



राष्ट्रीय प्रौद्योगिकी संस्थान अगरतला
NATIONAL INSTITUTE OF TECHNOLOGY AGARTALA
Fax : 0381 254-6360, Website : [http:// www.nita.ac.in](http://www.nita.ac.in)

No.F.NITA.12(94-EE)/Procurement Power Electronics Lab/2024/ 4207-10.

Date: 6/12/2024

E-Tender Notice

On behalf of National Institute of Technology Agartala, bids are invited in sealed cover from the reputed resourceful Manufacturers / Authorized Distributors/ Authorized Suppliers for supply of item(s)/goods as per specification mentioned in Annexure of tender document available at our website www.nita.ac.in.

Sl. No	Department / Section	Ref. No.	Items	Estimated cost (Rs.)	Last date of receipt of tender	Time and date of opening of Technical bid
1	Electrical Engineering	No.F.NITA.12(94-EE)/Procurement Power Electronics Lab/2024	Laboratory and Scientific Equipment	15,38,160.00	30/12/2024 Up to 3:00 PM	31/12/2024 At 3:00 PM

The interested Manufacturers / Authorized Distributors/Authorized Suppliers may arrange online submission of the tender through www.eprocure.gov.in along with scan copy of essential documents mentioned in the tender document.

Tender(s) is/are to be submitted only online through central public procurement portal i.e. "<http://eprocure.gov.in>". All the documents are to be scanned and uploaded along with the tender documents.

Tender sent by any other mode will not be accepted.

Registrar


Registrar
NIT Agartala

Copy to:

1. The P.S. to the Director for kind information.
2. The Nodal Officer, e-Procurement, NITA with a request to kindly arrange uploading the Tender Documents in the CPP portal <https://eprocure.gov.in/cppp>.
3. Mr. Kamal Kanti Paul, System Administrator, Computing & ICT Unit with a request to uploading the Tender documents in the Institute website site.
4. The Deputy Registrar (F & A).


Registrar
NIT Agartala



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National Institute of Technology Agartala
AGARTALA - 799 046 (TRIPURA)

No.F.NITA.12(94-EE)/Procurement Power Electronics Lab/2024/ 4207-10

Date: 6 / 12 / 2024

E- Tender Enquiry

IMPORTANT INFORMATION

Name of the Institute	: NATIONAL INSTITUTE OF TECHNOLOGY AGARTALA
GST Number of the Institute	: 16AAAGN0550K1ZG
PAN of the Institute	: AAAGN0550K
TAN of the Institute	: SHLN00719F
DSIR No.	: TU/V/RG-CDE(1053)/2022 dated 18/12/2022
Institute Bank A/C No.	: 030936141729 (IFSC: SBIN0011491) under SBI, NIT Agartala Branch.
Name of Department / Branch	: Electrical Engineering Department
Enquiry / Reference Number	: No.F.NITA.12(94-EE)/Procurement Power Electronics Lab/2024

Some important/Critical dates:

Uploading on CPP Portal and Department's web-site	Date: 09 / 12 / 2024	Time: 5:00 PM
Bid submission start date	Date: 09 / 12 / 2024	Time: 5:00 PM
Bid submission end date	Date: 30 / 12 / 2024	Time: 3:00 PM
Opening of technical bid	Date: 31 / 12 / 2024	Time: 3:00 PM

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Details of e-tender document.

NIT, Agartala intends to purchase the commodities/serie(s) specified in Annexure enclosed and invites quotations in accordance with the terms and conditions detailed in the bid document. If you are interested, kindly submit your offer with prices within the time mentioned above fulfilling all the terms and conditions marked in the bid documents.

Registrar

National Institute of Technology
Agartala – 799 046, Tripura

Encl :

- (1) Schedule of requirement, specifications, dates etc.
- (2) Bid document containing detail terms and conditions.



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1. Schedule of requirements

Sl. No.	Description of Goods/Service	Quantity
	1. DC-DC Bidirectional Buck Boost Converter for EV Charger with Controller	01 no
	2. Single Phase, 5 Level Diode Clamped Inverter with inbuilt FPGA Controller	01 no
	3. Single Phase, 5 level Cascaded Symmetric H-Bridge inverters with inbuilt FPGA Controller	01 no
	4. Study of VI Characteristics of SCR, TRIAC, IGBT and MOSFET	01 no
	5. Study of single-phase full Wave-Controlled Rectifier Circuits and Semi Converter (mid-point and bridge type) with R and R-L Load.	01 no
	6. DC-DC Buck Boost Converter	01 no
	7. Power Factor Correction (PFC) based setup and applications in SMPS Boost Converter with Power Factor Correction.	01 no
	8. Three phase SCR based Full Wave Rectifiers.	01 no
	9. 3-phase Shunt Active Power Filter (SAPF)	01 no
	(Details as per Sl No.1 to 9 at Annexure-B).	

2. Specifications and allied Technical Details

1. DC-DC Bidirectional Buck Boost Converter for EV Charger with Controller
2. Single Phase, 5 Level Diode Clamped Inverter with inbuilt FPGA Controller
3. Single Phase, 5 level Cascaded Symmetric H-Bridge inverters with inbuilt FPGA Controller
4. Study of VI Characteristics of SCR, TRIAC, IGBT and MOSFET
5. Study of single-phase full Wave-Controlled Rectifier Circuits and Semi Converter (mid-point and bridge type) with R and R-L Load.
6. DC-DC Buck Boost Converter
7. Power Factor Correction (PFC) based setup and applications in SMPS Boost Converter with Power Factor Correction.
8. Three phase SCR based Full Wave Rectifiers.
3-phase Shunt Active Power Filter (SAPF)
(Details as per Sl No.1 to 9 at Annexure-B).

1. Estimated Cost

₹ 15,38,160.00

2. Quotations should be valid for a period of **180** days from the opening date of the technical bid.
3. Bid Security or EMD: 2% of the estimated cost of the tender **or** Bidders should submit "**Bid Security Declaration Form**" on company letter head as per annexure-D of this tender document.
4. Performance Security: The amount of the Performance Security shall be 5%(five percent) (not applicable for consumable item(s)) of the Purchase Order / Contract value, valid up to 60 days after the date of completion of contract obligations including warranty obligations.
5. Delivery Option: 60 (sixty) days after receipt of the purchase/work order(s).
6. Please go through the enclosed "bid document" carefully for other bidding instructions.
7. For any technical details, you may contact through email-id: nitapurchasesection2@gmail.com.

Yours sincerely,

Registrar

National Institute of Technology
Agartala – 799 046, Tripura



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National Institute of Technology Agartala

AGARTALA - 799 046 (TRIPURA)

No.F.NITA.12(94-EE)/Procurement Power Electronics Lab/2024/

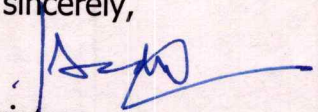
Date: / /2024

BID DOCUMENT

1. Instructions to the bidders:

- 1.1 Bids are invited through e-tender on behalf of the National Institute of Technology Agartala, Tripura, Agartala-799046 from the intending bidders for supply of the goods/stores/ equipments/Learning resources for the Institute as detailed in the enquiry letter.
- 1.2 The bidders should quote their rates in clear terms without ambiguity. The quotation should be only in Indian Rupees.
- 1.3 The last date & time for submission of the bid is marked in the enquiry.
- 1.4 The bids should be submitted online through www.eprocure.gov.in before the last date & time of submission specified in tender document.
- 1.5 Bids received after the deadline of receipt indicated in para 1.4 above, shall not be taken into consideration.
- 1.6 Each bidder shall submit only one bid **against one enquiry**. A bidder, who submits more than one bid against single enquiry, shall be disqualified and considered non-responsive.
- 1.7 The bidder has to enclose a check list at per Annexure - C duly filled in along with all relevant/supporting documents while submitting technical bid through www.eprocure.gov.in.
- 1.8 Opening of Bids by the Purchaser will be done as per the provisions of the e-procurement system.
- 1.9 At any time prior to the due date for submission of bids, the Purchaser may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the bidding documents by amendment.
- 1.10 All prospective bidders are expected to surf the website before formulating and submitting their bids to take cognizance of the amendments.
- 1.11 Custom Duty Exemption Certificate will be provided from the Institute for availing Custom Duty Exemption in trams of notification No. 51/96-Custom dated 23-07-1996, amended by notification No. 43/2017 dated 30-06-2017, further amended by notification No. 42/2022 dated 13-07-2022, as amended from time to time in case of imported items per OM No. F.4/1/2021-PPD dated 01-09-2021.

Yours sincerely,


Registrar

National Institute of Technology
Agartala – 799 046, Tripura



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National Institute of Technology Agartala
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No.F.NITA.12(94-EE)/Procurement Power Electronics Lab/2024/

Date: / /2024

2. General Terms & Conditions:

- 2.1 The rates quoted by the Supplier/Bidders should preferably be on basic price, Annual Maintenance Charges(if applicable), packing, forwarding, freight, Insurance and all other incidental charges including delivery of the Materials at National Institute of Technology, Agartala.
- 2.2 All taxes and duties will be paid extra and such amounts of mandatory/statutory taxes & duties shall be explicitly mentioned in BOQ while submitting of bid. If GST amount not quoted in the BOQ (price bid), the total cost will be treated as inclusive of GST.
- 2.3 Price has to be filled through CPP portal as per BOQ (<https://www.eprocure.gov.in>). The scanned copy of Price Bid, dully filled in, has to be uploaded on the above e-procurement site. The prices filled in the e-procurement site will be treated final and shall be binding to the vendor.
- 2.4 Insurance: The Goods supplied under the Contract shall be fully insured against any loss or damage incidental to manufacture or acquisition, transportation, storage and delivery up to the final destination.
- 2.5 All the Machines/Equipments/goods will be covered by Annual Maintenance Contract (AMC) / CMC/ Warranty beyond the normal warranty/guarantee period. Interested bidders are requested to quote price against AMC/Extended warranty as an optional item in the price bid. **Optional items will not be taken into consideration while selecting L₁ bidder.**
- 2.6 AMC/CMC/Extended Warranty will be awarded after completion of standard warranty period. AMC/CMC/Extended Warranty may be carried out only after receipt of confirmation letter from this Institute. The Institute will not be responsible for any due payments / obligations may arise as a result of execution of AMC/CMC/Extended Warranty without confirmation letter from this Institute.
- 2.7 Conditional discount, if any, offered by the bidder shall not be considered at the time of evaluation.
- 2.8 **The bidders who are registered as a Micro or Small Enterprise as per latest definitions under MSME rules, Govt. of India for exemption of submitting EMD/Bid security must enclose relevant documentary proof of authentication of their firm's registered as a Micro or Small Enterprise as per latest definitions under MSME rules, Govt. of India.**



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- 2.9 If the bidder is a Micro or Small Enterprise as per latest definitions under MSME rules, the bidder shall be exempted from the requirement of "Bidder Turnover" criteria and "Experience Criteria". If the bidder is OEM of the offered products, it would also be exempted from the "OEM Average Turnover" criteria. In case any bidder is seeking exemption from Turnover /Experience Criteria, the supporting documents to prove his eligibility for exemption must be uploaded with technical bid.
- 2.10 If the bidder is a Startup, the bidder shall be exempted from the requirement of "Bidder Turnover" criteria and "Experience Criteria". If the bidder is OEM of the offered products, it would also be exempted from the "OEM Average Turnover" criteria. In case any bidder is seeking exemption from Turnover / Experience Criteria, the supporting documents to prove his eligibility for exemption must be uploaded with technical bid.
- 2.11 National Institute of Technology, Agartala is following and abide with the Public Procurement (Preference to Make in India), Order 2017, DIPP, MoCI Order No. P-45021/2/2017-B.E.II dated 15th June 2017 and subsequent amendments to the order. Accordingly preference will be given to the Make in India products while evaluating the bids, however, it is the sole responsibility of the bidder(s) to specify the product quoted by them is of Make in India product along with respective documentary evidence as stipulated in the aforesaid order in the technical bid itself. A self-declaration as per Annexure- G should be enclosed in the technical bid.
- 2.12 **On site Comprehensive Warranty:**
- The successful bidder shall provide a Comprehensive Warranty for minimum period of 2 years (not applicable for consumable item(s)) after the installation and commissioning of the instrument / software/items. If within a warranty period after installation any such product or component is proven to be defective such product shall be repaired or replaced by the supplier/vendor. Such repair and replacement shall be sole obligation of supplier/vendor. Supplier / vendor shall be responsible for payment for all charges (to-and-fro) for repair/ replacement. Any design defects or installations deficiencies or any outer defects, if noticed during the warranty/ maintenance period, shall be rectified promptly by the successful bidder with no cost at all the places, which also includes the field installations.
 - Down-time call attendance should be within 48 hrs.
 - In case the Equipment / System remains non-operational for more than 5 days then warranty period will be extended for the equal period for which Equipment / System remained non-operational. Warranty extension in such case shall be done without prejudice to any other Term & condition of the contract.



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- 2.13 The documentary evidence of the bidders qualification to perform the contract if the bid is accepted shall establish to the purchasers satisfaction that:

(a)	The bidder meets the qualification criteria listed in bidding documents, if any.
(b)	Bidder who doesn't manufacture the goods it offers to supply shall submit Manufacturers' Authorization Form using the form specified in the bidding document to demonstrate that it has been duly authorized by the manufacturer of the goods to quote and / or supply the goods/services.

- 2.14 The successful bidder has to furnish "Performance Guarantee/Security" (not applicable for consumable item(s)) for an amount specified in the enquiry by E-Payment System to NITA Account within 15(fifteen) days of intimation of contract/supply order.

Alternatively, "Performance Guarantee/Security" will be retained by the Institute from the billed amount of the contract/supply order which will be released two months after the completion of warranty period (not applicable for consumable item(s)).

- 2.15 **Delivery Schedule:** As per e-Tender.

The item(s)/goods are required to be delivered at the indenting Department of National Institute of Technology, Agartala, and must be dispatched within specified days from the date of placement of the supply/purchase/work order.

If the supplier fails to Supply, Install and Commission the system/instrument as per specifications mentioned in the order within the due date, the Supplier is liable to pay liquidated damages of 0.5% of order value per week or part thereof of delay subject to a maximum of 10%, as the case may be, beyond the due date. Such money will be deducted from any amount due or which may become due to the supplier. Any exemption towards delay without LD can be resolved through mutual consent under exceptional circumstances.

- 2.16 Force Majeure: Notwithstanding the provisions of clauses relating to Extension of Time, Penalty and Termination for Default the Supplier shall not be liable for forfeiture of its Performance Security, Liquidated Damages or Termination for Default, if and to the extent that, its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.
- 2.17 Evaluation of Bid: The Technical Bid shall be evaluated on the basis of technical and other parameters usually taken in to consideration. Financial bid shall be evaluated on the basis of financial parameters. Govt. of India rules shall be taken in to account for evaluating both technical and financial bids.
- 2.18 The successful bidder(s) may be required to execute a contract on the basis of evaluation as per annexure(s) (as applicable).



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- 2.19 NIT Agartala will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive or coercive practices in competing for the Contract in question.
- 2.20 The bidder has to submit valid trade license, GST registration certificate, Last filled ITR and last filed GST return.
- 2.21 Payment: **100% will be made in INR (Indian National Rupees)** after successful Installation, Commissioning of item against submission of Performance Guaranty (PG) otherwise an equal amount of PG will be retained by the Institute till the completion of warranty obligations.
- Note:** All payments due under the contract shall be paid after deduction of statutory levies at source (like ESIC, IT (TDS), GST, LBT / Octroi etc.), wherever applicable.
- 2.22 In the event of any dispute arising out of the bid or from the resultant contract, the decision of the Competent Authority, National Institute of Technology, Agartala shall be final.
- 2.23 The bid document/resultant contract will be interpreted under Indian Laws.
- 2.24 National Institute of Technology, Agartala will not take any responsibility for arranging road permit/way bill or clearance from tax department for delivery of goods. All such requirements should be completed by the bidder for delivery of goods at National Institute of Technology, Agartala. GST payment, if required, should be paid by successful bidder and if GST not paid, National Institute of Technology, Agartala will deduct the applicable amount from successful bidder's bills and pay the same to Tax Authority. If there is any mandatory tax(es) other than GST/other taxes mentioned in this tender document, imposed by State Govt., the same may also be deducted from the bills of the successful bidder, as applicable.
- 2.25 **Competent Authority of National Institute of Technology, Agartala reserves the right to cancel the entire e-tendering process at any stage of the procurement process without mentioning any reason.**
- 2.26 **Legal disputes, if any with NIT Agartala will be restricted within the jurisdiction of Agartala only.**

Yours sincerely,

Registrar

National Institute of Technology
Agartala – 799 046, Tripura



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National Institute of Technology Agartala

AGARTALA - 799 046 (TRIPURA)

No.F.NITA.12(94-EE)/Procurement Power Electronics Lab/2024

Date: / /2024

3. Special Terms & Conditions:

- 3.1 Acceptance of Technical bid strictly depends on National Institute of Technology, Agartala's requirements credentials, manufacturing capability, quality control systems, past performance, after-sales service, financial background, commercial terms & conditions etc. of the supplier(s).
- 3.2 Detailed Specifications, brand, make, model & parts number, tolerance limit, resolution, corresponding ISO standard etc. of quoted Equipments/Items should be mentioned with supported leaflet/catalogue/brochure and list of buyers for acceptance of technical bid.
- 3.3 The technical bid and the financial bid should be submitted through www.eprocure.gov.in. The technical bids shall be opened and evaluated by the competent committee/authority. At the second stage, financial bids of only the technically qualified bidders shall be opened for further evaluation and recommendations for awarding the purchase order/contract.

It may specifically be mentioned whether quotation is strictly as per terms and conditions of the tender. Deviation, if any, must be spelt out specifically in technical bid. In the absence of this, the quotation may be rejected.
- 3.4 Installation & Commissioning: Within 15 (fifteen) days after delivery (if applicable).
- 3.5 The Quantity of each Item(s)/Equipment(s) may increase (as per Govt. Norms) or decrease at the time of issued of Purchase / Supply / Work Order. The Institute reserves right to purchase partly or not to purchase any item / cancel the entire process at any stage of procurement process.
- 3.6 Penalty: Penalty will be charged @ 0.5 % of per week or part thereof except for force majeure conditions for the unexecuted part of the supply/work order.
- 3.7 Arbitration: All disputes should be attempted to be resolve mutually between the National Institute of Technology, Agartala and the suppliers failing which jurisdiction of any Court of Agartala shall be applicable.
- 3.8 The successful bidder has to give at least 3-4 days on site training for each & every items/equipments by Certified Person (if required).
- 3.9 Model No. of the product should be given with catalogue (if any).
- 3.10 Items/Goods should be sent through Registered Transporter (preferably).
- 3.11 Bidders are required to upload a declaration on letter head stating that the bidder has not been black-listed & holiday listed by any Ministry/Department/Organization.



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- 3.12 Bidder(s) is/are required to upload a self-certificate as per applicability (Annexure- E or F) regarding offered item(s) as per Office Memorandum No. 6/18/2019-PPD dated 23-07-2022 & 24-07-2020 and Office Memorandum No. F.18/37/2020-PPD dated 8th February, 2021 issued by Department of Expenditure, Procurement Policy Division, Ministry of Finance, Govt. of India.
- 3.13 Bidders are requested to provide valid e-mail ID and phone number for further communication.
- 3.14 Bank A/C in the Exact Name of Bidder/Firm/Supplier with Name, A/C No., IFSC code must be furnished with technical bid.
- 3.15 Bidder has to submit annual turnover not less than 7.80 lakh per year with technical bid for last 3 (three) years. Bidder also has to submit OEM turnover not less than 61 lakhs per year for last 3(three) years (if bidder is not OEM).
- 3.16 If bidder itself OEM, has to be submit turnover not less than 61 lakhs per year for last 3 (three) years with technical bid.

Yours sincerely,

Registrar

National Institute of Technology
Agartala – 799 046, Tripura

DETAIL SPECIFICATIONS

01. DC-DC BIDIRECTIONAL BUCK BOOST CONVERTER FOR EV CHARGER WITH CONTROLLER

DC-DC BIDIRECTIONAL CONVERTER:

- 2Nos of Switching device SEMIKRON IGBT Rating @600v,75A ,20khz with proper heatsink and snubber circuit Used to form power circuit.
- BOOST MODE:
- I/P voltage range: -min: 24v Dc
- O/P voltage range: -max: 48V Dc
- Output power: 1000W(max)
- Switching Frequency---5-20khz
- 2 Nos of HCPL316J IC based Negative Turn Off (0-8 to +15v) with short circuit pwm driver circuit used
- One Hall effect current sensor used to sense Input current
- One Hall effect current sensor used to sense Inductor current and over load trip purpose.
- One hall effect voltage sensor used to sense the I/P voltage.
- One hall effect voltage sensor used to sense the o/p voltage.
- Voltage and current sensor o/pts terminated in front panel bs2 connector.
- Over load fuse protection available.
- Over temperature protection will be provided
- One no of 4" cooling fan used to dissipate switching device heat
- Controller to be provided at the time of installation

ARTIX7 7 XC7A35T FPGA CONTROLLER:

On-Board Features:

- Xilinx XC7A35T Artix 7 FPGA IC
- 256Mb SDRAM
- 8MB SPI FLASH Memory
- On-Board USB JTAG Programmer
- USB to UART Interface
- 4 Digit Seven Segment Display
- 50 MHz Clock
- ADC 4 channel 0-3V
- Temperature Sensor
- LDR Interface
- SPI DAC
- 2x16 LCD Display
- 16 Slide switches
- 5 Push Button
- 5v Buzzer
- 16 LEDs
- 31 External I/O's

02. SINGLE-PHASE, 5-LEVEL DIODE CLAMPED INVERTER WITH INBUILT FPGA CONTROLLER

- 8 no's of IGBT rating @600v,15A & 4 Nos Diodes used to form 1 phase 5 level cascaded h-bridge Inverterpower circuit,
- Snubber capacitor provided for dv/dt.
- 8nos TLP250 IC based PWM driver circuit used.
- 8no's of driver circuits used to isolate and Drive IGBT PWM signals.
- 8 no's of Isolated Regulated power supply rating @+15v/0.5A Used for IGBT PWM drivercircuits.
- 2 no's of current sensor used to sense the dc link current. All sensorO/P's used for current protection and terminated in front panel for measurement purpose.
- 1 no of CT used to sense the 1 phase load currents. The sensor output scaling needs to be mentioned, and the scaling control knobs must be accessible for the sensors.
- Sensor O/P's will used for over load Trip and terminated in front panel for measurement purpose.
- Necessary Interfacing connectors provided for PWM Input from FPGA controller and analog O/P's to FPGA controller.

- Over load trip and indication circuit is available.
- Over load fuse protection also provided.
- 2 no's of 2A single phase 24V isolation transformer and 1ph, 6A diode bridge rectifier's used to provide the isolated Dc supply **each diode clamped inverter included in each box.**
- The mentioned above all components covered with a Nice industrial type cabinet and Front panel covered with Power circuit mimic diagram sticker and labelling Will be provided for each terminal.
- **Each Inverter Dc Link volt:30V dc max**
- **Each Inverter o/p voltage :20 Vac rms**
- **Each inverter o/p current :2A max**

FPGA Spartan6 Controller:

On-Board Features:

Programming & Memory section

- Processor speed 20 MHZ.
- 57 Individually Programmable GPIO Pins.
- 4MB On board PROM for standalone program execution memory.

Interfaces

- 8 output and 8 input lines with 5V Level.
- Isolated serial communication interface through USB connector.
- 4 position user DIP switch.
- 8 user LEDs.
- 2 no of input push switches.
- 20x4 (or 16x2) LCD interface header.

Headers

- 2 no's of 16 pin and 1 no of 10 pin headers for GPIO line termination (49 Pins).
- 5 pin Unicon connector for power supply (+5V, GND).
- 20 pin header used to interface 20x4 LCD or 16x2 LCD.

LOAD:

50W Lamp Load TO be provided.

03. SINGLE-PHASE, 5-LEVEL CASCADED SYMMETRIC H-BRIDGE INVERTER WITH INBUILT FPGA CONTROLLER

- 8 no's of IGBT rating @600v,15A used to form 1 phase 5 level cascaded h-bridge Inverter power circuit,
- All IGBT are mounted on proper heat sink. Each H-bridge consist of 4 IGBTs with Anti parallel diodes totally 2 H-bridges used to form 1 phase 5level Inverter power module.
- Snubber capacitor provided for each H-bridge for dv/dt protection.
- Each H-bridge 4nos TLP250 IC based PWM driver circuit used.
- 8no's of driver circuits used to isolate and Drive IGBT PWM signals.
- 8 nos of Isolated Regulated power supply rating @+15v/0.5A Used for IGBT PWM driver circuits.
- 2 nos of current sensor used to sense the dc link current. All sensor O/Ps used for current protection and terminated in front panel for measurement purpose.
- 1 no of CT used to sense the 1 phase load currents. The sensor output scaling needs to be mentioned, and the scaling control knobs must be accessible for the sensors.
- Sensor O/P's will used for over load Trip and terminated in front panel for measurement purpose.
- Necessary Interfacing connectors provided for PWM Input from FPGA controller and analog O/P's to FPGA controller.
- Over load trip and indication circuit is available.
- Over load fuse protection also provided.
- 2 no's of 2A single phase 24V isolation transformer and 1ph, 6A diode bridge rectifiers used to provide the isolated DC supply **each H-bridge inverter included in each box.**
- The mentioned above all components covered with a Nice industrial type cabinet and Front panel covered with Power circuit mimic diagram sticker and labelling Will be provided for each terminal.
- **Each Inverter DC Link volt:30V dc max**
- **Each Inverter o/p voltage :20 Vac rms**
- **Each inverter o/p current :2A max**

FPGA Spartan6 Controller:**On-Board Features:****Programming & Memory section**

- Processor speed 20 MHZ.
- 57 Individually Programmable GPIO Pins.
- 4MB On board PROM for standalone program execution memory.

Interfaces

- 8 output and 8 input lines with 5V Level.
- Isolated serial communication interface through USB connector.
- 4 position user DIP switch.
- 8 user LEDs.
- 2 no of input push switches.
- 20x4 (or 16x2) LCD interface header.

Headers

- 2 no's of 16 pin and 1 no of 10 pin headers for GPIO line termination (49 Pins).
- 5 pin Unicon connector for power supply (+5V, GND).
- 20 pin header used to interface 20x4 LCD or 16x2 LCD.

Load:

- 50W Lamp Load will be provided.

04. STUDY OF VI CHARACTERISTICS OF SCR, TRIAC, IGBT AND MOSFET

It should Consist of power devices SCR, TRIAC, MOSFET, IGBT

- Two no. of 12V fixed DC power supply and one no of 30V fixed power supply for characteristics of all devices
- Two nos. of potentiometer to vary the gate/base current
- Fixed load resistor
- Power on/off switch provided, LED indication for 12V, 30V
- All necessary points terminated in the front panel Provision for connecting ammeter and voltmeter 3 meters (multi meter) are provided to measure the various power devices Current and voltage to find the static characteristics.
- For SCR only forward characteristics can be performed.

05. STUDY OF SINGLE-PHASE FULL WAVE-CONTROLLED RECTIFIER CIRCUITS AND SEMI CONVERTER(MID-POINT AND BRIDGE TYPE) WITH R AND R-L LOAD

This trainer should consist of two modules can be used to study all types of single-phase half & fully controlled bridge converters and single-phase AC regulator. It consists of two following modules.

a. Single phase SCR power circuit

- Four thyristor and two diodes are provided
- SCR rating: 1200V @ 25 Amp
- The device is mounted on suitable heat sinks and placed inside a nicely designed cabinet
- Snubber circuit is provided to each device
- All SCR and Diode points are terminated at sockets for easy wiring by patch cords
- Facilities are provided for switching ON/OFF, the AC supply to the converter circuit with fuse and miniature circuit Breaker protection
- Various circuit configurations like half and fully controlled bridge can be wired by interconnecting the devices using patch cords.

b. SCR pulse controller

- This module can be used to generate SCR Pulse for single phase and three phase half & fully controlled converter and ac regulator.
- One number of Digital Controller based (dsPIC) pulse controller for SCR Power circuit.
- Five Number of Touch Key Provided for Mode Selection
- One number of LCD provided to indicate the firing angle value etc
- One Number of toggle switch provided for Pulse Enable / Disable selection +5v 1Amp isolated dc supply provided for control circuits.
- All are mounted in a nice powder coated cabinet with stickered front panel with mimic diagram indication
- 230VAC input, One number of power on/Off switch with indication
- One number of 15 pin connector provided for Pulse output to external power module
- 7 Numbers of test points provided in the front panel for wave form
- 100W/230V lamp with holder will be provided

06. DC-DC Buck Boost Converter

- Switching device MOSFET Rating @200V, 8A, 20kHz with proper heatsink and snubber circuit Used to form power circuit.
- One Inductor used to boost the voltage.
- I/P voltage range: -max: 12V DC
- O/P voltage range: -max: 24V DC
- Switching Frequency---5-20kHz
- TLP 250 IC based pwm driver circuit used
- One Voltage divider used to sense the o/p voltage.
- Over load fuse protection available.
- One dsPIC 4011 based controller used to generate the pwm pulses
- 4*20lcd used to display the o/p voltage and duty cycle of the pwm.
- One no 0-30V /2A Regulated power will be provided to give variable input voltage.

07. POWER FACTOR CORRECTION (PFC) BASED SETUP AND APPLICATION IN SMPS BOOST CONVERTER WITH POWER FACTOR CORRECTION

- 1No of SEMIKRON IGBT rating @600V/75A with Heat sink and Snubber circuit used to form power circuit.
- 1no Ultrafast high frequency Diode used
- 1no 2mH/10A Inductor will be used.
- 1No SKYPER32 R SEMIKRON Based Isolated Negative Turn OFF (-7 to +15V) with High Speed PWM Driver circuits Used.
- 2 Nos of Current Transducer used for sensing the input and output of the converter current
- 2 Nos of IC7840 based Voltage Sensing circuit used for sensing the input and output of the converter voltage
- I/P--- is 230V AC
- O/P is 350VDC
- O/P CURRENT---6A
- Power Rating is 2000Watts
- 680mF/450V electrolytic capacitor will be used
- One no (0-900V dc) 72*72MM Analog Volt meter used to indicate the I/P voltage
- One no (0-100V dc) 72*72MM Analog Volt meter used to indicate the O/P voltage
- 1No of 1PH Diode Bridge Rectifier used to convert AC in to DC
- One no LC filter will be used in Input AC side
- Over Current Protection is available
- Short circuit protection Available.
- Over voltage Protection Available
- Additional External Controller can be interfaced.
- Outputs terminated in Banana socket

08. THREE PHASE SCR BASED FULL WAVE RECTIFIERS**3-Ø SCR POWER CIRCUIT:**

- Four thyristors and two diodes will be used
- SCR rating @: 1200V/25 Amp
- All SCR and Diode points will be terminated at sockets for easy wiring by patch cords
- One ON/OFF switch will be used for main 230V AC supply
- Over load fuse and miniature circuit Breaker protection will be used
- Various circuit configurations like half and fully controlled bridge will be wired by interconnecting the devices using patch cords.

SCR PULSE CONTROLLER:

This module will be used to generate SCR Pulse for three phase half & fully controlled converter and ac regulator.

- One number dsPic4011 controller used for pulse generation for SCR Power circuit.
- Five Number of Touch Key will be provided for Mode Selection
- One number of 20 x 4 LCD will be provided to indicate the firing angle value etc
- One Number of toggle switch should be provided for Pulse Enable / Disable selection
- +5V 1Amp isolated dc supply will be provided for control circuits.
- All components will be mounted in a nice powder coated cabinet with stickered front panel with mimic diagram indication
- 415VAC input, one number of power On/Off switch with indication will be used
- One number of 15 pin connector should be provided for Pulse output to external power module
- 7 Numbers of test points will be provided in the front panel for wave form

THREE PHASE RESISTIVE LOAD

- Power-- 1KW
- Voltage---230v
- 5 no's selector switches will be provided

0.5HP DC SHUNT MOTOR WITH SPRING BALANCE LOAD:

- Armature Voltage-----220v
- Armature current-----2.5A
- Field Voltage-----220v
- Speed-----1500rpm
- One no Proximity sensor used to sense the speed of the motor

09. 3-PHASE SHUNT ACTIVE POWER FILTER (SAPF)

- 110V, 50 Hz, Three phase supply
- 500 VA harmonic producing load,
- 1 kVA three phase IGBT based power converter for compensation
- Multi-parameter for measuring supply voltage, current and other parameters.
- Control algorithm developed in Synchronous Reference Frame
- ARM Cortex M4 32-bit microcontroller based digital controller
- Intermediate stage test point observations using Two Digital to Analogue Converter (DACs)
- Different test points in control and power

Controller Card:

- STM32F407VGT MCU @168MHz
- Buffered I/O Ports using 74HC573
- 2 DAC outputs
- 9 ADC input channels with buffering using LM324 IC
- On board QEI (Quadrature Encoder Interface) section
- 5 Keys push to ground
- 16*2 LCD (JHD162A) display
- UART section (RS-232) (IC Max 232)
- RS-485 serial communication port

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX





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ANNEXURE – B

PRICE BID

As per BOQ



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ANNEXURE – C

Documents for Comprising the Bid

Sr.No.	TENDER REQUIREMENT	COMPLIANCE	Document Submitted
1	Name of the Firm / Agency / Dealer / Supplier with full address including contact number and email id etc.	Yes / No	Yes / NA
2	Trade License issued by Government / Statutory Body or Company Registration on the item(s) related to this tender.	Yes / No	Yes / NA
3	GST Registration of the Supplier/Firm/Bidder.	Yes / No	Yes / NA
4	PAN Registration of the Supplier/Firm/Bidder	Yes / No	Yes / NA
5	Financial Solvency issued by Bank(as per RBI guidelines) (in case of estimated cost is Rs.25.00 lakhs and above).	Yes / No	Yes / NA
6	Up to date GST return / any other tax clearance certificate. (last filed GST return, GSTR 9 and 9B)	Yes / No	Yes / NA
7	Annual Turnover	Yes / No	Yes / NA
8	Up to date Income Tax Return (Last filled ITR)	Yes / No	Yes / NA
9	“Bid Security Declaration form” on Company Letter Head (Scanned copy to be uploaded along with Technical bid).	Yes / No	Yes / NA
10	Service Support details (if applicable)	Yes / No	Yes / NA
11	Certification of holiday and non-black listing (Self Certification)	Yes / No	Yes / NA
12	Certification as per memorandum No. F.18/37/2020-PPD dated 8 th February 2021, Dept. of Expenditure, Ministry of Finance, Govt. of India (Self Certification)	Yes / No	Yes / NA
13	Proprietary Certificate from OEM to be uploaded along with the Technical Bid in case of Proprietary items	Yes / No	Yes / NA
14	Manufacturers Authorization Form (MAF) (if applicable)	Yes / No	Yes / NA
15	Certificate under MSME, NSIC, Make-in-India & Startup as per Govt. of India Norms (if applicable).	Yes / No	Yes / NA
16	Experience, if any, with govt. sector /Public Undertaking /Private sector (if applicable) (May be relaxed for MSME, NSIC & Startup as per Govt. of India Norm)	Yes / No	Yes / NA
17	Any other criteria related to this tender.	Yes / No	Yes / NA
18	Supplier/Firm/Bidder should accept all Terms & Conditions and specification of the items given in the Tender Document.	Yes / No	

(Signature of the bidder)



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Annexure-D

Bid Securing Declaration Form

Date:..... Tender Ref. No: Tender ID:

To (insert complete name and address of the purchaser)

I/We. The undersigned, declare that:

I/We understand that, according to your conditions, bids must be supported by a Bid Securing Declaration.

I/We accept that I/We may be disqualified from bidding for any contract with you for a period of one year from the date of notification if I am /We are in a breach of any obligation under the bid conditions, because I/We

a) have withdrawn/modified/amended, impairs or derogates from the tender, my/our Bid during the period of bid validity specified in the form of Bid; or

b) having been notified of the acceptance of our Bid by the purchaser during the period of bid validity (i) fail or reuse to execute the contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with the Instructions to Bidders.

I/We understand this Bid Securing Declaration shall cease to be valid if I am/we are not the successful Bidder, upon the earlier of (i) the receipt of your notification of the name of the successful Bidder; or (ii) thirty days after the expiration of the validity of my/our Bid.

Signed: (insert signature of person whose name and capacity are shown)

in the capacity of (insert legal capacity of person signing the Bid Securing Declaration)

Name: (insert complete name of person signing the Bid Securing Declaration)

Duly authorized to sign the bid for an on behalf of (insert complete name of Bidder)

Dated on _____ day of _____ (insert date of signing)

Corporate Seal (where appropriate)

(Note: In case of a Joint Venture, the Bid Securing Declaration must be in the name of all partners to the Joint Venture that submits the bid)



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Annexure-E

(Compliance to be submitted in the bidder's letterhead)
(as applicable)

Sub: Compliance to Government of India order OM No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020 and OM No. F.18/37/2020-PPD dated 8th February, 2021 regarding restrictions under Rule 144 (XI) of the General Financial Rules (GFRs), 2017.

Item Name:	
Enquiry No.:	

We M/s.(name of the bidder company) have read the clauses pertaining to the Department of Expenditure's (DoE) Public Procurement Division Order (Public procurement no 1,2 & 3 vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020) regarding restrictions on procurement from a bidder of a country that shares a land border with India.

We hereby certify that **we are not from such a country** and eligible to be considered for this tender.

(Note: Non-compliance of above said GoI Order and its subsequent amendment, (if any), by any bidder(s) shall lead to commercial rejection of their bids by NIT-Agartala)

For and behalf of(Name of the bidder)

(Signature, date & seal of an authorized representative of the bidder)



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No.F.NITA.12(94-EE)/Procurement Power Electronics Lab/2024

Date: / /2024

Annexure-F

(Compliance to be submitted in the bidder's letterhead)
(as applicable)

Sub: Compliance to Government of India order OM No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020 and OM No. F.18/37/2020-PPD dated 8th February, 2021 regarding restrictions under Rule 144 (XI) of the General Financial Rules (GFRs), 2017.

Item Name:	
Enquiry No.:	

We M/s. (name of the bidder company) have read the clauses pertaining to the Department of Expenditure's (DoE) Public Procurement Division Order (Public procurement no 1,2 & 3 vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020) regarding restrictions on procurement from a bidder of a country that shares a land border with India.

We are from such a country which shares a land border with India & have been registered with the Competent Authority as specified in the above-said order. We hereby certify that we fulfill all requirements in this regard and are eligible to be considered.

Evidence of valid registration by the Competent Authority is attached.

(Note: Non-compliance of above said GoI Order and its subsequent amendment, (if any), by any bidder(s) shall lead to commercial rejection of their bids by NIT-Agartala)

For and behalf of(Name of the bidder)

(Signature, date & seal of an authorized representative of the bidder)



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Annexure -G

Self-Certification on the letterhead of the company

In line with Government Public Procurement Order No. P-45021/2/2017-BE-II dt. 15.06.2017, P-45021/2/2017-PP (BE-II) dated 28.05.2018, P-45021/2/2017-PP (BE-II) dated 29.05.2019 and P-45021/2/2017-PP (BE-II) dated 16.09.2020,

We hereby certify that (Supplier name) are local supplier meeting requirement of minimum local content..... % defined in as above orders for the material against Enquiry / Tender No dated.....

Details of the location at which local value addition will be made are as follows:

.....
.....
.....
.....

We also understand false declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permitted under law.

Date:

Place:

Signature:

Name and Designation:

Mobile no:

Office Telephone No:

Email ID: Office Seal



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Annexure -H

NON BLACKLISTING SELF CERTIFICATE

[To be submitted on letterhead]

I/We hereby certify that the ----- [Name of the company / firm] has not been ever blacklisted/debarred by any Central / State Government / Public Undertaking / University / Institute on any account.

I/We also certify that firm will provide material as per the specification given by NIT Agartala and also abide all the terms and conditions stipulated in the bid document.

I/We also certify that the information given in bid is true and correct in all aspects and in any case at a later date it is found that any details provided are false and incorrect, contract given to the concerned firm or participation may be summarily terminated at any stage, the firm will be blacklisted and NIT Agartala may impose any action as per the rules.

Date :

Name :

Place :

Business Address:

Signature of Service Provider:

Seal of the Service Provider: