E-5

Instrumentation /Electrical

PROCUREMENT OF GOODS UNDER NATIONAL SHOPPING PROCEDURES

COEP/TEQIP-II/CoE-SRES/March2016/NS/23

For

Flexible Solar PV Training System

Bid Price: Nil/-

PACKET NO :COEP/TEQIP-II/ CoE-SRES/ March2016 /NS /23

INVITATION FOR QUOTATIONS FOR SUPPLY OF

Flexible Solar PV Training System

1. You are invited to submit your most competitive quotation for the following goods: -

Sr. No	Title /Name of the equipment /System	Brief description [Attach separate annexure if necessary for detailed specifications	Quantity
1	**Flexible Solar PV Training System**	**Please refer to the Annexure A**	**01**

The schedule is as follows

Date of inviting the quotations	23/03/2016
Last date of submitting the sealed quotation to TEQIP office, COEP	04/04/2016 [upto 3:00 pm]
Opening of the quotations	04/04/2016 [4:00 pm]
Validity of quotation	Min 45 days
Delivery Period	**4 months from the acceptance of PO**

2. College of Engineering has received the grants for establishing Center of Excellence in Smart Renewable Energy System under MHRD's Technical Education Quality Improvement Program-Phase II. The said procurement is for this center. This project is World Bank sponsored project. This procurement is being carried out using the National Shopping Process, and will observe the guidelines of Shopping under TEQIP-II.

3. **Bid Price**

   a) The contract shall be for the full quantity as described above and in the annexure. Corrections, if any, shall be made by crossing out, initialing, dating and re-writing.

   b) All duties, taxes and other levies payable by the contractor under the contract shall be included in the total price. However, break- up of the basic price and taxes/duties shall be indicated clearly.

c) The bidders will be evaluated on the basic price.

d) The rates quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.

e) The Prices should be quoted **in Indian Rupees** only.

4. Each bidder shall submit only one quotation.

5. **Validity ofQuotation**

Quotation shall remain valid for a period not less than 45 days after the deadline date specified for submission.

6. **Evaluation of Quotations**

The purchaser shall evaluate and compare the quotations determined to be substantially responsive i.e. which

(a) are properly signed ; and

(b) conform to the terms and conditions, and specifications.

The Quotations would be evaluated considering all items together in this packet.

7. **Award of contract**

The Purchaser shallaward the contract to the bidder whose quotation has been determined to be substantially responsive and who has offered the lowest evaluated quotation price.

7.1 Notwithstanding the above, the Purchaser reserves the right to accept or reject any quotations and to cancel the bidding process and reject all quotations at any time prior to the award of contract.

7.2 The bidder whose bid is accepted shall be notified of the award of contract by the Purchaser prior to expiration of the quotation validity period. The terms of the accepted offer shall be incorporated in the purchase order.

8. 80 % Payment shall be made immediately after delivery of the goods. Remaining 20 % payment will be made after successful commissioning and testing of the equipment/system.

9. Three years commercial warranty/ guarantee shall be applicable to the supplied goods.

10. You are requested to provide your offer in sealed envelope latest by **04th April 2016. Please indicate *"Quotation for* Flexible Solar PV Training System**

CoE-SRES/ March2016 /NS /01" at the right hand corner of the sealed envelope"

11. The bidder has to supply the material within the prescribed date. A penalty as per norms will be imposed for delayed supply upto 6 weeks. Any further delay will automatically terminate the purchase order/ contract.

12. The supplier requires supplying the store exactly as per the specifications and will be responsible to replace the defective supplies at his risk and cost.

13 The Supplier should submit deviation statement if any. The quotations simply mentioning "asper your specification and cost" shall be rejected.

14. The supplier should arrange for free demo / working trial of equipment (if required) at the Institute / Manufacturers place as the case may be at suppliers cost. The Purchase Order would be placed subject to satisfactory demonstration of the equipment.

15. Commissioning / Installation is at suppliers cost unless otherwise specified.

16. Conditional quotation will not be accepted.

17. We look forward to receiving your quotations and thank you for your interest in this project.

Name: Prof. B. N. Chaudhari
Principal Investigator
Center of Excellence-Smart Renewable Energy System

Annexure A

Solar Panel (Power) Tracking System

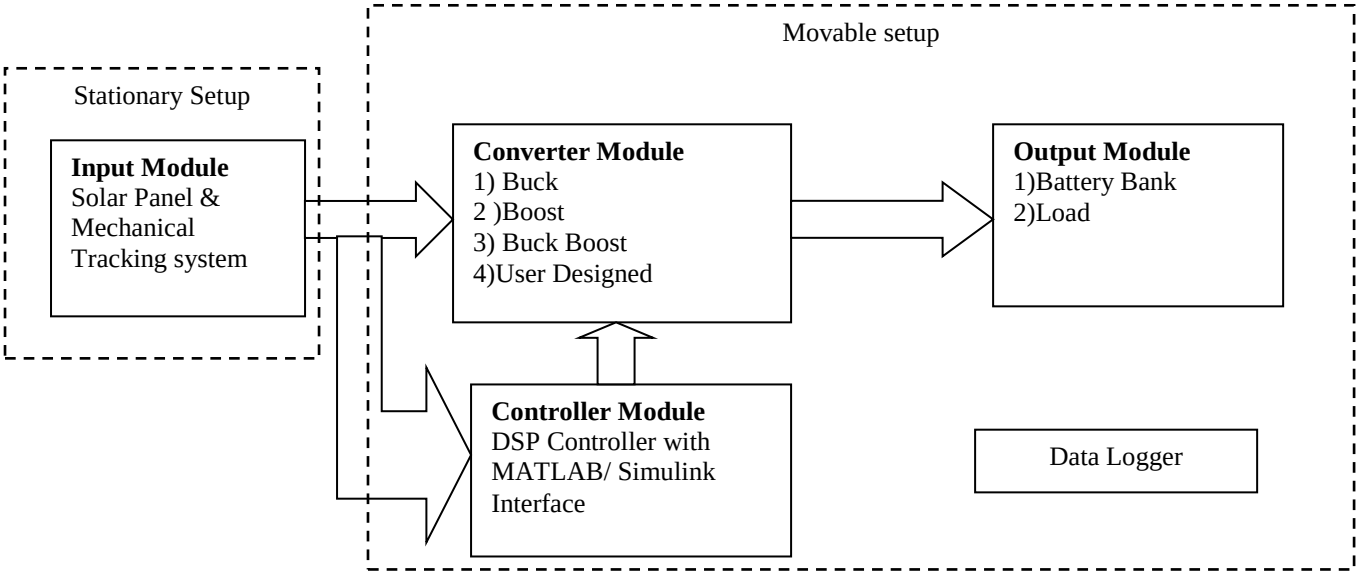
System Description:

The 600 Watt solar panel system should be comprises of

1) **Solar Panel Array**
2) **Solar Panel Tracking Mechanism**
3) **Converter Module**
4) **Controller Module**
5) **Converter Firing circuit**
6) **Maximum Power Point Tracking**
7) **Load**
8) **Battery Backup**
9) **Display Panel**
10) **Data Logger**

Whole system should consist of following

- The solar panel tracking and MPPT should operate independent to each other and the solar panel mechanical system and other hardware should be separate.
- The whole R& D setup should be mounted in the panel and panel should be mounted on the trolley like structure consist of wheels so that there will be the flexibility that the whole system can be carried to the other place with ease.
- System should be with various test points for analysis and system should be provided with Operation and maintenance manuals.
- Whole system should have 01year warranty & extended warranty of 03 years.
- Solar panel should have 10 year warranty.
- User friendly interface with IP 65 protection, adhere to industrial standards with all required electronic protection.



Details are as follows:

1) **Solar Panel Array**-

   The power requirement for the said project is 600W. The total four Polycrystalline Type panels from standard company.

   Minimum 10 years warranty for the panel should be with combiner box for series and parallel combination of the array.

   There should be provision for electronic switching to take all panels either in series or parallel or user defined combination.

   The response of the panels should be recorded through the data logger for the analysis of the data coming from solar panel.

   There should be the provision for cleaning like wiper which will move on the panel to clean the dust. The cleaning mechanism should be automatic and work when the signal given by the user or dust sensor.

2) **Solar Panel Tracking**-

   The Solar panel M.S./ G.I. along with 2D mechanical tracking system should be with suitable mechanical arrangement and sensors.

   The movement of the angle is adjusted through the stepper motor/ servo motor which should be operated with compatible microcontroller with digital level inclinometer.

   While tracking panel the various measurement should be recorded for analysis.

   There should be provision for various angle measurements for the 2D tracking.

3) **Converter Module**-

   Intelligent Energy Converter (DC-DC & DC-AC) with efficiency >90%

   Various combinations of DC-AC and DC-DC converter for the experimentation will be required.

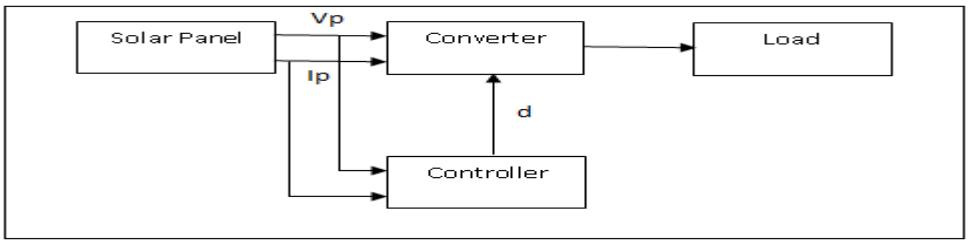
   DC-AC converter with suitable inverter with input 12-80VDC, output-230VAC, efficiency>90%.

DC-DC converter with following combinations
Buck Converter (inbuilt)
Boost Converter (inbuilt)
Buck- Boost Converter (inbuilt)
User developed Converter
There should be the flexibility that one should be able to select appropriate converter for the application by changing the connections. The different test points should be provided along with converter module.

4) **Controller module**- Maximum Power point Tracking controller consists of DSP processor and compatible with MATLAB with RS232 or equivalent communication which equipped with MPPT tracking algorithm.
Be made compatible with TTL/DSP & suitably isolated to enable user to work as any digital platform for experimentation.
On board programming facility to test various control algorithm.

5) **Converter Firing circuit**- Isolated converter firing circuits which accepts the input command from the MPPT controller and able to generate gate/ firing signal for converter module.

6) **Maximum Power Plant Tracking System**
The MPPT circuit is a DC-DC converter that is operated such that the fixed load resistance matches that of the array under varying conditions. The MPPT is done by varying the duty cycle of the switching element in the converter.
MPPT controller consists of DSP processor compatible with MATLAB with RS 232 or equivalent communication.
The system should provide auto-testing environment i. e. ability to change angle, change MPPT, Change load, Change controller etc.



MPPT Block Diagram

7) **Load** –Load to the system is flexible, reverse polarity protection for load

8) **Battery Backup**-
Solar tubular lead acid batteries for storage of energy with reverse polarity protection
12V battery bank for whole setup to store the charge developed by solar panel with suitable charge controller

11) **Display Panel**-Digital Display for Various parameters like Voltage, Current, Power, Irradiance, Battery Charging, Temperature etc.

12) **Data Logger & Software-**
    i. The Software should be with automatic computer interface. The following featuresshould be incorporated in the software.

ii. 24 x 7 data logger feature
iii. The trends/recording the input and output from panel (mechanical tracking and MPPT)
iv. The controller output
v. The input and output from converter module
vi. The duty ratio of the converter
vii. Battery charging and discharging profile
viii. Overall energy management
ix. The total cumulative power developed by the system.
x. Recording with different/ multiple trends for analysis

System Specification-

Solar Panel-

Total 04 Solar panel of 150 Watt each.

Converter-

Buck-

I/P selectable from16-22V/32-44V/48-66V/64-88V

O/P selectable from 18.5V/37V/55.5/74V

Ripple less than 100mvpk-pk, Switching frequency 100kHz, Regulation+/-0.1%

Boost-

I/P selectable from6-20/12-40/18-60/24-80

O/P selectable from 18.5V/37V/55.5/74V

Ripple less than 100mvpk-pk, Switching frequency 100kHz, Regulation+/-0.1%

Buck Boost-

Input Selectable6-22V/12-44V/18-66V/44-88V

Output selectable-18.5V/37V/55.5/74V

Controller-DSP controller TMS 320F2833 or equivalent MATLAB/ Simulink Compatible with RS 232 or Rs 485

For Mechanical Tracking-

For MPPT-Suitable from solar intensity 100W/sq.m.

Battery-26AH/4 No. connected in series with selectable switch

Inverter-

750VA/500W,230V,THD<3%, Protections 0V OL/SC,OTDC, I/P 15V to 100V

Load-50+50+100+100+200 Bulb load selectable by switches

Motor-Suitable Stepper motor/ Servo motor for Mechanical tracking with suitable gear box arrangement.