCADIA AG 34, ARCADIA AG 35, IS 12673, BS EN ISO 17704, BS EN ISO 26082-1, IUP 48-2, IUP 53-1, SFS 4328, ARCADIA AG 26, GB /T 21196, NEXT 26

24. Specifications for Random Tumble Pilling Tester

S.N.	Characteristic	Description
1	Operation	• Stainless steel impellers to be rotated within individually lit aluminum chambers constantly tumbling test fabrics against cork liners for a predetermined time (controlled by a timer and alarm). Possibility to inject compressed air into the chamber to assist the tumbling action. • 4 test chambers • With standard impellers for ASTM D3512 • Cork liners with Certificate of Conformity • Digital Cycle Display • Impeller (2 each) • Flapper Kit (modify two standard impellers) • Cork Liners (Pack of 50) • Cotton Sliver, Dyed 76 Grain (10 yards/9 meters) • White Adhesive
2	Standards	ASTM D3512, DIN 53867, JIS L 1076-D, NF G 07-132, GB /T 4802.4, ISO 12945-3

25. Specifications for Laboratory Compressor

S.N.	Characteristic	Description
1	Operation	Pressure: up to 8 bars/120 psi Power: 0.46 HP Tank size: 25-40 liters Supply: 230V/50Hz Noise level: 25 dB(A)/1m Configurations that meet varying needs Continuous duty operation High efficiency valves Oil free output System for treatment of air to produce dry and cool air

26. Specifications for Differential Scanning Calorimeter

S.N.	Characteristic	Description
1	Operation	Should be able to measure properties including glass transitions, “cold” crystallization, phase changes, melting, crystallization, thermal stability, cure/ cure kinetics, oxidative stability, polymorphic transition, Liquid crystal, Protein denaturation, Solid-solid transition • Multi-position auto sampler • User-Replaceable Cell • Direct Cp measurement • Digital Mass Flow Controller • Auto Lid • Cooling system • Temperature Accuracy ± 0.1° C • Temperature Precision ± 0.01° C • Temperature Range (with cooling accessory) -170 to 750 °C • Heating rate 0.01 to 300 C/min • Calorimetric Precision (indium metal) ± 0.05% • Calorimetric Reproducibility (indium metal) ± 0.05% • Sensitivity 0.15-0.25 µW • Indium Height/Width Ratio 60 mW/°C • Baseline Curvature (-50 to 300°C) 10µW • Baseline Reproducibility ± 10µW • Pressure DSC Cell • Touch screen operation with software including different analysis tools • sensitivity for detecting weak transitions and melts • Flat baseline stability • Capability to measure Tg for small samples of different materials such as pharmaceuticals and even highly crystalline polymers (even at slow heating rate 5°C/min) • Accurate measurements of glass transitions and heat capacity from materials that exhibit weak and broad transitions • Accurate measurements of Tg of small amorphous substances • Separation of complex transitions • Measurement of broad and weak transitions • Data interpretation • Quasi Isothermal heat capacity

27. Specifications for Coup Cut Resistance Tester

S.N.	Characteristic	Description
1	Operation	• For standard testing • With an advanced controller, allowing for variable speed settings, Possibility to change test weights. • Ensure a constant load during the complete test cycle. • Two sample holders • Two cutting blades • Easy access to the cutting head • Blade protection • Easy blade replacement, • Fast installation of the sample and control fabric. • Can be calibrated and set at variable test speed • Standard Fabric (5m²) necessary for performing tests, with IFTH certificate of compliancy • Cutting blade for test – set of 5 • Conductive rubber– set of 4 (2 small & 2 large)
2	Standard	• EN 388

28. Specifications for GCMS

S.R.	Characteristic	Description
1	GC Oven	**Oven temperature set point resolution :** Must be 0.1^{o}C **Column oven temperature:** Up to 450^{o}C **Oven ramps/plateaus :** Must be at least 20 ramps/21 plateaus **Oven cool down :** 450 to 50^{o}C in 4 min or less **Maximum achievable temperature ramp rate :** At least 100^{o}C/min **Temperature stability :** < 0.01^{o}C for a 1^{o}C ambient change
2	Injector/ Inlet	Split/ split less Injector with Temperature programmable Suitable for all capillary columns 50 µm to 530 µm id **Split ratios :** Up to 7,000:1 or more **Support modes :** Split, Splitless, Pulsed-Split and Pulsed-Splitless **Maximum temperature :** 450 °C or more **Pressure ranges :** 0 to 150 psi **Injection modes :** Hot or cold split/splitless, Pulse split/split less, Direct Injection **Temperature program :** up to 800 °C or more

	Mass Spectrometer / Detector	**Interface type:** Direct connection with capillary column **Ionization Method :** Electron Impact (EI) as standard and shall have provision for expandable to PCI, NCI **Transfer line temperature:** 100-350^{o}C **Ion Source Temperature :** 150-350^{o}C **Quadrupole Temperature:** 100-200^{o}C **Mass Analyzer:** Metallic parts of the Ion Source must be constructed from inert material **Mass Range :** 1.5-1050 amu or more **EI Scan Sensitivity :** At least 1500:1 at m/z 272 for 1pg octafluronapthalene OFN in EI scan **Mass Spectrometer Stability :** 0.10 u/48 hr **Scan Speed :** Upto 20,000 amu/sec (Single Scan with 0.1 amu step resolution. **Detector:** Electron multiplier with overdrive lens and conversion dynode Or triple axis detector **Dynamic Range :** 10^{6} **Retention Time locking :** The system must offer retention time locking capability to provide the same retention time after column maintenance. **eMethod capability :** Should have eMethod capability for simple method transfer between different model of GC **Mass Resolution :** Unit Mass resolution by tune **Filament:** Dual filament and automatic switching when one is failed. **Main Pump for Vacuum:** Turbo molecular pump **Fore Pump:** Rotary Pump **2 Line MS System:** Featuring two line MS system allowing two columns to be installed simultaneously into the ion source of Mass Analyzer

3	**Flame Ionization Detector (FID)**	**Minimum detectable level (for tridecane):** < 1.4 pg C/s or less **Linear dynamic range :** $>10^7$ **Set data rate :** Up to 500Hz **Electronic pneumatic Control :** For H2 and air flows (with electronic ON/OFF). **Operating temperature :** 450 °C or more
4	**Direct Inlet**	**Direct Inlet :** Must have the option of upgrading the system with Direct Inlet Probe/ Thermal Separation probe and Thermal Desorber. The bidder should justify the upgrade options.
5	**Auto Injector**	Auto injector tower with an auto sampler tray which is capable of handling more than 15 sample vials, the control is random access using the data management software. Must be upgradable to 150 vial tray or more Fully programmable dispense rate, draw rate, and injection rate. Able to accommodate 1, 2, 4 ml, maximum volume with standard syringe carriage. Support of 250- and 500-µL syringes with optional Enhanced Sample Handling Syringe Carriage Must allow future addition option of Heater/Mixer/Bar Code Reader and second injector. Can be used to prepare highly viscous or slightly soluble samples, as well as for dilution, mixing, derivatization and bar-code sample tracking. All functions are controlled via easy-to use software. Should be accompanied with Oil free air compressor Hydrogen Generator

	Software for instrument GC/MS operation and control	The supplier must supply the genuine and latest instrument operating software as per following specification. Simultaneous SIM/SCAN capability must be possible. System start-stop should be fully automated and controlled via the software. Reporting forma function must be flexible and be based on user's design. Like MS-Words, complete flexible function introduces ease and rapidness for making report and tidying up the analysis result. This software must be fully GLP/GMP compliance. Strong Security function, validation function for hardware & software, and audit trail function for data traceability must be built-in as a standard. The library search software should be capable of searching through atleast 3 libraries simultaneously including the user defines private library. The library search mode should be either by similarity search or index search. Quantification by different calibration curve methodMacro programming capability, HTML format data file for direct email purpose. Must be able to perform manual integration of single and group peaks capability for better peak identification. 200pcs 20mL vials with cap and septum for Headspace Sampler.
7	Computer to operate software system Printer	Branded computer with I3 or higher processor , 4 GB RAM memory, 500 GB Hard disk storage and DVD-RW ROM, 17" LCD wide monitor and antivirus. Laser Printer
8	Power Backup System	Online 7kVA capacity UPS with power backup up to 30 min.
9	Installation and commissioning	The GCMS system must be installed and commissioned by certified engineers
10	Training	The supplier should provide warranty on the system for at least one year from the date of installation and commissioning The bidder must provide five days basic operational training for the user of the instruments at site after installation and commissioning. The supplier must also provide application and operation training for two chemist of NTU University for 5 days. Additional Foreign Training for two technical persons at manufacturer site.
11	Verification	Verification of all the requirement shall be compulsory during installation of the equipment
		The bidder must have manufacturer certified local engineer trained on GCMS for providing complete support for the system. The bidder must submit certificate with the proposal

		Declaration of conformity, date of manufacture of different parts and calibration certificate of different part to be calibrated should be supplied with equipment.
	Others	The bidder must have the past record of supplying same or similar GC-MS equipment in Pakistan. The bidder must submit supply records. The bidder must have their own service support center with adequate tools and equipments for providing prompt service support.

29. Specifications for HPLC

S.N.	Characteristic	Description
1	**Quaternary Pump**	The instrument must have an operation pressure range of 0 – 60 MPa (0 – **600 bar**, 0 – 8700 psi) over the flow rate range up to **5 ml/min** and 20 Mpa (200 bar) up to **10 mL/min or better.** Must have active inlet valve (AIV) option that can be operated throughout analysis. Ensures robustness when handling mobile phases with high salt content. Integrated 4 channel Degasser.
2	**Diode Array Detector**	**Slit Width:** Programmable: 1, 2, 4, 8, 16 nm or better **RFID tags:** Radio Frequency Identification Tags for flow cells and UV lamp. **Max Sampling Rate:** 120 Hz. **Wavelength range:** Wavelength range must be at least 190-950 nm, settable in 1 nm increments or better. **Light Source:** Dual Lamp Design ((tungsten and deuterium) **Noise:** < ± 0.7 x 10^{-5} AU at 254 nm and at 750 nm (cell path length 10 mm, response time 2 s, flow 1 ml/min LC-grade. **Drift: <0.9 x 10^{-3} AU/h at 254 nm.** **Operating temperature:** The temperature operating range of instrument must be from 0°C to 55°C.
3	**Auto Injector**	**Autosampler injector design – flow through design:** The autosampler design must offer a flow through design with variable injection volume **Vial Capacity:** >130 Vials of 2 ml each & Must have option of 6 ml vial tray. **Precision:** precision must be better than 0.25% at 5uL to 100uL **Injection volume range:** The module must have the option to broaden the injection volume range – with multi-draw kit up to 1800µl **UHPLC capability:** metering device is located in high pressure environment. **Walk-up tray:** The autosampler must have the option to attach a tray that allows walk-up capabilities. **Thermostatting:** Settable temperature range 4-40°C **Injection volume range:** The module must have the option to inject large volumes with a single injection (900 uL single stroke, 1.8mL multidraw)
4	**Column Compartment**	**Temperature accuracy:** Temperature accuracy must be ± 0.8 °C or ± 0.5 °C with calibration. **Pre column heating and post column cooling:** The module must enable pre column heating and post column cooling. **independent temperature zones:** at least two independent temperature zones required. **Temperature range:** from 10°C below ambient to 85°C. **4Column identification module:** Must offer an automatic column-identification module as standard for GLP documentation of column type, and major column parameters

5	**Software & Data System**	Software must be GMP/GLP compliant and US FDA 21 CFR Part 11 Compliant. Branded Core i3 Computer system with LED and Printer required with the HPLC. (Compatible with the Machine)
6		HPLC Columns, L11, C18, Phenyl Startup kit HPLC Tool Kit
7	**Quaternary Pump**	The instrument must have an operation pressure range of 0 – 60 MPa (0 – **600 bar**, 0 – 8700 psi) over the flow rate range up to **5 ml/min** and 20 Mpa (200 bar) up to **10 mL/min or better.** Must have active inlet valve (AIV) option that can be operated throughout analysis. Ensures robustness when handling mobile phases with high salt content. Integrated 4 channel Degasser.
8	**Diode Array Detector**	**Slit Width:** Programmable: 1, 2, 4, 8, 16 nm or better **RFID tags:** Radio Frequency Identification Tags for flow cells and UV lamp. **Max Sampling Rate:** 120 Hz. **Wavelength range:** Wavelength range must be at least 190-950 nm, settable in 1 nm increments or better. **Light Source:** Dual Lamp Design ((tungsten and deuterium) **Noise:** < ± 0.7 x 10^{-5} AU at 254 nm and at 750 nm (cell path length 10 mm, response time 2 s, flow 1 ml/min LC-grade. **Drift: <0.9 x 10^{-3} AU/h at 254 nm.** **Operating temperature:** The temperature operating range of instrument must be from 0°C to 55°C.
9	**Auto Injector**	**Autosampler injector design – flow through design:** The autosampler design must offer a flow through design with variable injection volume **Vial Capacity:** >130 Vials of 2 ml each & Must have option of 6 ml vial tray. **Precision:** precision must be better than 0.25% at 5uL to 100uL **Injection volume range:** The module must have the option to broaden the injection volume range – with multi-draw kit up to 1800µl **UHPLC capability:** metering device is located in high pressure environment. **Walk-up tray:** The autosampler must have the option to attach a tray that allows walk-up capabilities. **Thermostatting:** Settable temperature range 4-40°C **Injection volume range:** The module must have the option to inject large volumes with a single injection (900 uL single stroke, 1.8mL multidraw)
10	**Column Compartment**	**Temperature accuracy:** Temperature accuracy must be ± 0.8 °C or ± 0.5 °C with calibration. **Pre column heating and post column cooling:** The module must enable pre column heating and post column cooling. **independent temperature zones:** at least two independent temperature zones required.

		Temperature range: from 10°C below ambient to 85°C. **Column identification module:** Must offer an automatic column-identification module as standard for GLP documentation of column type, and major column parameters
11	**Software & Data System**	Software must be GMP/GLP compliant and US FDA 21 CFR Part 11 Compliant. Branded Core i3 Computer system with LED and Printer required with the HPLC. (Compatible with the Machine)
		HPLC Columns, L11, C18, Phenyl Startup kit HPLC Tool Kit