SATS UNIVERSITY CONTRACTOR

COMSATS University Islamabad, Lahore Campus Defence Road, Off Raiwind Road, Lahore

> Tender No. CUI-LHR-TN-13-19-1319 Case # 2938

Single Stage Two Envelop Procedure

Title of Tender:Lab Equipment for Establishment of Centre for Advanced Technologies in
Biomedical Materials (Knowledge Economy Initiative)

TERMS AND CONDITIONS

- 1. All pages of bidding documents are mandatory to be signed / stamped, meaning thereby bidder agrees to our terms & conditions mentioned herein, failing which the bid may be rejected.
- 2. Any addition, deletion or modification of any clause of the procurement terms & conditions/ BoQs of CUI Lahore Campus by any vendor will not be acceptable and may lead to rejection of the bid.
- 3. Only registered Suppliers, who are on Active Taxpayers List (ATL) of FBR, are eligible to participate in tender.
- 4. The contract will be executed and handed over in satisfactory conditions up to the entire satisfaction of COMSATS University Islamabad, Lahore Campus.
- 5. Documents along with Pay Order / Demand Draft amounting to <u>Rs. 1,000/-</u> as a tender document fee (Non-Refundable) shall be submitted in favor of COMSATS University Islamabad, Lahore Campus to the address given below. No bid will be accepted without tender documents' fee.
- 6. Part / Advance payments is not allowed.
- 7. The exact completion/delivery time for is 120 Days (starting from the date of LC Opening). The handing over / completion time for this contract is of critical importance.
- 8. The bid proposal must be quoted inclusive of all freight and packing charges in C&F and to be delivered at Lahore Airport. CUI Lahore Campus shall open the direct LC in favor of Original Manufacturer / Principal and shall also clear the shipment from Custom Authorities.
- 9. After opening of bids, CUI-Lahore Campus will examine the bids for completeness as per tender document.
- 10. Purchase order (s) will be awarded to the lowest or technically recommended bidder (s) on the basis of item wise / subtotal wise / grand total wise according to the nature of BoQs.
- 11. The bid should be submitted in a sealed envelope up to <u>January 13, 2020</u> on or before <u>1400hrs</u> and will be opened on the same date <u>at 1430hrs</u> in the presence of available bidders.
- 12. COMSATS University Islamabad, Lahore Campus, will follow the PPRA rule of <u>single stage two</u> <u>envelope procedure;</u>
 - i. The bid shall comprise a single package containing <u>two separate envelopes</u>. Each envelope shall contain separately the <u>financial proposal</u> and the <u>technical proposal</u>;
 - ii. The envelopes shall be marked as "FINANCIAL PROPOSAL" and "TECHNICAL PROPOSAL" in bold and legible letters to avoid confusion;

Signature & Stamp of Bidder

- iii. Initially, only the envelope marked <u>"TECHNICAL PROPOSAL"</u> shall be opened;
- iv. The envelope marked as <u>"FINANCIAL PROPOSAL"</u> shall be retained in the custody of the procuring agency without being opened;
- v. The procuring agency shall evaluate the technical proposal in a manner prescribed in advance, without reference to the price and reject any proposal which does not conform to the specified requirements;
- vi. During the technical evaluation no **amendments** in the technical proposal shall be permitted;
- vii. The financial proposals of bids shall be opened publicly at a time, date and venue announced and communicated to the bidders in advance;
- viii. After the evaluation and approval of the technical proposal the procuring agency, shall at a time within the bid validity period, publicly open the financial proposals of the technically accepted bids only. The financial proposal of bids found technically nonresponsive shall be returned un-opened to the respective bidders;
- ix. and
- x. The bid found to be the lowest evaluated bid shall be accepted.
- 13. The envelope should be marked as under;

Secretary, Purchase Committee COMSATS University Islamabad, Lahore Campus Defence Road, Off Raiwind Road, Lahore. Tel: 042-111-001-007, Ext: 875

14. The envelope shall also bear the word "CONFIDENTIAL" and following identification quotation of <u>"Lab</u> <u>Equipment for Establishment of Centre for Advanced Technologies in Biomedical Materials</u> (Knowledge Economy Initiative)".

- 15. The bid form (BoQs) must be duly filled in, stamped and signed by the authorized representative of the bidder.
- 16. If the vendor fails to deliver the goods / services to COMSATS University Islamabad (CUI), Lahore Campus within the given deadline, any of the following can be opted by CUI Lahore campus on the recommendation of the end user and approval of the authority;
 - a. An extension in the delivery period may be granted in case a valid reason/justification with necessary documentary evidence is provided by the vendor supporting the reason for delay.
 - b. A penalty upto 10% of the invoice value may be charged.
 - c. Purchase order may be cancelled along with confiscation of earnest money if the vendor fails to deliver the goods / services after the initial or extended delivery time, as the case may be.
- 17. If the delivered goods / services are not according to the required quality standards / specifications, the same shall be liable to be rejected after inspection. The vendor would be required to supply as per requirements mentioned in our BoQs, otherwise the purchase / work order will be cancelled after due date with confiscation of earnest money.
- 18. Deduction of Income Tax and any other tax will be deducted at source according to Government prevailing rules.

CUI-LHR-PUR-Tender-001

- 19. Payment will be made on submission of Invoice in the name of "COMSATS University Islamabad (CUI), Lahore Campus" with a copy of delivery challan (s) after the complete order has been supplied, inspected and accepted which includes delivery / installation, and COMSATS acceptance / inspection thereof.
- 20. All prices should be valid for at least <u>120 days.</u> Withdrawal or any modification of the original offer within the validity period shall entitle CUI-Lahore Campus to forfeit the earnest money in favor of the CUI-Lahore Campus and / or put a ban on such vendor participation in tenders / works.
- 21. It is the sole responsibility of the agent / supplier / manufacturer to comply with the applicable laws, be national or international.
- 22. In case of any dispute or grievance, the matter shall be addressed as per PPRA rules.
- 23. The CUI-Lahore Campus reserves the right to modify the quantities of goods / services at any time before the award of purchase / work order.
- 24. Minimum one-year warranty shall be provided from the date of installation or standard warranty whichever is higher
- 25. The Successful/lowest bidder is required to submit the <u>05% of the total value of Purchase Order as a retention money in form of Call Deposit Receipt/ Local Bank Guarantee with the validity of Warranty Time Period (As mentioned in BoQs) in favor of COMSATS University Islamabad (CUI), Lahore Campus and it will be released after the completion of warranty period.</u>

26. The bidder is required to furnish in form of <u>Bank deposit/ CDR / Pay order equivalent to 2% of the</u> <u>total Bid price as Earnest Money crossed in favor of "COMSATS University Islamabad, Lahore</u> <u>Campus"</u>.

- 27. CUI Lahore Campus reserves the rights to reject the bid if;
 - i. Received without earnest money
 - ii. Received later than the date and time fixed for tender submission
 - iii. The tender is unsigned/ unstamped
 - iv. The offer is ambiguous
 - v. The offer is conditional
 - vi. The offer is from a firm, which is black listed by any Govt. Office.
 - vii. The offer is received by telephone/telex/fax/telegram.
 - viii. Any unsigned / ambiguous erasing, cutting / overwriting etc. is made.
- 28. The bidder should furnish a certificate as worded below in token of acceptance of all the terms and conditions of the tender otherwise the tender will not be considered under any circumstances.
- 29. The undersigned affirm that the terms and conditions as contained in this document have been read and accepted and that in the event of selection of my/our rate the agreement in the prescribed form will be entered into:
 - <u>Company / Vendor Name:</u>.....
 - <u>Postal Address:</u>.....

 - <u>NTN# :</u>......<u>GST#:</u>.....
 - <u>Signature:</u>

• Please also attach the Certificate supporting being Active Taxpayer as per requirement of <u>FBR.</u> <u>Signature & Stamp of Bidder</u>

BoQs of Lab Equipment for Establishment of Centre for Advanced Technologies in Biomedical Materials (Knowledge Economy Initiative)

<u>Technical Portion (Please mention the quoted model/brand in technical</u> portion with no mention of price otherwise the bid will be rejected)

is allo (i.e. n lead t	ange in the BoQ wed. Any additi odel / brand or o rejection of bi	Please mention the quoted Model / Brand with meeting the all specifications mentioned			
Sr. #	Equipment Name	Required Speci	fications	Qty	in BoQs
		Purpose of the Atomic Absorption spectrophotom eter Light source	For multi element analysis using atomic absorption spectrometer technique Continuum light source		
		Lamp	Lamp for multi elemental analysis with cooling		
		Flame technique	Burner head 100 mm and 50 mmO ring for organic samplesAutomatic adjustmentNebulizer with platinum/rhodium capillary		
1	Atomic Absorption spectrophoto meter with	Graphite furnace	Automatic calibrationAutosamplerIntegrated cooling systemCamera with integrated visiontoolDirect analysis of solid samples	1	
	Graphite Furnace	Hydride system	For analysis of hydride and Hg Cooling tube for graphite connection		
			Iridium standard (100mL) For automatic analysis of samples and standards		
		Auto sampler	Rack with minimum 54 positions		
		r -	75 pieces of 50 ml sample vials		
			Automatic dilution		
		software	Integrated software to run all the accessories		
		Air compressor	At least 50 Hz for dust, oil and water free air		

Computer With Power	Specifications As recommended by OEM with genuine windows	01
Backup	Laser printer	01
		150
	Cleaning strips	Nos.
	set of sealing rings mixing chamber nebulizer system	03
	intake ptfe tubes with 0.5mm diameter	02
	intake tubes for autosampler	02
	wash bottles	3
	IC graphite tubes coated	10
	IC graphite inserts	10
	Pieces sample cup of polysterol 1.5ml	2000
accessories	PTFE 2ml cup	20
	20 pieces polypropylene special cup 5 ml	20
	Pump tube	2
	Sample tube	12
	Acid tubes	4
	Connection tube 01	01
	Connection tube from reactor to double valve	2
	reactor tube	2
	drying tube	2
	Hg drying membrane hybrid	2
	predry tube	2
	online pure sinewave UPSbuilt in AVR capable ofregulating \pm 30 voltsPower factor \geq 0.95	
Power backup	Power backup in case of power	
with additional	failure for at least 30 mins	01
Servo Stabilizer	Including lead Acid free dry batteries	UI
	OR A better alternative as recommended and provided by OEM for optimum operations	
	Argon gas cylinder with double regulator and certified	01
	(pressure rated and tested) Acetylene gas cylinder with double regulator and certified (pressure rated and tested)	01
others	Nitrous oxide gas cylinder with double regulator and certified (pressure rated and tested)	01
	2 stage moisture trappers for gas cylinders	03
	Exhaust assembly	01

				1	CUI-LHR-PUR-Tender-001
		Warranty	12 Months from the date of installation with vendor having good local reputation with running machines and well- trained engineers		
		Purpose of the Micro-CT	Micro-computed tomography of ceramics, polymers, composites, bone and tissue.		
	X-ray source	100 kV or better, 10 W or better			
		Spot size	5 μm or better		
		X-ray detector	11 MP or better		
		Frame rate	4x4 binning or better		
		Scanning object size	75x70 (D x L) mm or higher		
		Resolution/ detectability	0.45 μm voxel size or better		
		Image matrix /Reconstruction array	12k x 12k pixel or above, isotropic grid		
		adjustment of geometry/ Fixed	Automatic	01 No.	
2 Micro-CT	Micro-CT	Software	Volumetric reconstruction, visualization software, Morphology analysis software (2D/3D quantitative analysis), Realistic surface rendering visualization, realistic volume rendering software, /softwares recommended by OEM		
			Format converter to TIFF, BMP, JPEG		
		Reconstruction workstation (Computer) With Power backup	Specifications as recommended by OEM With color laser printer		
	Radiation safety	<1 µSv/h			
		Compressor	oil, moisture and particle filter particles size > 10 microns if needed	01 No.	
			Artifact to calibrate the equipment	01 No.	
			Integrated stage		
		others	sample holders/mount for different size samples	01 No.	
			calibration rods for 2-4 mm for BMD and/ TMD	01 No.	

			1		CUI-LHR-PUR-Tender-001
1			calibration rods for 8-16 mm	01 No.	
			for BMD and/ TMD calibration rods for 32mm for	01 No.	
			BMD and/ TMD	01 No.	
ļ			online pure sinewave UPS	01 110.	
			built in AVR capable of		
			regulating ± 30 volts		
			Power factor ≥ 0.95		
		Power backup	Power backup in case of power		
		with additional	failure for at least 30 mins	04.33	
		Servo	Including lead free dry	01 No.	
		Stabilizer	batteries		
			OR		
			A better alternative as		
			recommended and provided by		
			OEM for optimum operations		
			12 Months from the date of		
			installation with vendor having		
			good local reputation with		
			running machines and well-		
			trained engineers		
		Warranty,	Enabled with Remote Access		
		Training &	feature for troubleshooting and		
		Others	identification of the routine		
			problems		
			2-persons advanced training		
			(Operations, Trouble Shooting		
			etc.) at Original Equipment		
			Manufacturer site (travel & accommodation included)		
			Reactions/wells: 96		
			Scan format: SYBR® Green &		
			FAM		
			Thermal block: should		
			accommodate 96 well plate,		
			8X12 strips, 0.2ml tubes		
			Lid heating limits: Heat up to		
			105°C		
			Range: 0-100°C		
			Filters: 6 Excitations, 6		
			Emissions		
	Real-time		Run time: 30min-40min	01	
3	PCR	Thermal cycler	Sample size volumes: 10-100	No.	
	-		μL		
			Automation compatible: Yes		
			Remote monitoring: Yes		
			On-Board memory: Yes		
			Dynamic range: Up to 10 logs		
			Collaboration Features		
		1	IP connectivity		
			Strong Password		
			Strong Password Requirements		

Flexibility	Flexible for passive reference dye (can be use with or without reference dye)	
Sensitivity	Temperature uniformity: up to ± 0.5°C Sensitivity: Detect down to 1 copy	
Accuracy	±0.2 °C	
Optical Detection	Excitation source: LED light of enhanced System Filters range excitation/emission: 6X6 filters (450–720 nm)	
Computer	Specifications as recommended by OEM with genuine windows with [power backup of 30 minutes	01
	online pure sinewave UPS	
	built in AVR capable of regulating ± 30 volts	
Power backup with additional Servo Stabilizer	Power factor ≥ 0.95	
	Power backup in case of power failure for at least 30 mins Including lead Acid free dry	01
	batteries OR A better alternative as recommended and provided by OEM for optimum operations	
Applications	Gene Expression, Protein Detection, Genotyping, MicroRNA, Copy Number Variation, High Resolution Melt	
	Interchangeable Trays: for using plates, strips, or tubes	01 each
	Samples mixing shaker: For 96 well plates and 8 well strips	01
	PCR Tubes (0.2ml): 1000 tubes	1000
Accessories	PCR strips (0.2ml): 1000 strips with caps	1000
	Micropipettes: 0.1-2.5µl, 0.5- 10µl, 10-100µl (pipette should have calibration window along with volume window and spring-loaded tip cone)	01 each
Warranty	12 Months from the date of installation with vendor having good local reputation with running machines and well- trained engineers	

					CUI-LIIK-PUK-Tender-001
		Purpose	Fabrication of electrospun matts and electrospraying of solutions for specifically biomedical applications		
		For biological	Complete electrospinning setup with single benchtop compartment having digital display of pump and power supply operations. The compartment should be made up of stainless steel with		
		purposes	proper insulation with climate control chamber Overall the equipment should be designed for fabrication of fiber for biomedical		
4	Electrospinni ng with power supply and syringe pumps	Syringe pump	applications. Channels Four-channel pump: can be controlled independently for individual syringe Flow rate, volume and time of infusion can be controlled precisely. Compatible to work under high voltage. Working temperature 5-40 °C (or better range) Pumping rate 50ml syringe : 0.1ml/h ~1500ml/h 30ml syringe : 0.1ml/h ~600ml/h 10ml syringe : 0.1ml/h ~400ml/h Pump rate accuracy : +/-2%	01	
		Climate control chamber	Controllable temperature Ambient to 40 °C or better Humidity control 10 to 90% or better		
		Power supply	Output Current Upto 1mAVoltages Up to 30KV or higherOver voltage protectionOver current protectionProtection against output shortcircuitOver temperature protectionManual recovery after cutoff		
		Collectors	Drum collector (1-5000rpm, +/- 1rpm) disk collector Plate collector	01 01 01	
			Grooved collector	01	

 1			CUI-LHR
	Needle sets 11 g to 27 g	05	
	Multi option coaxial needle set ranging from 11g to 27g	02	
	Triaxial spinneret Needle length should be 6cm with inner 22g, middle 18g and outer 14g	02	
	Triaxial spinneret Needle length should be 6cm with inner 22g, middle 18g and outer 15g	02	
	Triaxial spinneret Needle length should be 6cm with inner 22g, middle 18g and outer 16g	02	
	Tri-channel spinneret	02	
	Multi-nozzle spinnerets also called islands in the sea spinneret	02	
Accessories	Cold light source for observing the electrospinning process	01	
	Exhaust fan to cool down the equipment in working process and solvent vaporization. Should be controlled by control penal	01	
	HD Camera for observation (3 MP or higher)	01	
	Syringe heater Two-channel heater : 2 syringes can be heated at the same time. Up to 250°C or higher	01	
	50ml Glass syringes	05	
	20ml Glass syringes	05	
	10ml Glass syringes	10	
	5ml Glass syringes	10	
	2ml Glass syringes	10	
Power backup with additional Servo Stabilizer	as recommended by OEM for optimum operations	01	
Warranty	12 Months from the date of installation		

r		1			CUI-LHK-FUK-Tender-001
		Basic setup	Fabrication of electrospun matts and electrospraying of solutions		
		General features	Complete electrospinning setup with plate and rotating drum collector in single benchtop compartment having digital display of pump and power supply operations.		
5	Electrospinni ng with power supply and syringe pumps	Syringe pump	Channels 02-channel pump: can be controlled independently for individual syringe Flow rate, volume and time of infusion can be controlled precisely. Compatible to work under high voltage. Working temperature 5-40 °C (or better range) Pumping rate (or better) 50ml syringe : 0.1ml/h ~1500ml/h 30ml syringe : 0.1ml/h ~900ml/h 20ml syringe : 0.1ml/h ~600ml/h 10ml syringe : 0.1ml/h ~400ml/h Pump rate accuracy : +/-2% Voltages Up to 30KV or higher Output Current	02	
		Power supply	Upto 1mAOver voltage protectionOver current protectionProtection against output shortcircuitOver temperature protectionManual recovery after cutoff		
		Collectors	Drum collector (1-3000rpm, +/- 1rpm) or higher	02	
			disk collector	02	
			Needle sets 11 gauge to 27 gauge	05	
		Accessories	Multi option coaxial needle set ranging from 11 gauge to 27 gauge	05	
			Cold light source for observing the electrospinning process	02	
			Exhaust fan to cool down the equipment in working process and solvent vaporization. Should be controlled by control penal	02	

					CUI-LHR-PUR-Tender-001
			Syringe heater Two-channel heater : 2 syringes can be heated at the same time. Up to 250°C or higher 50ml Glass syringes 20ml Class syringes	02 05 05	
			20ml Glass syringes		
			10ml Glass syringes	10	
			5ml Glass syringes	10	
			2ml Glass syringes	10	
			online pure sinewave UPS		
			built in AVR capable of regulating ± 30 volts		
		Power backup	Power factor ≥ 0.95		
		with additional	Power backup in case of power	01	
		Servo	failure for at least 30 mins	01	
		Stabilizer	Including lead free Acid dry batteries		
			OR		
			A better alternative as		
			recommended by OEM for		
			optimum operations		
		XX 7 4	12 Months from the date of		
		Warranty	installation		
			Needed for the measurement of size, molecular weight,		
			mobility, transmittance and zeta potential, with complete package for liquid and solid samples. The system should provide the results for diluted and concentrated liquids samples, solid samples.		
6 ^a	Particle size analyzer (with zoto	General features	User friendly interface for measurement control and data analysis Measuring size range; 0.5 nm- 10 µM or better	01	
· · · · · · · · · · · · · · · · · · ·	(with zeta potential)	icatures	Molecular weight measurement range; 900 Da ⁻² x 107 Da or better Zeta potential Range; >+/-		
			400mV or better Mobility Range: >+/- 15 μ. cm/V.s or better		
			Accuracy should be better than ± 3 % on NIST traceable standards		
			Reproducibility should be better than ± 3 % on NIST traceable standards		

	Sensitivity should be better	
	than 0.5 mg/mL of standard	
	protein	
	Software should include the off	
	line data analysis option too	
D 1 /	Polystyrene cuvettes (12 mm)	••••
Polystyrene	with stoppers, compatible and	200
cuvettes	suitable with the above	pieces
	mentioned specs instrument	
	Quarts cuvette; compatible	
	with the above mentioned	
	specs instrument	
т ,	Should be suitable to perform	
Low volume	all type of above mentioned	4
quartz cuvette	measurements	
quui oz cu ; cooc	Sample volume range should	
	be;	
	Minimum; 15 μL	
	Maximum; above 50 µL	
	A kit to perform all above	
	mentioned measurements for	
	aqueous and non-aqueous	
	samples such as non-polar	
	dispersants such as	
	hydrocarbons. Compatible	
Accessory for	with the above mentioned	
aqueous and	cuvettes or compatible cuvettes	01
non-aqueous	should be provided in the	01
sample	package.	
•	Should be compatible with the	
	above mentioned specs	
	instrument.	
	Cuvettes should be compatible with the above mentioned	
	specs instrument, in case of	
	separately provided cuvettes A kit to perform all above	
	A kit to perform all above mentioned measurements for	
	high concentrated sample. Compatible with the above	
	mentioned cuvettes or	
Accessory for	compatible cuvettes should be	
high	provided in the package.	
concentrated	Should be compatible with the	01
sample	above mentioned specs	
sampie	instrument.	
	Cuvettes should be compatible	
	with the above mentioned	
	specs instrument, in case of	
	separately provided cuvettes	
	A kit to perform all above	
A	mentioned measurements for	
Accessory for	solid sample surfaces.	01
solid sample	Compatible with the above	
	mentioned cuvettes or	
	compatible cuvettes should be	

		•			CUI-LHR-PUR-Tender-001
			provided in the package. Should be compatible with the above mentioned specs instrument. Cuvettes should be compatible with the above mentioned specs instrument, in case of separately provided cuvettes. In case of unsuitable of main instrument software for solid samples, a separate software compatible for solid samples, compatible with the above mentioned specs instruments should be included in the package.		
		Computer with power backup	Specifications as recommended by OEM with genuine windows	01	
		LaserJet Printer	To print the output results	01	
		Power backup with additional Servo Stabilizer	online pure sinewave UPSbuilt in AVR capable of regulating ± 30 voltsPower factor ≥ 0.95Power backup in case of power failure for at least 30 minsIncluding lead free Acid dry batteriesOR A better alternative as recommended by OEM for optimum operations	01	
		Warranty	12 Months from the date of installation with vendor having good local reputation with running machines and well- trained engineers		
		Console Laboratory Freeze Dryer	Upright model capable of removing water and acetonitrile from samples		
		Exterior	Upright powder coated stainless-steel		
		Temperature	-55 °C or below		
7	Freeze Dryer	Water capture capacity	4 Kg/24 h or above	01	
		Solvents	Water, acetonitrile		
		Drying Chamber	 6-12 or more port transparent acrylic drying chamber Adjustable 4 trays/shelves or more 		
			Polished SS304 stainless steel shelves		

		CUI-LI
Condenser	 stainless-steel collector coil condenser 	
Condenser	• Electric heating defrost	
	• Cold trap temperature ≤ -50 °C	
Cold trap	• Cold trap capacity 5-10 L	
	• Total loading capacity (liquid) 1.2L or better	
	• Dual 1/3 hp refrigeration	
Refrigeration	compressor • CFC-free	
system	 CrC-iree Cooling type: Air cooled 	
	• two stage Rotary Vane	
	vacuum pump	
Vacuum system	• Displacement capacity: 80-90	
-	L/min • Ultimate vacuum: ≤ 0.002	
	mBar	
	• LCD touch screen display	
	panel	
	• Show operating parameters, set-up parameters and alarm	
	messages	
	 user-configured to display 	
	vacuum in mBar, Pa or Torr	
Control panel	and temperature in ° F or ° C	
	• Display time of refrigeration	
	system operation, time since	
	the refrigeration system was	
	serviced, time of vacuum pump operation and time	
	since the vacuum pump was	
	serviced	
	• Vacuum control option to maintain set point vacuum	
	level	
	• special arrangement for	
Safety controls	preventing the oil back-	
e e	streaming into the collector chamber during the power	
	outage	
	• auto restore functions in case	
	of power failure	
Electrical	 Power supply 20V/50Hz,60Hz (single 	
requirements	phase)	
	• Freeze drying flasks 100ml	
	(06 Qty)	
Accessories	Cone connectors (06 Qty) power supply	
	 power supply power stabilizer (01)	
	12 Months from the date of	<u> </u>
Warranty	12 Months from the date of	

		1			CUI-LHR-PUR-Tender-001
		Purpose	 Used to determine characteristics of materials such as Sample Volatility, Moisture Content, Oxidation Stability, Decomposition Temperature and Flammability Studies. It should measure changes in weight in relation to change in temperature extremely precisely and accurately. The level of inorganic and organic components in materials Absorbed moisture content of materials, Determine degradation temperatures of polymers 		
		Temperature Range	(from ambient to 1000 °C or more)	01	
		Temperature Precision	1 °C or better		
		Heating rate	0.1 to 100°C/min or better		
	Thermogravi metric	Sample Weight Capacity	1000 mg or more		
8	Analyzer (TGA)	Weighing Precision	±0.01 % or better		
		Autosampler	For multiple sample analysis Sample position ≥20		
		Features	 Low Mass Furnace Hi-Resolution Modulated Auto-Stepwise DTA Signal App-Style Touch Screen Temperature Calibration Customizable program with multiple cooling and heating steps 		
		Software	 Unlimited licenses and free lifetime software upgrades. Advanced custom analysis with user-defined variables and models Must be compatible with all provided hardware 		
		Power backup with additional Servo Stabilizer	online pure sinewave UPSbuilt in AVR capable of regulating ± 30 voltsPower factor ≥ 0.95Power backup in case of power failure for at least 30 mins	01	

		1	CUI-LIIK-I
	Lead acid free dry battery (1 year warranty)		
	OR A better alternative as recommended by OEM for optimum operations		
	12 Months from the date of installation with vendor having good local reputation with running machines and well- trained engineers		
Computer With power backup	 Computer compatible with system and recommended by OEM with genuine windows Laser printer 	01	
	• Set of standard samples for calibration measurements with purity certificate	01	
Accessories	• Aluminum Pans with lids	50	
	• Platinum reusable pans	03	
	• Alumina reusable pans	10	
	Argon gas cylinder with double regulator and certified (pressure rated and tested)	01	
others	Nitrogen gas cylinder with double regulator and certified (pressure rated and tested)	01	
	2 stage moisture trappers for gas cylinders	02	
Installation	Complete Installation, operation, Onsite Training		
Warranty	12 Months from the date of installation with vendor having good local reputation for providing high quality equipment. Must have well- trained engineers. Engineers must have been trained by the OEM with proof of trainings by the OEM.		

	1	1		1	CUI-LHK-PUK-Tender-001
		General Requirement	System that allows physisorption for specific surface area with single point and multiple points (BET), pore size, pore diameter for mesoporous and microporous materials and DFT calculations etc. Chemisorption with analysis for metal area, crystallite size, active metal dispersion, activation energy, Temperature Programmed Reduction, Temperature Programmed Oxidation, Temperature Programmed Desorption with inbuilt analysis and programmable		
9	Surface area and porosity measurement	Operating Specifications	multiple degassing unitsSurface area range :0.01 m²/gor betterPore Diameter Range: 17-5000A° or betterPressure range: 0-950 mmHgor moreDegassing range: Ambient to450 °C or moreMultiple Physisorption stationswith Dewar and elevatorHigh temperature furnacewith minimum 1100 °C withforced air coolingMultiple gas inputs fordifferent gasesInbuilt programmabledegassing stations(2-4 stations or more)N2, O2, Ar, Kr, CO2, CO, H2,	01	
		Analysis gases Available Techniques and Reports:	N2, 02, AI, KI, CO2, CO, H2,Butane or any non-corrosivegasesPhysiosorption Report:Specific Surface area (singlepoint and multiple point)Pore volumePore SizeLangmuir plott-plotDFT CalculationsChemisorption Report:Active metal area dispersionCrystallite SizeMonolayer CapacityActivation energy,Temperature ProgrammedReduction, TemperatureProgrammed Oxidation,		

Signature & Stamp of Bidder

	Temperature Programmed Desorption	
Oil free Vacuum Pump system	High vacuum with no oil contamination or back streaming	01
Regulator Expansion Kit	Expands regulator's single outlet into two (2) outlets, each with an isolation valve.	01
	Surface area reference materials	one
	Micropore reference materials	one
Accessories	Active surface area reference material	one
	O-rings compatible with analysis tubes	15
	Analysis quartz Tubes	10
	Glass Rods for samples analysis	10
Software	Software for Data collection and analysis	
Computer With power backup	 Computer Specifications as recommended by OEM with Genuine windows Laser printer Power backup 	01
	Helium gas cylinder with double regulator and certified (pressure rated and tested)	01
Gas Cylinders	Nitrogen gas cylinder with double regulator and certified (pressure rated and tested)	01
	2 stage moisture trappers for gas cylinders	02
Kit for sample transfer from Degassing unit to Analysis unit under vacuum	Device which enables transfer of physisorption sample tubes while under vacuum from degas to analysis port.	01
Installation and Training	1-person advanced training (Operations, Trouble Shooting etc.) at Original Equipment Manufacturer site (travel & accommodation included)	
Power backup with additional Servo	online pure sinewave UPS built in AVR capable of regulating ± 30 volts Power factor ≥ 0.95	01
Stabilizer	Power backup in case of power failure for at least 30 mins Including lead Acid free dry batteries	

	1				CUI-LHK-PUK-Tender-001
			OR A better alternative as recommended by OEM for optimum operations		
		Warranty and Services	12 Months from the date of installation with vendor having good local reputation for providing high quality equipment. Must have well- trained engineers. Engineers must have been trained by the OEM with proof of trainings by the OEM.		
		Functional Specifications	 Phase identification Quantitative phase analysis Crystallinity Crystallite size & strain Rietveld refinement Powders, solids and metals Structure analysis 		
		X-ray Generation	Rated output – 600 W or higher Voltage – up to 30 KV or higher Current – up to 10 mA or higher Tube – Copper radiation Full safety shielding		
	X-ray	Goniometer	Vertical type - θ-θ or θ-2θ -3° (or less) to 140° (or higher) 2θ range Accuracy - 0.02° (2θ) or better		
10	Diffracto meter (XRD)	Optics	Fixed/variable Divergence, scatter/anti-scatter, receiving, soller slits	01	
		Detector	 Capable of 0D, 1D & 2D modes High speed data acquisition 		
		Sample stage	Multipurpose sample stage and holders with zero low background		
		Sample Changer	Multiple position sample changer with sample holders		
		Desktop Computer and printer	Specifications recommended by OEM with genuine windows		
		Cooling system	In-built or external cooling system (if required) for temperature control. Must provide optimum cooling for operation in local Pakistani conditions.		

1

	The system showed be provided with all accessories and liquid nitrogen cooling system	
Temperature range	-150°C- 600°C or better	
Force range	0.001-10N or better	
Heating rate	0.1 to 10 °C /min or better	
cooling rate	0.1 to 10 °C /min or better	
Force resolution	0.002N or better	
Modulus range	10^3-10^6 or better	
frequency	0.01 to 100 Hz or better	
Deformation range	0.005 to 50 or better	
Cooling system	Automatic Liquid nitrogen system for cooling of system with 35 litre stock tank minimum	01
Measurement modes:	Three-point bending Single- and dual cantilever bending Linear shearing Compression /penetration Tension	
Sample holder accessories	Sample holder accessories For measuring the below properties in light of ISO standards Three-point bending Single- and dual cantilever bending Linear shearing Compression /penetration Tension	01 each
Operation modes	Temperature/frequency sweep Relaxation Isostrain Strain sweep Stress sweep	
photo accessory	Suitable for use with standard temperature furnace Contains UV source Power adapter	01
Calibration sample kit	Calibration sample kits with ISO standards	01
Computer and software's	Desktop PC required. Of specifications recommended by Original Equipment Manufacturer. With original windows with full range of	01

					CUI-LHR-PUR-Tender-001
			software packages and power		
			backup with laser printer		
			Air gas cylinder with double regulator and certified	01	
			8	UI	
			(pressure rated and tested) Helium gas cylinder with		
			e .	01	
			double regulator and certified (pressure rated and tested)	VI	
			· · · · · · · · · · · · · · · · · · ·		
		Gas cylinders	Argon gas cylinder with double regulator and certified	01	
			double regulator and certified (pressure rated and tested)	UI	
			Nitrogen gas cylinder with double regulator and cortified	01	
			double regulator and certified	UI	
			(pressure rated and tested)		
			2 stage moisture trappers for	04	
			gas cylinders		
			online pure sinewave UPS		
			built in AVR capable of		
			regulating \pm 30 volts		
			Power factor ≥ 0.95		
		Power backup	Power backup in case of power		
		with additional	failure for at least 30 mins		
		Servo	Land acid from dry battomy (1	01	
		Servo Stabilizer.	Lead acid free dry battery (1 year warranty)		
		stabilizer.	• • • • • • • • • • • • • • • • • • • •		
			OR		
			A better alternative as		
			recommended by OEM for		
			optimum operations		
			12 Months from the date of		
			installation with vendor having		
			good local reputation for		
			providing high quality		
		Warranty	equipment. Must have well-		
		,, al l alley	trained engineers. Engineers		
			must have been trained by the		
			OEM with proof of trainings		
			by the OEM.		
			1-person advanced training		
		Installation and	(Operations, Trouble Shooting		
		Training	etc.) at Original Equipment		
			Manufacturer site (travel &		
			accommodation included)		
			For measuring density and		
			porosity of the samples		
	Helium	General	Minimum 05 analysis ports for		
12	Pycnometer	features	simultaneous sample	01	
	i yenunctei	10atul 05	preparation and sequential		
			analysis, and automatic repeat		
			measurement mode		
		I			

	 Capacity: between1-to 350cc 		
Sample cells	 4 variable sizes 		
•	 Calibration standards 		
	for each size		
C	range 1-20 psi		
Gas	Joints	01	
compressor	Traps for moisture	UI	
Vacuum pump	Upto 20 mbar or better	01	
	Continuous flow with user		
	selectable time and Pulse with		
	user selectable number of		
Purge modes	pressurization/depressurizatio		
i ui ge moues	n cycles		
	Vacuum for user selectable		
	time with automatic valve		
	configuration.		
Temperature	Circulator with -20 °C to 150		
Control	°C or better		
	Digital display on machine		
	with all important		
Operation	information. Also attachable		
- I	with computer for data		
	transfer and operation		
	through software.		
	Sensitivity 0.1 mg	01	
Weighing balance	stander weights for calibration		
	Airproof chamber		
	Computer compatible with		
	system and recommended by	01	
	OEM with genuine windows		
Accessories	Laser printer	01	
	Installation/ operation / Onsite		
	Training		
	online pure sinewave UPS		
	built in AVR capable of		
	regulating ± 30 volts		
Power backup	Power factor ≥ 0.95		
with additional	Power backup in case of power		
Servo	failure for at least 30 mins	01	
Stabilizer	Lead acid free dry battery (1		
Stabilizer	year warranty)		
	OR C		
	A better alternative as		
	A better alternative as recommended and provided by		
	recommended and provided by		
others	recommended and provided by OEM for optimum operations	01	

					CUI-LIIK-I UK-Tender-001
			Nitrogen gas cylinder with double regulator and certified (pressure rated and tested)	01	
			2 stage moisture trappers for gas cylinders	01	
		warranty	12 Months from the date of installation with vendor having good local reputation for providing high quality equipment. Must have well- trained engineers.		
		Purpose	trained engineers.Use for studying phasetransition such as melting,Glass Transitions andexothermic decompositions		
		Temperature Range	-170°C or less to 700 °C or more		
		Temperature Accuracy	0.1 °C or better		
		Temperature Precision	0.01 °C or better		
		Heating Rate	(0.01 °C/min or less to 100 °C/min or more	01	
		Cooling Rate	(0.01 °C/min or less to 100 °C/min or more)		
13	Differential Scanning Calorimeter (DSC)	Cooling accessory	 To attain minimum temperature as required (-170°C or less) System based on liquid nitrogen 		
		Software	 Capacity:35 lite or more Must be compatible with all provided hardware Unlimited licenses and free lifetime software upgrades. 		
		computer	Computer compatible with system and recommended by OEM with genuine windows	01	
			Laser printer	01	
			Set of standard samples for calibration measurements (Cp or sensitivity/enthalpy), with purity certificate.	02	
			• Press and Die Sets Kit	04	
		Accessories	• Aluminium pans and lids	50	
			Reusable Alumina pans	10	
			Reusable Platinum pans	03	

· · · · · · · · · · · · · · · · · · ·			1		CUI-LHR-PUR-Tender-001
			 pans for aqueous solutions 	02	
			Pans for samples which react with Aluminum	02	
			Installation/ operation / Onsite	01	
			Training		
			online pure sinewave UPS		
			Lead acid free dry battery (1 year warranty)		
			built in AVR capable of		
			regulating ± 30 volts		
		Power backup	Power factor ≥ 0.95		
		with additional Servo	Power backup in case of power	01	
		Stabilizer	failure for at least 30 mins Including lead Acid free		
			batteries		
			OR		
			A better alternative as		
			recommended by OEM for optimum operations		
			Argon gas cylinder with double		
			regulator and certified	01	
			(pressure rated and tested)		
		others	Nitrogen gas cylinder with	01	
			double regulator and certified (pressure rated and tested)	01	
			2 stage moisture trappers for gas cylinders	01	
			12 Months from the date of		
			installation with vendor having		
			good local reputation for		
			providing high quality		
		warranty	equipment. Must have well-		
			trained engineers. Engineers must have been trained by the		
			OEM with proof of trainings		
			by the OEM.		
			This instrument used infrared	Τ	
		Purpose of	light to scan test samples and		
		FTIR	identify molecular components/ functional groups		
			/ and structures of materials		
	Fourier	Componente	Sources; Detectors; Beam		
	Fourier transformatio	Components	splitters		
14	n infrared	spectral range	7,500 to 350cm ⁻¹	01	
	spectrometer (FTIR)	Spectral Resolution	0.2 cm ⁻¹ or preferably better		
			• 50,000:1 or better - 1-		
			minute sample		
		Signal to Noise	measurement, 4 cm ⁻¹ 13,000:1 or better - 5-		
			second sample		
			measurement, 4 cm ⁻¹		

Wavenumber accuracy:	0.01 cm ⁻¹ or better	
Interferometer	Permanently/dynamically aligned	
Rapid-Scan:	60 spectra /second [@ 16 cm ⁻¹] or better	
Optics bench	Super Sealed & desiccated and/or purgeable	
Desiccants Reagent	Two Boxes	
Multi detector unit	With all requisite accessories to ensure they are mounted and installed completely	
	1. DLaTGS detector, Room temperature, Wide range (12,000- 350 cm ⁻¹)	01
Automated multi-detector unit (two detectors)	2. MCT Detector, Wide Range non cryogenic or cryogenic (10,000- 400 cm ⁻¹) with all requisite accessories including Liquid N ₂ Cool jacket, Transfer Dewar	01
Upgradeable system	 Mount for InGaAs detector Attachable to Raman module/component 	
IR source	Lifetime Infrared Source with 5 years warranty or better	
Beam-splitter	broadband: 400 cm ⁻¹ [or less] to 10,000 cm ⁻¹ [or more]	
Diamond ATR Accessory	400 cm ⁻¹ [or lower] to 5000 cm ⁻¹ [or higher]	01
Photoacoustic cell	With all requisite accessories	01
Transmission Module	Carbon reference sample x 1 Yes, capable of holding different kinds of flat solid samples, membranes, liquid and gas samples. Required with all accessories for quick IR measurements	01
Transmission Kit	 Pellet holders Magnetic holder for films Clamp holders/windows for different kinds of flat solid samples Liquid and gas cells Press and Die Set for use in press (to make discs) 	01
Gas Flow & Purging	 Nitrogen gas cylinder x 1 Helium gas cylinder x 1 All gas cylinders required with double regulator and 	

r			1	r	CUI-LHK-PUR-Tender-001
			 certification (pressure rated & tested) All gas lines required with 2 stage moisture trappers Purge Regulator, tubing and all requisite connectors Multi user license and installation files with free upgrades 		
		standard	Atmospheric suppression to		
		Spectroscopy	remove H ₂ O and CO ₂		
		software	With infrared spectra library in high resolution format for		
			General Chemicals, polymers, plasticizers, additives etc.		
		Principal component analysis software	For statistical analysis of data		
		Power backup with additional Servo Stabilizer	 online pure sinewave UPS Lead acid free dry battery (1 year warranty) built in AVR capable of regulating ± 30 volts Power factor ≥ 0.95 Power backup in case of power failure for at least 30 mins Including lead Acid free batteries OR A better alternative as recommended by OEM for 	01	
		computer	optimum operations Computer compatible with system and recommended by OEM with genuine windows	01	
		printer	Laser printer	01	
		Warranty	12 Months from the date of installation with vendor having good local reputation with running machines and well- trained engineers		
15	Universal Testing Machine (UTM)	Purpose of the Universal Testing Machine	A tabletop electromechanical universal testing machine capable of testing metals, ceramic and polymers under static uniaxial testing complete with all accessories and grips including power backup. Accuracy of the machine should be according to ISO7500-1	01	

				CUI-LHR-PUR-Tender-0
	Load Cell	±100 KN with Valid calibration Certificate ISO17025		
	Force Measuring Accuracy	Grade 0.5		
	Crosshead Speed	0.0005 - 400 mm/min or better		
	Crosshead Repeatability	± 2μm or better		
	Test area height	1500 mm or higher		
	Testing area height between connectors	1300 mm or better		
	Test Area Width	600 mm or higher		
	Load frame stiffness	230 KN/mm or better		
	Testing Mode	Tension, Compression, Bending		
	Power	2.5 kW or less		
		Round Sample universal grip for variable samples	1	
		• Flat sample grips for metals	1	
	Grips	Grips for polymeric materials self- tightening	1	
		• 3 and 4 point bending fixtures	1	
		Compression plates	1	
		 Standard sample for calculating machine stiffness of the grips 	1	
		 Axial Extensometer clip on gauges for flat sample 	1	
	Extensometer	Axial Extensometer Clip on gauges for rough samples	1	
		 Fully operable through graphical interface. Complete software with programing 		
	Software	 option for tailoring the test based on need. Multiple sequences and program and profile 		
		saving options.		

	1		1	· · · · ·	CUI-LHK-PUK-Tender-001
			• Full licensed and free upgradeable		
		Computer	Computer compatible with system and recommended by OEM with genuine windows	01	
		Power backup with additional Servo Stabilizer	Pure sign wave online UPS power backup suitable to the machine load. Load backup = 10 minutes at full load AVR range = ± 40 Volts Including lead Acid free batteries OR A better alternative as recommended by OEM for optimum operations	01	
		Warranty	12 Months from the date of installation with vendor having good local reputation with running machines and well- trained engineers		
16	Nanoindenter	Purpose of Nanoindenter	It is to be a compact indentation system capable of testing metals, ceramic, polymers and biomaterials. The system should be capable of operation in load control and frequency-based modes. The indentation system should be capable to perform nanoindentation, scratch test with a software-based control for determining mechanical properties in load control and dynamic modes. The instrument should also be capable of determining dynamic mechanical properties of soft materials e.g. biomaterials, tissues and polymers	01	
		Main Features	Actuator Load Range50 mN to 200 mNLoad Resolution4 nN or betterDamping Coefficient0.05 N-s/m or betterResonant Frequency100 KHz or HigherDrift Rate0.05 nm/s or betterDisplacement Monitoring		

				CUI-LHR-
	Displacem	ient s or higher		
		8		
	Displacem	ent Resolution or better		
	Indenter S			
	80 N/m or	higher		
	Sample St	age		
	-	= 75 mm or higher		
	Y-axis	= 75 mm or higher		
	$\mathbf{Z}\text{-}\mathbf{axis}=2$	5 mm or higher		
	Ontical C	olored Videoscope		
	with Digit			
	5	or higher		
	• Sc	ratch Testing		
		pability		
		equency Specific		
		termination of		
		echanical properties		
	e.g St	g orage & loss		
		odulus of polymers		
		d biomaterials		
	• Co	onstant strain rate		
	tes	sting		
		ultiple/single		
		tuators for testing all		
		aterial range if single		
		tuators cant perform namic mechanical		
	-	sting & scratch/wear		
		sting e.g. gels, tissues		
Testin		d polymers,		
featur		omaterials and their		
		ends		
		st indentation pability of mapping		
		pographic features of		
		e surfaces (optional)		
		tup should be		
	-	ovided with isolation		
		amber suitable to oid environmental		
		brational and noise		
		fects		
	, D.	erkovich indenter	1	
		ibe Corner	1 pcs 1 pcs	
		at punch	1 pcs 1 pcs	
		all indenter	1 pc	
		ovision of sample	2 pcs	
	h0	lder suitable for	-	

			1		CUI-LHR-PUR-Tender-001
			testing wet samples e.g. tissues and sample in SBF		
			Data acquisition rate 1KHz or higher		
			 Computer compatible with system and recommended by OEM with genuine windows Laser Printer 	01	
			 Power backup with additional Servo Stabilizer Pure sine wave online UPS 2 KVA Output efficiency ≥ 0.95 AVR range = ± 40 V Backup time = ≥ 1 hour OEM, Maintenance free Sealed Lead Acid & Leak Proof Battery or A better alternative as recommended by OEM for optimum operations 	01	
		Warranty	12 Months from the date of installation with vendor having good local reputation with running machines and well- trained engineers		
17	Screen Printer	General features	To print disposable screen printed electrode on various substrates including pvc, paper, cloth and conducting films Automatic feeder with touch control panel / Static eliminator / Auto registration for printing / Auto delivery.	1	
	1 I IIIter	Printing area mm	610*610 or better		
		Printing speed	300 p/h or better		
		Screen frame thickness(mm)	20-30 or better		
		Off-contact height (mm)	0.05 – 6 mm or better		

Squeegee/	
coater speed 0-800 or better (mm/sec.)	
Squeegee/ coater angle adjustment22±15° or better	
Power source (single phase)220V, 4.5kw	
Machine body is with powder coating.	
corrosion and rust resistant printing table	
powder coated body	
capable of printing with variety of inks including composite materials and Others	
capable of printing on variety of substrates including paper, glass and plastic sheets and cloths	
Safety light barrier Motor controlled in 3 axis movement	
Touch screen control air pressure for squeegee and	
flood coater	
Squeegee holders 650 mm 1	
Squeegee holders 550 mm 1 Squeegee holders 450 mm 1	
accessories Flood coater 700 mm 01	
Flood coater 500 mm 01	
silver paste 250g	
Carbon paste 1kg	
online pure sinewave UPS	
built in AVR capable of	
$\frac{\text{regulating} \pm 30 \text{ volts}}{2000}$	
Power factor ≥ 0.95	
Power backup Power backup in case of power	
with additional failure for at least 30 mins	
Servo Stabilizer Including lead Acid free batteries	
OR	
A better alternative as	
recommended by OEM for	
optimum operations	
12 Months from the date of	
installation with vendor having	
Warranty good local reputation with	
running machines and well-	

		-				CUI-LHR-PUR-Tender-001
		Scope		The Field-emission scanning electron microscope With EBSD must be capable of use in variable pressure, with low and high vacuum mode with suitable detectors along with analytical capabilities of chemical and structural properties (optional). The equipment must be complete in all aspect including water chiller, power backup, gas cylinder/s with regulators and moisture filters and compressor system if required for its operation.		
			Electr on Gun	Schottky Thermal Field Emitter		
	Field	Electr	Resolu tion	High Voltage @ 15 KV (0.8 nm or better) Low Voltage @ 1 KV (1.5 nm or better) STEM @ 30KV (0.8 nm or better)	01	
18	Emission Scanning Electron	onic Featu res		Low Vacuum (1.5 nm or better)		
	Microscope (FE-SEM)		Accele rating voltage	0.2 to 30kV (or better)		
			Probe Curre nt	Up to 100 nA or higher		
			Magni ficatio n	10 to 1,000,000 x or better		
		Vacu um	Low vacuu m range	133 Pa or higher pressure		
		Syste m	Vacuu m System	Oil Free	01	
		Speci men Stage	Eucent ric Stage	 Fully motorized X = 100 mm or more Y = 100 mm or more Z = 50 mm or more Rotation = 360° continuous, Tilt = -4° to +70° or wider 		
		Ports &	Ports	Minimum 10 or more		
		Detec tors	Colum n	InLens and In-column detection with multiple detectors including InLens SE		

				CUI-LHR-PUR-Tender
	Camer as	 and BSE (electrostatic and magnetic field free) For Sample view (& stage navigation) with display on the SEM display monitor For internal chamber view with display on the SEM display monitor 		
	Detect ors	InLens SE detector/detectors Inlens BSE detector In chamber SE detector for high vacuum Low vacuum in chamber SE detector or comparable alternative Retractable solid-state segmented BSD detector for low and high vacuum Retractable STEM Detector (bright-field, dark-field and high-angle dark-field modes)		
Softw	Image Acquis ition	 Multidetector image capture at single instance in multiple resolutions Live video acquisition options Drift corrected Frame Image acquisition 		
are	Acquis ition Softwa re	 Fully customized software for user specific routines Suitable CPU with monitors & keyboards and mouse/trackball. 		
EDS	EDS Detect or	 EDS (100 mm² or better active area), 129 eV or better, capability to Automatically record live processing Low acceleration voltage capability Input count rates 800,000 cps or better 		
	Acquis ition Softwa re	 Fully licensed software with built-in library for elemental and compositional analysis Complete with installation CDs/drives 		
EBSD	EBSD Detect or	 Acquisition speed of up to 400 fps or better Diffraction pattern image resolution 300 x 200 pixel or better 	01	

 	1	· · · ·	CUI
	 EBSD workstation for fast data storage and acquisition Fully licensed software 		
Softwa re	with built-in library for structural and crystallographic analysis		
Power backup with additional Servo Stabilizer	 10KVa pure sine wave UPS with isolation transformer or better Built in AVR ±40 V Lead acid free dry batteries from UPS OEM Overvoltage protecting relay Voltage surge protection relays Phase sequencer for automatic phase sequencing one-year warranty with minimum 30 mints backup to all system including instrument, computer etc. OR A better alternative as recommended by OEM for optimum operations. 	01	
Workstations	 Suitable Workstations for FE-SEM operation, EDS Analysis or any other application. If any aspect requires additional work- stations, they should be included 	01	
	Extra Schottky Thermal Field Emitter	01	
	• Double sided Carbon tape	10	
	Silver paste bottles	5	
	• Set of standard samples for EDS detector calibration (gold, copper, platinum standards)	1 each	
Accessories	Set of all replaceable vacuum o-rings	1 set	
	Vacuum grease	5 units	
	• Sample holder for multiple specimen stubs	5	
	• SEM stubs	50	
	 Set of stainless-steel and polymeric forceps 	1 pack	

						CUI-LHR-PUR-Tender-001
				 Gas cylinder with certified regulator along with moisture filters 	1	
				 Air compressor if required 	1	
				 Chiller, if required for operations 	1	
				 1-year standard warranty 		
		Warra Others	nty &	 Enabled with Remote Access feature for troubleshooting and identification of the routine problems Installation, operation & onsite demonstration of all capabilities with on-site training 		
				 1-person advanced training (Operations, Trouble Shooting etc.) at Original Equipment Manufacturer site (travel & accommodation included) 		
	Field Emission	Scope		The Field-emission scanning electron microscope must be capable of use in variable pressure, with low and high vacuum mode with suitable detectors along with analytical capabilities of chemical and structural properties (optional). The equipment must be complete in all aspect including water chiller, power backup, gas cylinder/s with regulators and moisture filters and compressor system if required for its operation.		
18.1	Scanning Electron Microscope (FE-SEM)		Electr on Gun	Schottky Thermal Field Emitter High Voltage @ 15 KV (0.8 nm	01	
		Flectr	Resolu tion	or better) Low Voltage @ 1 KV (1.5 nm or better) STEM @ 30KV (0.8 nm or better) Low Vacuum (1.5 nm or better)		
			Accele rating voltage	0.2 to 30kV (or better)		
			Probe Curre nt	Up to 100 nA or higher		

	1	1			CUI-LI
		Magni ficatio n	10 to 1,000,000 x or better		
	Vacu um Syste	Low vacuu m range	133 Pa or higher pressure		
	m	Vacuu m System	Oil Free	01	
	Speci men Stage	Eucent ric Stage	 Fully motorized X = 100 mm or more Y = 100 mm or more Z = 50 mm or more Rotation = 360° continuous, Tilt = -4° to +70° or wider 		
		Ports	Minimum 10 or more		
		Colum n	InLens and In-column detection with multiple detectors including InLens SE and BSE (electrostatic and magnetic field free)		
	Ports	Camer as	 For Sample view (& stage navigation) with display on the SEM display monitor For internal chamber view with display on the SEM display monitor 		
	& Detec tors	Detect ors	InLens SE detector/detectors Inlens BSE detector In chamber SE detector for high vacuum Low vacuum in chamber SE detector or comparable alternative Retractable solid-state segmented BSD detector for low and high vacuum Retractable STEM Detector (bright-field, dark-field and high-angle dark-field modes)		
	Softw are	Image Acquis ition	 Multidetector image capture at single instance in multiple resolutions Live video acquisition options Drift corrected Frame Image acquisition Fully customized software 		
		Acquis ition Softwa re	for user specific routines Suitable CPU with monitors & keyboards and mouse/trackball.		
0 04	6 D 1 1	1			

						CUI-LHR-PUR-Tender
	EDS	EDS Detect or Acquis ition Softwa re	•	EDS (100 mm ² or better active area), 129 eV or better, capability to Automatically record live processing Low acceleration voltage capability Input count rates 800,000 cps or better Fully licensed software with built-in library for elemental and compositional analysis Complete with installation CDs/drives 10KVa pure sine wave UPS with isolation transformer or better Built in AVR ±40 V		CUI-LHK-FUK-Tellder
		backup ditional Stabilizer	• • • •	Lead acid free dry batteries from UPS OEM Overvoltage protecting relay Voltage surge protection relays Phase sequencer for automatic phase sequencing one-year warranty with minimum 30 mints backup to all system including instrument, computer etc.	01	
	Workst	ations	•	Suitable Workstations for FE-SEM operation, EDS Analysis or any other application. If any aspect requires additional work- stations, they should be included	01	
			•	Extra Schottky Thermal Field Emitter	01	
			•	Double sided Carbon tape	10	
			•	Silver paste bottles	5	
	Accesso	ories	•	Set of standard samples for EDS detector calibration (gold, copper, platinum standards)	1 each	
			•	Set of all replaceable vacuum o-rings	1 set	
			•	Vacuum grease	5 units	

		1			CUI-LHR-PUR-Tender-001
			• Sample holder for multiple specimen stubs	5	
			• SEM stubs	50	
			 Set of stainless-steel and polymeric forceps 	1 pack	
			 Gas cylinder with certified regulator along with moisture filters 	1	
			• Air compressor if required	1	
			 Chiller, if required for operations 	1	
			 1-year standard warranty 		
		Warranty &	 Enabled with Remote Access feature for troubleshooting and identification of the routine problems Installation, operation & onsite demonstration of all 		
		Others	capabilities with on-site training		
			 1-person advanced training (Operations, Trouble Shooting etc.) at Original Equipment Manufacturer site (travel & accommodation included) 		
		Purpose of the Benchtop Laboratory Freeze Dryer	Compact benchtop model capable of removing water, acetonitrile, ethanol and methanol from samples		
		Exterior	Powder coated stainless-steel		
		Temperature	-85 °C or below		
		Water capture capacity	4 Kg/24 h or above		
			Freeze drying time	24 h	
		Solvents	Water, acetonitrile, methanol, ethanol		
19	Freeze Dryer	Drying Chamber	 Stainless steel drying chamber Transparent acrylic lid for connection of drying chamber 	02	
			 Adjustable 4 trays/shelves Polish SS304 stainless steel shelves 		
		Condenser	 stainless-steel collector coil condenser Electric heating defrost 		
		Cold trap	• Cold trap temperature ≤ -50 °C		

Cold trap capacity 5-10 L Total loading capacity (liquid) 1.21. european in the intervention of the intervention system Particle intervention interventintervention intervention intervention interve	-					CUI-LHR-PUR-Tender-001
Image: control in the image: conthe image: control in the image: control in the						
Refrigeration system • Dual 1/3 hp refrigeration compressor • CFC-free • Cooling type: Air cooled • Crooling type: Air cooled • Refrigerant: R600a+R290+R23 • two stage Rotary Vane 						
Refrigeration compressor Vacuum system CFC-free Vacuum system CFC-free Vacuum system Two stage Rotary Vane Vacuum system Displacement capacity: 80-90 L/min Uttimate vacuum : ≤ 0.002 mBar Uttimate vacuum: ≤ 0.002 mBar Show operating parameters, set-up parameters and alarm wessages user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° Control panel Safety controls Safety controls special arrangement for preventing the oil back-streaming into the collector chamber during the power outage auto restore functions in case of power failure Power suply 200/50Hz,60Hz (single phase) Accessories • IZ Months from the date of installation with vendor having good local reputation with running machines and well-trained engineers						
Refrigeration • CFC-free system • Cooling type: Air cooled Refrigerant: Refrigerant: R600a+R290+R23 • two stage Rotary Vane vacuum pump • Displacement capacity: 80-90 L/min • Utimate vacuum: ≤ 0.002 mBar • LCD touch screen display panel • Show operating parameters, set-up parameters and alarm messages • user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C C • Vacuum control option to maintin set point vacuum level • special arrangement for rpreventing the öl back- streaming into the collector chamber during the power outage • auto restore functions in case of power failure • Power supply 2007/S0Hz/60Hz (single phase) Accessories • Freeze drying flasks 100ml Warranty • 12 Months from the date of with running machines and weit-running machines and				1 3		
system • Cooling type: Air cooled • Refrigerant: Refrigerant: R00a+R290+R23 • two stage Rotary Vane vacuum system • Uitimate capacity: 80-90 L/min • Ultimate vacuum = 0.002 mBar • LCD touch screen display panel • LCD touch screen display safety control panel • LCD touch screen display safety control panel • Show operating parameters, set-up parameters and alarm messages sup parameters and alarm messages • user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C C • Vacuum control option to maintain set point vacuum level special arrangement for preventing the oil back-streaming into the collector chamber during the power outage • auto restore functions in case of power failure • Power suply • Power suply 220V/50Hz/60Hz (single phase) Accessories • Freeze drying flasks 100ml (06 Nos) • 12 Months from the date of installation with vendor having good local reputation with running machines and well-trained engineers			Refrigeration	-		
• Refrigerant: R000a+R290+R23 • two stage Rotary Vane vacuum pump • Displacement capacity: 80-90 L/min • Ultimate vacuum: ≤ 0.002 mBar • LCD touch screen display panel • LCD touch screen display panel • Show operating parameters, set-up parameters and alarm messages • user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C • Vacuum control option to maintain set point vacuum level • Safety controls • Vacuum control option to maintain set point vacuum level • Special arrangement for preventing the oil back- streaming into the collector chamber during the power outage • auto restore functions in case of power failure • Power supply 220V/S0Hz,60Hz (single phase) • Freeze drying flasks 100ml (06 Nos) • 12 Months from the date of installation with vendor having good local reputation with running machines and well-trained engineers			-			
R600a+R230+R23 two stage Rotary Vane vacuum system • two stage Rotary Vane • Displacement capacity: 80-90 L/min • Ultimate vacuum: ≤ 0.002 mBar • LCD touch screen display panel • Show operating parameters, set-up parameters and alarm messages • user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C Safety controls • Vacuum control option to maintain set point vacuum level • Safety controls • Vacuum control option to maintain set point vacuum level scafety controls • Safety controls Electrical requirements • Power supply 220V/S0H2,60H2 (single phase) Accessories • Freeze drying flasks 100ml (06 Nos) Warranty • 12 Months from the date of installation with vendor having good local reputation with vendor with running machines and well-trained engineers			system			
• two stage Rotary Vane vacuum pump • biplacement capacity: 80-90 L/min • Ultimate vacuum: ≤ 0.002 mBar • LCD touch screen display panel • LCD touch screen display panel • LCD touch screen display panel • Show operating parameters, set-up parameters and alarm messages • user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C Safety controls • Vacuum control option to maintain set point vacuum level • special arrangement for preventing the oil back- streaming into the collector chamber during the power outage • Electrical requirements • Power supply 220V/S0H2.60H2 (single phase) • Freeze drying flasks 100ml (06 Nos) • I2 Months from the date of installation with vendor having good local reputation with running machines and well-trained engineers				8		
Vacuum system vacuum pump • Displacement capacity: 80-90 ·//min • Ultimate vacuum: ≤ 0.002 mBar • LCD touch screen display panel • Show operating parameters, set-up parameters and alarm messages • user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C Vacuum control option to maintain set point vacuum level • Special arrangement for preventing the oil back- streaming into the collector chamber during the power outage • auto restore functions in case of power failure • Power supply 220V/SDL2,60Hz (single phase) Accessories • Freeze drying flasks 100ml (06 Nos) • 12 Months from the date of installation with vendor having good local reputation with running machines and well-trained engineers						
Vacuum system • Displacement capacity: 80-90 L/min • Ultimate vacuum: ≤ 0.002 mBar Control panel • LCD touch screen display panel • Show operating parameters, set-up parameters and alarm messages • user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C Safety controls • Vacuum control option to maintain set point vacuum level • special arrangement for preventing the oil back- streaming into the collector chamber during the power outage • auto restore functions in case of power failure • Power supply 220V/S0Hz_60Hz (single phase) Accessories • Freeze drying flasks 100ml (06 Nos) • Varranty • 12 Months from the date of installation with vendor having good local reputation with running machines and well-trained engineers						
Vacuum system L/min • Ultimate vacuum: ≤ 0.002 mBar • LCD touch screen display panel • Show operating parameters, set-up parameters and alarm messages • user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C • Vacuum control option to maintain set point vacuum level • special arrangement for preventing the oil back- streaming into the collector chamber during the power outage • auto restore functions in case of power failure • Power supply 220V/50Hz,60Hz (single phase) Accessories • Freeze drying flasks 100ml (06 Nos) • 12 Months from the date of installation with vendor having good local reputation with running machines and well-trained engineers						
• Ultimate vacuum: ≤ 0.002 mBar • LCD touch screen display panel • Show operating parameters, set-up parameters and alarm messages • user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C • Vacuum control option to maintain set point vacuum level • Safety controls • Vacuum control option to maintain set point vacuum level • special arrangement for preventing the oil back- streaming into the collector chamber during the power outage • auto restore functions in case of power failure • Power supply 220V/50Hz,60Hz (single phase) Accessories • Freeze drying flasks 100ml (06 Nos) • 12 Months from the date of installation with vendor having good local reputation with running machines and well-trained engineers			Vacuum system			
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Salety controls streaming into the collector chamber during the power outage • auto restore functions in case of power failure • Power supply 220V/50Hz,60Hz (single phase) Accessories • Freeze drying flasks 100ml (06 Nos) • 12 Months from the date of installation with vendor having good local reputation with running machines and well-trained engineers						
Streaming into the collector chamber during the power outage • auto restore functions in case of power failure • auto restore functions in case of power failure • Power supply 220V/50Hz,60Hz (single phase) Accessories • Freeze drying flasks 100ml (06 Nos) • 12 Months from the date of installation with vendor having good local reputation with running machines and well-trained engineers			Safety controls			
outage • auto restore functions in case of power failure Electrical requirements • Power supply 220V/50Hz,60Hz (single phase) Accessories • Freeze drying flasks 100ml (06 Nos) Warranty • 12 Months from the date of installation with vendor having good local reputation with running machines and well-trained engineers			Survey controls	-		
• auto restore functions in case of power failure • Power supply 220V/50Hz,60Hz (single phase) Accessories • Freeze drying flasks 100ml (06 Nos) • 12 Months from the date of installation with vendor having good local reputation with running machines and well-trained engineers						
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Accessories • Freeze drying flasks 100ml (06 Nos) • 12 Months from the date of installation with vendor having good local reputation with running machines and well-trained engineers			requirements			
Accessories (06 Nos) • 12 Months from the date of installation with vendor Warranty having good local reputation with running machines and well-trained engineers				• /		
			Accessories			
Warranty having good local reputation with running machines and well-trained engineers						
with running machines and well-trained engineers				installation with vendor		
well-trained engineers			Warranty			
				8		
hydraulic fatigue testing				• 0		
system with axial/torsion drive for static and dynamic tests in						
Fatigue Purpose of the axial and torsional mode. The		Fatione	Purpose of the			
20TestingFatigue Testingmachine should meet01	20	U	-		01	
20 resting ratigue resting interime should inter of Machine Machine conditions for fatigue testing of		0			v	
Hip Stem Fatigue, Dental		*				
				Implant Wear, Spinal		
				Vertebrectomy implants,		
				Prosthetic limbs implants as		

			CUI-LHK-PUK-Tender-
	per relevant ISO standard.		
	Materials to be used will be		
	metals, ceramics, polymers		
	and composites. The machine		
	should include all accessories		
	required for its operation e.g.		
	chillers and power backup.		
	The software should have		
	built-in programs examples to		
	test implants according to		
	ISO7206-4,		
	ISO7206-6, ISO 12189, ASTM		
	F2193, ASTM F1798.		
	10 kN according to EN-ISO		
Lood Call	7500-1 class 0.5 with valid		
Load Cell			
	calibration Certificate		
Axial Dynamic	30 Hz (<i>a</i>) ± 3 mm or better		
Performance			
Torsion			
Dynamic	10Hz @ 3° or better		
Performance	-		
Mode of	Electrically powered with		
operation	integrated servo-hydraulic		
Test area			
height	1200 mm or above		
0			
Testing	100 mm or better		
actuator stroke			
Displacement/D			
eformation	As per EN 10002-4		
Accuracy			
Torsion fatigue	100 N/m or above		
capacity			
Torsion	Total 100° or better		
	Tension, Compression, Axial		
Testing Mode	Fatigue & Torsion Fatigue		
	Ramp, Holding, Sinusoidal,		
	Triangular, Square,		
Wave Forms	Trapezoidal, virtual channels		
Capability	etc. in both axial and torsional		
	axes		
	Axial and torsional waveform		
	superposition in both in-phase		
Phase Angle	and out of phase. Provision		
	available for conducting test at		
	any quadrants of cycles		
Testing bed	T-Slot platen base platform for		
I esting beu	easy mounting of different jigs.		
	Compression plates	1 set	
	Standard tensile grips for flat		
Grips	and round samples (suitable	1 set	
Ortha	• •	1 301	
	upto 10kN)		
	3 & 4 point bending fixtures	1 set	
Chiller	To provide cooling to	1	
Chiller	hydraulic system (if required)	1	
		•	

 1			COI-LIIK-I OK-I Chuci-001
Standard Tool Kit	For regular inspection and maintenance	1	
Power backup with additional Servo Stabilizer	Pure sign wave online UPS power backup suitable to the machine load. Load backup = 10 minutes at full load AVR range = ± 40 Volts Lead acid free dry batteries OR A better alternative as recommended by OEM for optimum operations	1	
Training	1-person advanced training (Operations, Trouble Shooting etc.) at Original Equipment Manufacturer site (travel & accommodation included)	1	
Warranty	12 Months from the date of installation with vendor having good local reputation with running machines and well- trained engineers		

Bid Evaluation Criteria

All bids shall be evaluated in accordance with the following evaluation criteria and other terms & conditions set forth in this bidding document.

- a. The bids shall be evaluated to strictly ensure that the quoted brand/ model meet all the BoQ/ specification requirements given in the tender document for each item.
- b. In addition to the BoQ requirements, vendors must meet the vendor qualification criteria /company profile requirements (if any), as set forth in this tender document.
- c. Supporting literature of the quoted model must be attached for verification & technical evaluation of the required specification by the technical committee. In case of any clash is found between the quoted model and the supported literature may lead to rejection of bid.
- d. The vendor must have an authorized dealer certificate of the quoted Product/Item (Certificate with current year's validity) of Original Manufacturer for all Equipment which shall be also verifiable from the Principal / Manufacture Website or through email. It must be attached with bid otherwise such item/bid may be rejected.

CUI-LHR-PUR-Tender-001 <u>Financial Portion (Price and Brand/Model to be mention only in Financial</u> <u>Proposal in a separate sealed envelope) Strictly on our BoQs Form.</u>

Vendors are required to provide both unit and total price of each item and calculations must be made carefully to avoid mistakes. However, in case, total price does not match with the unit price and quantity due to calculation error or typo error, any of the following can be opted

- 1. The bid may be rejected on the reason of ambiguity (OR)
- 2. Unit price will be considered as final and total price of the respective item will be calculated by multiplying it with the quantity required. Sub-totals and grand total will also be corrected accordingly.

is allo (i.e. m	ange in the BoQs (wed. Any addition odel / brand or Pr	(Specs & Qty.) of CU al information may 'ice). Any modificati fully or partially).	below, mns	Prices to be quoted in C&F with all freight & packing charges at Lahore Airport			
Sr. #	Equipment Name	Required Speci	fications	Qty	Quoted Model / Brand	Unit Price (C&F Lahore Airport) with mentioning of Quoted Currency	Total Price (C&F Lahore Airport) with mentioning of Quoted Currency
		Purpose of the Atomic Absorption spectrophotom eter	For multi element analysis using atomic absorption spectrometer technique				
		Light source	Continuum light source				
	Atomic Absorption	Lamp	Lamp for multi elemental analysis with cooling				
		tion photo	Burner head 100 mm and 50 mm				
			O ring for organic samples				
			Automatic adjustment	1			
			Nebulizer with				
			platinum/rhodium				
1	spectrophoto		capillary				
1	meter with		Automatic calibration	1			
	Graphite Furnace		Autosampler				
		Graphite	Integrated cooling				
		furnace	system Camera with integrated				
			vision tool				
			Direct analysis of solid				
			samples				
			For analysis of hydride				
			and Hg				
		Hydride system	Cooling tube for graphite connection				
		· ·	connection Iridium standard				
			(100mL)				
		A	For automatic analysis of				
		Auto sampler	samples and standards				

	Rack with minimum 54 positions	
	75 pieces of 50 ml sample vials	
	Automatic dilution	
software	Integrated software to run all the accessories	
Air compressor	At least 50 Hz for dust, oil and water free air	
Computer With Power	Specifications As recommended by OEM with genuine windows	01
Backup	Laser printer	01
	Cleaning strips	150 Nos.
	set of sealing rings mixing chamber nebulizer system	03
	intake ptfe tubes with 0.5mm diameter	02
	intake tubes for autosampler	02
	wash bottles	3
	IC graphite tubes coated	10
	IC graphite inserts	10
· · · ·	Pieces sample cup of polysterol 1.5ml	2000
accessories	PTFE 2ml cup	20
	20 pieces polypropylene special cup 5 ml	20
	Pump tube	2
	Sample tube	12
	Acid tubes	4
	Connection tube 01	01
	Connection tube from reactor to double valve	2
	reactor tube	2
	drying tube	2
	Hg drying membrane hybrid	2
	predry tube	2
	online pure sinewave UPS	
	built in AVR capable of regulating ± 30 volts	
Power backup	Power factor ≥ 0.95	
with additional Servo	Power backup in case of	01
Stabilizer	power failure for at least 30 mins	
	Including lead Acid free dry batteries	
	OR	
4 5 1 1		

					C	UI-LIIK-I UK-I	
			A better alternative as recommended and				
			provided by OEM for optimum operations				
			Argon gas cylinder with				
			double regulator and	01			
			certified (pressure rated	01			
			and tested)				
			Acetylene gas cylinder				
			with double regulator	01			
			and certified (pressure				
		others	rated and tested) Nitrous oxide gas				
		others	cylinder with double				
			regulator and certified	01			
			(pressure rated and				
			tested)				
			2 stage moisture trappers	03			
			for gas cylinders				
			Exhaust assembly	01			
			Air compressor	01			
			12 Months from the date of installation with				
			vendor having good local				
		Warranty	reputation with running				
			machines and well-				
			trained engineers				
			Micro-computed				
		Purpose of the	tomography of ceramics,				
		Micro-CT	polymers, composites,				
			bone and tissue.				
		X-ray source	100 kV or better, 10 W or better				
		Spot size	5 μm or better				
		X-ray detector	11 MP or better				
		Frame rate	4x4 binning or better				
		Scanning object size	75x70 (D x L) mm or higher				
2	Micro-CT	Resolution/ detectability	0.45 μm voxel size or better	01 No.			
		Image matrix /Reconstruction	12k x 12k pixel or above,				
		array	isotropic grid				
		adjustment of					
		geometry/	Automatic				
		Fixed	X7 1 4 •				
			Volumetric				
			reconstruction, visualization software,				
		Software	Morphology analysis				
		Solution	software (2D/3D				
			quantitative analysis),				
			Realistic surface				

				C	UI-LHK-PUK-I	l e
		rendering visualization, realistic volume rendering software, /softwares recommended by OEM				
		Format converter to TIFF, BMP, JPEG				
	Reconstruction workstation (Computer) With Power	Specifications as recommended by OEM With color laser printer				
	backup Radiation safety	<1 µSv/h				
	Compressor	oil, moisture and particle filter particles size > 10 microns if needed	01 No.			
		Artifact to calibrate the equipment	01 No.			
		Integrated stage sample holders/mount	01			
	others	for different size samples calibration rods for 2-4	No. 01			
	Utilet 5	mm for BMD and/ TMD calibration rods for 8-16 mm for BMD and/ TMD	<u>No.</u> 01 No.			
		calibration rods for 32mm for BMD and/	01 No.			
		TMD	01 No.			
		online pure sinewave UPS built in AVR capable of regulating ± 30 volts Power factor ≥ 0.95				
	Power backup with additional Servo Stabilizer	Power backup in case of power failure for at least 30 mins Including lead free dry	01 No.			
		batteries OR A better alternative as recommended and provided by OEM for				
	Warranty, Training & Others	optimum operations 12 Months from the date of installation with vendor having good local reputation with running machines and well- trained engineers Enabled with Remote				
		Access feature for				L

-	r	T			C	UI-LIIK-PUK-I	chuci-001
			troubleshootingandidentificationofthetheroutine problems				
			training (Operations, Trouble Shooting etc.) at Original Equipment				
			Manufacturer site (travel & accommodation included)				
			Reactions/wells: 96 Scan format: SYBR® Green & FAM				
			Thermal block: should accommodate 96 well plate, 8X12 strips, 0.2ml tubes				
			Lid heating limits: Heat up to 105°C Range: 0-100°C				
			Filters: 6 Excitations, 6 Emissions Run time: 30min-40min				
		Thermal cycler	Sample size volumes: 10- 100 µL Automation compatible:				
			Yes Remote monitoring: Yes On-Board memory: Yes Dynamic range: Up to 10				
3	Real-time PCR		logs Collaboration Features IP connectivity	01 No.			
	TCK		Strong Password Requirements				
			Multiplex: 5-21 targets combinations Flexible for passive				
		Flexibility	reference dye (can be use with or without reference dye)				
		Sensitivity	Temperature uniformity: up to ± 0.5°C Sensitivity: Detect down to 1 copy				
		Accuracy	±0.2 °C				
		Optical Detection	Excitation source: LED light of enhanced System Filters range excitation/emission: 6X6 filters (450–720 nm)				
		Computer	Specifications as recommended by OEM with genuine windows	01			

		1			C	UI-LHR-PUR-1	ender-001
			with [power backup of 30 minutes				
			online pure sinewave				
			UPS				
			built in AVR capable of				
			regulating ± 30 volts				
		Power backup with additional	Power factor ≥ 0.95				
			Power backup in case of				
		Servo	power failure for at least 30 mins	01			
		Stabilizer	Including lead Acid free				
			dry batteries				
			OR A better alternative				
			as recommended and				
			provided by OEM for optimum operations				
			Gene Expression, Protein				
			Detection, Genotyping,				
		Applications	MicroRNA, Copy				
			Number Variation, High Resolution Melt				
			Interchangeable Trays:				
			for using plates, strips,	01			
			or tubes	each			
			Samples mixing shaker:	01			
			For 96 well plates and 8 well strips	01			
		Accessories	PCR Tubes (0.2ml): 1000	1000			
			tubes	1000			
			PCR strips (0.2ml): 1000	1000			
			strips with caps	1000			
			Micropipettes: 0.1-2.5µl,				
			0.5-10µl, 10-100µl				
			(pipette should have	01			
			calibration window along with volume window and	each			
			spring-loaded tip cone)				
			12 Months from the date				
			of installation with				
		Warranty	vendor having good local reputation with running				
			machines and well-				
			trained engineers				
			Fabrication of				
		Dumasa	electrospun matts and				
	Electrospinni	Purpose	electrospraying of solutions for specifically				
4	ng with		biomedical applications	01			
4	power supply and syringe		Complete				
	pumps	For biological	electrospinning setup				
	Pamps	purposes	with single benchtop				
		parposes	compartment having digital display of pump				

					U U	UI-LHR-PUR-I	Chuci-001
			and power supply				
			operations.				
			The compartment should				
			be made up of stainless				
			steel with proper				
			insulation with climate				
			control chamber				
			Overall the equipment				
			should be designed for				
			fabrication of fiber for				
			biomedical applications.				
			Channels				
			Four-channel pump: can				
			be controlled				
			independently for				
			individual syringe Flow				
			rate, volume and time of				
			infusion can be				
			controlled precisely.				
			Compatible to work				
			under high voltage.				
			Working temperature				
		Syringe pump	5-40 °C (or better range)				
		Syringe pump	Pumping rate				
			50ml syringe : 0.1ml/h				
			~1500ml/h				
			30ml syringe : 0.1ml/h				
			~900ml/h				
			20ml syringe:0.1ml/h				
			~600ml/h				
			10ml syringe : 0.1ml/h				
			~400ml/h				
			Pump rate accuracy : +/-				
			2%				
			Controllable				
			temperature				
		Climate control	Ambient to 40 °C or				
		chamber	better				
			Humidity control 10 to				
			90% or better				
			Output Current Upto				
			1mA				
			Voltages Up to 30KV or				
			higher				
			Over voltage protection				
		D	Over current protection				
		Power supply	Protection against output				
			short circuit				
			Over temperature				
			protection				
			Manual recovery after				
			cutoff				
		Collectors	Drum collector (1-	01			
		Conectors	5000rpm, +/- 1rpm)	01			
			disk collector	01			
_							

				JI-LHK-PUK-I	ender-001
		Plate collector	01		
		Grooved collector	01		
		Needle sets	05		
		11 g to 27 gMultioptioncoaxial			
		needle set	02		
		ranging from 11g to 27g	•=		
		Triaxial spinneret			
		Needle length should be	02		
		6cm with inner 22g,	02		
		middle 18g and outer 14g			
		Triaxial spinneret			
		Needle length should be 6cm with inner 22g,	02		
		middle 18g and outer 15g			
		Triaxial spinneret			
		Needle length should be	02		
		6cm with inner 22g,	02		
		middle 18g and outer 16g			
		Tri-channel spinneret	02		
		Multi-nozzle spinnerets			
		also called islands in the	02		
		sea spinneret			
		Cold light source for			
	Accessories	observing the	01		
		electrospinning process Exhaust fan to cool down			
		the equipment in			
		working process and	01		
		solvent vaporization.	01		
		Should be controlled by			
		control penal			
		HD Camera for observation (3 MP or	01		
		higher)	01		
		Syringe heater			
		Two-channel heater : 2			
		syringes can be heated at	01		
		the same time. Up to			
		250°C or higher			
		50ml Glass syringes	05		
		20ml Glass syringes	05		
		10ml Glass syringes	10		
		5ml Glass syringes	10		
		2ml Glass syringes	10		
	Power backup with additional	as recommended by			
	Servo	OEM for optimum	01		
	Stabilizer	operations			
	Warranty	12 Months from the date			
	v	of installation			

	1	1			<u> </u>	UI-LHK-PUK-I	chuci-001
		Basic setup	Fabrication of electrospun matts and electrospraying of solutions				
		General features	Complete electrospinning setup with plate and rotating drum collector in single benchtop compartment having digital display of pump and power supply operations.				
5	Electrospinni ng with power supply and syringe pumps	Syringe pump	Channels 02-channel pump: can be controlled independently for individual syringe Flow rate, volume and time of infusion can be controlled precisely. Compatible to work under high voltage. Working temperature 5-40 °C (or better range) Pumping rate (or better) 50ml syringe : 0.1ml/h ~1500ml/h 30ml syringe : 0.1ml/h ~600ml/h 10ml syringe : 0.1ml/h ~400ml/h Pump rate accuracy : +/- 2%	02			
		Power supply	Voltages Up to 30KV or higher Output Current Upto 1mA Over voltage protection Over current protection Protection against output short circuit Over temperature protection Manual recovery after cutoff				
		Collectors	Drum collector (1- 3000rpm, +/- 1rpm) or higher	02			
			disk collector	02	Į		
		Accessories	Needle sets 11 gauge to 27 gauge	05			
			Multi option coaxial needle set	05			

			1		t	01	-LHK-PUK-
			ranging from 11 gauge to				
			27 gauge				
			Cold light source for	03			
			observing the	02		l	
			electrospinning process			l	
			Exhaust fan to cool down				
			the equipment in				
			working process and	02			
			solvent vaporization.	02			
			Should be controlled by				
			control penal				
			Syringe heater				
			Two-channel heater : 2				
			syringes can be heated at	02			
			the same time. Up to				
			250°C or higher				
			50ml Glass syringes	05			
			20ml Glass syringes	05			
			10ml Glass syringes	10			
				10			
			5ml Glass syringes				
			2ml Glass syringes	10			
			online pure sinewave UPS				
			built in AVR capable of				
			regulating \pm 30 volts				
			Power factor ≥ 0.95				
		Power backup					
		with additional	Power backup in case of				
		Servo	power failure for at least	01			
		Stabilizer	30 mins				
			Including lead free Acid				
			dry batteries				
			OR				
			A better alternative as				
			recommended by OEM				
			for optimum operations				
		Warranty	12 Months from the date				
		•• ai i aiity	of installation				
			Needed for the			Į	
			measurement of size,				
			molecular weight,				
			mobility, transmittance				
			and zeta potential, with				
			complete package for				
			liquid and solid samples.			ļ	
	Particle size		The system should				
6	analyzer	General	provide the results for	01			
U	(with zeta	features	diluted and concentrated	01			
	potential)		liquids samples, solid				
			samples.				
			User friendly interface				
			for measurement control			ļ	
			and data analysis				
			Measuring size range;			l	
			0.5 nm-10 μM or better				

				Ľ	UI-LHK-PUK-I	ender-001
		Molecular weight				
		measurement range; 900				
		Da ⁻² x 107 Da or better				
		Zeta potential Range;				
		>+/- 400mV or better				
		Mobility Range: >+/- 15				
		μ. cm/V.s or better				
		Accuracy should be				
		better than ± 3 % on				
		NIST traceable				
		standards				
		Reproducibility should				
		be better than ± 3 % on				
		NIST traceable				
		standards				
		Sensitivity should be				
		better than 0.5 mg/mL of				
		standard protein				
		Software should include				
		the off line data analysis				
	<u> </u>	option too				
		Polystyrene cuvettes (12				
		mm) with stoppers,	200			
	Polystyrene	compatible and suitable	piece			
	cuvettes	with the above	s			
		mentioned specs	3			
		instrument				
		Quarts cuvette;				
		compatible with the				
		above mentioned specs				
		instrument				
		Should be suitable to				
	Low volume	perform all type of above				
	quartz cuvette	mentioned	4			
	qualitz cuvelle	mentioned measurements				
		Sample volume range				
		should be;				
		Minimum; 15 μL				
		Maximum; above 50 μL				
		A kit to perform all				
		above mentioned				
		measurements for				
		aqueous and non-				
		aqueous samples such as				
		non-polar dispersants				
	Accessory for	such as hydrocarbons.				
	aqueous and	Compatible with the				
	non-aqueous	above mentioned	01			
	sample	cuvettes or compatible				
	sampie					
		cuvettes should be				
		provided in the package.				
		Should be compatible				
		with the above				
		mentioned specs				
		instrument.				
_						

			Ę	UI-LIIK-I UK-I	
	Cuvettes should be compatible with the above mentioned specs instrument, in case of separately provided cuvettes				
Accessory for high concentrated sample	A kit to perform all above mentioned measurements for high concentrated sample. Compatible with the above mentioned cuvettes or compatible cuvettes should be provided in the package. Should be compatible with the above mentioned specs instrument. Cuvettes should be compatible with the above mentioned specs instrument, in case of separately provided cuvettes	01			
Accessory for solid sample	A kit to perform all above mentioned measurements for solid sample surfaces. Compatible with the above mentioned cuvettes or compatible cuvettes should be provided in the package. Should be compatible with the above mentioned specs instrument. Cuvettes should be compatible with the above mentioned specs instrument, in case of separately provided cuvettes. In case of unsuitable of main instrument software for solid samples, a separate software compatible for solid samples, compatible with the above mentioned specs instruments should be included in the package.	01			
Computer with power backup	Specifications as recommended by OEM	01			

			with convince windows		 UI-LIIK-I UK-I	
			with genuine windows			
		LaserJet Printer	To print the output results	01		
		Power backup with additional Servo Stabilizer	online pure sinewave UPSbuilt in AVR capable of regulating ± 30 voltsPower factor ≥ 0.95Power backup in case of power failure for at least 30 minsIncluding lead free Acid dry batteriesOR A better alternative as	01		
		Warranty	recommended by OEM for optimum operations 12 Months from the date of installation with vendor having good local reputation with running machines and well- trained engineers			
	Freeze Dryer	Console Laboratory Freeze Dryer	Upright model capable of removing water and acetonitrile from samples			
		Exterior	Upright powder coated stainless-steel			
		Temperature	-55 °C or below			
		Water capture capacity	4 Kg/24 h or above			
		Solvents	Water, acetonitrile			
7		Drying Chamber	 6-12 or more port transparent acrylic drying chamber Adjustable 4 trays/shelves or more Polished SS304 stainless steel shelves 	01		
		Condenser	 stainless-steel collector coil condenser Electric heating defrost 			
		Cold trap	 Cold trap temperature ≤ -50 °C Cold trap capacity 5-10 L Total loading capacity (liquid) 1.2L or better 			
		Refrigeration system	 Dual 1/3 hp refrigeration compressor CFC-free 			

		<u> </u>	UI-LHK-FUK-Tellder-V	10
	Cooling type: Air cooled			
	• two stage Rotary Va	ne		
	vacuum pump			
Vacuur	m system • Displacement capaci 80-90 L/min	ty:		
	 Ultimate vacuum: ≤ 0.002 mBar 			
	• LCD touch screen			
	display panel			
	 Show operating 			
	parameters, set-up			
	parameters and alar	m		
	messages			
	• user-configured to			
	display vacuum in			
	mBar, Pa or Torr an			
Contro	l panel temperature in ° F o C	r -		
	• Display time of			
	refrigeration system			
	operation, time since			
	the refrigeration			
	system was serviced,			
	time of vacuum pum	p		
	operation and time since the vacuum			
	pump was serviced			
	• Vacuum control opti	ion		
	to maintain set point			
	vacuum level			
	• special arrangement			
	for preventing the oi			
Safety	controls back-streaming into			
	the collector chambe	r		
	during the power			
	outage			
	• auto restore function			
	in case of power failu	ire		
Electric	cal • Power supply			
require	ements 20V/50Hz,60Hz (sing	gle		
	phase)			
	• Freeze drying flasks			
	100ml (06 Qty)			
Accesso	ories • Cone connectors (06			
	Qty) • power supply			
	 power suppry power stabilizer (01) 			
	12 Months from the de			
Warrai	nty of installation			

			11		I-LHK-PUK-I	ender-001
		Purpose	Used to determine characteristics of materials such as Sample Volatility, Moisture Content, Oxidation Stability, Decomposition Temperature and Flammability Studies. It should measure • changes in weight in relation to change in temperature extremely precisely and accurately. • The level of inorganic and organic components in materials • Absorbed moisture content of materials, • Determine degradation temperatures of polymers			
	Thermogravi metric Analyzer (TGA)	Temperature Range	(from ambient to 1000 °C or more)	01		
8		Temperature Precision	1 °C or better			
		Heating rate	0.1 to 100°C/min or better			
		Sample Weight Capacity	1000 mg or more			
		Weighing Precision	±0.01 % or better			
		Autosampler	For multiple sample analysis Sample position ≥20			
		Features	 Low Mass Furnace Hi-Resolution Modulated Auto- Stepwise DTA Signal App-Style Touch Screen Temperature Calibration Customizable program with multiple cooling and heating steps 			
		Software	 Unlimited licenses and free lifetime software upgrades. Advanced custom analysis with user- 			

			U	UI-LHK-PUK-I	ender-001
	defined variables and models • Must be compatible with all provided hardware				
	online pure sinewave UPSbuilt in AVR capable of regulating ± 30 voltsPower factor ≥ 0.95Power backup in case of power failure for at least 30 mins				
Power b with ad Servo Stabiliz	ditional battery (1 year warranty) OR er OR A better alternative as recommended by OEM	01			
	for optimum operations 12 Months from the date of installation with vendor having good local reputation with running machines and well- trained engineers				
Compu With po backup		01			
	• Set of standard samples for calibration measurements with purity certificate	01			
Accesso	• Aluminum Pans with lids	50			
	 Platinum reusable pans Alumina reusable 	03			
	Alumina reusable pans	10			
others	Argon gas cylinder with double regulator and certified (pressure rated and tested)	01			
	Nitrogen gas cylinder with double regulator and certified (pressure rated and tested)	01			

-					 	
			2 stage moisture trappers for gas cylinders	02		
		Installation	Complete Installation, operation, Onsite Training			
		Warranty	12 Months from the date of installation with vendor having good local reputation for providing high quality equipment. Must have well-trained engineers. Engineers must have been trained by the OEM with proof of trainings by the OEM.			
9	Surface area and porosity measurement	General Requirement	System that allows physisorption for specific surface area with single point and multiple points (BET), pore size, pore diameter for mesoporous and microporous materials and DFT calculations etc. Chemisorption with analysis for metal area, crystallite size, active metal dispersion, activation energy, Temperature Programmed Reduction, Temperature Programmed Oxidation, Temperature Programmed Desorption with inbuilt analysis and programmable multiple degassing units	01		
		Operating Specifications	Surface area range :0.01 m ² /g or better Pore Diameter Range: 17-5000 A° or better Pressure range: 0-950 mmHg or more Degassing range: Ambient to 450 °C or more Multiple Physisorption stations with Dewar and elevator High temperature furnace with minimum			

-		1	C	UI-LIIK-I UK-I
	1100 °C with forced air			
	cooling			
	Multiple gas inputs for			
	different gases			
	Inbuilt programmable			
	degassing stations			
	(2-4 stations or more)			
	$N_2, O_2, Ar, Kr, CO_2, CO,$			
Analysis gases	H ₂ , Butane or any non-			
	corrosive gases			
	Physiosorption Report:			
	Specific Surface area			
	(single point and			
	multiple point)			
	Pore volume			
	Pore Size			
	Langmuir plot			
	t-plot			
	DFT Calculations			
Available				
Available	Chemisorption Report:			
Techniques and	Active metal area			
Reports:	dispersion			
	Crystallite Size			
	Monolayer Capacity			
	Activation energy,			
	Temperature			
	Programmed Reduction,			
	Temperature			
	Programmed Oxidation,			
	Temperature			
	Programmed Desorption			
Oil free	High vacuum with no oil			
	contamination or back	01		
Vacuum Pump		01		
system	streaming			
	Expands regulator's			
Regulator	single outlet into two (2)	01		
Expansion Kit	outlets, each with an	01		
	isolation valve.			
	Surface area reference			
	materials	one		
	Micropore reference	one		
	materials	one		
	Active surface area			
Accessories	reference material	one		
	O-rings compatible with			
	analysis tubes	15		
	Analysis quartz Tubes	10		
	Glass Rods for samples			
	-	10		
	analysis Software for Data			
Software	Software for Data			
	collection and analysis			
Computer	• Computer			
With power	Specifications as	01		
backup	recommended by			

				U	UI-LHK-FUK-I	chuci-001
		OEM with Genuine				
		windows				
		 Laser printer 				
		Power backup				
		Helium gas cylinder with				
		double regulator and	01			
		certified (pressure rated	01			
		and tested)				
	Cas Culindars	Nitrogen gas cylinder				
	Gas Cylinders	with double regulator	01			
		and certified (pressure	01			
		rated and tested)				
		2 stage moisture trappers	02			
		for gas cylinders	02			
	Kit for sample	Device which enables				
	transfer from	transfer of physisorption				
	Degassing unit	sample tubes while under	01			
	to Analysis unit	vacuum from degas to				
	under vacuum	analysis port.				
		1-person advanced				
		training (Operations,				
	Installation and	Trouble Shooting etc.) at				
	Installation and	Original Equipment				
	Training	Manufacturer site (travel				
		& accommodation				
		included)				
		online pure sinewave				
		UPS				
		built in AVR capable of				
		regulating ± 30 volts				
	Power backup					
	with additional	Power factor ≥ 0.95	01			
	Servo		01			
	Stabilizer					
		Power backup in case of				
		power failure for at least				
		30 mins				
		Including lead Acid free				
		dry batteries				
		OR				
		A better alternative as				
		recommended by OEM				
		for optimum operations				
		12 Months from the date				
		of installation with				
		vendor having good local				
		reputation for providing				
	Warranty and	high quality equipment.				
	Services	Must have well-trained				
		engineers. Engineers				
		must have been trained				
		by the OEM with proof				
		of trainings by the OEM.				
L				L		

					C	UI-LAK-PUK-I	chuci-001
	X-ray 10 Diffracto	Functional Specifications	 Phase identification Quantitative phase analysis Crystallinity Crystallite size & strain Rietveld refinement Powders, solids and metals Structure analysis 				
		X-ray Generation	Rated output – 600 W or higher Voltage – up to 30 KV or higher Current – up to 10 mA or higher Tube – Copper radiation Full safety shielding	01			
		Goniometer	Vertical type - θ-θ or θ- 2θ -3° (or less) to 140° (or higher) 2θ range Accuracy – 0.02° (2θ) or better				
10		Optics	Fixed/variable Divergence, scatter/anti- scatter, receiving, soller slits				
	meter (XRD)	Detector	 Capable of 0D, 1D & 2D modes High speed data acquisition 				
		Sample stage Multipurp	Multipurpose sample stage and holders with zero low background				
		Sample Changer	Multiple position sample changer with sample holders				
		Desktop Computer and printer	Specifications recommended by OEM with genuine windows				
		Cooling system	In-built or external cooling system (if required) for temperature control. Must provide optimum cooling for operation in local Pakistani conditions.				
		Power backup with additional Servo Stabilizer	online pure sinewave UPS built in AVR capable of regulating ± 30 volts Power factor ≥ 0.95				
		l					

		· · · · · · · · · · · · · · · · · · ·	0	UI-LIIK-I UK-I
	Power backup in case of power failure for at least 30 mins			
	Including lead Acid free dry batteries			
	OR A better alternative as recommended by OEM for optimum operations			
Software for data collection	Needed for data acquisition along with license and installer disk/storage			
Software for Analysis and Library	 Must facilitate peak match and data analysis PDF4/PDF4+ or higher with 5-year license also required 			
Rietveld Refinement Software	Required for rietveld refinement of collected data			
Accessories Required	 Sample Holder for powders – 2 or more Sample holder for solid samples – 2 or more Reference Sample (1 or more) 			
Local warranty and Service	12 Months from the date of installation with vendor having good local reputation for providing high quality equipment. Must have well-trained engineers. Engineers must have been trained by the OEM with proof of trainings by the OEM.			
Installation and Training	1-person advanced training (Operations, Trouble Shooting etc.) at Original Equipment Manufacturer site (travel & accommodation included)			

					UI-LHR-PUR-T	ender-001
11	Dynamic Mechanical Analyzer (DMA)	Purpose Temperature range Force range Heating rate Cooling rate Force resolution Modulus range frequency Deformation range	To study and characterize materials. It is most useful for studying the viscoelastic behavior of polymers, Dynamic moduli of polymers, Measuring glass transition temperature, Polymer composition, Dynamic stress-strain studies. The system showed be provided with all accessories and liquid nitrogen cooling system -150°C- 600°C or better 0.001-10N or better 0.1 to 10 °C /min or better 0.1 to 10 °C /min or better 0.002N or better 10^3-10^6 or better 0.005 to 50 or better Automatic Liquid	01		
		Cooling system Measurement modes:	nitrogen system for cooling of system with 35 litre stock tank minimum Three-point bending Single- and dual cantilever bending Linear shearing Compression /penetration Tension	01		
		Sample holder accessories	Sample holder accessories For measuring the below properties in light of ISO standards Three-point bending Single- and dual cantilever bending Linear shearing Compression /penetration Tension	01 each		
		Operation modes	Temperature/frequency sweep Relaxation Isostrain			

	Strain sweep		
	Stress sweep		
photo accessory	Suitable for use with standard temperature furnace Contains UV source	01	
	Power adapter		
Calibration sample kit	Calibration sample kits with ISO standards	01	
Computer and software's	Desktop PC required. Of specifications recommended by Original Equipment Manufacturer. With original windows with full range of software packages and power backup with laser printer	01	
Gas cylinders	Air gas cylinder with double regulator and certified (pressure rated and tested)	01	
	Helium gas cylinder with double regulator and certified (pressure rated and tested)	01	
	Argon gas cylinder with double regulator and certified (pressure rated	01	
	Nitrogen gas cylinder with double regulator and certified (pressure rated and tested)	01	
		04	
Power backup with additional Servo Stabilizer.	online pure sinewave UPSbuilt in AVR capable of regulating ± 30 voltsPower factor ≥ 0.95Power backup in case of power failure for at least 30 minsLead acid free dry battery (1 year warranty)OR A better alternative as recommended by OEM	01	
	Calibration sample kit Computer and software's Gas cylinders Gas cylinders	Stress sweepbuitable for use with standard temperature furnacePhoto accessorySuitable for use with standard temperature furnaceCalibration sample kitCalibration sample kits with ISO standardsSample kitDesktop PC required. Of specifications recommended by Original Equipment Manufacturer. With original windows with full range of software packages and power packages and power 	Stress sweepImage: standard temperature furnacePhoto accessorySuitable for use with standard temperature furnaceContains UV sourcePower adapterPower adapter01Calibration sample kits with ISO standards01Sample kitDesktop PC required. Of specifications recommended by Original Equipment Manufacturer. With original windows with full range of software packages and power backup with laser printer01Air gas cylinder with double regulator and certified (pressure rated and tested)01Helium gas cylinder with double regulator and certified (pressure rated and tested)01Nitrogen gas cylinder with double regulator and certified (pressure rated and tested)01Nitrogen gas cylinder with double regulator and certified (pressure rated and tested)01Nitrogen gas cylinder with double regulator and certified (pressure rated and tested)01Nitrogen gas cylinder with double regulator and certified (pressure rated and tested)01Nitrogen gas cylinder with double regulator and certified (pressure rated and tested)01Nitrogen gas cylinder with double regulator and certified (pressure rated and tested)01Nitrogen gas cylinder with double regulator and certified (pressure rated and tested)01Nitrogen gas cylinder with double regulator and certified (pressure rated and tested)01Nitrogen gas cylinder with double regulator and certified (pressure rated and tested)01Nitrogen gas cylinders0101Nitrogen gas cylinders0101Nitrogen gas cylinders0101Nitrogen gas cylinders

		1	1		<u> </u>	UI-LHK-PUK-T	ender-001
			12 Months from the date				
			of installation with				
			vendor having good local				
			reputation for providing				
		Warnantar	high quality equipment.				
		Warranty	Must have well-trained				
			engineers. Engineers				
			must have been trained				
			by the OEM with proof				
			of trainings by the OEM.				
			1-person advanced				
			training (Operations,				
			Trouble Shooting etc.) at				
		Installation and	Original Equipment				
		Training	Manufacturer site (travel				
			& accommodation				
			included)				
			For measuring density				
			and porosity of the				
			samples				
		~ .	Minimum 05 analysis				
		General	ports for simultaneous				
		features	sample preparation and				
			sequential analysis, and				
			automatic repeat				
			measurement mode	01			
		Capacity:					
			between1-to				
			350cc				
		Sample cells	4 variable sizes				
			Calibration				
			standards for				
			each size				
			range 1-20 psi				
		Gas	Joints	01			
	TT 1	compressor	Traps for moisture				
12	Helium		•				
	Pycnometer	Vacuum pump	Upto 20 mbar or better	01			
			Continuous flow with				
			user selectable time and Pulse with user selectable				
			number of				
			pressurization/depressur				
		Purge modes					
		_	ization cycles Vacuum for user				
			selectable time with				
			automatic valve				
		Tomporature	configuration. Circulator with -20 °C to				
		Temperature Control	150 °C or better				
			Digital display on				
			machine with all				
		Operation	important information.				
			Also attachable with computer for data		1		

				e	
		transfer and operation			
		through software.			
		Sensitivity 0.1 mg			
	Weighing	stander weights for	01		
	balance	calibration	01		
		Airproof chamber			
		Computer compatible			
		with system and	0.1		
		recommended by OEM	01		
	• •	with genuine windows			
	Accessories	Laser printer	01		
		<u>^</u>	UI		
		Installation/ operation /			
		Onsite Training			
		online pure sinewave UPS			
		built in AVR capable of			
		regulating \pm 30 volts			
		Power factor ≥ 0.95			
	Power backup	Power backup in case of			
	with additional	power failure for at least			
	Servo	30 mins	01		
	Stabilizer	Lead acid free dry			
		battery (1 year warranty)			
		Dattery (1 year warranty)			
		OR			
		A better alternative as			
		recommended and			
		provided by OEM for			
		optimum operations			
		Helium gas cylinder with			
		double regulator and	01		
		certified (pressure rated	01		
		and tested)			
	others	Nitrogen gas cylinder			
		with double regulator	01		
		and certified (pressure	~ 4		
		rated and tested)			
		2 stago maisture turner			
		2 stage moisture trappers	01		
_		for gas cylinders			
		12 Months from the date			
		of installation with			
		vendor having good local			
	warranty	reputation for providing			
		high quality equipment.			
		Must have well-trained			
		engineers.			

					C .	UI-LIIK-I UK-I	
		Purpose	Use for studying phase transition such as melting, Glass Transitions and exothermic decompositions				
		Temperature Range	-170°C or less to 700 °C or more				
		Temperature Accuracy	0.1 °C or better				
		Temperature Precision	0.01 °C or better				
		Heating Rate	(0.01 °C/min or less to 100 °C/min or more				
		Cooling Rate	(0.01 °C/min or less to 100 °C/min or more)	01			
		ng	 To attain minimum temperature as required (-170°C or less) System based on liquid 				
13	Differential Scanning Calorimeter		nitrogen • Capacity:35 lite or more				
	(DSC)	Software	 Must be compatible with all provided hardware Unlimited licenses and free lifetime software upgrades. 				
		computer	Computer compatible with system and recommended by OEM with genuine windows	01			
			Laser printer	01			
			Set of standard samples for calibration measurements (Cp or sensitivity/enthalpy), with purity certificate.	02			
			Press and Die Sets Kit	04			
		Accessories	• Aluminium pans and lids	50			
			Reusable	10			
			Alumina pans Reusable Platinum pans 	03			
			• pans for aqueous solutions	02			

		1			Ŭ	UI-LIIK-I UK-I	chuci ooi
			• Pans for samples				
			which react with	02			
			Aluminum				
			Installation/ operation /	01			
			Onsite Training	01			
			online pure sinewave				
			UPS				
			Lead acid free dry				
			battery (1 year warranty)				
			built in AVR capable of				
			regulating \pm 30 volts				
		Power backup	Power factor ≥ 0.95				
		with additional	Power backup in case of	01			
		Servo	power failure for at least	01			
		Stabilizer	30 mins				
			Including lead Acid free				
			batteries				
			OR				
			A better alternative as				
			recommended by OEM				
			for optimum operations				
			Argon gas cylinder with				
			double regulator and				
			certified (pressure rated	01			
			and tested)				
			Nitrogen gas cylinder				
		others	with double regulator				
			and certified (pressure	01			
			rated and tested)				
			· · · · · · · · · · · · · · · · · · ·				
			2 stage moisture trappers	01			
			for gas cylinders		ļ		
			12 Months from the date				
			of installation with				
			vendor having good local				
			reputation for providing				
		warranty	high quality equipment.				
			Must have well-trained				
			engineers. Engineers				
			must have been trained				
			by the OEM with proof				
			of trainings by the OEM.				
			This instrument used				
			infrared light to scan test				
		Purpose of	samples and identify				
	Fourier	FTIR	molecular components/				
	transformatio		functional groups / and				
14	n infrared		structures of materials	01			
	spectrometer	Components	Sources; Detectors;				
	(FTIR)	-	Beam splitters				
		spectral range	7,500 to 350cm ⁻¹				
		Spectral	0.2 cm ⁻¹ or preferably				
		Resolution	better				

			C	UI-LIIK-I UK-I	chuci ooi
Signal to Noise	 50,000:1 or better - 1- minute sample measurement, 4 cm⁻¹ 13,000:1 or better - 5- second sample measurement, 4 cm⁻¹ 				
Wavenumber accuracy:	0.01 cm ⁻¹ or better				
Interferometer	Permanently/dynamicall y aligned				
Rapid-Scan:	60 spectra /second [@ 16 cm ⁻¹] or better				
Optics bench	Super Sealed & desiccated and/or purgeable				
Desiccants Reagent	Two Boxes				
Multi detector unit	With all requisite accessories to ensure they are mounted and installed completely				
	3. DLaTGS detector, Room temperature, Wide range (12,000-350 cm ⁻¹)	01			
Automated multi-detector unit (two detectors)	 4. MCT Detector, Wide Range non cryogenic or cryogenic (10,000-400 cm⁻¹) with all requisite accessories including Liquid N₂ Cool jacket, Transfer Dewar 	01			
Upgradeable system	 Mount for InGaAs detector Attachable to Raman module/component 				
IR source	Lifetime Infrared Source with 5 years warranty or better				
Beam-splitter	broadband: 400 cm ⁻¹ [or less] to 10,000 cm ⁻¹ [or more]				
Diamond ATR Accessory	400 cm ⁻¹ [or lower] to 5000 cm ⁻¹ [or higher]	01			
Photoacoustic	With all requisite accessories	01			
cell	Carbon reference sample x 1	01			
 Transmission Module	Yes, capable of holding different kinds of flat solid samples,	01			

			C	UI-LIIK-I UK-I	chuci-001
	membranes, liquid and				
	gas samples. Required				
	with all accessories for				
	quick IR measurements				
	 Pellet holders 				
	 Magnetic holder for 				
	films				
	 Clamp 				
	holders/windows for				
Transmission	different kinds of flat	01			
Kit	solid samples	01			
	 Liquid and gas cells 				
	 Press and Die Set for 				
	use in press (to make				
	discs)				
	 Nitrogen gas cylinder 				
	x 1				
	 Helium gas cylinder 				
	x 1				
	 All gas cylinders 				
	required with double				
	regulator and				
Gas Flow &	certification				
Purging	(pressure rated &				
	tested)				
	 All gas lines required 				
	with 2 stage moisture				
	trappers				
	 Purge Regulator, 				
	tubing and all				
	requisite connectors				
	Multi user license and				
	installation files with free				
	upgrades				
	Atmospheric suppression				
standard	to remove H ₂ O and CO ₂				
Spectroscopy	With infrared spectra				
software	library in high resolution				
	format for General				
	Chemicals, polymers,				
	plasticizers, additives etc.				
Principal	piasucizei s, auuitives ett.				
	For statistical analysis of				
component	For statistical analysis of data				
analysis	data				
software					
	 online pure sinewave 				
	UPS				
Power backup	Lead acid free dry				
with additional	battery (1 year	~ -			
Servo	warranty)	01			
Stabilizer	 built in AVR capable 				
~~~~	of regulating $\pm$ 30				
	volts				
	• Power factor $\geq 0.95$				

					C	
			<ul> <li>Power backup in case of power failure for at least 30 mins</li> <li>Including lead Acid free batteries OR</li> <li>A better alternative as recommended by</li> </ul>			
			OEM for optimum operations			
		computer	Computer compatible with system and recommended by OEM with genuine windows	01		
		printer	Laser printer	01		
		Warranty	12 Months from the date of installation with vendor having good local reputation with running machines and well- trained engineers			
	Purpose of the Universal Testing Machine	A tabletop electromechanical universal testing machine capable of testing metals, ceramic and polymers under static uniaxial testing complete with all accessories and grips including power backup. Accuracy of the machine should be according to ISO7500-1				
	Universal Testing	Load Cell	±100 KN with Valid calibration Certificate ISO17025			
15	Machine (UTM)	Force Measuring Accuracy	Grade 0.5	01		
		Crosshead Speed	0.0005 - 400 mm/min or better			
		Speed Crosshead Repeatability	± 2μm or better			
		Test area height	1500 mm or higher			
		Testing area height between connectors	1300 mm or better			
		Test Area Width	600 mm or higher			
		Load frame stiffness	230 KN/mm or better			

			<u> </u>
Testing Mode	Tension, Compression, Bending		
Power	2.5 kW or less		
	Round Sample     universal grip for     variable samples	1	
	Flat sample grips     for metals	1	
Grips	Grips for polymeric materials self- tightening	1	
ľ	• 3 and 4 point bending fixtures	1	
	Compression     plates	1	
	• Standard sample for calculating machine stiffness of the grips	1	
	Axial     Extensometer     clip on gauges for     flat sample	1	
Extensometer	• Axial Extensometer Clip on gauges for rough samples	1	
Software	<ul> <li>Fully operable through graphical interface.</li> <li>Complete software with programing option for tailoring the test based on need.</li> <li>Multiple sequences and program and profile saving options.</li> <li>Full licensed and free upgradeable</li> </ul>		
Computer	Computer compatible with system and recommended by OEM with genuine windows	01	

	1	1	1		t	UI-LHK-PUK-I	enuer-oor
		Power backup with additional Servo Stabilizer	Pure sign wave online UPS power backup suitable to the machine load. Load backup = 10 minutes at full load AVR range = ± 40 Volts Including lead Acid free batteries OR A better alternative as recommended by OEM for optimum operations	01			
		Warranty	12 Months from the date of installation with vendor having good local reputation with running machines and well- trained engineers				
16	Nanoindenter	Purpose of Nanoindenter	It is to be a compact indentation system capable of testing metals, ceramic, polymers and biomaterials. The system should be capable of operation in load control and frequency-based modes. The indentation system should be capable to perform nanoindentation, scratch test with a software- based control for determining mechanical properties in load control and dynamic modes. The instrument should also be capable of determining dynamic mechanical properties of soft materials e.g. biomaterials, tissues and polymers	01			
		Main Features	Actuator Load Range 50 mN to 200 mN Load Resolution 4 nN or better Damping Coefficient 0.05 N-s/m or better Resonant Frequency 100 KHz or Higher Drift Rate 0.05 nm/s or better Displacement Monitoring Linear Capacitive				

			C	UI-LHK-PUK-T	ender-001
		Displacement 50 microns or higher			
	-	Displacement Resolution 0.004 nm or better			
		Indenter Stiffness 80 N/m or higher			
	-	Sample Stage X-axis = 75 mm or			
		higher Y-axis = 75 mm or higher			
		Z-axis = 25 mm or higher			
		Optical Colored Videoscope with Digital Zoom			
		20 to 800x or higher			
		Scratch Testing			
	-	capability			
		Frequency     Specific			
		determination of			
		mechanical properties e.g			
		Storage & loss			
		Modulus of			
		polymers and biomaterials			
		Constant strain			
		rate testing			
		• Multiple/single actuators for			
		testing all			
		material range if			
Т	esting	single actuators cant perform			
fe	eatures	dynamic			
		mechanical testing &			
		scratch/wear			
		testing e.g. gels,			
		tissues and polymers,			
		biomaterials and			
		their blends			
		• Fast indentation capability of			
		mapping			
		topographic features of the			
		surfaces			
		(optional)			
		Setup should be provided with			
		isolation			
<b>C'</b> ( <b>C</b> )	CD'11				

I		1	UUI-LIII	K-PUK-Tender-001
	chamber suitable to avoid environmental vibrational and noise effects • Berkovich indenter • Cube Corner • Flat punch • Ball indenter	1 pcs 1 pcs 1 pcs 1 pcs 1 pc		
	• Provision of sample holder suitable for testing wet samples e.g. tissues and sample in SBF	2 pcs		
	Data acquisition rate 1KHz or higher			
	<ul> <li>Computer compatible with system and recommended by OEM with genuine windows</li> <li>Laser Printer</li> </ul>	01		
	<ul> <li>Power backup with additional Servo Stabilizer</li> <li>Pure sine wave online UPS 2 KVA</li> <li>Output efficiency ≥ 0.95</li> <li>AVR range = ± 40 V</li> <li>Backup time = ≥ 1 hour</li> <li>OEM, Maintenance free Sealed Lead Acid &amp; Leak Proof Battery or</li> <li>A better alternative as recommended by OEM for optimum operations</li> </ul>	01		

					,	UI-LIIK-I UK-I	ender oor
		Warranty	12 Months from the date of installation with vendor having good local reputation with running machines and well- trained engineers				
		General features	To print disposable screen printed electrode on various substrates including pvc, paper, cloth and conducting films Automatic feeder with touch control panel /				
	Screen Printer		Static eliminator / Auto registration for printing / Auto delivery.				
		Printing area mm	610*610 or better				
		Printing speed	300 p/h or better				
		Screen frame thickness(mm)	20-30 or better				
		Off-contact height (mm)	0.05 – 6 mm or better				
		Squeegee/ coater speed (mm/sec.)	0-800 or better	1			
17		Squeegee/ coater angle adjustment	22±15° or better				
		Power source (single phase)	220V, 4.5kw				
			Machine body is with powder coating.				
			corrosion and rust resistant printing table				
			powder coated body				
		Others	capable of printing with variety of inks including composite materials and conducting pastes				
			capable of printing on variety of substrates including paper, glass and plastic sheets and cloths				
			Safety light barrier				
			Motor controlled in 3				
			axis movement				

r					C	UI-LIIK-PUK-I	
			Touch screen control air				
			pressure for squeegee				
			and flood coater				
			Squeegee holders 650	1			
			mm				
			Squeegee holders 550	1			
			mm				
		accessories	Squeegee holders 450	1			
			mm	01			
			Flood coater 700 mm	01			
			Flood coater 500 mm	01			
			silver paste	250g			
			Carbon paste	1kg			
			online pure sinewave				
			UPS				
			built in AVR capable of				
			regulating ± 30 volts				
			Power factor $\geq 0.95$				
		Power backup	Power backup in case of				
		with additional	power failure for at least	01			
		Servo	30 mins	U1			
		Stabilizer	Including lead Acid free				
			batteries				
			OR				
			A better alternative as				
			recommended by OEM				
			for optimum operations				
			12 Months from the date				
			of installation with				
		Warranty	vendor having good local				
		··· •• •••	reputation with running				
			machines and well-				
			trained engineers				
			The Field-emission				
			scanning electron				
			microscope With				
			EBSD must be capable of				
			use in variable pressure,				
			with low and high				
	Field		vacuum mode with				
	Field Emission		suitable detectors along with analytical				
18			with analytical capabilities of chemical				
10	Scanning Electron	Scope	and structural properties	01			
	Microscope	Brohe	(optional). The	UI			
	(FE-SEM)		equipment must be				
			complete in all aspect				
			including water chiller,				
			power backup, gas				
			cylinder/s with regulators				
			and moisture filters and				
			compressor system if				
			required for its				
			operation.				
	l		operation.			l	

					U	UI-LIIK-PUK-I	enuer-oor
		Electr on Gun	Schottky Thermal Field Emitter				
			High Voltage @ 15 KV (0.8 nm or better)				
	Electr onic Featu res	Resolu tion	Low Voltage @ 1 KV (1.5 nm or better)				
			STEM @ 30KV (0.8 nm or better)				
			Low Vacuum (1.5 nm or better)				
		Accele rating voltage	0.2 to 30kV (or better)				
		Probe Curre nt	Up to 100 nA or higher				
		Magni ficatio n	10 to 1,000,000 x or better				
	Vacu um	Low vacuu m range	133 Pa or higher pressure				
	m	Vacuu m System	Oil Free	01			
	Speci men Stage	Eucent ric Stage	<ul> <li>Fully motorized</li> <li>X = 100 mm or more</li> <li>Y = 100 mm or more</li> <li>Z = 50 mm or more</li> <li>Rotation = 360° continuous,</li> <li>Tilt = -4° to +70° or wider</li> </ul>				
		Ports	Minimum 10 or more				
		Colum n	InLens and In-column detection with multiple detectors including InLens SE and BSE (electrostatic and magnetic field free)				
	Ports & Detec tors	Camer as	<ul> <li>For Sample view (&amp; stage navigation) with display on the SEM display monitor</li> <li>For internal chamber view with display on the SEM display monitor</li> </ul>				
		Detect ors	InLensSEdetector/detectorsInlens BSE detector				

In chamber SE detector for high vacuum         Low vacuum in chamber SE detector or comparable alternative         Retractable solid-state segmented BSD detector for low and high vacuum         Retractable STEM         Detector (bright-field, dark-field and high-angle dark-field modes)         • Multidetector image capture at single instance in multiple resolutions         • Live video acquisition options         • Drift       corrected Frame         Frame       Image acquisition	
Low vacuum in chamber         SE       detector         Comparable alternative         Retractable       solid-state         segmented BSD detector         for low and high vacuum         Retractable       STEM         Detector       (bright-field,         dark-field and high-angle       dark-field modes)         •       Multidetector image         capture       at single         instance in multiple       resolutions         •       Live video acquisition         options       •         Drift       corrected         Frame       Image	
Set       detector       or         comparable alternative       Retractable       solid-state         Retractable       solid-state       segmented BSD detector         for low and high vacuum       Retractable       STEM         Detector       (bright-field,         dark-field and high-angle       dark-field modes)         •       Multidetector       image         capture       at       single         ition       esolutions       -         •       Live video acquisition       options         •       Drift       corrected         Frame       Image       -	
Softw       comparable alternative         Retractable solid-state         Retractable solid-state         segmented BSD detector         for low and high vacuum         Retractable STEM         Detector (bright-field,         dark-field and high-angle         dark-field modes)         • Multidetector image         capture at single         instance in multiple         resolutions         • Live video acquisition         options         • Drift corrected         Frame Image	
Retractable solid-state         segmented BSD detector         for low and high vacuum         Retractable         Retractable         Softw	
Softw       segmented BSD detector         for low and high vacuum       Retractable         Retractable       STEM         Detector       (bright-field,         dark-field and high-angle       dark-field modes)         •       Multidetector         instance       in multiple         resolutions       •         Live video acquisition       options         •       Drift         corrected       Frame	
Softw       segmented BSD detector         for low and high vacuum       Retractable         Retractable       STEM         Detector       (bright-field,         dark-field and high-angle       dark-field modes)         •       Multidetector         instance       in multiple         resolutions       •         Live video acquisition       options         •       Drift         corrected       Frame	
for low and high vacuum         Retractable       STEM         Detector       (bright-field,         dark-field and high-angle       dark-field modes)         •       Multidetector image         capture       at single         instance in multiple         resolutions         •       Live video acquisition         options         •       Drift         corrected         Frame       Image	
Retractable       STEM         Detector       (bright-field,         dark-field and high-angle       dark-field modes)         •       Multidetector image         capture       at single         instance in multiple         resolutions         •       Live video acquisition         options         •       Drift         corrected         Frame       Image	
Detector (bright-field, dark-field and high-angle dark-field modes)         • Multidetector image capture at single instance in multiple resolutions         Image Acquis ition       • Live video acquisition options         • Drift corrected Frame Image	
dark-field and high-angle         dark-field modes)         • Multidetector image         capture at single         instance in multiple         resolutions         Acquis         ition         options         • Drift         corrected         Frame	
Image       • Multidetector image         Image       capture at single         Acquis       • Live video acquisition         ition       options         • Drift       corrected         Frame       Image	
• Multidetector image capture at single instance in multiple         Image Acquis         Live video acquisition ition         • Drift Frame         Softw	
Softw       capture at single instance in multiple resolutions         Image       resolutions         Acquis       Live video acquisition options         Ition       Drift         corrected         Frame       Image	
Image       instance in multiple         Image       resolutions         Acquis       Live video acquisition         ition       options         •       Drift         corrected       Frame	
Image     resolutions       Acquis     • Live video acquisition       ition     options       • Drift     corrected       Frame     Image	
Acquis     • Live video acquisition       ition     options       • Drift     corrected       Frame     Image	
ition options Drift corrected Frame Image	
ition options Drift corrected Frame Image	
• Drift     corrected       Softw     Frame	
Softw Frame Image	
Notfw	
are Fully customized	
Acquis specific routines	
ition • Suitable CPU with	
Softwa monitors &	
re keyboards and	
mouse/trackball.	
■ EDS (100 mm ² or	
better active area),	
129 eV or better,	
canability to	
EDS Automatically record	
Detect live processing	
or Low acceleration	
voltage capability	
FDS Input count futes	
EDS 800,000 cps or better	
Fully licensed	
software with built-in	
Acquis library for elemental	
ition and compositional	
Softwa analysis	
re Complete with	
installation	
CDs/drives	
<ul> <li>Acquisition speed of</li> </ul>	
up to 400 fps or	
better	
EBSD • Diffraction pattern	
EBSD Detect image resolution 300 01	
or x 200 pixel or better	
EBSD workstation	
for fast data storage	
and acquisition	

			t	UI-LHK-PUK-I	ender-001
Power backup with additional Servo Stabilizer	<ul> <li>Fully licensed software with built-in library for structural and crystallographic analysis</li> <li>10KVa pure sine wave UPS with isolation transformer or better</li> <li>Built in AVR ±40 V</li> <li>Lead acid free dry batteries from UPS OEM</li> <li>Overvoltage protecting relay</li> <li>Voltage surge protection relays</li> <li>Phase sequencer for automatic phase sequencing</li> <li>one-year warranty</li> </ul>	01		<u>UI-LIIK-FUK-</u>	
	<ul> <li>with minimum 30 mints backup to all system including instrument, computer etc.</li> <li>OR</li> <li>A better alternative as recommended by OEM for optimum operations.</li> </ul>				
Workstations	<ul> <li>Suitable Workstations for FE- SEM operation, EDS Analysis or any other application. If any aspect requires additional work- stations, they should be included</li> </ul>	01			
	<ul> <li>Extra Schottky Thermal Field Emitter</li> <li>Double sided Carbon</li> </ul>	01			
	tape	10			
	Silver paste bottles	5			
Accessories	• Set of standard samples for EDS detector calibration (gold, copper, platinum standards)	1 each			
	Set of all replaceable vacuum o-rings     Vacuum grease	1 set 5			
	• Vacuum grease	units			

					e	UI-LAK-FUK-I	001
			Sample holder for multiple specimen stubs	5			
			• SEM stubs	50			
			<ul> <li>Set of stainless-steel and polymeric forceps</li> </ul>	1 pack			
			<ul> <li>Gas cylinder with certified regulator along with moisture filters</li> </ul>	1			
			<ul> <li>Air compressor if required</li> </ul>	1			
			<ul> <li>Chiller, if required for operations</li> </ul>	1			
			<ul> <li>1-year standard warranty</li> </ul>				
			• Enabled with Remote Access feature for troubleshooting and identification of the				
		Warranty & Others	<ul> <li>routine problems</li> <li>Installation, operation &amp; onsite demonstration of all capabilities with on- site training</li> </ul>				
			<ul> <li>1-person advanced training (Operations, Trouble Shooting etc.) at Original Equipment Manufacturer site (travel &amp; accommodation</li> </ul>				
18.1	Field Emission Scanning Electron Microscope (FE-SEM)	Scope	included) The Field-emission scanning electron microscope must be capable of use in variable pressure, with low and high vacuum mode with suitable detectors along with analytical capabilities of chemical and structural properties (optional). The equipment must be	01			
			complete in all aspect including water chiller, power backup, gas cylinder/s with regulators and moisture filters and compressor system if				

						001
			required for its operation.			
		Electr on Gun	Schottky Thermal Field Emitter			
	Electr onic Featu	Resolu tion	High Voltage @ 15 KV (0.8 nm or better) Low Voltage @ 1 KV (1.5 nm or better) STEM @ 30KV (0.8 nm or better) Low Vacuum (1.5 nm or better)			
	res	Accele rating voltage Probe	0.2 to 30kV (or better)			
		Curre nt Magni ficatio	Up to 100 nA or higher 10 to 1,000,000 x or			
	Vacu um Svoto	n Low vacuu m range	better 133 Pa or higher pressure			
	Syste m	Vacuu m System	Oil Free	01		
1	Speci men Stage	Eucent ric Stage	<ul> <li>Fully motorized</li> <li>X = 100 mm or more</li> <li>Y = 100 mm or more</li> <li>Z = 50 mm or more</li> <li>Rotation = 360° continuous,</li> <li>Tilt = -4° to +70° or wider</li> </ul>			
		Ports	Minimum 10 or more			
	Ports	Colum n	InLens and In-column detection with multiple detectors including InLens SE and BSE (electrostatic and magnetic field free)			
	Detec tors	Camer as	<ul> <li>For Sample view (&amp; stage navigation) with display on the SEM display monitor</li> <li>For internal chamber view with display on the SEM display monitor</li> </ul>			

						C	UI-LHR-PUR-I	enuel-001
				InLens SE				
				detector/detectors				
				Inlens BSE detector				
				In chamber SE detector				
				for high vacuum				
				Low vacuum in chamber				
			Detect	SE detector or				
			ors	comparable alternative				
				Retractable solid-state				
				segmented BSD detector				
				for low and high vacuum				
				Retractable STEM				
				Detector (bright-field, dark-field and high-angle				
				dark-field modes)				
				<ul> <li>Multidetector image</li> </ul>				
				capture at single				
				instance in multiple				
			Image	resolutions				
			Acquis	<ul> <li>Live video acquisition</li> </ul>				
			ition	options				
				<ul> <li>Drift corrected</li> </ul>				
		G <b>G</b>		Frame Image				
		Softw		acquisition				
		are	are Acquis ition Softwa	<ul> <li>Fully customized</li> </ul>				
				software for user				
				specific routines				
				<ul> <li>Suitable CPU with</li> </ul>				
				monitors &				
			re	keyboards and				
				mouse/trackball.				
				• EDS (100 mm ² or				
				better active area),				
				129 eV or better,				
			EDS	capability to				
			Detect	Automatically record				
			or	live processing				
				<ul> <li>Low acceleration</li> </ul>				
				voltage capability				
	EDS		<ul> <li>Input count rates</li> <li>200,000 and a batter</li> </ul>					
				800,000 cps or better				
				<ul> <li>Fully licensed</li> <li>software with built in</li> </ul>				
		Acqui ition Softw re	A	software with built-in				
				library for elemental				
				and compositional analysis				
				<ul><li>Complete with</li></ul>				
			10	- Complete with installation				
				CDs/drives				
			<u> </u>	<ul> <li>10KVa pure sine</li> </ul>				
	Power back with additio Servo Stabilizer			wave UPS with				
			with additional	isolation transformer	01			
				or better	VI.			
			er	<ul> <li>Built in AVR ±40 V</li> </ul>				

 			C	UI-LHR-PUR-T	ender-001
	<ul> <li>Lead acid free dry batteries from UPS OEM</li> <li>Overvoltage protecting relay</li> <li>Voltage surge protection relays</li> <li>Phase sequencer for automatic phase sequencing</li> <li>one-year warranty with minimum 30 mints backup to all system including instrument, computer etc.</li> <li>OR</li> <li>A better alternative as recommended by OEM for optimum operations.</li> </ul>				
Workstations	<ul> <li>Suitable         Workstations for FE- SEM operation, EDS Analysis or any other application. If any aspect requires additional work- stations, they should be included     </li> </ul>	01			
	• Extra Schottky Thermal Field Emitter	01			
	Double sided Carbon tape	10			
	Silver paste bottles	5			
	• Set of standard samples for EDS detector calibration (gold, copper, platinum standards)	1 each			
Accessories	• Set of all replaceable vacuum o-rings	1 set			
	Vacuum grease	5 units			
	• Sample holder for multiple specimen stubs	5			
	• SEM stubs	50			
	<ul> <li>Set of stainless-steel and polymeric</li> </ul>	1			
	forceps	pack			
	<ul> <li>Gas cylinder with certified regulator</li> </ul>	1			

					U	UI-LAK-FUK-I	chuci-001
			along with moisture filters				
			<ul> <li>Air compressor if</li> </ul>				
			required	1			
			Chiller, if required	1			
			for operations	1			
			1-year standard				
			<ul><li>warranty</li><li>Enabled with Remote</li></ul>				
			- Enabled with Remote Access feature for				
			troubleshooting and				
			identification of the				
			routine problems				
			<ul> <li>Installation,</li> </ul>				
			operation & onsite				
		Warranty &	demonstration of all capabilities with on-				
		Others	site training				
			<ul> <li>1-person advanced</li> </ul>				
			training (Operations,				
			Trouble Shooting				
			etc.) at Original				
			Equipment				
			Manufacturer site (travel &				
			accommodation				
			included)				
		Purpose of the Benchtop Laboratory Freeze Dryer	Compact benchtop				
			model capable of				
			removing water, acetonitrile, ethanol and				
			methanol from samples				
		Entonion	Powder coated stainless-				
		Exterior	steel				
		Temperature	-85 °C or below				
		Water capture	4 Kg/24 h or above				
		capacity Freeze drying					
	Freeze Dryer	Freeze drying time	24 h				
			Water, acetonitrile,				
10		Solvents	methanol, ethanol				
19		Drying Chamber	Stainless steel drying	02			
			chamber				
			• Transparent acrylic lid				
			for connection of drying chamber				
			Adjustable 4				
			trays/shelves				
			• Polish SS304 stainless				
			steel shelves				
			• stainless-steel collector				
		Condenser	coil condenser				
			Electric heating defrost				
		Cold trap	• Cold trap temperature				
		· · · <b>r</b>	≤ -50 °C				

		 <u>CUI-LHR</u>
	<ul> <li>Cold trap capacity 5-10 L</li> <li>Total loading capacity (liquid) 1.2L</li> </ul>	
Refrigeration system	<ul> <li>Dual 1/3 hp refrigeration compressor</li> <li>CFC-free</li> <li>Cooling type: Air cooled</li> <li>Refrigerant:</li> </ul>	
Vacuum system	<ul> <li>R600a+R290+R23</li> <li>two stage Rotary Vane vacuum pump</li> <li>Displacement capacity: 80-90 L/min</li> <li>Ultimate vacuum: ≤ 0.002 mPan</li> </ul>	
Control panel	<ul> <li>0.002 mBar</li> <li>LCD touch screen display panel</li> <li>Show operating parameters, set-up parameters and alarm messages</li> <li>user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C</li> </ul>	
Safety controls	<ul> <li>Vacuum control option to maintain set point vacuum level</li> <li>special arrangement for preventing the oil back-streaming into the collector chamber during the power outage</li> <li>auto restore functions in case of power failure</li> </ul>	
Electrical requirements	• Power supply 220V/50Hz,60Hz (single phase)	
Accessories	• Freeze drying flasks 100ml (06 Nos)	
Warranty	• 12 Months from the date of installation with vendor having good local reputation with running machines and well-trained engineers	

r		1			U	UI-LHR-PUR-T	ender-001
20	Fatigue Testing	Purpose of the Fatigue Testing Machine	Multipurpose bi-axial servo-hydraulic fatigue testing system with axial/torsion drive for static and dynamic tests in axial and torsional mode. The machine should meet conditions for fatigue testing of Hip Stem Fatigue, Dental Implant Wear, Spinal Vertebrectomy implants, Prosthetic limbs implants as per relevant ISO standard. Materials to be used will be metals, ceramics, polymers and composites. The machine should include all accessories required for its operation e.g. chillers and power backup. The software should have built-in programs examples to test implants according to ISO7206-4, ISO7206-6, ISO 12189, ASTM F2193, ASTM	01			
	Machine	Load Cell Axial Dynamic	F1798. 10 kN according to EN- ISO 7500-1 class 0.5 with valid calibration Certificate 30 Hz @ ± 3 mm or				
		Performance	better				
		Torsion Dynamic Performance	10Hz @ 3° or better				
		Mode of operation	Electrically powered with integrated servo- hydraulic				
		Test area height	1200 mm or above				
		Testing actuator stroke	100 mm or better				
		Displacement/D eformation Accuracy	As per EN 10002-4				
		Torsion fatigue capacity	100 N/m or above				
		Torsion	Total 100° or better				
		Testing Mode	Tension, Compression, Axial Fatigue & Torsion Fatigue				

		-	e	UI-LIIK-I UK-I	chuch 001
Wave Forms Capability	Ramp, Holding, Sinusoidal, Triangular, Square, Trapezoidal, virtual channels etc. in both axial and torsional axes				
Phase Angle	Axial and torsional waveform superposition in both in-phase and out of phase. Provision available for conducting test at any quadrants of cycles				
Testing bed	T-Slot platen base platform for easy mounting of different jigs.				
Grips	Compression plates Standard tensile grips for flat and round samples (suitable upto 10kN)	1 set			
Chiller	3 & 4 point bending fixtures To provide cooling to hydraulic system (if required)	1 set			
Standard Tool Kit	For regular inspection and maintenance	1			
Power backup with additional Servo Stabilizer	Pure sign wave online UPS power backup suitable to the machine load. Load backup = 10 minutes at full load AVR range = ± 40 Volts Lead acid free dry batteries OR A better alternative as recommended by OEM for optimum operations	1			
Training	1-person advanced training (Operations, Trouble Shooting etc.) at Original Equipment Manufacturer site (travel & accommodation included)	1			
Warranty	12 Months from the date of installation with vendor having good local reputation with running machines and well- trained engineers				

## **Special Terms and conditions;**

- i. Please submit the technical and financial bid (rates) on our prescribed BoQs Form and clearly mention the quoted model / brands, with complete terms and conditions signed, stamped with both bids, otherwise your bid (s) may be rejected.
- ii. Vendor will be responsible for Onsite Installation, Commissioning & Training of the delivered equipment's.
- iii. CUI Lahore campus prefers to procure item at Sr.# 18 i.e. FE-SEM with EBSD. However, in case, the cost of quoted item at Sr. # 18 exceeds the budget limitations, CUI may opt for item at 18.1 i.e. FE-SEM without EBSD.
- iv. Purchase / work order (s) will be awarded on Item wise Basis.
- v. Kindly attach the Tender fee with Technical Bid and Bid money / CDR with Financial Bid.
- vi. <u>Multiple rates of an item may also lead to the rejection of bid / item.</u>