
Ref: NITMGH/ES/RECTPCL/035/2017-18/413

Date: 29.05.2017

**NOTICE INVITING QUOTATION (NIQ) FOR SUPPLY OF ITEMS TO IMPLEMENT
RESEARCH MODULE OF AC/DC MICROGRID SYSTEM (LABORATORY SCALE) UNDER
RECTPCL-CSR PROJECT, DEPARTMENT OF ELECTRICAL ENGINEERING, NIT
MEGHALAYA**

NIT Meghalaya invites sealed tenders in a two bid system for supply of equipment as per details at ANNEXURE-III. The first part is the **Technical Bid** which consists of technical requirements and general terms & conditions and the second part is the **Financial Bid**.

Prescribed Tender document, detailed fees and specifications, bid instructions and Terms & Conditions can be downloaded from the Institute website and should reach the undersigned on or before **1:00 PM on 29th June 2017**.

BID INSTRUCTIONS:

01. For submitting Technical and Financial bid, two separate sealed covers should be used with superscription clearly on the top of the Envelope. If two separate sealed covers are not used, the tender shall be cancelled as not conforming to the technical requirement. Both the sealed covers should be placed in the main sealed Envelope distinctly superscribed with the address of the Agency submitting the quotation and the Officer to whom the quotation is addressed to. Further, on the sealed cover, the following are to be written:

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RECTPCL-CSR PROJECT, DEPARTMENT OF ELECTRICAL ENGINEERING, NIT
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NIQ REF No. **NITMGH/ES/RECTPCL/035/2017-18/413**

Date:29.05.2017

LAST DATE OF SUBMISSION:**29th June 2017, 1:00 PM** . Technical bids will be opened on the same day at 3:00 p.m. After evaluation of technical bids, financial bids of the successful bidders will be opened on a later date which will be duly notified.

02. **Submission of Compliance Certificate:** Duly filled and signed Compliance Certificates (as per formats at Annexure-I A & B) are must with the Technical bid.
03. **Bid not transferable:** The bid documents are not transferable and the seal and signature of the authorized official of the firms must appear on all the papers and envelopes submitted.
04. The quantity mentioned for each item in the Annexure-III may vary depending on requirements.
05. **Softcopy of the Technical bid** either in Microsoft Word or Microsoft Excel format must also be submitted in a CD along with the Technical Bid, in addition to the hard copies. Quotations not accompanied by soft copy will be rejected.

SIGNATURE OF BIDDER

NIQ TERMS & CONDITIONS:

01. **Rates:** Rates quoted in the Price Bid should be on DOOR DELIVERY NIT Meghalaya basis, as per details below:

Group:	Item Sl. No.	Item name	
Sl. No.	Particulars		Rate
I	Basic Price (per unit)		
	Discount if any		
	Total		
	Taxes (pl. give break up)		
	Total (per unit)		
	Grand total for the item		
II	Transportation charge up to NIT Meghalaya premises (if applicable)		
III	Transit Insurance covering all risk up to 10 days after delivery (if applicable)		
	Grand total on door delivery at NIT Meghalaya		
IV	Annual Maintenance Contract rate (after expiry of warranty period)		

Note: Vague terms like “packing, forwarding, transportation etc. extra” without mentioning the specific amount will not be accepted. Such offers shall be treated as incomplete and rejected.

Bidders shall indicate their rates in clear/visible figures as well as in words and shall not alter/overwrite/make cutting in the quotation. In case of a mismatch, the rates written in words will prevail. Usage of “White ink” to erase and then rewrite the rates will not be accepted. Bidders are advised to strike out wrong entries and rewrite clearly beside them. In such cases, the bidder shall have to sign and place their official seal for every corrected entry.

02. All documents submitted should be self-attested with seal of the bidder.
03. Bidder must unconditionally accept all terms and conditions stipulated in the tender document and all pages of the bid including all enclosures should be numbered and must be duly filled in, signed and stamped by the bidder or his authorized representative. Offers received without signature and seal on all pages are liable to be rejected.
04. **Validity of Quotation:** Quoted rates must be valid for 120 days from the date of quotation.
05. **Warranty:** The quoted equipment and components must be warranted for a minimum of one Year or period specified against the item.
06. **Literature must:** All the quotations must be supported by the printed technical data sheet/ literature and the specifications mentioned in the quotation must be reflected/ supported by such printed technical data sheet/ literature. The model no. and specifications quoted should invariably be highlighted in the data sheets/ literature for easy reference.
07. **Details of supply** of similar items to Institutes of National Importance (preferably those located in the Northeastern region) must be provided.
08. **Presentation:** Technically qualified bidders may be called upon to give full presentation of the quoted equipment at NIT Meghalaya campus before opening of Price bid as a support of their Technical Quotations and for any clarifications.
09. **Equipment breakdown:** Any Equipment breakdown must be attended to within 72 hours during the warranty period of the equipment free of cost.

SIGNATURE OF BIDDER

10. **Training:** If required, free training is to be provided to NIT Meghalaya personnel on the operation, maintenance and trouble shooting of the supplied items.
11. **After Sales Service:** Vendor should clearly state the available nearest after sales service facilities in the North Eastern region, without which the offer will be rejected.
12. **Dealership Certificate:** The bidder/tenderer should be either a manufacturer or authorized agent of the foreign/Indian manufacturer. Dealers or Agents quoting on behalf of Manufacturer must enclose valid dealership certificate.
13. **Quality Certificates:** Valid certificate to prove the genuineness of the products and of International standard, as mentioned below, must be enclosed
 - (a) Manufacturer's certificate and
 - (b) ISO/ISI certificate.
14. The vendor must quote item_01 and item_02 (including all sub-items) under RECTPCL project and no partial quotation is entertained.
15. During technical bid evaluation of said tender, the vendor may be called to demonstrate the technical feasibility for implementation of customized control and energy management for hybrid AC/DC micro-grid system. The demonstration will be carried either in person or through skype based on suitability of vendor/indenter.
16. **Earnest Money:** Refundable earnest money deposit (EMD) of ` **25,000/- (Rupees Twenty Five Thousand)** only of the quoted value through demand draft drawn in favour of National Institute of Technology Meghalaya, payable at Shillong, will have to accompany the technical Bid. The EMD of unsuccessful bidders shall be returned after award of contract. EMD of the successful bidder will be released on submission of the Performance Bank Guarantee or delivery of the ordered items, as applicable.

Firms registered under DGS&D will be exempted from submitting EMD. In case of firms registered under NSIC, exemption will be given to the permissible extent, as indicated in their Certificate. All vendors claiming exemption must submit copies of their valid DGS&D/NSIC registration Certificate (along with the Technical Bid in case of two bid system). Offers received without Earnest Money or valid Certificate shall be summarily rejected.
17. **Performance Bank Guarantee (PBG):** In case of items with order value of INR 5,00,000/- (Rupees Five Lakh) and above, the successful bidder shall furnish an unconditional PBG (as per format at Annexure II) for 10% of the Purchase Order value from a scheduled Bank of India, before release of the payment. Else 10% of the billed amount will be deducted as security deposit. Where the PBG is obtained by a foreign bank, it shall be got confirmed by a Schedule Indian bank and shall be governed by Indian Laws and be subject to the jurisdiction of courts at Shillong. The PBG shall guarantee that,
 - a) The Vendor guarantees satisfactory operation of the Equipment & components against poor workmanship, bad quality of materials used, faulty designs and poor performance.
 - b) The Vendor shall, at his own cost, rectify the defects/replace the items supplied, for defects identified during the period of guarantee.
 - c) This guarantee shall be operative from the date of installation till 60 days after the warranty period.

18. Delivery:

- a. **Time Limit:** Maximum within 60 (Sixty) days from the date of issue of purchase order.
 - b. **Safe Delivery:** All aspects of safe delivery shall be the exclusive responsibility of the vendor. At the destination site, the package will be opened only in the presence of NIT user/representative and vendor's representative. The intact condition of the package and the seal/indicators for not being tampered with, shall form the basis for certifying the receipt in good condition.
 - c. **Insurance:** The supplier is to establish 'All Risk Transit Insurance' coverage till door delivery at NIT Meghalaya.
 - d. **Part Delivery:** Acceptance of part delivery shall be a prerogative of the Institute.
 - e. **Penalty for delay in delivery:** The date of delivery should be strictly adhered to otherwise the Director, NIT Meghalaya reserves the right not to accept delivery in part or full.
 - f. In case Road Permit/ Special Permission from the Commissioner of Tax is required, proforma invoice has to be submitted to the Institute within 15(fifteen) days from the date of issue of P.O.
19. **Genuine Pricing:** Vendor is to ensure that quoted price for the particular item is not more than the price quoted to any other customer in India, particularly to IITs/NITs and other Government Organization. Copy of the latest price list for the quoted item, applicable in India, must be enclosed with the offer.
20. **Conditional tenders not acceptable:** All the terms and conditions mentioned herein must be strictly adhered to by all the vendors. Conditional tenders shall not be accepted on any ground and shall be rejected straightway. Conditions mentioned in the tender bids submitted by vendors will not be binding on NIT Meghalaya.
21. **VAT deduction at source:** In case of suppliers within Meghalaya, VAT deduction at source, as per Order/ notification of the Govt. of Meghalaya will be applicable.
22. **Late and delayed tender:** Late and delayed tender will not be considered. In case any unscheduled holiday occurs on the prescribed closing/opening date the next working day shall be the prescribed date of closing/opening.
23. **Payment:** 100% payment within 30(thirty) days from date of delivery, installation and acceptance.
24. **Enquiry during the course of evaluation not allowed:** After opening the Technical Bid, no enquiry from the bidder(s) shall be entertained during the course of evaluation of the tender till final decision is conveyed to the successful bidder(s). However, the Purchase Committee or its authorized representative may make enquiries/seek clarification from the bidders. In such a case, the bidder must extend full co-operation. The bidders may also be asked to arrange demonstration of the offered items, in a short period of notice.
25. At any time prior to the date of submission of bid, NIT Meghalaya may, for any reason, either of its own or in response to a clarification from a prospective bidder, modify the bidding documents by an amendment / corrigendum. Any such amendment / corrigendum will be duly notified through newspapers and also uploaded on the Institute's website. Prospective bidders are advised to check the Institute's website every now and then for any amendment / corrigendum. In order to provide reasonable time to take the amendment into account in preparing the bid, NIT Meghalaya may extend the date and time for submission of bids.

26. The acceptance of the quotation will rest solely with the Director, NIT Meghalaya, who in the interest of the Institute is not bound to accept the lowest quotation and reserves the right to himself to reject or partially accept any or all the quotations received without assigning any reasons.

27. Price quoted in foreign currency will be calculated as per Exchange Rate at the time of opening of financial bid.

28. Force Majeure:

If the performance of the obligation of either party is rendered commercially impossible by any of the events hereafter mentioned that party shall be under no obligation to perform the agreement under order after giving notice of 15 days from the date of such an event in writing to the other party, and the events referred to are as follows:

(a) Any law, statute or ordinance, order action or regulations of the Government of India,

(b) Any kind of natural disaster, and

(c) Strikes, acts of the Public enemy, war, insurrections, riots, lockouts, sabotage.

29. Termination for default: Default is said to have occurred

(a) If the equipment or any of its component is found having poor workmanship, faulty designs, poor performance and bad quality of materials used.

(b) If the supplier fails to deliver any or all of the services within the time period(s) specified in the purchase order or any extension thereof granted by NIT Meghalaya.

(c) If the supplier fails to perform any other obligation(s) under the contract.

Under the above circumstances NIT Meghalaya may terminate the contract / purchase order in whole or in part and forfeit the EMD/PBG as applicable. In addition to above, NIT Meghalaya may at its discretion also take the following actions: NIT Meghalaya may procure, upon such terms and in such manner, as it deems appropriate, goods similar to the undelivered items/products and the defaulting supplier shall be liable to compensate NIT Meghalaya for any extra expenditure involved towards goods and services obtained.

28. Applicable Law:

(a) The contract shall be governed by the laws and procedures established by Govt. of India and subject to exclusive jurisdiction of Competent Court and Forum in Shillong / India only.

(b) Any dispute arising out of this purchase shall be referred to the Director, NIT Meghalaya, and if either of the parties hereto is dissatisfied with the decision, the dispute shall be referred to the decision of an Arbitrator, who should be acceptable to both the parties, to be appointed by the Director of the Institute. The decision of such Arbitrator shall be final and binding on both the parties.

ADDITIONAL TERMS FOR IMPORTED GOODS

Following terms, besides the aforementioned terms, will be applicable in case of foreign purchases:

01. **Rates :** Rates quoted in the Price Bid should be on **DOOR DELIVERY NIT Meghalaya basis**, as per details below:

a. Ex-works value

b. Estimated Overseas Freight to be paid at actual against authentic documents and monetary receipt

- c. Estimated Overseas Insurance Charge to be paid at actual against authentic documents and monetary receipt (In case the firm holds open insurance policy, the Insurance Certificate relating to the consignment will have to be provided).
 - d. Estimated Custom Duty and Custom Clearance charges.
Please note that NIT Meghalaya has a valid registration with the Department of Scientific & Industrial Research (DSIR), Ministry of Science & Technology, Government of India for availing Customs/ Central Excise Duty exemption.
 - e. Documentation and Handling Charges.
 - f. **As NIT Meghalaya presently does not have a clearing agent, the supplier or their Indian Agent/ Partner has to take all responsibilities for clearing the equipment from the landing port in India and for door delivery at NIT Meghalaya.**
Suppliers or their Indian Agent/ Partner who are unable to arrange for Custom Clearance of the consignment/ equipment at the port of landing in India and for their onward transportation upto Shillong NEED NOT SUBMIT QUOTATIONS.
 - g. Estimated inland transportation and insurance charges from the port of landing upto NIT Meghalaya, Shillong, Meghalaya.
 - h. **Total value of the item must indicate all the above charges for DOOR DELIVERY upto NIT Meghalaya, Shillong, Meghalaya.**
 - i. Reimbursement for charges incurred for Customs Clearance, handling, documentation, inland transportation and insurance charges from the port of landing upto NIT Meghalaya will be made by NIT Meghalaya as per actual costs in Indian Rupees to the Indian Agent/Partner, on production of all related original documents within 30(thirty) days from the date of receipt of the documents.
02. NIT Meghalaya will provide all necessary certificates, authorizations, documents and road permits required for clearing the consignment and for onward transportation upto Shillong. A copy of the Proforma Invoice will be required for obtaining the Road Permit from the Tax Department, Government of Meghalaya.
03. **After Sales Service:** In case of imported stores, foreign manufacturing firms should indicate facilities available for after sales service in India without which their offers are liable to be ignored. The quotation will have to clearly state the available nearest after sales service centre and contact no. in India.
04. **Delivery :**
- a. Delivery of goods at NIT Meghalaya, will have to be within 100 (one hundred) days from the date of issue of the Purchase Order.
 - b. While transshipment will be allowed, part shipment will not be allowed.
05. **Conversion of tender currencies to Indian Rupees:**
 In case the tenderers quote their prices in different currencies, all such quoted prices of the tenderers will be converted to a single currency viz., Indian Rupees for the purpose of equitable comparison and evaluation, as per the reference rates established by the Reserve Bank of India for similar transactions, as on the date of price bid opening.

06. Payment and Performance Bank Guarantee (PBG):

- a. **Above US\$ 10,000.00:** By an irrevocable Letter of Credit at CIP/CIF any landing air/sea/road/railway port in India value negotiable through any overseas branch of State Bank of India with unrestricted provision.

In this case, the Indian Agent/ Partner is required to submit an unconditional PBG from a scheduled Bank of India for 10% of the Purchase Order value within 21 (twenty one) days from date of issue of Purchase Order, as per format at Annexure II of the Tender papers. Where the PBG is obtained by a foreign bank, it shall be endorsed by its counterpart in India and shall be governed by Indian Laws and be subject to the jurisdiction of courts at Shillong.

- b. **Below UD\$ 10,000.00 by FDD/Wire Transfer as given below:**

- (i) **Advance payment Against Bank Guarantee:** 90% of the price will be paid in advance **against equivalent bank guarantee** from a scheduled bank provided by the supplier/Indian Agent/ Partner. The remaining 10% shall be released only after receipt and acceptance of materials in good condition or after satisfactory installation and commissioning of the equipment.

OR

- (ii) **100% Payment Basis:** On request by the supplier/s 100% payment by FDD will be made. In this case on receipt of your Order Acknowledgement an FDD will be established for total ordered value, thereupon, a scanned / photo copy of the FDD will be sent to you, which will enable you to send the materials. On satisfactory receipt and acceptance of the materials or satisfactory installation and commission of the equipment the Original FDD will be sent to you.

In the case of order value worth more than US\$ 7,500.00, the Indian Agent/ Partner is required to submit an unconditional PBG from a scheduled Bank of India for 10% of the Purchase Order value within 21 (twenty one) days from date of issue of Purchase Order, as per format at Annexure II of the Tender papers. Where the PBG is obtained by a foreign bank, it shall be endorsed by its counterpart in India and shall be governed by Indian Laws and be subject to the jurisdiction of courts at Shillong.

Note: Please note FDD/LoC will not be opened unless and until Letter of Acknowledgement in original is received at NIT Meghalaya, directly from the principal (even in case of firms having subsidiary office in India) and receipt of the original PBG from the Indian Agent/ Partner (if applicable). The Indian agents are therefore advised to submit quotation after consultation with their respective principals.

The PBG shall guarantee that:

- a. The Vendor guarantees that the P.O. shall be executed as per terms and conditions mentioned therein.
- b. The Vendor guarantees satisfactory performance of the equipment and that the equipment and components are free from poor workmanship, bad quality, faulty designs and poor performance.
- c. The Vendor shall, at his/their own cost, rectify the defects/replace the items supplied, for defects identified during the period of guarantee.

This guarantee shall be operative from the date of installation upto 60(sixty) days after the warranty period.

07. **Agency Commission:** The percentage of ex-works value to be paid to Indian agent in equivalent Indian currency as agency commission (if any) will have to be clearly stated in the quotation.
08. **Country of Origin:** While Country of Origin Certificate will not be insisted, the same however will have to be stated in the Original Invoice for payment through LoC.
09. **LoC/FDD Amendment:** LoC/FDD amendment charges due to mistake on the part of the supplier, if any, will have to be borne by the supplier.

Sd/-
Registrar (i/c)

Encl.: ANNEXURE-I, ANNEXURE-II, ANNEXURE-III

Annexure –I

A. COMPLIANCE CERTIFICATE FOR NIQ TERMS
(To be enclosed in the Technical bid)

Sl. No.	NIQ Terms and Conditions	Yes/No
01	Rate quoted as per instruction	
02	AMC rate after warranty provided	
03	Validity of quoted rate for 120 days agreed	
04	EMD submitted (appropriate certificate enclosed)	
05	PBG term agreed	
06	Payment term agreed	
07	Delivery terms agreed	
08	Warranty period agreed	
09	Literature: Printed Literature provided	
10	Dealership / distributorship certificate (in case of dealers/agents) provided	
11	Equipment breakdown clause agreed	
12	After Sales Service: address of after Sales Service centre in India (for imported goods)/ in the region provided	
13	Manufacturer certificate provided	
14	ISO/ ISI certification provided	
15	Applicable law terms agreed	
16	Soft copy of Technical Bid enclosed	

Signature with Seal:.....
Vendor: M/s.....

Annexure -I

B. COMPLIANCE CERTIFICATE FOR SPECIFICATIONS
(One for each item, must to be enclosed in the Technical bid)

Item Sl. No.		Item Name:	
Quoted Product:	Make:	Model No:	
Specifications as per Annexure-III		Quoted Item Specifications*	Complied/ Deviation
Parameter	Specification		

Signature with Seal:

Vendor: M/S

*** Vendor must quote the parameter specification of the quoted product in this column and not just copy the specification from the tender call document. Failure to do so will lead to rejection of the tender.**

Annexure -II

PERFORMANCE BANK GUARANTEE

To:
The Registrar (i/c),
National Institute of Technology Meghalaya
Bijni Complex, Laitumkhrah, Shillong-793 003
Meghalaya

WHEREAS (Name of Supplier)
hereinafter called "the Supplier" has undertaken, in pursuance of Contract No..... dated,.....
20... to supply..... (Description of Goods and Services)
hereinafter called "the order".

AND WHEREAS it has been stipulated by you in the said order that the Supplier shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with the Supplier's performance obligations in accordance with the order.

AND WHEREAS we have agreed to give the Supplier a Guarantee:
THEREFORE WE hereby affirm that we are Guarantors and responsible to you, on behalf of the Supplier, up to a total of (Amount of the Guarantee in Words and Figures) and we undertake to pay you, upon your first written demand declaring the Supplier to be in default under the order and without cavil or argument, any sum or sums within the limit of (Amount of Guarantee) as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This guarantee is valid until theday of.....20.....

Signature and Seal of Guarantors

.....
.....
.....
Date.....20....
Address:.....
.....
.....

All correspondence with reference to this guarantee shall be made at the following address:

Registrar (i/c),
National Institute of Technology Meghalaya
Bijni Complex, Laitumkhrah, Shillong-793 003
Meghalaya

ANNEXURE-III

Item 01: Hybrid DC Micro-grid (Laboratory scale research module)

DETAILED TECHNICAL SPECIFICATIONS
<p>a) Modular Solar Array Simulator <u>Specification:</u> Input Line voltage: 95 to 264VAC, 45-60Hz, 1Ph Output Ratings: Maximum Power 1.2kW Maximum open Circuit Voltage (Voc) 120V Maximum short circuit Current (Isc) 10.5A Operating Temp 0-50°C</p>
<p>b) DC DC Boost converter – 1.5 kW <u>Specification:</u></p> <ul style="list-style-type: none">• Switching devices SEMIKRON IGBT Rating @600 V,100A ,20khz with proper heat sink and snubber circuit.• O/P voltage range -max : 380/400 V DC• Output power : 1500W(max)• Switching Frequency---5-100 kHz• HCPL316J IC based pwm driver circuit• One Hall effect current sensor used to sense Inductor current and over load trip purpose.• One hall effect voltage sensor used to sense the o/p voltage.• Voltage and current sensors o/p terminated in front panel.• Over load protection and over temperature protection will be provided• One no of 4inch cooling fan used to dissipate switching device heat
<p>c) Battery Bank <u>Specification:</u></p> <ul style="list-style-type: none">• 12V, 110Ah x 10Nos (Connected in series)• Stand with Ammeter, Voltmeter and Fuse Protection• Battery Bank Voltage : 120V DC
<p>d) Super Capacitor Bank <u>Specification:</u></p> <ul style="list-style-type: none">• 380 F, 2.7V cell x 6Nos - 5.8 F, 16 V module (10 such modules to be Connected in series)• Stand with Ammeter, Voltmeter and Fuse Protection• Super Capacitor Bank Voltage : 160V DC
<p>e) Bi-Directional Buck-Boost Converter <u>Specification:</u></p> <ul style="list-style-type: none">• 4 Nos of high speed MOSFET/IGBT with rating @600v/25A semiconductor devices and 2 Nos of isolated high speed driver circuits with heat sink and snubber circuit used to form power circuit.• 4 Nos of Current Transducer used for sensing the input and output of the converter current• 4 Nos of Voltage Transducer used for sensing the input and output of the converter voltage• I/P is 150/180V and O/P is 380/400V• Each power rating is 1500Watts• Over Load Protection is available

- Additional controller can be interfaced.
- Outputs terminated in Banana socket

f) IGBT Based 3-phase Voltage Source Inverter Power Module (5 kVA peak power)

Specification:

- 1200V/ 75A, peak Semikron based IGBT module
- 6 Nos of IGBT's provided in 3nos of IGBT module, Six driver (inbuilt opto isolator)
- PWM inputs are brought out on Front Panel,
- One common +15V Power supply for all the driver circuit, Inbuilt isolated power supply provided.
- Over current protection and short circuit protection provided for all individual IGBT module
- Snubber capacitor provided for dv/dt protection for all IGBT module
- 60A / 3 phase bridge rectifier and filter circuit available for power circuit input.
- 4 no Current sensor for DC link current and Output line current
- 4 no Voltage sensor for DC link voltage and grid side voltage

g) Grid side interfacing stuffs

Specification:

- LA25-P HALL EFFECT Current sensors with signal conditioner - 6 nos (25Amps Current sensor), which is used to measure the grid side and inverter output currents.
- 3 nos of hall effect voltage sensors (LV25-P) with signal conditioner used to sense the grid voltage.
- 3 Nos of Inductors used to filter the grid side injected current.
- Power switches and MCBs of different ratings.
- 1 no of 3-ph, 3-kVA 110 V/230 V(phase volt.) step-up transformer used for voltage matching .
- Synchronisation panel

h) SPARTAN-6 Development Board

Specification:

On-Board Features:

- ✓ Processor speed 20 MHz
- ✓ 100 output lines / inputs lines are in 3.3/5V level
- ✓ Isolated serial communication interface through USB connector
- ✓ 4MB PROM for code execution memory.
- ✓ External JTAG header for programming
- ✓ 20x4 (or 16x2) LCD interface header.
- ✓ 8 user LEDs/4 position user DIP switch
- ✓ 2 up & down input push switch
- ✓ Up to 100 Individually Programmable GPIO Pins
- ✓ ADC
 - No of ADC input : 16 Channels
 - Resolution : 12 bit
 - Sampling rate : 1MSPS
 - Analog input range : $\pm 10V$
 - Buffer section for voltage protection
- ✓ DAC
 - No of DAC output : 4 Channels
 - Resolution : 12 bit

- Settling time : 6 μ s
- Analog input range : -5v to +5V
- ✓ Connectors
 - 20 pin header for ADC input
 - 40 pin header for PWM OUTPUT
 - 2 no's of 50 pin headers for GPIO line termination
 - External Programming header
 - Total 50pwm signals can be generated.

i) DC Controllable Load

Specification:

DC Shunt Motor with Spring Balance Load

POWER-----0.5-1HP

VOLTAGE-----220VDC

SPEED-----1500rpm

LOAD-----spring balance load

SPEED SENSOR-----Proximity sensor used.

Step down dc-dc converter

DC Pedestal Fan (18 Watt)

- | | | |
|------------------------|---|---------------------------------|
| 1. Power | : | 18 Watt |
| 2. Operating Model | : | Pedestal Swing Type |
| 3. Operating Voltage | : | 12 Volt DC |
| 4. Best Replacement to | : | 4 Feet AC Pedestal Fan (40 Watt |

j) Equivalent DC Grid

Specification:

- a) 1-ph 15A Auto Transformer -----1No.
- b) 1-ph 35A Diode Bridge Rectifier-----1No
- c) 4700mF/450V Capacitor-----3Nos.

Item 02: AC Micro-grid (Laboratory scale research module)

DETAILED TECHNICAL SPECIFICATIONS

a) 200V,1.5 kW Roof-Top Solar Panel with Stand

Specification:

- * Make : Reputed approved by MNRE
- * Peak Power / Module : 1000 watts
- * Temperature : -45 to 85°c
- * Wind Load : upto 200kmph
- * Humidity : 0 to 100%
- * Voc to each module : 19 Volts
- * Type of cell : Poly crystalline silicon
- * Efficiency of cell : 14% to 15%
- * Lamination Type : Vacuum Laminated Glass to ladler

(Fixed Mechanical Structure to be provided by Institute)

b) DC DC Boost Converter

Specification:

1500W DC-Dc Boost converter

- Switching device SEMIKRON IGBT Rating @600v,100A ,20khz with proper heatsink and snubber circuit Used to form power circuit.
- I/P voltage range -min : 200V DC
- O/P voltage range-max : 380-400V DC
- Output power : 1500W(max)
- Switching Frequency---5-100khz
- HCPL316J IC based pwm driver circuit used
- One Hall effect current sensor used to sense Inductor current and over load trip purpose.
- 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 4inch cooling fan used to dissipate switching device heat

c) IGBT Based 3-phase VOLTAGE SOURCE INVERTER Power Module (5 kVA peak power)

Specification:

- *1200V/ 75A, Peak Semikron based IGBT module
- *6Nos of IGBT's provided in 3nos of IGBT module, Six driver (inbuilt opto isolator)
- * All the collector and emitter terminals are brought out in proper connector for power circuit connection
- * All the gate and emitter terminals are brought out and terminated on front panel to view driver output fault output
- * Indicator LED provided for PWM input and power supply input
- * Proper heat sink provided for all the IGBTs with cooling fan provision
- * Temperature sensor provided for over temperature Protection
- * PWM inputs are brought out on Front Panel,
- * One common +15V power supply for all the driver circuit, Inbuilt isolated power supply provided.
- * Over current protection and short circuit protection provided for all individual IGBT module
- * Reset circuit provided and terminated to clear the fault
- * Snubber capacitor provided for dv/dt protection for all IGBT module
- * 60A / 3 phase bridge rectifier and filter circuit available for power circuit input.

- * 4 no Current sensor for DC link current and Output line current
- * 1 no Voltage sensor for DC link voltage

d) SPARTAN-6 Development Board

Specification:

On-Board Features:

- ✓ Processor speed 20 MHZ
- ✓ 100 output lines / inputs lines are in 3.3/5V level
- ✓ Isolated serial communication interface through USB connector
- ✓ 4MB PROM for code execution memory.
- ✓ External JTAG header for programming
- ✓ 20x4 (or 16x2) LCD interface header.
- ✓ 8 user LEDs/4 position user DIP switch
- ✓ 2 up & down input push switch
- ✓ Up to 100 Individually Programmable GPIO Pins
- ✓ ADC
 - No of ADC input : 16 Channels
 - Resolution : 12 bit
 - Sampling rate : 1MSPS
 - Analog input range : $\pm 10V$
 - Buffer section for voltage protection
- ✓ DAC
 - No of DAC output : 4 Channels
 - Resolution : 12 bit
 - Settling time : 6 μ s
 - Analog input range : -5v to +5V
- ✓ Connectors
 - 20 pin header for ADC input
 - 40 pin header for PWM OUTPUT
 - 2 no's of 50 pin headers for GPIO line termination
 - External Programming header
 - Total 100pwm signals can be generate.

e) Grid side interfacing stuffs

Specification:

- LA25-P HALL EFFECT Current sensors with signal conditioner - 6 nos (25Amps Current sensor), which is used to measure the grid side and inverter output currents.
- 3 nos of hall effect voltage sensors (LV25-P) with signal conditioner used to sense the grid voltage.
- 3 Nos of Inductors used to filter the grid side injected current.
- Power switches and MCBs of different ratings.
- 1no of 3-ph 110 V/230 V step up transformer used for voltage matching .
- Synchronisation panel