Dayalbagh Educational Institute (Deemed University), Agra,Dayalbagh, Agra - 282005, Uttar Pradesh

INVITATION LETTER

Package Code: TEQIP-III/2019/UP/deia/301 **Current Date: 17-Jul-2019**

Package Name: dei/foe/elect/PV Wind **Method: Shopping Goods**

Sub: INVITATION LETTER FOR dei/foe/elect/PV Wind

Dear Sir,

1. You are invited to submit your most competitive quotation for the following goods with item wise detailed specifications given at Annexure I,

Sr. No	Item Name	Quantity	Place of Delivery	Installation Requirement (if any)
1	Solar PV & Wind HybridSystem with DC Micro Grid	1	Faculty of Engineering , DEI, Dayalbagh Agra-282005	Installation would be done at Faculty of Engineering, D.E.I., Dayalbagh, Agra-282005

2. Government of India has received a credit from the International Development Association (IDA) towards the cost of the **Technical Education Quality Improvement Programme [TEQIP]-Phase III** Project and intends to apply part of the proceeds of this credit to eligible payments under the contract for which this invitation for quotations is issued.

3. **Quotation**

3.1 The contract shall be for the full quantity as described above.

3.2 Corrections, if any, shall be made by crossing out, initialling, dating and re writing.

3.3 All duties and other levies payable by the supplier under the contract shall be included in the unit Price.

3.4 Applicable taxes shall be quoted separately for all items.

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

3.6 The Prices should be quoted in Indian Rupees only.

4. Each bidder shall submit only one quotation.

5. Quotation shall remain valid for a period not less than **45**days after the last date of quotation submission.

6. Evaluation of Quotations: The Purchaser will evaluate and compare the quotations determined to be Substantially responsive i.e. which

6.1 are properly signed; and

6.2 Confirm to the terms and conditions, and specifications.

7. The Quotations would be evaluated for all items together.

8. Award of contract The Purchaser will award the contract to the bidder whose quotation has been determined to be substantially responsive and who has offered the lowest evaluated quotation price.

8.1 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.

8.2 The bidder whose bid is accepted will 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.

9. Payment shall be made in Indian Rupees as follows:

Satisfactory Delivery & Installation - 90% of total cost
Satisfactory Acceptance - 10% of total cost

10. Liquidated Damages will be applied as per the below:
Liquidated Damages Per Day Min % : N/A
Liquidated Damages Max % : N/A

11. All supplied items are under warranty of **N/A** months from the date of successful acceptance of items and AMC/Others is **.**

12. You are requested to provide your offer latest by **16:30** hours on **31-Jul-2019.**

13. Detailed specifications of the items are at Annexure I.

14. Training Clause (if any) **Training would be done at Faculty of Engineering DEI, Dayalbagh**

15. Testing/Installation Clause (if any) **Testing would be done at Faculty of Engineering, D.E.I.**

16. Performance Security shall be applicable**: 0%**

17. Information brochures/ Product catalogue, if any must be accompanied with the quotation clearly indicating the model quoted for.

18. Sealed quotation to be submitted/ delivered at the address mentioned below, **Dayalbagh Educational Institute (Deemed University), Agra,Dayalbagh, Agra - 282005, Uttar Pradesh**

19. We look forward to receiving your quotation and thank you for your interest in this project.

(Authorized Signatory)
Name & Designation

Annexure I

1. Wind Turbine Emulator

S. No.	Component	Specification
1.	**DC Motor** • Output Power • Nominal Field Voltage • Nominal Armature • Speed at rated voltages	 3.5kW (5HP) 220V DC 220V DC 1500
2.	**DC Drive** • Input voltage • Input Current • Output Voltage • Output Current • Switching Frequency	 230 V 13 A 200 V 15 A 20 kHz
3.	**Buck Converter after generator** • Input voltage • Output Voltage • Output Current • Switching Frequency	 450 V 150 V 10 A 20 kHz
4.	**Bidirectional Converter** • Input voltage • Output Voltage • Output Current • Switching Frequency	 105 V (Battery Side) 150 V (Inverter Side) 10 A 20 kHz
5.	**Gear Box** • Gear Ratio	 2 : 1
6.	**Induction Generator** • Type • Output Power • Line to Line Voltage • No of Poles	 Squirrel Cage Type (Self Excited) 1.2kW 415V AC 8
7.	**Tacho-Generator** • Input Voltage • Speed Encoding	 24V DC 10V DC for 1500RPM
8.	**AC Excitation Capacitors** • Connection • Capacitance	 delta 50 µF AC
9.	**Control Card** • Technology • ADC Inputs • PWM Ports	 FPGA Available Available
10.	**Sensing Board** • 4DC Voltage Sensors • 3DC Current Sensors	
11.	**Pull-UP Card for Inverter Gate Firing**	8 PWM Signals
12.	**Bridge Rectifier** • Rating • Capacitor	 10A, 400V 3300µF, 450V
13.	**Three Phase Inverter** • 3 Leg inverter	

	• Maximum DC Input Voltage • Output Voltage • Output Current • Switching Frequency	150V DC 112 V AC 25 A 10*k*Hz
14.	**Step UP Power Transformer** • Connection • Rating	 Delta to Star 5000VA
15.	**Measurement** • DC Link Voltage Voltmeter • Armature Voltage Voltmeter • Field Voltage Voltmeter • Battery Voltage Voltmeter • Rectified Voltage Voltmeter • Battery Current Ammeter • Tachometer	 0-1000 V 0-1000 V 0-1000 V 0-200 V 0-1000 V 0-10 A 0-2000 RPM
16.	**Three Phase LC Filter** • Inductor • Capacitor	 3mH, 10A 10µF, 400V
17.	**Protection** • AC and DC MCBs	
18.	**Battery Bank** • Voltage • Capacity • Total No. Of Batteries	 12 V 24 Ah 8
19.	**Autotransformer Single Phase** • Voltage Range • Wattage	 0-250 V 5 kW
20.	**Autotransformer Three Phase (For Motor)** • Voltage Range • Max. Current	 0-450 V 8 Amp.
21.	**Autotransformer Three Phase (For Grid)** • Voltage Range • Max. Current	 0-450 V 15 Amp.

2. Solar PV Array

S. No.	Component	Specification
22.	**PV Panel (To be provided by DEI)** • Voc • Isc • Power • Vmpp • Impp • Total No. of PV Panels in PV Array • Total Power • Total No. of Panels in series • Total no. of Parallel legs	 43.2 V 7.5 A 250 Wp 35.0 V 7.14 A 8 2 kW 4 2
23.	**Buck Converter** • Input voltage	 140 V 15 A

	• Input Current • Output Voltage • Output Current • Switching Frequency	120 V 17 A 20 kHz

3. Fuel Cell

Component	**Specifications**
Type of fuel cell	PEM
Number of cells	48
Rated Power	1000W
Performance	28.8V @ 35A
H2 Supply valve voltage	12V
Purging valve voltage	12V
Blower voltage	12V
Reactants	Hydrogen and Air
External temperature	5 to 30ºC
Max. stack temperature	65ºC
H2 Pressure	0.45-0.55bar
Hydrogen purity	≧99.995％ dry H2
Humidification	self-humidified
Cooling	Air (integrated cooling fan)
Stack weight (with fan & casing)	4000 grams(±100grams)
Controller weight	400 grams(±30grams)
Dimension	23.3cm x 26.8cm x 12.3cm
Flow rate at max output*	13 L/min
Start up time	≦30S at ambient temperature
Efficiency of stack	40% @ 28.8V
Low voltage shut down	24V
Over current shut down	42A
Over temperature shut down	65℃
External power supply**	13V(±1V),8A

Boost Converters for Fuel Cell:

1.	**1st Stage Boost Converter** • Input DC Voltage • O/P DC Voltage • O/P DC Current • Switching Frequency	 50 V 120 V 9 Amps. 25 kHz Forced Cooled 45 Deg.

	• Type of Cooling • Ambient Temperature • Duty Class	Class 1 100% Cont.

System Capabilities

System should have following capabilities:-

1. Study of the effect of change in wind speed and pitch angle on the operation of DC micro grid system.
2. Power flow analysis of in a DCmicro-grid system with multiple sources (wind and solar) and battery as energy storage.
3. Study the effect of change in solar insolation with daytime and geographic location on the operation of DC micro grid system.
4. Study the buck and boost mode of operation of bidirectional converter connected to the battery storage system, under the following conditions:
    A. Load is greater than generation from both sources (i.e. Battery discharging)
    B. Load is less than generation from both sources (i.e. Battery charging)
5. Study of system performance with two renewable sources (wind and solar) connected together to form a DC micro grid with battery as the energy storage device.
6. Study of the integration of DC micro-grid to the main AC grid using a 3-phase inverter.
7. Study the operation of DC micro-grid under various load conditions by applying various DC and AC loads.
8. Control and analysis of the power supplied to the AC grid
9. Ability to track torque-speed and power-speed characteristics of a wind turbine at different wind speeds and pitch angle.
10. Plotting Cp-λ curve to show the turbine characteristics at a particular pitch angle.
11. Real time tracking of λ could be utilized to track the optimal λ of a turbine.
12. Maximum power point tracking opportunity based on the generated voltage and current feedback.

13. Ability to control DC link voltage using bidirectional converter in stand-alone mode.
14. Research on micro grid possible as the DC link can accommodate other renewable sources such as PV.
15. Comparative analysis of different PV panels using PV emulator.
16. Series-parallel behavior of different PV panels could be analyzed for both stand-alone and grid connected systems.
17. Power flow and quality supplied to the grid can be controlled and analyzed.
18. Further exploration of control techniques for smart grid implementation possible.
19. Continuous sensing of grid side voltage and currents provide opportunity to implement advanced control algorithms to control the behavior as per grid conditions.

FORMAT FOR QUOTATION SUBMISSION
(In letterhead of the supplier with seal)

Date: _____

To:_____
_____

Sl. No.	Description of goods \ (with full Specifications)	Qty.	Unit	Quoted Unit rate in Rs. (Including Ex-Factory price, excise duty, packing and forwarding, transportation, insurance, other local costs incidental to delivery and warranty/ guaranty commitments)	Total Price (A)	Sales tax and other taxes payable	
						In %	In figures (B)
Total Cost							

Gross Total Cost (A+B): Rs. _____

We agree to supply the above goods in accordance with the technical specifications for a total contract price of Rs. ———————— (Amount in figures) (Rupees ————————amount in words) within the period specified in the Invitation for Quotations.
We confirm that the normal commercial warranty/ guarantee of ———————— months shall apply to the offered items and we also confirm to agree with terms and conditions as mentioned in the Invitation Letter.
We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in bribery.

Signature of Supplier
Name: _____
Address: _____
Contact No. _____