



## University of Engineering and Technology, Lahore

### PRE-QULIFICATION NOTICE

Sealed proposals are invited from income tax and sales tax registered companies/firms, sole/authorized dealers or suppliers for the purchase of following items under PPRA Rules 2014 (Amended).

Sr. #	Equipment Name	Quantity Required
1	Field Emission Gun Scanning Electron Microscope (FEG-SEM)	01
2	High Resolution Transmission Electron Microscope (HR-TEM)	01
3	X-Ray Diffractometer (XRD)	01

Pre-qualification document, containing the detailed terms and conditions and information etc, can be obtained from the same day, of publication from the office of **Director, Center for Nanotechnology and Advanced Materials Research/Chairman Physics Department, UET Lahore** during office hours ( 8:00 am to 4:00 pm) against the written request on company letter head along with receipt of Rs.3000/- (Non-Refundable) to be deposited in the Main **Account No.553-33 of UET, maintained in Habib Bank Ltd. UET Branch, Lahore.** The document can also be downloaded from PPRA and UET, Lahore website.

Sealed pre-qualification documents will be received till July 30<sup>th</sup> , 2018 up till 10:00 AM and will be opened, by the Convener Central Purchase Committee, UET, Lahore, on the same day at 10:30 AM in the presence of the bidders or their representatives.

  
**Director**

Center for Nanotechnology & Advance  
Material research (CNAMR)  
University of Engineering and Technology  
Lahore.

Phone: (042) - 99029204



**PRE-QUALIFICATION DOCUMENT**

**CENTRE FOR NANOTECHNOLOGY & ADVANCED MATERIALS RESEARCH  
(CNAMR)**

**University of Engineering and Technology, Lahore**

**PHONE: (042) - 99029204**

**PRE - QUALIFICATION PROCESSING FEE      **Rs. 3,000/-****

**LAST DATE OF SUBMISSION      30/ 07 / 2018 till 10: 00 AM**

**FOR OFFICE USE ONLY**

Serial No. \_\_\_\_\_

Sold to: -

M/S \_\_\_\_\_

Date of Sale: \_\_\_\_\_ Bank Challan No. \_\_\_\_\_ Date: \_\_\_\_\_

## **Important Note:**

Companies/Firms, Sole/Authorized dealers or suppliers must ensure that they submit all the required documents indicated in the Pre-Qualification Document without fail. Proposals received without, undertakings, valid documentary evidence, supporting documents and the manner for the requirements mentioned in the Pre-Qualification Document or test certificates are liable to be rejected at the initial stage itself. The data sheets, valid documentary evidences for the critical components as detailed hereinafter should be submitted by the Companies/Firms, Sole/Authorized dealers or suppliers for scrutiny. It is intimated that no objection shall be entertained regarding the terms and conditions of the Pre-Qualification Document at the later stages during Pre-Qualification process.

**Applicability of Punjab Procurement Rules, 2014 (amended).** This Pre-Qualification Process will be governed under Punjab Procurement Rules, 2014 as amended from time to time and instructions of the Government of the Punjab received during the completion of the process. These may be obtained from PPRA's website:

<http://www.ppra.punjab.gov.pk/>

### **Table of Contents**

1	INTRODUCTION	3
2	TERMS AND CONDITIONS OF THE PRE-QUALIFICATION	5
3	SUBMISSION OF PROPOSAL	6
4	PREQUALIFICATION FORMS	6-7-8
5	DETAILS OF CONTRACTS/ASSIGNMENTS/PROJECTS UNDERTAKEN BY THE FIRM	8
6	EVALUATION CRITERIA	9-10
7	ANNEXURE-A ( <b>Format for Covering Letter</b> )	11
8	ANNEXURE-B ( <b>INTEGRITY PACT</b> )	12
9	ANNEXURE-C ( <b>Under Taking</b> )	13
10	ANNEXURE-D ( <b>Financial Capacity of the Firm/Supplier</b> )	14
11	Technical Specifications	15-21

## 1. INTRODUCTION

University of Engineering & Technology Lahore intends to Pre-Qualify Companies/Firms, Sole/Authorized dealers or suppliers in order to further streamline the Procurement procedures.

All reputable, registered and established Companies/Firms, Sole/Authorized dealers or suppliers are invited to apply for the participation in Pre-qualification Process and submit proposals for Pre-Qualification.

A transparent evaluation method given in this document shall be adopted for the purpose of Pre-Qualification of the applicant's capabilities in respect of vital elements of applicant's organization and capacity to perform so that eligible Companies/Firms, Sole/Authorized dealers or suppliers may be invited to get involved in further Procurement Procedures. Performance in terms of quality, delivery, after sales service, credit terms and other contractual obligations will be closely monitored and periodically reviewed during all future procurements they are involved in.

Pre-qualification documents, containing the detailed terms and conditions and information etc, can be obtained from the same day of publication from the office of the Director, Centre for Nanotechnology and Advanced Materials Research / Chairman Physics Department, UET, Lahore during office hours (08:00am to 04:00pm) against the written request on company letter head along with receipt of Rs. 3000/- (Non-Refundable) to be deposited in the main account No. 553-33 of UET, maintained in HBL, UET Branch, Lahore.

The proposals are required to be delivered to the office of the Director, Centre for Nanotechnology and Advanced Materials Research / Chairman Physics Department, UET, Lahore by **30-07-2018 at 10:00 AM**. The Central Procurement Cell will open the proposals in Conference room adjacent to V.C Office for evaluation of eligible Companies/Firms, Sole/Authorized dealers or suppliers as per given evaluation criteria on the same date at **10:30 AM**. in the presence of the eligible Companies/Firms, Sole/Authorized dealers or suppliers representatives, who may like to be present.

Queries of the eligible Companies/Firms, Sole/Authorized dealers or suppliers (if any) for seeking clarifications regarding Pre-Qualification Document must be received in writing to the office of the Director, Centre for Nanotechnology and Advanced Materials Research / Chairman Physics Department, UET, Lahore till 23<sup>rd</sup> July, 2018. Any query received after said date shall not be entertained. All queries shall be responded to within due time. UET

Lahore may host a Q & A session, if required. All Companies/Firms, Sole/Authorized dealers or suppliers shall be informed of the date and time in advance.

The Companies/Firms, Sole/Authorized dealers or suppliers should be fully and completely responsible for all the deliveries and deliverables to the Purchaser.

The Primary Contact & Secondary Contact for all correspondence in relation to this Pre-qualification as follows:

### **Primary Contact**

- Prof. Dr. Anwar Latif  
Director, CNAMR/Chairman, Physics Department  
Office Phone. (042-99029204)  
(anwalatif@uet.edu.pk)

### **Secondary Contact**

- Mr. Aqeel M. Babar  
Manager Procurement & Administration  
Office Phone. (042-99029450)  
(aqeel.babar@kics.edu.pk)

Companies/Firms, Sole/Authorized dealers or suppliers should note that during the period from the receipt of the proposal and till further notice from the Primary Contact, all queries should be communicated via the Primary Contact and in writing (e-mail) only. In the case of an urgent situation where the Primary Contact cannot be contacted, the Companies/Firms, Sole/Authorized dealers or suppliers may alternatively direct their enquiries through the Secondary Contact.

Companies/Firms, Sole/Authorized dealers or suppliers are also required to state, in their proposals, the name, title, fax number and e-mail address of the their authorized representative through whom all communications shall be directed until the process has been completed or terminated.

The Purchaser will not be responsible for any costs or expenses incurred by Companies/Firms, Sole/Authorized dealers or suppliers in connection with the preparation or delivery of proposals.

As authority competent to accept the proposal, the Purchaser reserves the exclusive right to cancel the Pre-Qualification process, accept or reject one or all proposals. However, if the Companies/Firms, Sole/Authorized dealers or suppliers are not satisfied with the decision they can submit an appeal/case in the grievance committee.

The Companies/Firms, Sole/Authorized dealers or suppliers selected after pre-qualification process will follow procurement process on C&F basis.

## **2. TERMS AND CONDITIONS OF THE PRE-QUALIFICATION**

### **Definitions**

1. In this document, unless there is anything repugnant in the subject or context:
2. "Authorized Representative" means any representative appointed, from time to time, by the Purchaser or the Supplier.
3. "Purchaser" means the UET Lahore, or any other person for the time being or from time to time duly appointed in writing by the Purchaser to act as Purchaser for the purposes of the Contract.
4. "Supplier" means the Companies/Firms, Sole/Authorized dealers or suppliers selected by the Purchaser to deliver the required Goods or Services under the Purchase Order/Contract.
5. "Purchase Order" means a document issued by the Purchaser to the Supplier for the Delivery of Goods or Services as required by the Purchaser.
6. "Commencement Date of the Contract" means the date of signing of the Contract between the Purchaser and Companies/Firms, Sole/Authorized dealers or suppliers.
7. "Contract" means the agreement entered into between the Purchaser and the Supplier, as recorded in the Contract Form signed by the parties, including all Schedules and attachments there to and all documents incorporated by reference therein.
8. "The Contractor" means the Companies/Firms, Sole/Authorized dealers or suppliers whose Proposal has been accepted.
9. "Contract Price" means the price payable to the Contractor under the Purchase Order/Contract for the full and proper performance of its contractual obligations.
10. "Contract Value" means that portion of the Contract Price adjusted to give effect to such additions or deductions as are provided for in the Contract which is properly apportion-able to the Goods or Services in question.
11. "Day" means calendar day.
12. "Goods" means equipment, machinery, and/or other materials / supplies which the Supplier is required to supply to the Purchaser under the Purchase Order/Contract against each item.
13. "Person" includes individual, association of persons, firm, company, corporation, institution and organization, etc., having legal capacity.
14. "Prescribed" means prescribed in the Pre-Qualification Document.
15. "Origin" shall be considered to be the place where the Goods are produced or from where the Services are provided. Goods are produced when, through manufacturing, processing or assembling of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components. The origin of Goods and Services is distinct from the nationality of the Supplier.
16. "Services" means work to be done by the Companies/Firms, Sole/Authorized dealers or suppliers or other such obligations which the Companies/Firms, Sole/Authorized dealers or suppliers is required to provide to the Purchaser under the Purchase Order/Contract.

### 3. SUBMISSION OF PROPOSAL

Proposal must comprise the following:

- 2.1 Original deposit slips of Pre-Qualification fee, as mentioned in Pre-Qualification advertisement.
- 2.2 Duly filled below given Pre-Qualification Forms.
- 2.3 Covering letter duly signed and stamped by authorized representative. (**Annexure-A**).
- 2.4 Integrity Pact duly signed and stamped by authorized representative (**Annexure-B**).
- 2.5 Undertaking (All terms & conditions and qualifications listed anywhere in the Pre-Qualification document have been satisfactorily vetted) (**Annexure-C**).
- 2.6 Financial Capacity as per **Annexure-D**.
- 2.7 Certificate of Companies/Firms, Sole/Authorized dealers or suppliers Registration/Incorporation under the laws of Pakistan.
- 2.8 Valid Registration Certificates for Income Tax, Sales Tax and Professional Tax.

Verifiable documentary proof of the mandatory and other requirements mentioned in this document must be submitted along with the below form, noncompliance of which shall lead to disqualification.

### 4. PRE-QUALIFICATION FORMS

#### PARTICULARS

Name			
Abbreviated Name			
National Tax No.		Sales Tax Registration No	
No. of Employees		Company's Date of Formation	

\*Please attach copies of NTN, GST Registration & Professional Tax Certificate

Registered Office Address		State/Province	
City/Town		Postal Code	
Phone		Fax	
Email Address		Website Address	

Branch Office Address	
-----------------------	--

City/Town		State/Province	
Country		Postal Code	
Phone		Fax	

Head Office Address			
City/Town		State/Province	
Country		Postal Code	
Phone		Fax	

### **Financial Worth**

Company Net Worth		
Company Turn Over		
Last 3 years of Company Profits	Year	Profit/Loss

\* In case of Private Limited, Please Audited Balance Sheet for the last three years.

CEO/Chairman Name		National ID Number	
Mailing Address			
Phone		Fax	
Email			

### **Profile**

1	Primary Business Details	1	
		2	
		3	
		4	
2	List of Items / Services	1	
		2	
		3	
		4	
3	After Sale Services		
4	Warranty Details		
5	Buy Back or Return Policy		
6	Any Other Information that supplier may like to provide		



**List of Current Customers (Companies / Organizations / Businesses)**

Sr. #	Name of Company/Organization	Current Business / Scope of work	No. of Years	Annual Contract Volume	Approximate Value of Business
1					
2					
3					
4					
5					

(Attach documentary proof with proper reference for the companies / organizations mentioned above)

The information given above is true to the best of our knowledge; we undertake to inform UET, Lahore of any changes that may take place later in the status of company in business / agency or the management.

The terms and conditions attached have also been read and certificate signed.

Authorized Signature : \_\_\_\_\_  
(with official seal)

Name: \_\_\_\_\_

Designation: \_\_\_\_\_

Date: \_\_\_\_\_

Note: In case of insufficient space against any column, please attach separate sheet (s) for details / information

**5. DETAILS OF CONTRACTS/ASSIGNMENTS/PROJECTS UNDERTAKEN**

*(All documentary evidences must be annexed)*

Sr. #	Title of Contracts / Projects / Services	General Description	Value of Contract	Years	Department / Organization	Performance
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						

## **6. EVALUATION CRITERIA**

### **IMPORTANT NOTE:-**

All the applicants to please note that as per PPRA Rules and Regulations, all the documents/statements submitted by a Companies/Firms, Sole/Authorized dealers or suppliers for its pre-qualification are under Oath.

Any document/statement provided if proved false, mis-stated, concocted or incorrect at any time during or after Pre-qualification will result into permanent dis-qualification and black listing of the Companies/Firms, Sole/Authorized dealers or suppliers with their names displayed on PPRA website.

**PASS MARKS:** Based on conditions listed in this document, proposals meeting the 70% of the total marks will be considered. Furthermore, minimum passing percentage for individual evaluation criteria (from Sr. # 1-6) is 50%.

**PROVISO:** If NONE or ONLY ONE (single) Companies/Firms, Sole/Authorized dealers or suppliers exceed the 70% pass mark, then the Purchaser reserves the right to decrease the Pass Mark limit.

The Companies/Firms, Sole/Authorized dealers or suppliers who have duly complied with the Qualification and Evaluation Criteria against each item will be eligible for further processing.

The proposals shall be evaluated by the Technical Evaluation Committee in the light of following evaluation criteria:

<b>Category</b>	<b>Description</b>	<b>Requirement/Points</b>
Legal (Mandatory)	Certificate of Registration/Incorporation under the laws of Pakistan	Mandatory
	Valid Income Tax Registration	Mandatory
	Valid Professional Tax Certificate	Mandatory
	Valid General Sales Tax Registration (Status = Active with FBR)	Mandatory
	Submission of undertaking on legal, valid and attested stamp paper that the firm is not Blacklisted and not involved in litigation with any of Provincial or Federal Government Department, Agency, Organization or autonomous body anywhere in Pakistan. In case involved in any litigation process, proof of dispute resolution is required.	Mandatory

<b>Sr. No.</b>	<b>Documents Required</b>	<b>Marks</b>
1	<b>Details of branch offices</b> Branch office in Lahore	<b>Max Marks 05</b> 05
	<b>Company has been in Existence Since (years) - with documentary evidences</b> 05 to 10 years 02 to 04 years BELOW 02 YEAR IS NOT ELIGIBLE	<b>Max Marks 10</b> 10 05
	<b>Company Website</b>	<b>Max Marks 05</b>

	<ul style="list-style-type: none"> <li>• <b>Company Website</b></li> </ul>	05
	ISO Certificate 9000 or above of the company and manufacturer	<b>Max Marks 05</b>
2	<b>Copies of Authorization Certificate of Parts</b> <ul style="list-style-type: none"> <li>• Tier 1 Business Partner / Gold partner / Sole Distributor</li> <li>• Authorized Distributor / Tier 1 Premier Partner / Silver Partner</li> <li>• Premier Partner</li> <li>• Authorized Dealer</li> </ul>	<b>Max Marks 10</b> 10 05 03 02
3	<b>Details about Principal (with documentary evidences)</b> <p>a) <b>Principal has been in Existence Since (years)</b></p> <ul style="list-style-type: none"> <li>• 15 to 20 years</li> <li>• 10 to 15 years</li> </ul> <p>b) <b>Principal has Experience of supplying Equipment with in region</b></p> <ul style="list-style-type: none"> <li>• Same equipment in last five years</li> <li>• Similar equipment supplied during last five years</li> <li>• Any equipment supplied during last five years</li> </ul> <p>c) <b>How many application and training centers are available</b></p> <ul style="list-style-type: none"> <li>• One mark per center.</li> </ul>	<b>Max Marks 10+</b> <b>10+05=25</b> 10 10 05 10 10 8 5 5 -
4	<b>List of Technical Staff with CV's with documentary evidences</b> <p>a) <b>Training</b></p> <ul style="list-style-type: none"> <li>• Trained on similar equipment (from principal – Two marks per person)</li> <li>• Trained on similar equipment (not from principal – One mark per person)</li> </ul> <p>b) <b>Experience</b></p> <ul style="list-style-type: none"> <li>• Hands on Experience of more than two years on similar equipment (Two Marks per person)</li> <li>• Hands on Experience of less than two years on similar equipment (1 mark per person)</li> </ul>	<b>Max Marks 06+04=10</b> 06 06 04 04 04 03
5	<b>Detail of Relevant Projects in Last Five Years which shows business turnover.</b> <b>(Attach Purchase orders or other documentary evidence )</b> <ul style="list-style-type: none"> <li>• 101.00 Million or above on average</li> <li>• 81.00 Million to 100.00 Million on average</li> <li>• 61.00 Million to 80.00 Million on average</li> <li>• 40.00 Million to 60.00 Million on average</li> </ul>	<b>Max Marks 15</b> 15 12 08 06
6	<b>Company's sound Financial position reflected by:</b> <b>Three Years (2015,2016, 2017)</b> <ul style="list-style-type: none"> <li>• Audited Accounts</li> <li>• Tax Returns</li> <li>• Bank statements</li> <li>• Supplier credit position</li> </ul>	<b>Max Marks 15</b> 05 Marks per Year

**Format for Covering Letter**

To  
(Name and address of Purchaser)

Sub: \_\_\_\_\_

Dear Sir,

- a) Having examined the Pre-Qualification document and Appendixes we, the undersigned, in Conformity with the said document, offer to provide the said items on terms of reference to be signed upon the award of Purchase Order/Contract.
- b) We undertake, if our proposal is accepted, to provide the items/services comprise in the contract within time frame specified, starting from the date of receipt of notification of award from the Purchaser.
- c) We agree to abide by this proposal for the period of \_\_\_\_ days (as per requirement of the Project) from the date of opening and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
- d) We agree to execute a contract in the form to be communicated by the (insert name of the Purchaser), incorporating all agreements with such alterations or additions thereto as may be necessary to adapt such agreement to the circumstances of the standard.
- e) Unless and until a formal agreement is prepared and executed this proposal together with your written acceptance thereof shall constitute a binding contract agreement.
- f) We understand that you are not bound to accept any proposal you may receive, not to give any reason for rejection of any proposal and that you will not defray any expenses incurred by us in Pre-Qualification.

Authorized Signatures with Official Seal: \_\_\_\_\_

\_\_\_\_\_

**INTEGRITY PACT**

**(To be submitted on Legal Stamp Paper)**

**AFFIDAVIT**

We (Name of the Supplier) being the first duly sworn on oath submit, that Mr. /Ms. \_\_\_\_\_(if participating through agent / representative) is the agent / representative duly authorized by \_(Name of the Supplier)\_ hereinafter called the Supplier to submit the attached proposal to the \_(Name of the Purchaser)\_. Affiant further states that the said M/s (Supplier Name) has not paid, given or donate or agreed to pay, given or donate to any line officer or employee of the \_(Name of the Purchaser)\_ any money or thing of value, either directly or indirectly, for special consideration in the letting of the contract, or for giving undue advantage to any of the Supplier in the Pre-Qualification Process and in the evaluation and selection of the Supplier for contract or Participating in further Procurement Procedures or for refraining from properly and thoroughly maintaining projects implementations, reporting violation of the contract specification or other forms of non-compliance. [The Supplier] certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with the Purchaser and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty / support. [The Supplier] accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representation and warranty / support. It agrees that any contract, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other right and remedies available to the Purchaser under any law, contract or other instrument, be voidable at the option of the Purchaser. Notwithstanding any rights and remedies exercised by the Purchaser in this regard, [the Supplier] agrees to indemnify the Purchaser for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to the Purchaser in an amount equivalent to ten time the sum of any commission, gratification, bribe, finder's fee or kickback given by [the Firm/ Supplier] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from the Purchaser.

\_\_\_\_\_  
Authorized Signature & Stamp

Subscribed and sworn to me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_

\_\_\_\_\_  
Notary Public

**UNDERTAKING**

It is certified that the information furnished here in and as per the document submitted is true and correct and nothing has been concealed or tampered with. We have gone through all the conditions of Pre-Qualification and are liable to any punitive action for furnishing false information / documents.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_

Signature

(Company Seal)

\_\_\_\_\_  
In the capacity of

Duly authorized to sign proposals for and on behalf of:

**Financial Capacity of the Companies/Firms, Sole/Authorized dealers or Suppliers**

Additionally, the following financial data form shall be filled out for the Purchaser. The Purchaser reserves the right to request additional information about the financial capacity of the Companies/Firms, Sole/Authorized dealers or suppliers. A Companies/Firms, Sole/Authorized dealers or suppliers that fails to demonstrate through its financial records that it has the financial capacity to perform the required Supply/Services may be disqualified.

Financial Information	Historical information for the previous three years (most recent to oldest in (PAK Rupees))		
	Year 1 (Year)	Year 2 (Year)	Year 3 (Year)
Information from Balance Sheet:			
(1) Total Assets (TA)			
(2) Current Assets (CA)			
(3) Total Liabilities (TL)			
(4) Current Liabilities (CL)			
Information from Income Statement:			
(5) Total Revenue (TR)			
(6) Profits before Taxes (PBT)			
Net Worth (1) – (3)			
Current Ratio (2) / (4)			

Provide information on current or past litigation or arbitration over the last three (3) years as shown in the form below.

Litigation or arbitration in the last three (3) years: No: \_\_\_\_\_ Yes: \_\_\_\_\_ (See below)

Litigation and Arbitration during Last three (3) Years

Year	Matter in Dispute	Value of Award Against Contract in PAK Rupees
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\_\_\_\_\_  
Authorized Signatures with Official Seal

## **TECHNICAL SPECIFICATIONS (EQUIVALENT OR HIGHER)**

<b>Sr. No. 1</b>	<b>FIELD EMISSION GUN SCANNING ELECTRON MICROSCOPE (FEG SEM) HIGH RESOLUTION ATTACHED WITH LATEST ANALYTICAL AND DIGITAL ATTACHMENTS</b>
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The minimum requirements of Branded Field Emission Scanning Electron Microscope (FEG-SEM) attached with latest analytical and digital attachments (All operations and functions should be fully PC controlled with software compatible to the Windows latest version) are given below.

### **Description (Equivalent or Higher)**

1. Have highly stable Schottky field emission gun.
2. Be capable of producing sharp and bright images at maximum resolution of approx. 0.8 nm or better. The magnification range should be from approx. 30 X to 1000,000 X or close enough.
3. Fitted with In-Lens detectors:
  - a. SEI and BEI In-Lens Detectors capable of imaging at very short working distances
  - b. Electron Channelling Pattern (ECP) Kikuchi lines for selected area channelling pattern (SACP)
  - c. Equipped with an IR CCD camera for live chamber view. Live 3D Imaging, etc.
  - d. With a low vacuum mode or Variable Pressure Operation for non-destructive imaging of non-conducting, biological and hydrated specimens where operation without conductive coating could be possible.
4. Approx. 10 ports/expansion slots are required for EDS or EDX, EBSD, EL and other detectors and accessories/attachments.
5. Should have a flicker free, fast imaging rate. Latest and maximum digital image storage capability for best imaging.
6. Should have an X-ray microanalysis system (Solid State Detector, SSD, Liquid N<sub>2</sub> Free) for elemental analysis, in point mode, line scan mode, area modes and EDX multi-element mapping and should be controllable fully through the software. For detection of elements from C6 / or Na 12 to U92.
7. The system should be capable of providing EDS spectra quickly and effectively and to automatically scan for elements present in the periodic table as mentioned above and to provide quick qualitative and quantitative analysis for polished and unpolished bulk samples with quick report generating software including Templates. The ED System should be supplied with the latest software.
8. The ED System should be fully upgradeable for any future requirements i.e. WDS and EBSD etc on one platform



9. Motorized, computer controlled specimen stage and sample weight with 5-axis stage movements. The chamber size should be large to accommodate samples of various sizes.
10. Should have multiple stub holder (at least 10) in specimen chamber to analyze different samples at a time.
11. Should have a touch alarm to prevent the touching of sample and any part of sample chamber
12. The vacuum system (both for the specimen and gun chambers) should be quick, operating automatically within, have lowest noise and clean (oil free) without contamination.
13. Microscope must be fitted with Auto Column functions. With Electromagnetic Objective Aperture (EOA) assembly without mechanical movement for maximum imaging and analytical flexibility
14. Software user interface should be friendly, advanced and support customizable view. The system should be supplied with the additional (the second) PC capable for data storage and available for installation of software by user.
15. Enabled with a Remote diagnostic support and online help mechanism.
16. The FE-SEM system must have uninterruptible power supply and backup time (UPS preferably true sine wave) should be compatible as per requirements of the quoted equipment.
17. Onsite technical installation and operational training should be provided, comprehensive manufacturer site training (2 persons, 3-5 days) on FE-SEM or application center training for FE-SEM as a main item.
18. Should have sputter coating unit including Carbon, Gold/Platinum etc targets for sample preparation.
19. Manufacturers who have already supplied similar equipment in the region with good technical/after sale-service repute will be given preference.
20. Standard warranty (1-2 years) is mandatory and a service contract of 3-5 years should be included as an option. The separate costing choice should be available for service contract for 5 years with parts and without parts. Warranty period will start when the equipment will be fully operational after complete free of cost installation.
21. Guaranty of replaceable accessories for the next five years. After sale service should be easily available in Pakistan.
22. All the operational drawings and user instructions manuals/literature should be in English and provided along with the equipment.
23. Consumable items like oil, grease, O-rings, conducting tapes and standard samples for calibrations should be provided along with the equipment.
24. For in-situ measurements, heating, and cooling stages.
25. Standard samples for calibrations should be provided.

## **TECHNICAL SPECIFICATIONS (EQUIVALENT OR HIGHER)**

<b>Sr. No. 2</b>	<b>HIGH RESOLUTION TRANSMISSION ELECTRON MICROSCOPE (HR-TEM) ATTACHED WITH ANALYTICAL AND DIGITAL FACILITIES</b>
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The minimum requirements of Branded HR-TEM attached with latest analytical and digital attachments (All operations and functions should be fully PC controlled with software compatible to the Windows latest version) are given below.

### **Description (Equivalent or Higher)**

1. 200KV HR-TEM: fast, multichannel, high resolution TEM imaging and precise compositional analysis (energy dispersive x-ray spectroscopy).
2. The fast HRTEM camera, large gap objective lens (approx. 5mm), +/-90° stage tilt range (Maximum tilt angle with double tilt holder  $\pm 30^\circ$ ) and large stage Z height adjustment combine to offer. TEM Information limit should be approx. 0.12nm, STEM magnification range 330Mx, TEM magnification range 25-1.50Mx Point Resolution 0.23nm (lattice resolution: 0.1nm)
3. Integrated EDS system with two silicon drift detectors (SDD) for superior sensitivity and elemental mapping capabilities of up to 10 spectra/sec.
4. Integration with the objective lens maximizes collection efficiency while delivering outstanding output count rates for a given beam current – even for low intensity EDS signals.
5. Four-channel integration of multiple TEM detectors. Differential phase Contrast (DPC) imaging for resolving electro-magnetic structures. Electron gun Shocottky Based (ZrO/W)
6. A complete line of signal detectors could be added, which may include EDS and EELS, backscattered electron detectors, and up to 4 STEM detectors. Which may support simultaneous observation of high angle annular dark field image, low angle annular dark field image, annular bright field image, bright field image, and selective area electron diffraction pattern (SAED). Beam Probe Diameter TEM mode approx. 2-4nm, EDS, NBD, CBD mode: approx. 0.5~2.4nm, STEM (Lattice-image resolution): approx. 0.2nm, HAADF unit.
7. Digital search-and-view camera offers a large field of view for all applications and allows operation in normal room light.
8. Fully integrated fast detector: approx. 16M pixel camera which provides large field of view and high read-out speed around (25-30 fps)
9. Full remote operation: Automatic aperture system in combination with the camera supports full remote operation.
10. Enabled with a Remote diagnostic support and online help mechanism
11. Consumable items like oil, grease, O-rings and standard samples for calibrations should be provided along with the equipment. Holders/grids of different types should be provided and also quote the separate price of holders/grids.

12. Software user interface should be friendly, advanced and support customizable view. The system should be supplied with the additional (the second) PC capable for data storage and available for installation of software by user.
13. The system must have uninterruptible power supply and backup time (UPS preferably true sine wave) should be compatible as per requirements of the quoted equipment.
14. Onsite technical installation and operational training should be provided, comprehensive manufacturer site training on TEM (2 person, 3-5 days) or application centre training for TEM as a main item.
15. Companies who have already supplied similar equipment in the region with good technical/after sale-service reputations will be given preference.
16. Standard warranty (1-2 years) is mandatory and a service contract of 3-5 years should be included as an option. The separate costing choice should be available for service contract for 5 years with parts and without parts. Warranty period will start when the equipment will be fully operational after complete free of cost installation.
17. Guaranty of replaceable accessories for the next five years. After sale service should be easily available in Pakistan.
18. All the operational drawings and user instructions manuals/literature should be in English and provided along with the equipment.

## TECHNICAL SPECIFICATIONS (EQUIVALENT OR HIGHER)

<b>Sr. No. 3</b>	<b>X-Ray Diffractometer (XRD)</b>
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The minimum requirements of Branded X-Ray Diffractometer (XRD) attached with latest analytical and digital attachments (All operations and functions should be fully PC controlled with software compatible to the Windows latest version) are given below.

X-ray Diffractometer with hardware and software package should include: Phase identification and quantitative phase analysis, Residual stress analysis, X-ray Reflectometry (XRR), Texture analysis, grazing incidence diffraction (GID) and Small angle X-ray scattering (SAXS).

Specifications (Equivalent or Higher)

1. Alignment-free switching of all beam path components incl. X-ray tube, all optical components, non-ambient sample holders, stage and all detectors.
2. X-ray Diffractometer with hardware and software package should include: Phase identification and quantitative phase analysis, Residual stress analysis, X-Ray Reflectometry (XRR), Texture analysis, grazing incidence diffraction (GID) and Small angle X-ray scattering (SAXS).
3. The system should be true plug & play functionality by fully automatic, real-time component recognition and configuration as well as conflict detection for all beam path components incl. X-ray tube, all optical components, all ambient and non-ambient sample holders, and all detectors.
4. Failure-safe operation via automatic, real-time validation of replaced components.
5. Fully automatic, motorized switching between Bragg-Brentano and parallel beam geometry through software control.
6. Simultaneous variable counting time and variable step-size support.
7. The system must have all safety and interlocks for operator safety.
8. The system must display an up-to-date CE marking, accompanied by a correct EC Declaration of Conformity as well as all required documentation including but not limited to machinery Directive and Electromagnetic compatibility.
9. At installation, the instrument must pass a documented acceptance test based on an established instrument verification procedure in which instrument alignment should be approximately equal to  $\pm 0.01^\circ$  2Theta using standard reference material (should also be provided with the equipment).
10. 3KW X-ray generator with Stand-by mode.

11. The kV and mA settings must be continuously adjustable via software with automatic tube startup tube conditioning.
12. XRD must be compatible with ceramic, glass tubes, and 3<sup>rd</sup> party tubes.
13. The sealed X-ray tube shall be universal size ceramic type, with Cu, Cr anode.
14. X-ray tube must be able to switch between line and point focus, without dis-connection and removal. The system shall have automatic focus direction recognition of x-ray tube.
15. THETA-THETA goniometer, maintenance free drive mechanism / gearings, with variable measurement circle diameter.
16. The goniometer shall have angular measurement range of  $-110^{\circ} < 2\theta \leq 168^{\circ}$ .
17. Angle positioning: Stepper motors with encoders for optimum scanning speed and positioning precision.
18. Minimum angular speed: 20°/s, minimum step size shall be 0.0001°.
19. The reproducibility shall be  $\pm 0.0001^{\circ}$ .
20. Switching amongst powder diffraction, grazing incidence diffraction or Reflectometry should be software-controlled.
21. Exchange of all optics shall be tool-free and alignment free using any snap-lock mechanism.
22. The system must have the following sample stages: (i) Standard Sample Stage (ii) Spinning Stage (iii) and all those stages required for Phase identification and quantitative phase analysis, Residual stress analysis, X-ray Reflectometry (XRR), Texture analysis, grazing incidence diffraction (GID) and Small angle X-ray scattering (SAXS) applications.
23. All sample stages can be ex-changed without re-alignment.
24. The multiple sample stage/tray should also be provided.
25. Detector with Silicon-Strip technology, with all functional strips. Detector should be maintenance free with no external cooling or purging gas required, for Cu, Cr radiation etc. 0D/1D operation, selectable by software.
26. Complete and full functional with all software, hardware, computer with PDF-2 files
27. The measurement software shall have a graphical instrument representation for real-time display of the actual instrument configuration based on component recognition, real-time validation and conflict detection, and measurement planning (definition of instrument parameters such as slit settings, selection of optical components and selection of diffractometer geometry. Variable counting time and variable step-size support).
28. Enabled with a Remote diagnostic support and online help mechanism.
29. Include the latest Intel core-i7 or better PC with monitor.
30. The subscription of reference data base/library should be included.

31. Include onsite free of cost installation and training of our technical team.
32. Should be supplied with a Compatible UPS (preferably true sine wave).
33. After sale service should be easily available in Pakistan.
34. Companies who have already supplied similar equipment with good technical/after sale-service repute will be given preference.
35. Guaranty of replaceable accessories for the next five years.
36. Reference from within Pakistan from a similar offered XRD user is preferable.
37. All the operational/technical drawings and instructions manuals/literature should be in English and provided along with the equipment.
38. Standard warranty (1-2 years) is mandatory and a service contract of 3-5 years should be included as an option. The separate costing choice should be available for service contract for 5 years with parts and without parts. Warranty period will start when the equipment will be fully operational after complete free of cost installation.