TENDER (E - PROCUREMENT MODE)

FOR

SUPPLY & INSTALLATION OF ELECTRIC DRIVES LAB ITEMS IN SCHOOL OF COMPUTING & ELECTRICAL ENGINEERING AT IIT MANDI

Tender No.: IITMANDI/S&P/PUR-422/2019-20/14241-42

Tender date: 06th February, 2020

Last Date of Submission: 27th February, 2020

Indian Institute of Technology Mandi (IIT Mandi),
Store & Purchase Section,
2nd Floor, A7 Building, South Campus,
Kamand – 175 075, District – Mandi (H.P), India

Tel.: **01905-267039/267048**

Email: himanshumisra@iitmandi.ac.in & arsp@iitmandi.ac.in

Indian Institute of Technology Mandi, Kamand invites online Bids for supply, erection, installation, commissioning, testing, demonstration and training of **"Electric Drives Lab Items"** as per specifications given in the Annexure attached to the Tender form. All offers should be made in English and should be written in both figures and words. Tender forms can be downloaded from the CPP Portal **(http://eprocure.gov.in/eprocure/app) &** Institute website **http://iitmandi.ac.in/administration/tenderseoi.php.**

The bidders are requested to read the tender document carefully and ensure compliance with all specifications/instructions herein. Non-compliance with specifications/instructions in this document may disqualify the bidders from the tender exercise. The Director, IIT Mandi, Kamand reserves the right to select the item (in single or multiple units) or to reject any quotation wholly or partly without assigning any reason. Incomplete tenders, amendments and additions to tender after opening or late tenders are liable to be ignored and rejected.

Instruction to bidder:

1. There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, organization name, location, date, value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as organization name, form of contract, location, date, other keywords etc. to search for a tender publishing on the CPP Portal.

2. Bidder should take into account any corrigendum published on the tender document before submitting their bids.

3. Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents – including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.

4. The tenders will be received online through portal http://eprocure.gov.in/eprocure/app. In the Technical Bids, the bidders are required to upload all the documents in .pdf format. All quotation **(both Technical and Financial should be submitted in the E-procurement portal**).

5. Possession of a Valid Class II/III Digital Signature Certificate (DSC) in the form of smart card/e-token in the company's name is a prerequisite for registration and participating in the bid submission activities through http://eprocure.gov.in/eprocure/app. Digital Signature Certificates can be obtained from the authorized certifying agencies, details of which are available in the web site https://eprocure.gov.in/eprocure/app under the link "Information about DSC".

Instruction for Preparation & Submission of bids:

1. Technical & Financial Bids should be submitted in PDF format.
2. **In case of Financial bids,** a standard BOQ format has been provided in Excel format. Bidders are required to download the BoQ Excel file and fill their financial offer on the same BOQ format. After filling the same, submit it online in Excel format, without changing the financial template format. However, if bidder wants to modify in its financial offer, then bidder can modify.
3. Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document / schedule and generally, they can be in PDF formats. Bid documents may be scanned with 100 dpi with black and white option.
4. The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.
5. The uploaded tender documents become readable only after the tender opening by the authorized bid openers.
6. **Kindly add scanned PDF of all relevant documents in a single PDF file like, compliance sheet, OEM/Principle Certificate etc.**
7. Bidder should log into the site well in advance for bid submission so that he/she upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay due to other issues.
8. Upon the successful and timely submission of bids, the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.
9. The technical and financial bids should be submitted online through portal http://eprocure.gov.in/eprocure/app in original. The financial bid should include the cost of main equipment/item and its accessories. If there is any separate cost for installation etc. that should be quoted separately.
10. Each bidder should be marked with the following reference on the top bids submitted online: "**IITMANDI/S&P/PUR-422/2019-20/14241-42/Electric Drives Lab Items, dated 06th February, 2020".**
11. The printed literature and catalogue/brochure giving full technical details should be included with the technical bid to verify the specifications quoted in the tender. The bidders should submit copies of suitable documents in support of their reputation, credentials and past performance in .pdf format.
12. The rates should be quoted in figures (typed or printed) and cutting should be avoided. The final amount should be in figures as well as in words. If there are cuttings, they should be duly initialed, failing which the bids are liable to be rejected.

13. **Tender Cost:** The bidder should submit a demand draft of **Rs. 1,180 (Tender Fee inclusive GST) in Words Rupees One Thousand One Hundred & Eighty only** towards non-refundable **tender fee, drawn in favour of "The Registrar, IIT Mandi"** payable at Mandi in a sealed envelope super-scribed as **"Tender fee & NIT No.: IITMANDI/S&P/PUR-422/2019-20/14241-42/Electric Drives Lab Items, dated 06th February, 2020"** on or before last date & time of submission of bids. **In the absence of tender fee, bids for evaluation shall not be accepted. NSIC/MSME exemption certificate shall be considered only against EMD (detail as mentioned in S.No.15).**

14. **Earnest Money Deposit (EMD)**:

Bidder should furnish an EMD of a refundable amount in the shape of Demand Draft or FDR from a scheduled bank in India drawn in favour of **"The Registrar, IIT Mandi" payable at Mandi**. EMD amount should be submitted for quoted item/s and the details given are as under:-

Sl. No.	Items Name	EMD Amount
1	DC Machine (DCM) Drive	7000
2	Induction Motor coupled with DC Machine	7000
3	Synchronous Motor coupled with DC Machine	9000
4	Slip Ring Induction Motor coupled with DC Machine	10000
5	IGBT based Power Converter	7000
6	Auto Transformer:- Single Phase, Continuously variable, 5A	1000
7	Rectifier:- 3 Phase 415V Input, 560VDC Output, 45 Amps	1000
8	Auto Transformer :- Three Phase, continuously variable , 15 A , 0 - 470 V	2000
9	Real-time Controller: dSPACE (1104)	36000
10	Voltage Sensors: Isolated +/- 1000V AC/DC Measurement.	2000
11	Current Sensors: 50A FEM Hall effect current sensors with signal conditioning	1000
12	Permanent Magnet Synchronous Motor (PMSM) Drive	32000
13	Brushless DC Motor Drive	32000
14	Setup No:-3: Slip Ring Induction Motor	32000
15	Setup No:-4: Switched Reluctance Motor Drive	32000
16	Setup No:-5: Synchronous Machine Drive (Advanced)	32000
Total EMD Amount		2,43,000

The EMD amount being submitted may be for more then 01 (one) item However, details of all the items quoted should be clearly mentioned on a separate sheet to be forwarded along with DD/FDR.

This EMD should be submitted in sealed envelop super-scribed as EMD & NIT No. "**IITMANDI/S&P/PUR-422/2019-20/14241-42/Electric Drives Lab Items, dated 06th February, 2020"**. The bidders should enclose a pre-receipted bill for the EMD to enable us to return the EMD of unsuccessful bidders. **Failure to deposit Earnest Money will lead to rejection of tender.** In the event of the awardee bidder backing out, EMD of that bidder will be forfeited.

- **To return FDR in original, bidder must submit its valid address as an address proof on its letterhead.**
- **Note: Both (tender fee & EMD) envelops should be placed in another sealed envelope addressed to:**

"**Assistant Registrar, Stores and Purchase"**
Indian Institute of Technology Mandi (IIT Mandi),
S & P Section, 2nd Floor, A7 Building, South Campus,
Kamand – 175 075, Distt. – Mandi (H.P), India"

The envelop having tender fee & EMD should reach on or before last date time of submission of bid.

15. EMD Exemption:

The Institute may accept bids without EMD from those bidders who are registered with the Central Purchase Organization, National Small Industries Corporation (NSIC) or the concern Ministry or Department **as Manufacturer.** To claim the exemption, the bidder must be offering goods manufactured by themselves. Exemption will not be granted in case the bidder is acting as an agent for some other vendor.

General Terms & Condition:

1. While sending rates, the firm shall give an undertaking to the effect that **"*the terms/conditions mentioned in the enquiry letter/Tender Notice against which the rates are being given are acceptable to the firm*." in .pdf format.** In case the firms do not give this undertaking, their rates will not be considered.

2. If the supplier/firm is original equipment manufacturer (OEM)/authorized dealer/sole distributor of any item, the certificate to this effect should submit in .pdf format.

3. The quantity shown against the item is approximate and may vary as per demand of the Institute at the time of placing order.

4. Any bids received after **02:30 P.M. on 27th February, 2020,** shall not be considered

5. The Technical Bids will be opened on **28th February, 2020 at 02:30 P.M.** The date & time for opening of Financial Bids will be informed later on to the technically qualified bidders.
6. The tenders will be received online through portal http://eprocure.gov.in/eprocure/app. All tender documents received after the specified date and time shall not be considered.

   For any correspondence regarding tenders is on below address:

   "**Assistant Registrar, Stores and Purchase"**
   Indian Institute of Technology Mandi (IIT Mandi),
   S & P Section, 2nd Floor, A7 Building, South Campus,
   Kamand – 175 075, Distt. – Mandi (H.P), India"

7. **Arbitration Clause:** In the event of any dispute or difference(s) between the vendee Institute (IIT Mandi) and the vendor(s) arising out of non-supply of material or supplies not found according to specifications or any other cause whatsoever relating to the supply or purchase order before or after the supply has been executed, shall be referred to "The Director, IIT Mandi", Kamand who may decide the matter himself or may appoint arbitrator(s) under the arbitration and conciliation Act,1996. The decision of the arbitrator shall be final and binding on both the parties.

   a) In case of a dispute between the purchaser and a foreign supplier, the dispute shall be settled by arbitration in accordance with provision of sub-clause above. But if this is not acceptable to the supplier then dispute shall be settled in accordance with provisions of UNCITRAL (United Nations Commission on International Trade Law) Arbitration Rules.

   b) The venue of the arbitration shall be the place from where the order is issued.

   c) The place of arbitration and the language to be used in arbitral proceedings shall be decided by the arbitrator.

   d) All disputes shall be subject to Mandi Jurisdiction only.

8. All tenders in which any of the prescribed conditions is not fulfilled or any condition is putforth by the tenderer shall be summarily rejected.

9. The bidders or their authorized representatives may also be present during the opening of the Technical Bid, if they desire so, at their own expenses.

Note: Price bids of only those bidders will be opened whose technical bids are found suitable by the committee appointed for the purpose. Date and time of opening of price bids will be decided after technical bids have been evaluated by the committee. Information in this regard will be intimated only to the technically qualified bidders. In exceptional situation, an authorized committee may negotiate price with the qualified bidder quoting the lowest price before awarding the contract.

10. **Clarifications**:

In case the bidders requires any clarification regarding the tender document, they are requested to submit their queries on the e-mail i.e. himanshumisra@iitmandi.ac.in, & arsp@iitmandi.ac.in on or **before 20.02.2020**.

11. **Assistance To Bidders:** Any queries relating to the tender document and the terms & conditions contained therein should be addressed to tender Inviting Authority for a tender or relevant contact person indicated in the tender.

12. **Pre – Qualification Criteria**:

- Bidders should be the manufacturer / authorized dealer. Letter of Authorization from original equipment manufacturer (OEM) on the same and specific to the tender should be enclosed.
- An undertaking from the OEM is required stating that they would facilitate the bidder on a regular basis with technology/product updates and extend support for the warranty as well.
- OEM should be internationally reputed Branded Company.
- Non-compliance of tender terms, non-submission of required documents, lack of clarity of the specifications, contradiction between bidder specification and supporting documents etc. may lead to rejection of the bid.
- The Vendors who have earlier supplied the equipment to any of the IITs, IISc, IISERs and other Scientific Institute of National Repute may only tender. The details of such institutions and the cost with name of equipment may also be supplied with the bids.
- **In the tender, either the Indian agent on behalf of the Principal/OEM** or **Principal/OEM itself can bid but both cannot bid simultaneously for the same item/product in the same tender**.
- **If an agent submits bid on behalf of the Principal/OEM, the same agent shall not submit a bid on behalf another Principal/OEM in the same tender for the same item/product**.

- **Furnishing of wrong/ambiguous information in the compliance statement may lead to rejection of bid and further black listing of the bidder, if prima-facie it appears that the information in the compliance statement was given with a malafide/fraudulent intent.**

13. **Prices**:

- The Prices quoted should be inclusive of basic price of an item, custom duties, packing, forwarding, freight, insurance, delivery and commissioning etc. at destination site (IIT Mandi, Mandi/Kamand). IIT Mandi is registered with DSIR, Govt. of India and is exempted from Custom /GST Exemption Certificate to this effect will be issued by IIT Mandi. **Hence, Customs/Excise Duty exempted price should be quoted**. The rates shall be firm and final. Nothing extra shall be paid on any account.
- **In case of imports/foreign supplier, the price should be quoted on ex-work price/FOB/FCA basis only. Under special circumstance (e.g. perishable chemicals), when the item is imported on CIP/CIF, please indicate CIF/CIP charges separately upto Delhi indicating the mode of shipment. IIT Mandi will make necessary arrangements for the clearance of imported goods at the Airport/Seaport.**
- In case of imported equipment(s)/item(s), the agency commission, if any, payable in Indian rupees should be mentioned separately. **IAC shall be paid after satisfactory installation & commissioning of the goods at the destination.** For imported equipment, the Letter of Credit will be opened for the amount excluding agency commission in Indian Rupees. The firm should clearly mention the address of foreign bank in the financial bid.
- **In case of indigenous item, the vendor should clearly mention the final FOR IIT Mandi, Kamand Campus Price, as applicable in their bid.**

14. **Validity**:

The bid should be valid for acceptance up to a period of 180 Days. The Bidders should be ready to extend the validity, if required without any additional financial implications.

15. **Delivery**:

The Equipment should be delivered and installed within the period as specified in the purchase order and be ready for use within 4-6 weeks of the issue of purchase order unless otherwise prescribed. If the bidder fails to deliver and place any or all the Equipments or perform the service by the specified date,

penalty at the rate of 1% per week of the total order value subject to the maximum of 10% of total order value will be deducted.

16. **Installation, Training & Demonstration**:

Bidders need to provide adequate training to the nominated persons of IIT Mandi at their cost. IIT Mandi will not bear any training expenditure. The supplier is required to done the installation and demonstration of the equipment within **15 days** of arrival of materials at the IIT Mandi site of installation, otherwise the penalty clause will be the same as per the supply of material.

In case of any mishappening/damage to equipment and suppliers during the carriage of suppliers from the origin of equipment to the installation site, the supplier has to replace to it with new equipment/supplies immediately at his own risk. Supplier will settle his claim with the insurance company as per his convenience. IIT Mandi will not be liable to any type of losses in any form.

17. **Insurance:** For delivery of goods at the purchaser's premises, the Insurance shall be obtained by the supplier on **"All Risk"** basis. The insurance shall be valid for a period of not less than 3 months after installation and commissioning. **In case of order placed on FOB/FCA basis, the purchaser shall arrange insurance. If order placed on CIF/CIP basis, the insurance should be up to New Delhi, the supplier shall arrange insurance.**

18. **Warranty Declaration**:

Bidders must give the comprehensive on-site warranty as required from the date of successful installation of Equipment against any manufacturing defects and also give the warranty declaration that "*everything to be supplied by us hereunder shall be free from all defects and faults in material, workmanship and shall be of the highest quality and material of the type ordered, shall be in full conformity with the specification and shall be complete enough to carry out the experiments, as specified in the tender document.*

Any deviation in the material, and the specifications from the accepted terms may liable to be rejected and the bidders need to supply all the goods in the specified form to the satisfaction/specifications specified in the order / contract and demonstrate at their own cost.

- The Purchaser Shall Promptly notify the Supplier in writing of any claims arising under this warranty. Upon receipt of such notice, the Supplier shall immediately within **Two weeks** arrange to repair or replace the defective goods or parts thereof free of cost at the ultimate destination. The Supplier shall take over the replaced parts/goods at the time of their replacement. No claim whatsoever shall lie to the Purchaser

for the replacement parts/goods thereafter. The period for correction of defects in the warranty period is **Two week.** If the supplier having been notified fails to remedy the defects within **Two week,** the purchaser may proceed to take such remedial action as may be necessary, at the supplier's risk and expenses without prejudice to any other rights, which the purchase may have against supplier under the contract.

- The warranty period should be clearly mentioned. The maintenance charges (AMC) under different schemes after the expiry of the warranty should also be mentioned. The comprehensive warranty will commence from the date of the satisfactory installation/commissioning of the equipment against the defect of any manufacturing, workmanship and poor quality of the components.

- After the warranty period is over, Annual Maintenance Contract (AMC)/Comprehensive Maintenance Contract (CMC) should be started. The AMC/CMC Charges will not be included in computing the total cost of the equipment.

19. **Performance Bank Guarantee:** A performance bank guarantee from a scheduled bank in India for an amount equal to 10% of the price for duration of two months beyond the expiry of warranty period will be taken from the supplier or Indian agent.

20. **Terms of Payment**: Payment will generally be made only after delivery and satisfactory installation, testing, commissioning etc. **This must be specified in the tender/quotation.**

- In case of imported supplies, payment (excluding Indian agency commission, if any) will be made through irrecoverable Letter of Credit in two installments. 80 % of the money will be released on submission of shipping of documents. Remaining 20 % will be released after successful installation of the instrument and submission of a performance bank guarantee for 10% of the order value from scheduled bank in India, valid for 2 months beyond the expiry of the warranty. All the bank charges within India will be borne by the Institute and outside India will be borne by the Supplier.
- In case of required item quoted in INR, 80% payment will be made through E-payment after receipt of material in good condition and Remaining 20% will be released on successful installation of the instrument and on submission of a performance bank guarantee for 10% of the order value from scheduled bank in India, valid for 2 months beyond the expiry of the warranty.

21. **Tender expenses and documents**: All costs incurred by the bidder in the preparation of the tender shall be at the entire expense of the bidder.

22. **Tender Evaluation Criteria**: The technical bids will be opened and evaluated by a duly constituted committee. After evaluation of the technical bid, the financial bid for only those offers which have qualified in the evaluation of technical bid will be opened.

23. **Return of EMD**:

- The earnest money of unsuccessful bidders will be returned to them without any interest within 15 working days after awarding the contract.
- The earnest money of the successful bidder will be returned to them without any interest within 15 Days after supply of material.

24. **Manual and documentation**: All the manuals necessary for operating and servicing the equipment (including details of electronic circuits) will have to be provided along with the instrument.

25. The IIT Mandi reserves the right to cancel the tender at any stage (point of time) without assigning any reason.

26. Bidders should go through the tender terms, conditions and specifications carefully and fill in the attached compliance statement accurately and unambiguously. They should ensure that all the required documents are furnished along with the bid.

Sd/-
Assistant Registrar
Stores & Purchase

BID PARTICULARS

1. Name of the Supplier :

2. Address of the Supplier :

3. Availability of demonstration of equipment : Yes / No

4. Tender cost enclosed: : Yes/No if yes

D.D. No._____ Bank_____ Amount_____

5. EMD enclosed : Yes / No if Yes

D.D. No._____ Bank_____

6. Name and address of the Officer/contact person to whom all references shall be made regarding this tender enquiry.

Name :

Address :

Telephone No. :

Fax No. :

Mobile No :

e-Mail :

Web :

< Organization Letter Head >>

DECLARATION SHEET

We, _____ hereby certify that all the information and data furnished by our organization with regard to this tender specification are true and complete to the best of our knowledge. I have gone through the specification, conditions and stipulations in details and agree to comply with the requirements and intent of specification.This is certified that our organization has been authorized (Copy attached) by the OEM to participate in Tender.We further certified that our organization meets all the conditions of eligibility criteria laid down in this tender document. Moreover, OEM has agreed to support on regular basis with technology / product updates and extend support for the warranty.

We, further specifically certify that our organization has not been Black Listed/De Listed or put to any Holiday by any Institutional Agency/ Govt. Department/ Public Sector Undertaking in the last three years.	NAME & ADDRESS OF THE Vendor/ Manufacturer / Agent
1 Phone	
2 Fax	
3 E - mail	
4 Contact Person Name	
5 Mobile Number	
6 TIN Number	
7 PAN Number	
8 GST No.	
9 Kindly provide bank details of the bidder in the following format: a) Name of the Bank	
b) Account Number	
c) Kindly attach scanned copy of one Cheque book page to enable us to return the EMD to unsuccessful bidder	

Annexure-I

Ref:-ENQUIRYNO:- IITMANDI/S&P/PUR-422/2019-20/14241-42/Electric Drives Lab Items, dated 06th February, 2020

Technical Specifications of Electric Drives Lab Items details are as under.

Tender Technical Specifications
The tendering specification for the Electric Drives Lab are given below

A. Discrete components Purchase for 4 setups (from 1 to 11)

S.No.	Name/Specifications	Quantity	Remark
1	DC Machine (DCM) Drive DC Motor 220V 2.5kW 1500RPM coupled with separately excited DC Machine 220V 2.5kW 1500RPM (**Reputed make** like ABB, CG, Kirloskar, Siemens, etc.) coupled with following items Encoder :- 1024 PPR Magnetic powder brake: Torque 15 Nm Torque Sensor (good quality high bandwidth)	1	as a complete coupled arrangement
2	Induction Motor coupled with DC Machine(**Reputed make** like ABB, CG, Kirloskar, Siemens, etc.), torque sensor, encoder and Magnetic powder brake Induction Motor (squirrel cage) of 3 Phase, 415V, 2.2 kW, 1500RPM coupled with following parts DC Motor :- 220V 2.5KW 1500 RPM. Separately excited DC Machine Encoder :- 1024 PPR Magnetic powder brake: Torque 15 Nm Torque Sensor (good quality High bandwidth)	1	as a complete coupled arrangement
3	Synchronous Motor coupled with DC Machine(**Reputed make** like ABB, CG, Kirloskar, Siemens, etc.), torque sensor, encoder and particle clutch	1	as a complete coupled arrangement

	Synchronous Motor 415 V 2.2 KW 1500 RPM coupled with following parts DC Motor :- 220V 2.5KW 1500 RPM. Separately excited DC Machine Encoder :- 1024 PPR Particle clutch: Torque 15 Nm Torque Sensor (good quality High bandwidth)		
4	Slip Ring Induction Motor coupled with DC Machine(**Reputed make** like ABB, CG, Kirloskar, Siemens, etc.), torque sensor, encoder and Eddy current dynamometer Induction Motor (slip ring) :-3 Phase, 415V, 2.2 kW, 1500RPM coupled with following parts DC Motor :- 220V 2.5KW 1500 RPM. Separately excited DC Machine Encoder :- 1024 PPR Eddy Current Dynamometer: 3.5 Kw Eddy Current Dynamometer with shaft at both ends with speed range of 1500 rpm Torque Sensor (good quality High bandwidth)	1	as a complete coupled arrangement
5	IGBT based Power Converter Reputed make: Semikron, etc. Power Converter Configuration: Rectifier + four leg Inverter Rectifier: 415VAC Input, 560VDC Output, 45 Amps Inverter: 600V DC Link, 415VAC Output, 30 Amps Type of Cooling: Forced Air	4	
6	Auto Transformer:- Single Phase, Continuously variable, 5A	4	
7	Rectifier:- 3 Phase 415V Input, 560VDC Output, 45 Amps	4	
8	Auto Transformer :- Three Phase,	4	

	continuously variable , 15 A , 0 - 470 V		
9	Real-time Controller: dSPACE (1104)	4	
10	Voltage Sensors: Isolated +/- 1000V AC/DC Measurement.	50	
11	Current Sensors: 50A FEM Hall effect current sensors with signal conditioning	50	

B. <u>Following entire setups to be purchased from one vendor for individual integrated drive setups (from 12 to 16)</u>

12. Permanent Magnet Synchronous Motor (PMSM) Drive (1 Nos.)

(**Reputed make: every component)**

		Quantity
1	Permanent Magnet Synchronous Motor (PMSM) 300V, 1.07 kW, 4000 RPM. Speed and Position Encoder Outputs	1
2	DC Motor 220V 2.5kW 3000RPM. Separately excited DC Machine	1
3	Auto Transformer Single Phase, Continuously variable, 5A	2
4	Rectifier 3 Phase 415V Input, 560VDC Output, 45 Amps Type of Cooling: Forced Air Ambient Temp:40Deg Duty Class: Class I 100% continuous	1
5	IGBT based Power Converter Reputed make: Semikron, etc. Power Converter Configuration: Rectifier + Brake Chopper + Inverter Rectifier: 415VAC Input, 560VDC Output, 45 Amps Chopper: 600VDC Input, 300VDC Output, 30 Amps Inverter: 600V DC Link, 415VAC Output, 30 Amps Switching Frequency: 2kHz Fundamental Frequency: 50Hz Type of Cooling: Forced Air Ambient Temp:40Deg Duty Class:Class I 100% continuous Power Converter consists of 1 x SKD 160/18 module, 4 x SKM75GB12T4 IGBT modules, MD-P3 heat sink, 4 x SKYPER 32R drivers, Electrolytic capacitor, Busbar, IGBT snubbers, fan and thermal trip etc. All are encapsulated in polycarbonate box with Elcom knobs on it etc.	1
6	Particle clutch	1

	2kW with shaft at both ends and speed range upto 4000rpm	
7	Torque Sensor Shaft to Shaft Slip ring type with a range of 10Nm and speed of 10000rpm with signal conditioner	1
8	FPGA Controller with 8 Voltage Sensors, 8 Current Sensors, 2 Encoder Inputs, 8 PWMs Outputs, 8 Relay Outputs, 8 Analog Inputs <u>Voltage Sensors:</u> Isolated +/- 1000V AC/DC Measurement. Dedicated 16-bit Delta-Sigma Analog to Digital Converter per Channel. Up to 1MSPS Sampling per Channel Parallel Sampling of all Channels. <u>Current Sensors:</u> Isolated Closed Loop Fluxgate Current Measurement Dedicated 16-bit Delta-Sigma Analog to Digital Converter per Channel. Up to 1 MSPS per Channel Sampling rate Parallel Sampling of all Channels. <u>Encoder Inputs:</u> RS422 Differential Hall Encoder Inputs. 4 Input Signals with +5V Supply Output per Channel DA15 Connector Interface for direct Encoder connection <u>PWM Outputs:</u> 5V/15V PWM Outputs with Galvanic Isolation 8 PWM Outputs per Card. Output Voltage Level is selectable per Card. Pair of PWM outputs along with +15V Supply output on a DE9 Connector Direct Connection to Semikron Power Converter using Shielded DE9 Cable <u>Relay Outputs:</u> 230V 5A SPDT Relay Fast Operating Time 8 outputs per card. Each output available on a individual connector <u>Analog Inputs:</u> Isolated +/- 10V AC/DC Measurement. Dedicated 16-bit Delta-Sigma Analog to Digital Converter per Channel. Up to 1MSPS Sampling per Channel Parallel Sampling of all Channels. BNC Connector per Output channel	1
9	Software Framework <u>Software for Programming, Control, Analysis and Measurement Functions</u> 32 virtual inputs for run time control commands and online tuning of user selected control parameters 32 virtual outputs for display, plot and recording of user selected signals (slow rate-10SPS per signal) 64 virtual Probes for display, plot, measurement and recording of	1

	user selected signals (fast rate-200KSPS per signal) Controller Management Functions: Controller discovery, status check, Binary compatibility check, Remote Programming, Firmware update TCl Script for GUI configuration and scenario script Instantaneous Time Plot for inputs, outputs, probes and measurement signals. Offline analysis (Pause & Analyze). Export signal data to CSV format. Up to 16 number of Time Plots with 6 Signals per Plot XY Plot for X vsYn signal plot Power Calculation Panel – Active Power(P), Reactive Power(Q), Apparent Power(S), Power Factor (PF) and Instantaneous Power calculation for Single Phase 2 wire setup, Two Phase 3 wire setup, Three Phase 3 wire setup, Three Phase four wire setup and Four Phase setup. FFT Measurement – Fundamental Frequency, THD calculation, Distortion Factor, Harmonic components of signal (RMS, Peak) Power Analyzer – DC, Fundamental and Harmonics measurement-RMS, Peak, Angle, Power and Power Factor, Phasor Diagram, Power Vector Diagram Energy Panel – Active Energy and Reactive Energy calculation Create Multiple dashboard for setup operation Matlab/Simulink HDL Coder development flow support Xilinx System Generator development flow support Controller device library Example design demonstrating the basic operation of the setup	

13. Brushless DC Motor Drive (1 Nos.)

(**Reputed make: every component)**

		Quantity
1	BLDC Motor 320V, 0.746 kW, 1800 RPM. Speed and Position Encoder Outputs	1
2	DC Motor 220V 2.5kW 3000RPM. Separately excited DC Machine	1
3	Auto Transformer Single Phase, Continuously variable, 5A	2
4	Rectifier 3 Phase 415V Input, 560VDC Output, 45 Amps Type of Cooling: Forced Air Ambient Temp:40Deg Duty Class:Class I 100% continuous	1
5	Torque Sensor Shaft to Shaft Slip ring type with a range of 10Nm and speed of 10000rpm with signal conditioner	1
6	Particle clutch	1

	2KW with shaft at both ends and speed range upto 4000rpm	
7	IGBT based Power Converter Reputed make: Semikron, etc. Power Converter Configuration: Rectifier + Brake Chopper + Inverter Rectifier: 415VAC Input, 560VDC Output, 45 Amps Chopper: 600VDC Input, 300VDC Output, 30 Amps Inverter: 600V DC Link, 415VAC Output, 30 Amps Switching Frequency: 2kHz Fundamental Frequency: 50Hz Type of Cooling: Forced Air Ambient Temp:40Deg Duty Class: Class I 100% continuous Power Converter consists of 1 x SKD 160/18 module, 4 x SKM75GB12T4 IGBT modules, MD-P3 heat sink, 4 x SKYPER 32R drivers, Electrolytic capacitor, Busbar, IGBT snubbers, fan and thermal trip etc. All are encapsulated in polycarbonate box with Elcom knobs on it etc.	1
8	FPGA Controller with 8 Voltage Sensors, 8 Current Sensors, 2 Encoder Inputs, 8 PWMs Outputs, 8 Relay Outputs, 8 Analog Inputs <u>Voltage Sensors:</u> Isolated +/- 1000V AC/DC Measurement. Dedicated 16-bit Delta-Sigma Analog to Digital Converter per Channel. Up to 1MSPS Sampling per Channel Parallel Sampling of all Channels. <u>Current Sensors:</u> Isolated Closed Loop Fluxgate Current Measurement Dedicated 16-bit Delta-Sigma Analog to Digital Converter per Channel. Up to 1 MSPS per Channel Sampling rate Parallel Sampling of all Channels. <u>Encoder Inputs:</u> RS422 Differential Hall Encoder Inputs. 4 Input Signals with +5V Supply Output per Channel DA15 Connector Interface for direct Encoder connection <u>PWM Outputs:</u> 5V/15V PWM Outputs with Galvanic Isolation 8 PWM Outputs per Card. Output Voltage Level is selectable per Card. Pair of PWM outputs along with +15V Supply output on a DE9 Connector Direct Connection to Semikron Power Converter using Shielded DE9 Cable <u>Relay Outputs:</u> 230V 5A SPDT Relay Fast Operating Time 8 outputs per card. Each output available on a individual connector <u>Analog Inputs:</u>	1

	Isolated +/- 10V AC/DC Measurement. Dedicated 16-bit Delta-Sigma Analog to Digital Converter per Channel. Up to 1MSPS Sampling per Channel Parallel Sampling of all Channels. BNC Connector per Output channel	
9	Software Framework Software for Programming, Control, Analysis and Measurement Functions 32 virtual inputs for run time control commands and online tuning of user selected control parameters 32 virtual outputs for display, plot and recording of user selected signals (slow rate-10SPS per signal) 64 virtual Probes for display, plot, measurement and recording of user selected signals (fast rate-200KSPS per signal) Controller Management Functions: Controller discovery, status check, Binary compatibility check, Remote Programming, Firmware update TCl Script for GUI configuration and scenario script Instantaneous Time Plot for inputs, outputs, probes and measurement signals. Offline analysis (Pause & Analyze). Export signal data to CSV format. Up to 16 number of Time Plots with 6 Signals per Plot XY Plot for X vsYn signal plot Power Calculation Panel – Active Power(P), Reactive Power(Q), Apparent Power(S), Power Factor (PF) and Instantaneous Power calculation for Single Phase 2 wire setup, Two Phase 3 wire setup, Three Phase 3 wire setup, Three Phase four wire setup and Four Phase setup. FFT Measurement – Fundamental Frequency, THD calculation, Distortion Factor, Harmonic components of signal (RMS, Peak) Power Analyzer – DC, Fundamental and Harmonics measurement-RMS, Peak, Angle, Power and Power Factor, Phasor Diagram, Power Vector Diagram Energy Panel – Active Energy and Reactive Energy calculation Create Multiple dashboard for setup operation Matlab/Simulink HDL Coder development flow support Xilinx System Generator development flow support Controller device library Example design demonstrating the basic operation of the setup	1

14.Setup No:-3: Slip Ring Induction Motor (1 Nos.):

(**Reputed make: every component)**

		Quantity
1	Slip Ring Induction Motor 3 Ph, 415V, 2.2kW, 1500 RPM	1
2	DC Motor 220V 2.5kW 1500RPM. Separately excited DC Machine	1
3	Encoder	1

	1024 PPR, RS422 output, externally coupled for Speed Feedback	
4	Auto Transformer Single Phase, Continuously variable, 5A	1
5	Auto Transformer Three Phase, Continuously variable, 15A , 0 -470 V	1
6	Torque Sensor Shaft to Shaft Slip ring type with a range of 20Nm and speed of 2500rpm with signal conditioner	1
7	Eddy Current Dynamometer 3.5kW Eddy Current Dynamometer with shaft at both ends with speed range of 1500 rpm	1
8	Three phase isolation Transformer 5 kVA	1
9	IGBT based Power Converter Reputed make: Semikron, etc. Power Converter Configuration: Rectifier + Brake Chopper + Inverter Rectifier: 415VAC Input, 560VDC Output, 45 Amps Chopper: 600VDC Input, 300VDC Output, 30 Amps Inverter: 600V DC Link, 415VAC Output, 30 Amps Switching Frequency: 2kHz Fundamental Frequency: 50Hz Type of Cooling: Forced Air Ambient Temp:40Deg Duty Class: Class I 100% continuous Power Converter consists of 1 x SKD 160/18 module, 4 x SKM75GB12T4 IGBT modules, MD-P3 heat sink, 4 x SKYPER 32R drivers, Electrolytic capacitor, Busbar, IGBT snubbers, fan and thermal trip etc. All are encapsulated in polycarbonate box with Elcom knobs on it etc.	3
10	Rectifier 3 Phase 415V Input, 560VDC Output, 45 Amps Type of Cooling: Forced Air Ambient Temp:40Deg Duty Class: Class I 100% continuous	1
11	FPGA Controller with 12 Voltage Sensors, 12 Current Sensors, 2 Encoder Inputs, 24 PWMs Outputs, 8 Relay Outputs, 8 Analog Inputs <u>Voltage Sensors:</u> Isolated +/- 1000V AC/DC Measurement. Dedicated 16-bit Delta-Sigma Analog to Digital Converter per Channel. Up to 1MSPS Sampling per Channel Parallel Sampling of all Channels. <u>Current Sensors:</u> Isolated Closed Loop Fluxgate Current Measurement Dedicated 16-bit Delta-Sigma Analog to Digital Converter per Channel. Up to 1 MSPS per Channel Sampling rate Parallel Sampling of all Channels.	1

	Encoder Inputs: RS422 Differential Hall Encoder Inputs. 4 Input Signals with +5V Supply Output per Channel DA15 Connector Interface for direct Encoder connection PWM Outputs: 5V/15V PWM Outputs with Galvanic Isolation 8 PWM Outputs per Card. Output Voltage Level is selectable per Card. Pair of PWM outputs along with +15V Supply output on a DE9 Connector Direct Connection to Semikron Power Converter using Shielded DE9 Cable Relay Outputs: 230V 5A SPDT Relay Fast Operating Time 8 outputs per card. Each output available on an individual connector Analog Inputs: Isolated +/- 10V AC/DC Measurement. Dedicated 16-bit Delta-Sigma Analog to Digital Converter per Channel. Up to 1MSPS Sampling per Channel Parallel Sampling of all Channels. BNC Connector per Output channel	
12	Software Framework Software for Programming, Control, Analysis and Measurement Functions 32 virtual inputs for run time control commands and online tuning of user selected control parameters 32 virtual outputs for display, plot and recording of user selected signals (slow rate-10SPS per signal) 64 virtual Probes for display, plot, measurement and recording of user selected signals (fast rate-200KSPS per signal) Controller Management Functions: Controller discovery, status check, Binary compatibility check, Remote Programming, Firmware update TCl Script for GUI configuration and scenario script Instantaneous Time Plot for inputs, outputs, probes and measurement signals. Offline analysis (Pause & Analyze). Export signal data to CSV format. Up to 16 number of Time Plots with 6 Signals per Plot XY Plot for X vs Y signal plot Power Calculation Panel – Active Power(P), Reactive Power(Q), Apparent Power(S), Power Factor (PF) and Instantaneous Power calculation for Single Phase 2 wire setup, Two Phase 3 wire setup, Three Phase 3 wire setup, Three Phase four wire setup and Four Phase setup. FFT Measurement – Fundamental Frequency, THD calculation, Distortion Factor, Harmonic components of signal (RMS, Peak) Power Analyzer – DC, Fundamental and Harmonics measurement-RMS, Peak, Angle, Power and Power Factor, Phasor	1

	Diagram, Power Vector Diagram Energy Panel – Active Energy and Reactive Energy calculation Create Multiple dashboard for setup operation Matlab/Simulink HDL Coder development flow support Xilinx System Generator development flow support Controller device library Example design demonstrating the basic operation of the setup	

15.Setup No:-4: Switched Reluctance Motor Drive(1 Nos.):

(**Reputed make: every component)**

		Quantity
1	Switch Reluctance Machine 4 Ph, 220V, 2.2kW, 3000 RPM	1
2	DC Motor 220V 2.5kW 3000RPM. Separately excited DC Machine	1
3	Encoder 1024 PPR, RS422 output, externally coupled for Speed Feedback	1
4	Auto Transformer Single Phase, Continuously variable, 5A	1
5	Auto Transformer Single Phase, Continuously variable, 10 A	1
6	Torque Sensor Shaft to Shaft Slip ring type with a range of 20Nm and speed of 3000rpm with signal conditioner	1
7	Eddy Current Dynamometer 3.5 kW Eddy Current Dynamometer with shaft at both ends with speed range of 3000 rpm	1
8	IGBT based Power Converter Reputed make: Semikron, etc. Power Converter Configuration: Rectifier + SRM Inverter Rectifier: 415VAC Input, 560VDC Output Inverter: 415VAC Output, 10 Amps Switching Frequency: 10 kHz Type of Cooling: Forced Air Ambient Temp:40Deg Duty Class:Class I 100% continuous Power Converter consists of 8 IGBT Devices, One SKD 160/18, MD P3 heatsink, 4 x SKYPER driver, Electrolytic capacitor bank, Busbar, IGBTsnubbers, Fan, thermal trip enclosed in a polycarbonate box.	1
9	FPGA Controller with 8 Voltage Sensors, 8 Current Sensors, 2 Encoder Inputs, 16 PWMs Outputs, 8 Relay Outputs, 8 Analog Inputs <u>Voltage Sensors:</u> Isolated +/- 1000V AC/DC Measurement. Dedicated 16-bit Delta-Sigma Analog to Digital Converter per	1

	Channel. Up to 1MSPS Sampling per Channel Parallel Sampling of all Channels. Current Sensors: Isolated Closed Loop Fluxgate Current Measurement Dedicated 16-bit Delta-Sigma Analog to Digital Converter per Channel. Up to 1 MSPS per Channel Sampling rate Parallel Sampling of all Channels. Encoder Inputs: RS422 Differential Hall Encoder Inputs. 4 Input Signals with +5V Supply Output per Channel DA15 Connector Interface for direct Encoder connection PWM Outputs: 5V/15V PWM Outputs with Galvanic Isolation 8 PWM Outputs per Card. Output Voltage Level is selectable per Card. Pair of PWM outputs along with +15V Supply output on a DE9 Connector Direct Connection to Semikron Power Converter using Shielded DE9 Cable Relay Outputs: 230V 5A SPDT Relay Fast Operating Time 8 outputs per card. Each output available on a individual connector Analog Inputs: Isolated +/- 10V AC/DC Measurement. Dedicated 16-bit Delta-Sigma Analog to Digital Converter per Channel. Up to 1MSPS Sampling per Channel Parallel Sampling of all Channels. BNC Connector per Output channel	
10	Software Framework Software for Programming, Control, Analysis and Measurement Functions 32 virtual inputs for run time control commands and online tuning of user selected control parameters 32 virtual outputs for display, plot and recording of user selected signals (slow rate-10SPS per signal) 64 virtual Probes for display, plot, measurement and recording of user selected signals (fast rate-200KSPS per signal) Controller Management Functions: Controller discovery, status check, Binary compatibility check, Remote Programming, Firmware update TCl Script for GUI configuration and scenario script Instantaneous Time Plot for inputs, outputs, probes and measurement signals. Offline analysis (Pause & Analyze). Export signal data to CSV format. Up to 16 number of Time Plots with 6 Signals per Plot XY Plot for X vsYn signal plot	1

	Power Calculation Panel – Active Power(P), Reactive Power(Q), Apparent Power(S), Power Factor (PF) and Instantaneous Power calculation for Single Phase 2 wire setup, Two Phase 3 wire setup, Three Phase 3 wire setup, Three Phase four wire setup and Four Phase setup. FFT Measurement – Fundamental Frequency, THD calculation, Distortion Factor, Harmonic components of signal (RMS, Peak) Power Analyzer – DC, Fundamental and Harmonics measurement-RMS, Peak, Angle, Power and Power Factor, Phasor Diagram, Power Vector Diagram Energy Panel – Active Energy and Reactive Energy calculation Create Multiple dashboard for setup operation Matlab/Simulink HDL Coder development flow support Xilinx System Generator development flow support Controller device library Example design demonstrating the basic operation of the setup	

16.Setup No:-5: Synchronous Machine Drive (Advanced) (1 Nos.):

(**Reputed make: every component)**

		Quantity
1	DC Motor 220V 2.5kW 1500RPM , separately excited	1
2	Encoder 1024 PPR, RS422 output, externally coupled for Speed Feedback	1
3	Auto Transformer Single Phase, Continuously variable, 5A	2
4	Rectifier 3 Phase 415V Input, 560VDC Output, 45 Amps Type of Cooling: Forced Air Ambient Temp:40Deg Duty Class:Class I 100% continuous	2
5	Synchronous Motor 415 V 2.2 kW 1500 RPM	1
6	Torque Sensor Shaft to Shaft Slip ring type with a range of 20Nm and speed of 2500rpm with signal conditioner	1
7	Eddy Current Dynamometer 3.5 kW Eddy Current Dynamometer with shaft at both ends with speed range of 1500 rpm	1
8	IGBT based Power Converter Reputed make: Semikron, etc. Power Converter Configuration: Rectifier + Brake Chopper + Inverter Rectifier: 415VAC Input, 560VDC Output, 45 Amps Chopper: 600VDC Input, 300VDC Output, 30 Amps Inverter: 600V DC Link, 415VAC Output, 30 Amps Switching Frequency: 2kHz Fundamental Frequency: 50Hz	1

	Type of Cooling: Forced Air Ambient Temp:40Deg Duty Class:Class I 100% continuous Power Converter consists of 1 x SKD 160/18 module, 4 x SKM75GB12T4 IGBT modules, MD-P3 heatsink, 4 x SKYPER 32R drivers, Electrolytic capacitor, Busbar, IGBTsnubbers, fan and thermal trip etc. All are encapsulated in polycarbonate box with Elcom knobs on it etc.	
9	FPGA Controller with 8 Voltage Sensors, 8 Current Sensors, 2 Encoder Inputs, 16 PWMs Outputs, 8 Relay Outputs, 8 Analog Inputs <u>Voltage Sensors:</u> Isolated +/- 1000V AC/DC Measurement. Dedicated 16-bit Delta-Sigma Analog to Digital Converter per Channel. Up to 1MSPS Sampling per Channel Parallel Sampling of all Channels. <u>Current Sensors:</u> Isolated Closed Loop Fluxgate Current Measurement Dedicated 16-bit Delta-Sigma Analog to Digital Converter per Channel. Up to 1 MSPS per Channel Sampling rate Parallel Sampling of all Channels. <u>Encoder Inputs:</u> RS422 Differential Hall Encoder Inputs. 4 Input Signals with +5V Supply Output per Channel DA15 Connector Interface for direct Encoder connection <u>PWM Outputs:</u> 5V/15V PWM Outputs with Galvanic Isolation 8 PWM Outputs per Card. Output Voltage Level is selectable per Card. Pair of PWM outputs along with +15V Supply output on a DE9 Connector Direct Connection to Semikron Power Converter using Shielded DE9 Cable <u>Relay Outputs:</u> 230V 5A SPDT Relay Fast Operating Time 8 outputs per card. Each output available on a individual connector <u>Analog Inputs:</u> Isolated +/- 10V AC/DC Measurement. Dedicated 16-bit Delta-Sigma Analog to Digital Converter per Channel. Up to 1MSPS Sampling per Channel Parallel Sampling of all Channels. BNC Connector per Output channel	1
10	Software Framework <u>Software for Programming, Control, Analysis and Measurement</u>	1

	Functions 32 virtual inputs for run time control commands and online tuning of user selected control parameters 32 virtual outputs for display, plot and recording of user selected signals (slow rate-10SPS per signal) 64 virtual Probes for display, plot, measurement and recording of user selected signals (fast rate-200KSPS per signal) Controller Management Functions: Controller discovery, status check, Binary compatibility check, Remote Programming, Firmware update TCl Script for GUI configuration and scenario script Instantaneous Time Plot for inputs, outputs, probes and measurement signals. Offline analysis (Pause & Analyze). Export signal data to CSV format. Up to 16 number of Time Plots with 6 Signals per Plot XY Plot for X vsYn signal plot Power Calculation Panel – Active Power(P), Reactive Power(Q), Apparent Power(S), Power Factor (PF) and Instantaneous Power calculation for Single Phase 2 wire setup, Two Phase 3 wire setup, Three Phase 3 wire setup, Three Phase four wire setup and Four Phase setup. FFT Measurement – Fundamental Frequency, THD calculation, Distortion Factor, Harmonic components of signal (RMS, Peak) Power Analyzer – DC, Fundamental and Harmonics measurement-RMS, Peak, Angle, Power and Power Factor, Phasor Diagram, Power Vector Diagram Energy Panel – Active Energy and Reactive Energy calculation Create Multiple dashboard for setup operation Matlab/Simulink HDL Coder development flow support Xilinx System Generator development flow support Controller device library Example design demonstrating the basic operation of the setup	

COMPLIANCE STATEMENT FOR THE TENDER SPECIFICATION
INDIAN INSTITUTE OF TECHNOLOGY MANDI
SOUTH CAMPUS, KAMAND – 175 075, DISTRICT – MANDI, HIMACHAL PRADESH

Ref:- ENQUIRYNO:- IITMANDI/S&P/PUR-422/2019-20/14241-42/Electric Drives Lab Items, dated 06th February, 2020

Sr. No.	Check list of documents/ Undertakings?	YES/ NO	Remarks (Give explanation if answer is No)
1	Is Tender fees attached?		
2	Is EMD attached? (if applicable)		
3	Is the bidder original equipment manufacturer (OEM)/authorised dealer?		
4	If authorised dealer, recent dated Certificate to this effect from OEM, attached or not?		
5	Undertaking from OEM regarding technical support & extended warranty period		
6	Validity of 180 days or not?		
7	Undertaking from bidder regarding acceptance of tender terms & conditions		
8	Whether list of reputed users (along with telephone numbers of contact persons) for the past three years specific to the instrument attached.		
9	Whether special educational discount for Indian Institute of Technology (IIT) Mandi (H.P) given.		
10	Whether training of operator and research students without any charges offered.		
11	**Does the instrument comply with all the required specifications as per annexure 1.** **IMPORTANT: Attach a separate sheet highlighting compliances with the specifications and explanations thereto if the equipments vary from the requested specifications.**		
12	Whether free Installation, Commissioning and Application Training offered.		
13	Whether warranty as per requirement offered		
14	Whether Annual maintenance after expiry of comprehensive onsite warranty quoted separately as optional.s		