



Institute of Technology, Gopeshwar, The Director, Institute of
Technology, Gopeshwar, Kothiyalsain, Chamoli-246424, Uttarakhand

INVITATION LETTER

Package Code: TEQIP-III/UK/iotg/112

Current Date: 10-Dec-2019

Package Name: ITG/GOODS/EQUIPMENTS/EE/05

Method: Shopping Goods

To,

Sub: INVITATION LETTER FOR ITG/GOODS/EQUIPMENTS/EE/05

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	RENEWABLE ENERGY LABORATORY	1	THE DIRECTOR, INSTITUTE OF TECHNOLOGY GOPESHWAR, KOTHIYAL SAIN CHAMOLI UTTARAKHAND (246424)	YES

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:

Payment Description	Expected Delivery Period (in Days)	Payment Percentage
Satisfactory Acceptance	30	100

10. Liquidated Damages will be applied as per the below:
Liquidated Damages Per Day Min %: 0.10
Liquidated Damages Max %: 10
11. All supplied items are under warranty of **12** months from the date of successful acceptance of items and AMC/Others is **0**.
12. You are requested to provide your offer latest by **12:30** hours on **28-Dec-2019**.

13. Detailed specifications of the items are at Annexure I.
14. Training Clause (if any) **YES**
15. Testing/Installation Clause (if any) **YES**
16. Performance Security shall be applicable: %
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, **Institute of Technology, Gopeshwar, The Director, Institute of Technology, Gopeshwar, Kothiyalsain, Chamoli-246424, Uttarakhand**
19. We look forward to receiving your quotation and thank you for your interest in this project.

(Authorized Signatory)

Name & Designation

Annexure I**RENEWABLE ENERGY LABORATORY SPECIFICATIONS**

S.No.	Experiment Name	Specifications	QTY.
1.	Francis Turbine Test Rig	<ul style="list-style-type: none"> ➤ Output Power: 1HP ➤ Discharge: 1000ltrs/min ➤ Supply Head :10m ➤ Gauges: Pressure Gauge, Glycerine Filled ➤ Speed :1000RPM with proximity sensor ➤ Weighing Balance: Standard Make ➤ Sump Tank: Capacity 200 Ltr's ➤ Dynamometer: Rope Brake Type ➤ Water Circulation: Centrifugal Pump ➤ Capacity: 5 HP, Three Phase, RPM 280 ➤ Discharge Measurement: Pitot Tube with Manometer ➤ Frame / Structure: MS, Angle Iron ➤ The whole set-up is well designed and arranged in a good quality painted structure ➤ Power Requirement: Three Phase 440 VAC +10%, 50 Hz <p>Standard Accessories Power cable, Mercury, Instruction manual Guide Vanes & Runner Made by Aluminium</p>	01
2.	ME RWE - Wind Energy System Trainer	<p>Features:</p> <ul style="list-style-type: none"> ➤ Modular and easy to use in Laboratories ➤ Equipped with high safety features ➤ Portable and easy to install ➤ Provided with safety protections ➤ Connector insulated socket panel type ➤ Wind generator provided ➤ Supplied with patch cords for interconnections and experimental work book <p>Experiments can be performed...</p> <ul style="list-style-type: none"> ➤ Measure the velocity of air ➤ Measurement and analysis of different parameters like load, charging etc. ➤ Open circuit voltage of system ➤ Parameter measurements in low and high-speed wind ➤ Microprocessor controlled charge controller fundamentals ➤ Charging parameter of batteries ➤ Electricity generation <p>Technical Specifications: Technical Specifications: Generating power : 400W Rated wind speed : 11 m/s,</p>	01

Start-up win speed : 2.5m/s
 Rotor diameter : 1.33m,
 Number of blades : 3
 Blade material : Carbon fiber,
 Body : Magnalium framework
 Rotor speed : 500 - 1000 rpm
 Generator : 12VDC
 Brake : Electromagnetic brake
 Surface protection: Aluminium oxide and plastic coating

 Controller : High function external charge controller
 Artificial wind generating unit
 Induction motor power rating 1.5 (HP)
 Generated wind speed range 0-15 m/sec
 Control Unit
 Battery Capacity 42 (Ah)/12V
 Inverter Rated power 650(VA)
 Input voltage: 10-15(V)



3.

Solar PV
 Training &
 Research
 System (Stand
 Alone System)

The Solar PV Training & Research Kit is a mini Solar PV Plant Prototype



which enables students and faculty to understand in-depth concepts about stand-alone PV systems. The product also provides research orientation on several concepts such as MPPT, inverter control etc

01

The system consists of individual plug-in units each with components for different experimental arrangements. The conception of the system allows indoor and outdoor experiments. Additional options are the change of slope angle of the module to see the effect of tilt.

Technical Specifications

Sl. No.	Components	Sub-Components	Specifications
1	Power generating unit	Solar PV Module	
		Number of modules	2
		Type	Poly-crystalline
		Total Power rating	80Wp
2	Artificial Source of radiation	Halogen Light with regulator	
		Total power rating	1800W
3	Power Conditioning Unit (PCU)	DC-DC Converter – Auto/Manual mode	
		Power rating	25 W
		Nominal system voltage	12V
		Maximum Load Current	2.0 (A)
		Type	Buck converter
		Inverter- Auto/Manual mode	
		Power rating	50W
		Output Voltage	Variable
		4	Control and Measuring Unit
Temperature meter with sensor			
DC ammeter			
DC voltmeter			
AC ammeter			

		AC voltmeter	
		Battery bank (2 batteries)	
		Capacity of each battery	4.5 Ah/12V
		Loads- AC/DC	
5	Data Logger and Plotter	Voltage Range	0-200 (V)
		Current Range	0-2.0 (A)
6	Accessories	Radiation meter	
		Range	0 to 1999 $\frac{W}{m^2}$
		Battery Charger	
		Output voltage	12 (V)
		Module Cooling system	
		Manual	

Salient Features

- Experiments can be conducted indoor (using artificial source) as well as outdoor (Real time).
- Intensity of radiation can be controlled.
- Various types of PV modules can be used for experimentations.
- Manual tracking of PV modules
- Cooling mechanism to control PV module temperature
- Manual control of DC-DC converter and MPPT algorithm testing
- Manual control of inverter
- PC interfacing for data logging and plotting

List of Experiments

PV characteristics

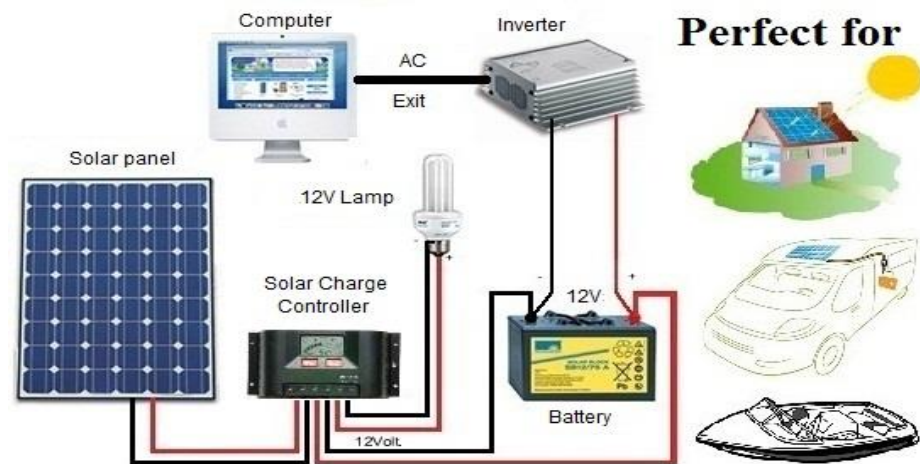
- Single PV module I-V and P-V characteristics with radiation and temperature changing effect.
- I-V and P-V characteristics with series and parallel combination of modules.
- Effect of shading.
- Effect of tilt angle.

- Demonstration of bypass and blocking diode.
- Stand-alone system**
- Battery charging and discharging characteristics.
 - Demo of system using DC load with battery, (with variable rated capacity of system).
 - Demo of system using AC load with battery.
 - Combine AC and DC load system with battery.
- Maximum Power Point Tracking**
- Finding MPP by varying the resistive load across the PV panel.
 - Finding MPP by varying the duty cycle of DC-DC converter.
 - Using MPPT algorithm find the V_{max} , I_{max} and P_{max} and duty cycle at which MPP occurs.
 - Perform the experiment (3) with different values of perturbation (ΔD). Observe the response of P_{max} with the P_{max} observed in exp -3.
 - Perform the experiment no 1 to no 4, with battery in the circuit.
- Inverter**
- Observe the output voltage waveform of inverter in auto mode.
 - Observe the output voltage with manual control.
 - 180-degree control
 - 120-degree control.
- Observe the RMS value and waveform of output voltage with both 180- and 120-degree control.

4. Solar MPPT controller-electronics

Characteristics of Solar Battery charger with MPPT Technique (electrical)

01



		<p>This set up is designed to study the sun tracking system for solar panel using Electrical MPPT (Maximum Power Point Tracking) arrangement. This set up consists of</p> <ol style="list-style-type: none"> 1. DC-DC Converter with MPPT Set up 2. Solar Panel with Light source set up (12/24V,25W (OR) DC Power supply 3. Meter arrangement <p>1. DC-DC Converter with MPPT Set up</p> <p>DC-DC Converter (solar Charge Controller) with Maximum power point tracking (MPPT) is a technique used to get the maximum possible power from photovoltaic devices(solar panels) for any environmental conditions (sun light variation-condition)</p> <ul style="list-style-type: none"> ➤ MPPT controller with increased efficiency by 10%-30% ➤ Can charge and discharge at the same time ➤ When the battery voltage is low, the controller will automatically cut off the load from the system. If the voltage of battery is back to normal and the load will restart working. <p>Specification</p> <ul style="list-style-type: none"> ➤ Category : MPPT solar controller ➤ Rated Voltage : 12V/24V ➤ Max Load current : 10A ➤ Input voltage range : 12V~20V/24V~40V ➤ Full charge cut : 13.7V~14.4V/27.4V~28.8V ➤ Low voltage cut : 10.5V~11V/21V~22V ➤ Ambient temperature : -25°C + 55°C 	
5	Solar/wind on grid /off grid inverter trainer	<p>SOLAR INVERTER (1Ø) TRAINING SYSTEM</p>  <p>This set up can be designed to study the solar based single phase ON –Grid & OFF Grid inverter system, this set up consists of</p> <ol style="list-style-type: none"> 1. Solar Panel with Mounting structure-1 KW 	01

2. Battery bank -100AH
3. Inverter set up with panel Meter & Load
4. Solar -PC Data Acquisition system

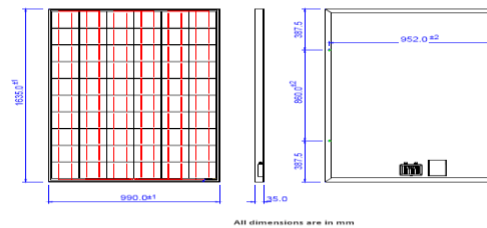
1. Solar Panel with Mounting Structure-1 KW

- 4 numbers 100W Solar Panel
- Each panel rating is 250W/300W
- Max.Voltage -32-37V



Model	KL240
Maximum power (P _{max})	250 Wp
Open Circuit Voltage (V _{oc})	37.66 V
Maximum power point voltage (V _{mpp})	29.94V
Short circuit current (I _{sc})	8.92 A
Maximum power point current (I _{mpp})	8.35 A
Tolerance	±7.5%
Cell Size (mm)	156 X 156
Nb. of cells	60
Dimensions (mm) ± 1	1660 x 990 x 35
Maximum system voltage	1000
Temperature coefficient	NOCT (°C)45
ΔV (Voc) (mV/°C)	- 105
ΔI _c (Isc) (mA/°C)	- 0.32
ΔP (P _{max}) (W/°C)	- 0.45
Weight (kgs)	23.5

Standard Test Condition : Irradiance 1,000 W/m², Temperature 25deg C Air mass 1.5 spectrum)



All dimensions are in mm

Photovoltaic mounting systems (solar Panel mounting structure)

Photovoltaic mounting systems are used to fix solar panels on surfaces like roofs, empty plots etc. These mounting systems enable retrofitting of solar panels on roofs or as part of the structure of the building

Solar modules are held in place by racks or frames that are attached to ground-based mounting supports.

Ground based mounting supports include:

- Pole mounts, which are driven directly into the ground or embedded in concrete.
- Made of Aluminium/MS
- Provision to fix 4 number of solar panels
- Moveable /Permanent type

2. Battery bank -100AH

- Four numbers of this battery is used

for off grid inverter

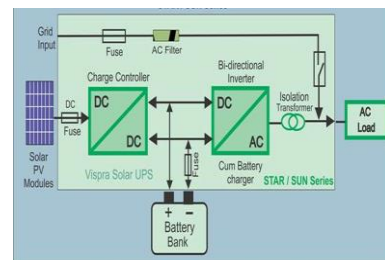
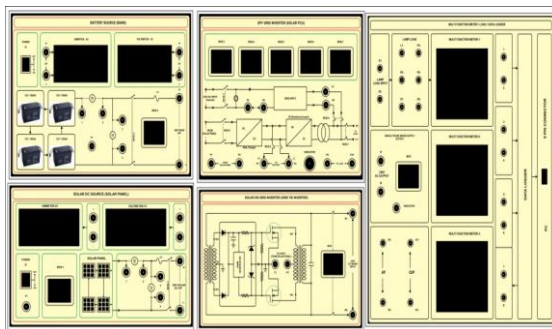
- 100AH Ratings
- 12VDC-Tubular type
- Suitable for solar applications
- EXIDE or equivalent with battery stand



3. Inverter set up with panel Meter

This set up consists of

- 1KW OFF –GRID Inverter (PCU)
- 1KW ON –GRID Inverter
- Panel, Meters with DAS set up



1KW OFF –GRID Inverter (PCU)

- Models / VA : 1000VA
- Watts : 800W
- VDC : 48V
- MAX SOLAR PV : 800/1000W
- Charge Controller : MPPT
- Bidirectional Inverter : Yes
- Pure Sine wave : Yes
- Mode-Selection : Solar-Grid-Batt (or) Solar-Batt-Grid

1KW ON –GRID Inverter

- Compact size and high-power density
- High speed MPPT for real time power tracking and improved energy harvesting
- Transformer less operation for highest efficiency 97%
- High overload capability under most ambient conditions
- Certified grid connected operation according to the international standards

- True sine wave output
- Integrated RS485/RS232 serial communications
- Multi-language LCD display

Specifications

- Models / VA : 1100VA
- Watts : 1300W (Max)
- VDC (From solar) : 450v Max
- Start-Up Voltage : 50-450VDC
- Charge Controller : MPPT
- Pure Sine wave : Yes
- Efficiency : 96.5%
- Max Output Current : 5.7
- Max.Output Power ; 1100W



Panel, Meters with DAS set up

- MS Panel with powder coating and stickered front panel is provided to fix the inverters

For Battery side

- One number of DC Voltmeter (300vdc /Digital) is provided to measure the battery voltage
- One number of DC Ammeter (20A /Digital) is provided to measure the battery Current
- MCB is provided for battery output protection

For Solar side

- One number of DC Voltmeter (300vdc /Digital) is provided to measure the Solar voltage
- One number of DC Ammeter (20A /Digital) is provided to measure the Solar Current
- MCB is provided for Solar output protection

For Mains/Load side

- One number of digital Multifunction meter is provided to measure the mains side parameters like voltage, current & Power etc
- One number of digital Multifunction meter is provided to measure the Load side parameters like voltage, current & Power etc
- MCB is provided for Mains & Load ON/OFF & Protection

Lamp Load

- Single phase Lamp load with Load selector switch
- 1.2 KW capacity-230VAC Input
- 10 Numbers of load ON/OFF switch

4. SOLAR MONITORING SYSTEM (Data Acquisition system)

- Windows-PC Based Monitoring systems
- Able to monitor

		<ul style="list-style-type: none"> ○ Battery voltage & Current ○ Solar Voltage ○ Generated Power etc <p>Note: Computer is not our scope of supply</p>	
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QUALIFICATION CRITERION

Sr. No	General Specifications
1.	The product should be certified by standard certification bodies ISO/ISI/CE/IEEE and IEC.
2.	GST Registration Certificate Photocopy
3.	Income Tax Clearance Certificate Last Three Year
4.	PAN Card Photocopy

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. _____