



**TENDER DOCUMENTS**

**Laboratory Equipment**

**NUTECH / SCM / Electrical Lab Phase-III (B)-2019 / TD-082**

**NATIONAL UNIVERSITY OF TECHNOLOGY**

## **TENDER NOTICE**

### **National University of Technology (NUTECH)**

#### **NUTECH / SCM / Electrical Lab Phase-III (B)-2019 / TD-082**

Sealed bids are invited from Government / FBR Registered Firms for the procurement of **Electrical Laboratory Equipment** for NUTECH.

1. Tender documents containing terms, conditions and detailed specifications of items (including draft contract) can be downloaded from NUTECH website "<https://nutech.edu.pk>" w.e.f **10 Oct 2019**.
2. Quotations shall be submitted as per requirement of the tender documents.
3. Bidders will be required to submit **Bank Draft / CDR** equal to **5%** of quoted value as Bid Bond in favor of National University of Technology (NUTECH).
4. Sealed bids with detailed specifications should reach on the following address latest by **1030 hours on 28 Oct 2019**. Late submission will not be entertained.
5. Bids will be opened at **1100 hours on 28 Oct 2019** at SCM Office.
6. Project is to be completed in **90days** from the date of award of contract.
7. Submit Rs 1500/- as Tender fee in favor of NUTECH HBL Account (**NUTECH Tendering and Contracts, 5037-7000210755**). Please attach bank receipt with technical offer. Offers will not be entertained without payment of processing fee.

**Deputy Director (Supply Chain Management)**

**NATIONAL UNIVERSITY OF TECHNOLOGY, UPROAD,I-12,ISLAMABAD**

**Tel: 0092-51-5476768, Ext: 178**

**NATIONAL UNIVERSITY OF TECHNOLOGY**

**SUPPLY CHAIN MANAGEMENT**

**INVITATION TO TENDER**

1. NUTECH desires to procure the list of item(s) / Store(s) as per **Annexure-A**. Interested bidders are requested to send their bids through courier or deliver at NUTECH under "Single Stage – Two Envelopes" (two envelopes placed together in third envelope), marked clearly as "**Technical Offer**" and "**Commercial Offer**" respectively to the undersigned, latest by or before above mentioned due date. If due to any unforeseen circumstances, NUTECH establishment is close on given date, then the last date of submission will be extended to next working day.
2. Please also note that Technical Offer should contain only Annexes-A & B duly filled in (supported with relevant technical literature / details / catalogues etc) and receipt of tender processing fee. Commercial Offer will contain Annexure-C and bid bond (Dully mentioned and placed in separate envelope). Please ensure no space is left blank in the annexes.
3. Following must be noted :-
  - a. 4 x copies of technical offer are to be provided.
  - b. Annexes A, B and C must be signed and stamped. Attach only relevant documents.
  - c. Complete all document as per given format. Do not use your format or letter head. Offer may be rejected if given format is not followed.
  - d. Validity of offer will be for **90 days**.
  - e. Delivery period will be **90 days** from the date of award of contract.
  - f. The firm should provide point to point acceptance of each clause of IT and special instructions attached with IT.
  - g. Firm will render a certificate with technical offer that firm is neither defaulter nor blacklisted by any Government / semi Government organization directly or indirectly.
  - h. Commercial Offer must be accompanied with a Bid Bond in agreement of faithful compliance of the conditions of Contract / Purchase Order. This amount will be equivalent to 5% of the total quoted value. In case of non-acceptance of any offer, the Bid Bond will be returned to the bidder by

fastest possible means. The Bid Bond amount submitted by the successful bidder will however be refunded on effective termination of Contract / Purchase Order. (The Bid Bond will be forfeited in case of default by the bidder from his commitments made through his offer). Submission of Bid Bond is mandatory; otherwise your offer will be rejected.

- i. Rates should be quoted on Free Delivery basis at NUTECH Islamabad.
- j. **2 years** warranty against **5% Bank Guarantee** will be required from the successful bidders from the date of commissioning as performance bond.
- k. Commercial Offer must be accompanied with a Bid Bond in agreement of faithful compliance of the conditions of Contract/Purchase Order. This amount will be equivalent to 5% of the total quoted value. In case of non-acceptance of any offer, the Bid Bond will be returned to the bidder by fastest possible means. The Bid Bond amount submitted by the successful bidder will however be refunded on effective termination of Contract/ Purchase Order. (The Bid Bond will be forfeited in case of default by the bidder from his commitments made through his offer). Submission of Bid Bond is mandatory; otherwise your offer will be rejected.
- l. Rates should be quoted on Free Delivery basis at NUTECH Islamabad.
- m. Bid Bond may be used as performance guarantee till the delivery of stores, otherwise separate performance guarantee valued at 5 % of contract will be submitted by successful firm till stores are delivered and inspected.
- n. The stipulated delivery period should be strictly adhered to. Any anticipated delay that is beyond the control of Seller will be informed (in writing) well in advance of the expiry of the due date of the activity along with reasons thereof, requesting for the grant of extension in delivery period. If the Seller fails to do so, or the Buyer is not convinced with the rationale provided by the Seller, Liquidated Damages up to/at 2% per month or part thereof, will be imposed. However, the maximum limit of the Liquidated Damages will not exceed 10% of the contract value, in any way.
- o. If even after applicability of 10% LD, the Seller fails to deliver the

- required stores, the Buyer will be at liberty to procure the stores from an alternate source, on the Seller's "Risk & Cost". In that case, the Seller will be bound to make payment to the new source through NUTECH
- p. NUTECH reserves the right to cancel the Contract without assigning any reason whatsoever during its currency / execution / after placement, if the firm is found to be involved in any dubious activity, litigation, lacking to meet contractual obligations with the purchaser or is blacklisted with any other Public procurement agency. No claims / loss /damage of whatsoever nature shall be entertained and NUTECH's decision in this regard will be final and binding on the Supplier / Seller.
  - q. An appropriate amount may be paid for mobilization against Bank Guarantee/CDR/Demand Draft/Pay Order
  - r. Partial payment/partial delivery allowed
4. NUTECH reserves the rights to accept or reject any or all tenders as a whole or in part without assigning any reason whatsoever. The decision in this regard will be firm, final and binding on all bidders.

DD (Supply Chain Management)

Technical Specifications

NUTECH / SCM / Electrical Lab Phase-III (B)-2019/TD-082

Ser	Part No	Items	Description	A/ U	Country of Origin	Qty Req	Bidder Compliance			Tech Scrutiny to be done by user	
							Yes	No	Alternate	Accepted	Rejected
							Reason of Rejection				
01	1a	Electrical Power Engineering Trainer	Generation: Alternator and Parallel Operation <ul style="list-style-type: none"> <li>• Three-phase power supply module:</li> <li>• Electrical power measurement module</li> <li>• Maximum demand meter</li> <li>• Power circuit breaker</li> <li>• Power circuit breaker</li> <li>• Synchronization indicator</li> <li>• Synchronoscope</li> <li>• Generator synchronizing relay</li> <li>• Resistive load</li> <li>• Inductive load</li> <li>• Capacitive load</li> <li>• Automatic voltage regulator</li> <li>• Brushless motor with controller</li> <li>• Braking resistor for brushless motor nominal 5.4Nm</li> <li>• Three Phase Synchronous Machine 4 poles</li> </ul>	No.	European/USA	01					

			<ul style="list-style-type: none"> <li>• Universal base for electrical machines</li> <li>• Communication MODBUS</li> <li>• Three-phase isolation transformer 3kVA</li> <li>• SCADA Software Winlog Pro W-NET/I-USB Up to 256 variables sampled</li> <li>• Computer All in one</li> <li>• Kit of cables</li> <li>• Holder for leads</li> </ul> <p>Frame with 3 levels</p>							
	1b	Voltage and Current Transformers	<ul style="list-style-type: none"> <li>• Motorized variable three-phase power supply</li> <li>• Three-phase transformer</li> <li>• Digital module for measuring vector groups and power factor</li> <li>• Single phase digital power meter (active, reactive, apparent)</li> <li>• Overhead line model</li> <li>• Overhead line model 110Km</li> <li>• Line capacitor</li> <li>• Petersen coil</li> <li>• Double busbar with two disconnectors</li> <li>• Single-phase current transformer</li> <li>• Three-phase current transformer</li> <li>• Summation current transformer</li> </ul>							

			<ul style="list-style-type: none"> <li>• Ct load</li> <li>• Vt load</li> <li>• Single-phase voltage transformer</li> </ul> <p>Three-phase voltage transformer</p>							
	1c	Protection Relays	<ul style="list-style-type: none"> <li>• Three-phase supply unit</li> </ul> <p>Feeder manager relay</p>							
	1d	Energy Management	<ul style="list-style-type: none"> <li>• Three-phase power supply module (panel type)</li> <li>• Three-phase asynchronous machine 4P cage , 1.5kW , 50 / 60Hz</li> <li>• Power circuit breaker</li> <li>• Reactive power controller</li> <li>• Switchable capacitor battery</li> <li>• Load Manager</li> <li>• Multifunction digital HMI gateway</li> </ul>							
02	2a	Motor, Electric Traction Training Equipment	<p>Training power bench</p> <ul style="list-style-type: none"> <li>• Power supply control panel</li> <li>• Three phase four wire power supply input, with leakage protector, contactors, buttons with red and green indicator lights.</li> <li>• AC power supply</li> <li>• Three phase 0~450V adjustable power supply, with output overcurrent protection, with 3 pcs pointer AC voltmeter. By switching the switch, three - phase grid</li> </ul>	No	European/USA	02				



			<p>voltage and voltage regulator output voltage can be respectively indicated.</p> <ul style="list-style-type: none"> <li>• DC power supply</li> <li>• Provide a continuous adjustable power supply for low DC voltage 0.0~24V/2A. Each circuit is equipped with a separate digital voltmeter indicating the output voltage, voltage stability<math>\leq</math>0.3%, current stability<math>\leq</math>0.3%, With short circuit soft stop protection and automatic recovery function .</li> <li>• High voltage DC power supply</li> <li>• Provide two high voltages DC 40~220V/2A continuous adjustable power supplies. Each circuit is equipped with a separate digital voltmeter indicating the output voltage, voltage stability<math>\leq</math>0.3%, current stability<math>\leq</math>0.3%, With short circuit soft stop protection and automatic recovery function . Used as DC motor excitation and armature power supply.</li> <li>• Measuring meter</li> <li>• 3 pcs AC multifunction meter, voltage range: 500V, current range: 5A, storage 15 groups data of power and power factors.</li> <li>• Switch and capacitor</li> </ul>							
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			<ul style="list-style-type: none"> <li>• Three-pole double-throw switch 1 piece</li> <li>• Motor starting capacitor 4uF/450V</li> <li>• Training Table</li> </ul>							
	2b	Instrument Unit 1	<ul style="list-style-type: none"> <li>• DC digital voltmeter 2pcs, measuring range: 0~300V</li> <li>• DC digital ammeter 2pcs, measuring range: 0~3A</li> </ul>							
		Instrument Unit 2	<ul style="list-style-type: none"> <li>• AC digital voltmeter 3pcs, measuring range: 0~450V</li> </ul>							
		Instrument Unit 3	<ul style="list-style-type: none"> <li>• AC digital ammeter 3pcs, measuring range: 0~2A</li> </ul>							
		Relay Control Unit 1	<ul style="list-style-type: none"> <li>• AC contactor (Coil voltage 220V) 2pcs</li> </ul>							
		Relay Control Unit 2	<ul style="list-style-type: none"> <li>• Thermal overload relay (Coil voltage 220V) 2pcs</li> </ul>							
		Relay Control Unit 3	<ul style="list-style-type: none"> <li>• Transformer (220V/26V)</li> <li>• Time relay (220V)</li> <li>• Resistance (10Ω/25W)</li> </ul>							
		Relay Control Unit 4	<ul style="list-style-type: none"> <li>• Button switch 4pcs (green 2pcs, red 2pcs with 220V indicator light)</li> </ul>							
		Relay Control Unit 5	<ul style="list-style-type: none"> <li>• Travel switch 4pcs</li> </ul>							
		Speed, Torque & Mechanical Power Measurer	<ul style="list-style-type: none"> <li>• For measuring Speed, Torque &amp; Mechanical Power</li> </ul>							
		High performance permanent magnetic dynamometer	<ul style="list-style-type: none"> <li>• Rated power <math>P_n=250W</math>, Rated voltage <math>U_n=110V</math>, Rated current <math>I_N=2.8A</math>, Rated speed <math>N_n=1500r/min</math></li> </ul>							

		Separately excited DC motor	<ul style="list-style-type: none"> <li>Rated power <math>P_n=100W</math>, Rated voltage <math>U_n=110V</math>, Rated current <math>I_N=1.25A</math>, Rated speed <math>n_N=1000r/min</math></li> </ul>							
		Capacitive single phase asynchronous motor	<ul style="list-style-type: none"> <li>Rated power <math>P_N=120W</math>, Rated voltage <math>U_N=220V</math>, Rated current <math>I_N=1.45A</math>, Rated speed <math>n_N=1420r/min</math> <math>C=4\mu F</math></li> </ul>							
		3-phase dual-speed cage asynchronous motor	<ul style="list-style-type: none"> <li>Rated power <math>P_N=120/90W</math>, Rated voltage <math>U_N=220V</math>, Rated current <math>I_N=0.6A/0.6</math>, Rated speed <math>n_N=(2800/1400) r/min</math></li> </ul>							
		DC compound motor	<ul style="list-style-type: none"> <li>110V 120W</li> <li>Rated power <math>P_N=120W</math>, Rated voltage <math>U_N=110V</math>, Rated current <math>I_N=1.58A</math>, Rated speed <math>n_N=1000r/min</math></li> </ul>							
		3 phase synchronous motor	<ul style="list-style-type: none"> <li>Rated power <math>P_N=170/90W</math>, <math>U_N=220V(Y)</math>, Rated current <math>I_N=0.45/0.35A</math>, Rated speed <math>n_N=1500r/min</math></li> </ul>							
		DC compound generator	<ul style="list-style-type: none"> <li>Rated power <math>P_N=120W</math>, Rated voltage <math>U_N=110V</math>, Rated current <math>I_N=1.1A</math>, Rated speed <math>n_N=1000r/min</math></li> </ul>							
		3 phase winding rotor asynchronous motor	<ul style="list-style-type: none"> <li>Rated power <math>P_N=120W</math>, Rated voltage <math>U_N=220V/\Delta</math>, Rated current <math>I_N=0.6A</math>, Rated speed <math>n_N=1380r/min</math></li> </ul>							

		3 phase cage asynchronous motor	<ul style="list-style-type: none"> <li>Rated power PN=100W, Rated voltage UN=220V/Δ, Rated current IN=0.5A, Rated speed nN=1420r/min</li> </ul>							
		Single phase transformer	<ul style="list-style-type: none"> <li>127V ; 50V ; 100W</li> <li>127V ; 50V ; 200W</li> </ul>							
		3 phase transformer	<ul style="list-style-type: none"> <li>127V ; 50V ; 150W</li> </ul>							
		Sliding resistance	<ul style="list-style-type: none"> <li>Sliding resistance 2 Pieces</li> </ul>							
		Connecting leads	<ul style="list-style-type: none"> <li>Total:10 pcs/bag φ2</li> <li>25cm yellow 4pcs</li> <li>25cm green 4pcs</li> <li>25cm red 2pcs</li> </ul>							
		Safety connecting leads	<ul style="list-style-type: none"> <li>Total:10 75pcs/bag</li> <li>60cm 30pcs</li> <li>40cm 25pcs</li> <li>20cm 20pcs</li> </ul>							
		Dynamometer fixing base	<ul style="list-style-type: none"> <li>Stainless steel guide rail: for fixing motor, dynamometer</li> </ul>							
		Cross rubber block	<ul style="list-style-type: none"> <li>Cross rubber block 1 piece</li> </ul>							
		Monkey wrench	<ul style="list-style-type: none"> <li>200x24</li> </ul>							
		Power supply cable (~220V)	<ul style="list-style-type: none"> <li>1m</li> </ul>							
		Spare parts	<ul style="list-style-type: none"> <li>Fuse 5x20 1A (50 pcs)</li> <li>Fuse 5x20 2A (50 pcs)</li> <li>Fuse 5x20 5A (20 pcs)</li> <li>Manual book</li> </ul>							

Installation /Assembly /Commissioning Required	Yes✓	No	Contract with OEM / Supplier	Yes✓		No
Performance Bond Required	Yes✓	No	Package Deal	Yes		No✓
<b>Note:</b> (If any)			<b>Warranty (2 x Years)</b>	Yes✓		No
Maintenance Spares Required	Yes✓	No	Essentially Running Spares Required	Yes		No✓
Publications / Literature Required	Yes✓	No	Requirement of Certificate for Test Data Results	Yes✓		No
Training Required	Local✓	Foreign	Requirement of Calibration	Yes✓		No

Firm Name: \_\_\_\_\_  
Signature: \_\_\_\_\_  
Name: \_\_\_\_\_  
Designation: \_\_\_\_\_

## Special Instructions

Description	Bidder			Tech Scrutiny to be done by User		
	Yes	No	Alternate Offer	Accepted	Rejected	Reasons of Rejection
<b>Environment Conditions</b> (a) Temperature range: 05°C to +60°C (b) Relative humidity: 0-70% non-condensing						
<b>Warranty period</b> Two years from the date of commissioning. A warranty sticker is to be pasted on each imported item by the Supplier / OEM highlighting Name of Firm, Contract No and date, Description of Store and Warranty validity						
<b>Training Notes</b> Supplier will provide a set of handouts for training on operation and maintenance of the equipment						
<b>Publications</b> Supplier is to provide hard and soft copies (CD) of following manuals. (a) <b>Operational / Maintenance manual:</b> - Qty 01 with Equipment and additional Qty 02 for record purposes and should consist of following sections:- (1) <b>Equipment Description /Operation:-</b> (a)Specifications (b)Description (c)Operation (2) <b>Servicing:-</b> (a)Maintenance Schedule (b )Adjustment / test (c)Removal / Installation procedure (d)Tools Used (3) Trouble shooting guide (4) Cleaning requirements (5) Shipping and receiving (6) Storage requirements (b) <b>IPB</b> (Illustrated Parts Breakdown Manual) should have full parts description along with detailed diagrams (exploded view). (c) <b>Experimental manuals</b> which must contain the list and procedure of the experiments that equipment can perform.						
<b>Spares / Technical Support</b>						

<p>(a) Supplier to have in-country spares / technical support and ensure spares and technical support / assistance for next 10 years</p> <p>(b) Comprehensive list of spares required for scheduled maintenance of Equipment is to be provided</p> <p>(c) Any software provided must have its license</p> <p>(d) Software upgrade support must be provided free of cost for 10 x years with renewed license at every upgrade</p> <p>(e) Supplier must also provide calibration service for at least 5 x years after commissioning</p>						
<p><b>Additional Spare / Replaceable parts.</b></p> <p>(a) Replaceable spare / parts during scheduled inspections are to be identified and provided as per requirement along with equipment sufficient to cater five years consumption.</p> <p>(b) All specialized / standard tools required for inspection / repair / servicing must be supplied along with equipment.</p>						
<p><b>Physical Inspection Criteria:</b> 100% physical inspection of store will be carried out before commissioning of the equipment for following details:-</p> <p>(a) For physical damage, scratches and deformity.</p> <p>(b) Accessories /components as per contractual specifications.</p> <p>(c) Technical Manuals (Operation manual, user guide, IPBs).</p> <p>(d) Quality certificate and calibration certificate by the OEM</p> <p>(e) OEM certificate and verifiable documents by the supplier that store has been procured from certified source and is factory new and from latest production.</p> <p>(f) Brand name and country of origin.</p>						
<p><b>Commissioning</b></p> <p>(a) Commissioning of the equipment will be carried out by OEM rep at his own cost and risk at designated place at NUTECH.</p> <p>(b) Any special requirement for installation, operation and commissioning must be specified in the offer by the supplier.</p>						

<b>Training:</b> 01 week OEM operational/ maintaince training at NUTECH						
<b>Improvement and Safety Measures:</b> Any improvement and safety measures suggested by NUTECH during commissioning are to be resolved by the supplier / manufacturer at no extra cost.						
<b>Liability of Supplier</b> (a) OEM certificate of authorized dealership Supplier is to provide original OEM certificate of subject equipment bought directly from the manufacturer and being an authorized dealer. (b) In case the equipment supplied is not compatible with specifications, the supplier will be obliged to call his representatives at his own cost for consultation and corrective action						
<b>Special Notes</b> (a) Additional requirements for the maintenance of equipment (if any) must be intimated by the supplier in technical offer. (b) Supplier must provide the list of organizations using same equipment in Pakistan (if any). (c) Equipment must be a standard product of OEM available at web address of OEM. (d) In case of premature failure of the equipment, OEM has to replace / rectify the item free of cost. Required transportation charges would be borne by the supplier.						

Firm Name: \_\_\_\_\_  
Signature: \_\_\_\_\_  
Name: \_\_\_\_\_  
Designation: \_\_\_\_\_



**TECHNICAL OFFER**

**NUTECH / SCM / Electrical Lab Phase-III (B)-2019/TD-082**

**Fill in following essential parameters:-**

1. Validity of Offer: \_\_\_\_\_ Days (Should not be less than **90 days**)
2. Delivery period: \_\_\_\_\_ Days (After placement of Offer)
3. Country of Origin: \_\_\_\_\_
4. Warranty Period: \_\_\_\_\_

**General**

1. GST Number: \_\_\_\_\_ (Enclose Copy)
2. NTN / CNIC: \_\_\_\_\_ (if exempted, provide valid exemption certificate)

**Payment Terms.**

1. 50% advance payment against BG/CDR/Pay Order/DD
2. 50% payment after delivery, installation / commissioning, user satisfaction certificate.

**Details of Payment Recipient**

1. Name / Title: \_\_\_\_\_
2. Address: \_\_\_\_\_

OEM Name:	Signature:
Focal Person:	Official Seal:
Phone Number:	Name:
Email Id:	Designation:

**Annex-C**

**FINANCIAL OFFER**

**NUTECH / SCM / Electrical Lab Phase-III (B)-2019 / TD-082**

<b>Ser</b>	<b>Part No</b>	<b>Items</b>	<b>Description</b>	<b>A/U</b>	<b>Qty Req</b>	<b>Unit Price (Rs) (Including all taxes)</b>	<b>Total (Rs) (Including all taxes)</b>
1.	1a	Electrical Power Engineering Trainer	Generation: Alternator and Parallel Operation <ul style="list-style-type: none"><li>• Three-phase power supply module:</li><li>• Electrical power measurement module</li><li>• Maximum demand meter</li><li>• Power circuit breaker</li><li>• Power circuit breaker</li><li>• Synchronization indicator</li><li>• Synchronoscope</li><li>• Generator synchronising relay</li><li>• Resistive load</li><li>• Inductive load</li><li>• Capacitive load</li><li>• Automatic voltage regulator</li><li>• Brushless motor with controller</li><li>• Braking resistor for brushless motor nominal 5.4Nm</li><li>• Three Phase Synchronous Machine 4 poles</li><li>• Universal base for electrical machines</li><li>• Communication MODBUS</li><li>• Three-phase isolation transformer 3kVA</li><li>• SCADA Software Winlog Pro W-NET/I-USB Up to 256 variables sampled</li></ul>	No	01		

			<ul style="list-style-type: none"> <li>• Computer All in one</li> <li>• Kit of cables</li> <li>• Holder for leads</li> </ul> <p>Frame with 3 levels</p>				
	1b	Voltage and Current Transformers	<ul style="list-style-type: none"> <li>• Motorized variable three-phase power supply</li> <li>• Three-phase transformer</li> <li>• Digital module for measuring vector groups and power factor</li> <li>• Single phase digital power meter (active, reactive, apparent)</li> <li>• Overhead line model</li> <li>• Overhead line model 110Km</li> <li>• Line capacitor</li> <li>• Petersen coil</li> <li>• Double busbar with two disconnectors</li> <li>• Single-phase current transformer</li> <li>• Three-phase current transformer</li> <li>• Summation current transformer</li> <li>• Ct load</li> <li>• Vt load</li> <li>• Single-phase voltage transformer</li> </ul> <p>Three-phase voltage transformer</p>				
	1c	Protection Relays	<ul style="list-style-type: none"> <li>• Three-phase supply unit</li> </ul> <p>Feeder manager relay</p>				
	1d	Energy Management	<ul style="list-style-type: none"> <li>• Three-phase power supply module (panel type)</li> <li>• Three-phase asynchronous machine 4P cage , 1.5kW , 50 / 60Hz</li> <li>• Power circuit breaker</li> <li>• Reactive power controller</li> <li>• Switchable capacitor battery</li> <li>• Load Manager</li> </ul> <p>Multifunction digital HMI gateway</p>				

2	2a	Motor, Electric Traction Training Equipment	<p>Training power bench</p> <ul style="list-style-type: none"> <li>• Power supply control panel</li> <li>• Three phase four wire power supply input, with leakage protector, contactors, buttons with red and green indicator lights.</li> <li>• AC power supply</li> <li>• Three phase 0~450V adjustable power supply, with output overcurrent protection, with 3 pcs pointer AC voltmeter. By switching the switch, three - phase grid voltage and voltage regulator output voltage can be respectively indicated.</li> <li>• DC power supply</li> <li>• Provide a continuous adjustable power supply for low DC voltage 0.0~24V/2A. Each circuit is equipped with a separate digital voltmeter indicating the output voltage, voltage stability≤0.3%, current stability≤0.3%, With short circuit soft stop protection and automatic recovery function .</li> <li>• High voltage DC power supply</li> <li>• Provide two high voltages DC 40~220V/2A continuous adjustable power supplies. Each circuit is equipped with a separate digital voltmeter indicating the output voltage, voltage stability≤0.3%, current stability≤0.3%, With short circuit soft stop protection and automatic recovery function . Used as DC motor excitation and armature power supply.</li> <li>• Measuring meter</li> <li>• 3 pcs AC multifunction meter, voltage range: 500V, current range: 5A, storage 15 groups data of power and power factors.</li> <li>• Switch and capacitor</li> </ul>	NO	02		
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			<ul style="list-style-type: none"> <li>• Three-pole double-throw switch 1 piece</li> <li>• Motor starting capacitor 4uF/450V</li> </ul>				
	2b	Instrument Unit 1	Training Table <ul style="list-style-type: none"> <li>• DC digital voltmeter 2pcs, measuring range: 0~300V</li> </ul> DC digital ammeter 2pcs, measuring range: 0~3A				
		Instrument Unit 2	AC digital voltmeter 3pcs, measuring range: 0~450V				
		Instrument Unit 3	AC digital ammeter 3pcs, measuring range: 0~2A				
		Relay Control Unit 1	AC contactor (Coil voltage 220V) 2pcs				
		Relay Control Unit 2	Thermal overload relay (Coil voltage 220V) 2pcs				
		Relay Control Unit 3	<ul style="list-style-type: none"> <li>• Transformer (220V/26V)</li> <li>• Time relay (220V)</li> </ul> Resistance (10Ω/25W)				
		Relay Control Unit 4	<ul style="list-style-type: none"> <li>• Button switch 4pcs (green 2pcs, red 2pcs with 220V indicator light)</li> </ul>				
		Relay Control Unit 5	Travel switch 4pcs				
		Speed, Torque & Mechanical Power Measurer	For measuring Speed, Torque & Mechanical Power				
		High performance permanent magnetic dynamometer	Rated power P <sub>n</sub> =250W, Rated voltage U <sub>n</sub> =110V, Rated current I <sub>N</sub> =2.8A, Rated speed n <sub>n</sub> =1500r/min				
		Separately excited DC motor	Rated power P <sub>n</sub> =100W, Rated voltage U <sub>n</sub> =110V, Rated current I <sub>N</sub> =1.25A, Rated speed n <sub>N</sub> =1000r/min				
		Capacitive single phase asynchronous motor	Rated power P <sub>N</sub> =120W, Rated voltage U <sub>N</sub> =220V, Rated current I <sub>N</sub> =1.45A, Rated speed n <sub>N</sub> =1420r/min C=4μF				
		3-phase dual-speed cage asynchronous motor	Rated power P <sub>N</sub> =120/90W, Rated voltage U <sub>N</sub> =220V, Rated current I <sub>N</sub> =0.6A/0.6, Rated speed n <sub>N</sub> = (2800/1400) r/min				
		DC compound motor	<ul style="list-style-type: none"> <li>• 110V 120W</li> </ul>				

			Rated power PN=120W, Rated voltage UN=110V, Rated current IN=1.58A, Rated speed nN=1000r/min				
		3 phase synchronous motor	Rated power PN=170/90W, UN=220V(Y), Rated current IN=0.45/0.35A, Rated speed nN=1500r/min				
		DC compound generator	Rated power PN=120W, Rated voltage UN=110V, Rated current IN=1.1A, Rated speed nN=1000r/min				
		3 phase winding rotor asynchronous motor	Rated power PN=120W, Rated voltage UN=220V/Δ, Rated current IN=0.6A, Rated speed nN=1380r/min				
		3 phase cage asynchronous motor	Rated power PN=100W, Rated voltage UN=220V/Δ, Rated current IN=0.5A, Rated speed nN=1420r/min				
		Single phase transformer	<ul style="list-style-type: none"> <li>• 127V ; 50V ; 100W</li> </ul> 127V ; 50V ; 200W				
		3 phase transformer	127V ; 50V ; 150W				
		Sliding resistance	Sliding resistance 2 Pieces				
		Connecting leads	<ul style="list-style-type: none"> <li>• Total:10 pcs/bag φ2</li> <li>• 25cm yellow 4pcs</li> <li>• 25cm green 4pcs</li> </ul> 25cm red 2pcs				
		Safety connecting leads	<ul style="list-style-type: none"> <li>• Total:10 75pcs/bag</li> <li>• 60cm 30pcs</li> <li>• 40cm 25pcs</li> </ul> 20cm 20pcs				
		Dynamometer fixing base	Stainless steel guide rail: for fixing motor, dynamometer				
		Cross rubber block	Cross rubber block 1 piece				
		Monkey wrench	200×24				
		Power supply cable ( ~220V)	1m				
		Spare parts	<ul style="list-style-type: none"> <li>• Fuse 5×20 1A (50 pcs)</li> <li>• Fuse 5×20 2A (50 pcs)</li> <li>• Fuse 5×20 5A (20 pcs)</li> </ul> Manual book				

	<b>Total (Rs)</b>			
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Bid Bond Ref \_\_\_\_\_ GST \_\_\_\_\_

Total Value (Including Tax) \_\_\_\_\_

Bid Bond to be attached with Annex-C. Copy of Bid Bond be attached with technical offer without showing its value. Exposure of bid bond may result in rejection of offer.

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

Signature: \_\_\_\_\_

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

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