TENDER

FOR

SUPPLY & INSTALLATION OF MULTI-DIMENSIONAL SMART ENERGY GRIDS ANALYSIS IIT MANDI

Tender No.: IITMANDI/S&P/PUR-68/2015-16/3622-23

Tender date: 10th August, 2015

Last Date of submission: 01st September, 2015

Indian Institute of Technology Mandi

Transit Campus: Mandav Hotel, 2nd Floor (Near Bus Stand), Mandi – 175001 (H.P)

Tel.: 01905-237921 & 01905-267039

Email: bsr@iitmandi.ac.in & arsp@iitmandi.ac.in

Indian Institute of Technology Mandi, Mandi invites tender for supply, erection, installation, commissioning,testing,demonstration and training of **Multi-Dimensional Smart Energy Grids Analysis,** as per specifications given in the Annexure attached to the Tender form. All offers should be made in English and should be written in both figures and words. Tender forms can be downloaded from the website (http://iitmandi.ac.in/administration/tenderseoi.html) of the Institute.

The bidders are requested to read the tender document carefully and ensure compliance with all specifications/instructions herein. Non-compliance with specifications/instructions in this document may disqualify the bidders from the tender exercise. The Director, IIT Mandi, Kamand reserves the right to select the item (in single or multiple units) or to reject any quotation wholly or partly without assigning any reason. Incomplete tenders, amendments and additions to tender after opening or late tenders are liable to be ignored and rejected.

Terms and Conditions:

1. The technical and financial bids should be quoted separately and put in different sealed envelopes marked "**Technical bid**" or "**Financial bid**" as applicable. These separate bids envelopes are to be put in an outer envelope which should also be sealed.

2. The Vendors who have earlier supplied the equipment to any of the IITs, IISc, IISERs and other Scientific Institute of National Repute may only tender. The details of such institutions and the cost with name of equipment may also be supplied with the bids.

3. The technical and financial bids should be submitted in original. The financial bid should include the cost of main equipment/item and its accessories. If there is any separate cost for installation etc. that should be quoted separately.

4. Each individual sealed envelope as well as the outer envelope should be marked with the following reference on the top left hand corner: "**IITMANDI/S&P/PUR-68/2015-16/3622 - 23/Item Name.__ ____dated 10th August, 2015"**

5. The printed literature and catalogue/brochure giving full technical details should be included with the technical bid to verify the specifications quoted in the tender. The bidders should submit copies of suitable documents in support of their reputation, credentials and past performance.

6. The rates should be quoted in figures (typed or printed) and cutting should be avoided. The final amount should be in figures as well as in words. If there are cuttings, they should be duly initialed, failing which the bids are liable to be rejected.

7. Any bids received after **1:00 P.M. on 01st September, 2015** shall not be considered

8. The Technical Bids will be opened on **01st September, 2015 at 03:00 P.M.** The date & time for opening of Financial Bids will be informed later on to the technically qualified bidders.

9. While sending rates, the firm shall give an undertaking to the effect that "*the terms/conditions mentioned in the enquiry letter/Tender Notice against which the rates are being given are acceptable to the firm.*" In case the firms do not give this undertaking, their rates will not be considered.

10. If the supplier/firm is original equipment manufacturer (OEM)/authorized dealer/sole distributor of any item, the certificate to this effect should be attached.

11. The quantity shown against the item is approximate and may vary as per demand of the Institute at the time of placing order.

12. All tender documents should have to be sent through courier, speed post or registered post only. All tender documents received after the specified date and time shall not be considered.

    The postal address for submitting the tenders is:

    "**Assistant Registrar, Stores and Purchase"**
    Indian Institute of Technology Mandi (IIT Mandi),
    Administrative Block (Mandav Hotel,
    Near Bus Stand), Mandi – 175001 (H.P), India"

13. In the event of any dispute or difference(s) between the vendee Institute (IIT Mandi) and the vendor(s) arising out of non-supply of material or supplies not found according to specifications or any other cause whatsoever relating to the supply or purchase order before or after the supply has been executed, shall be referred to "The Director, IIT Mandi", Kamand who may decide the matter himself or may appoint arbitrator(s) under the arbitration and conciliation Act,1996. The decision of the arbitrator shall be final and binding on both the parties.

14. The place of arbitration and the language to be used in arbitral proceedings shall be decided by the arbitrator.

15. All disputes shall be subject to Mandi Jurisdiction only.

16. All tenders in which any of the prescribed conditions is not fulfilled or any condition is putforth by the tenderer shall be summarily rejected.

17. IIT Mandi reserves the right to cancel the tender at any point of time without assigning any reason.

18. The bidders or their authorized representatives may also be present during the opening of the Technical Bid, if they desire so, at their own expenses.

    Note: Price bids of only those bidders will be opened whose technical bids are found suitable by the committee appointed for the purpose. Date and time of opening of price bids will be decided after technical bids have been evaluated by the committee. Information in this regard will be intimated to the technically qualified bidders. In exceptional situation, an authorized committee may negotiate price with the qualified bidder quoting the lowest price before awarding the contract.

19. **Clarifications**:

    In case the bidders requires any clarification regarding the tender documents, they are requested to contact our office (e-mail: bsr@iitmandi.ac.in & arsp@iitmandi.ac.in on or **before 25/08/2015**.

20. Tender Cost:

A Demand draft of **Rs. 1,000/-(Rupees One Thousand only)** towards non-refundable **tender fee, drawn in favour of "The Registrar, IIT Mandi"** payable at Mandi should accompany the Technical bid documents. In the absence of tender cost, the tender will not be accepted.

21. **Earnest Money Deposit (EMD)**:

A refundable amount of **Rs. 1,30,000/-** of quoted price as earnest money deposit (EMD) in the shape of DD from a scheduled bank in India **(valid for a minimum period of 3 months from the date of submission of tender)** should accompany the bid documents. The DD drawn in favour of "The Registrar, IIT Mandi" payable at Mandi should accompany the bid documents. The EMD should be kept in a separate sealed envelope, should be marked clearly and put in the outer envelope that contains the technical and financial bid envelopes. The bidders should enclose a pre-receipted bill for the EMD to enable us to return the EMD of unsuccessful bidders. Failure to deposit **Earnest Money** will lead to rejection of tender. The bidders should submit separate EMD. In the event of the awardee bidder backing out, EMD of that bidder will be forfeited.

22. **Pre – Qualification Criteria**:

a. Bidders should be the manufacturer / authorized dealer. Letter of Authorization from original equipment manufacturer (OEM) on the same and specific to the tender should be enclosed.

b. The Vendors who have earlier supplied the equipment to any of the IITs, IISc, IISERs and other Scientific Institute of National Repute may only tender. The details of such institutions and the cost with name of equipment may also be supplied with the bids.

c. An undertaking from the OEM is required stating that they would facilitate the bidder on a regular basis with technology/product updates and extend support for the warranty as well.

d. OEM should be internationally reputed Branded Company.

e. Non-compliance of tender terms, non-submission of required documents, lack of clarity of the specifications, contradiction between bidder specification and supporting documents etc. may lead to rejection of the bid.

f. **Furnishing of wrong/ambiguous information in the compliance statement may lead to rejection of bid and further black listing of the bidder, if prima-facie it appears that the information in the compliance statement was given with a malafide/fraudulent intent.**

23. **Prices**:

a. The Prices quoted should be inclusive of all taxes or duties, packing, forwarding, freight, insurance, delivery and commissioning etc. at destination site (IIT Mandi, Mandi/Kamand). IIT Mandi is registered with DSIR, Govt. of India and is exempted from Custom / Excise Duty. Exemption Certificate to this effect will be issued by IIT Mandi. **Hence, Customs/Excise Duty exempted price should be quoted**. The rates shall be firm and final. Nothing extra shall be paid on any account. **In the price bid/financial bid, the vendor should clearly mention the final price breakup i.e. ex-work price/FCA price, FOB price, CIP/CIF price & FOR IIT Mandi, Kamand Campus price, as applicable in their bid.**

b. In case of imported equipment(s)/item(s), the agency commission, if any, payable in Indian rupees should be mentioned separately. For imported equipment, the Letter of Credit will be opened for the amount excluding agency commission in Indian Rupees. The firm should clearly mention the address of foreign bank in the financial bid.

24. **Validity**:

The bid should be valid for acceptance up to a period of 180 Days. The Bidders should be ready to extend the validity, if required without any additional financial implications.

25. **Delivery**:

The Equipment should be delivered and installed within the period as specified in the purchase order and be ready for use within 24 weeks of the issue of purchase order unless otherwise prescribed. If the bidder fails to deliver and place any or all the Equipments or perform the service by the specified date, penalty at the rate of 1% per week of the total order value subject to the maximum of 10% of total order value will be deducted.

26. **Training**:

Bidders need to provide adequate training to the nominated persons of IIT Mandi at their cost. IIT Mandi will not bear any training expenditure.

27. **Warranty Declaration**:

Bidders must give the comprehensive on-site warranty as required from the date of successful installation of Equipment against any manufacturing defects and also give the warranty declaration that "*everything to be supplied by us hereunder shall be free from all defects and faults in material, workmanship and shall be of the highest quality and material of the type ordered, shall be in full conformity with the specification and shall be complete enough to carry out the experiments, as specified in the tender document.*

Any deviation in the material, and the specifications from the accepted terms may liable to be rejected and the bidders need to supply all the goods in the specified form to the satisfaction / specifications specified in the order / contract and demonstrate at their own cost.

28. **Performance Bank Guarantee:** A performance bank guarantee from a scheduled bank in India for an amount equal to 10% of the price for duration of two months beyond the expiry of warranty period will be taken from the supplier or Indian agent.

29. **Terms of Payment**: Payment will generally be made only after delivery and satisfactory installation, testing, commissioning etc. **This must be specified in the tender/quotation.**

- In case of imported supplies, payment (excluding Indian agency commission, if any) will be made through irrecoverable Letter of Credit in two installments. 80 % of the money will be released on submission of shipping of documents. Remaining 20 % will be released after successful installation of the instrument and submission of a performance bank guarantee for 10% of the order value from a nationalized bank, valid for 2 months beyond the expiry of the warranty.

30. **Tender expenses and documents**: All costs incurred by the bidder in the preparation of the tender shall be at the entire expense of the bidder.

31. **Tender Evaluation Criteria**: The technical bids will be opened and evaluated by a duly constituted committee. After evaluation of the technical bid, the financial bid for only those offers which have qualified in the evaluation of technical bid will be opened.

32. **Return of EMD**:

- The earnest money of unsuccessful bidders will be returned to them without any interest within 15 working days after awarding the contract.
- The earnest money of the successful bidder will be returned to them without any interest within 15 Days after supply of material.

33. **Manual and documentation**: All the manuals necessary for operating and servicing the equipment (including details of electronic circuits) will have to be provided along with the instrument.

34. The IIT Mandi reserves the right to cancel the tender at any stage (point of time) without assigning any reason.

35. Bidders should go through the tender terms, conditions and specifications carefully and fill in the attached compliance statement accurately and unambiguously. They should ensure that all the required documents are furnished along with the bid.

Sd/-
Assistant Registrar
Stores & Purchase

BID PARTICULARS

1. Name of the Supplier :

2. Address of the Supplier :

3. Availability of demonstration of equipment : Yes / No

4. Tender cost enclosed: : Yes/No if yes

D.D. No._____ Bank_____ Amount_____

5. EMD enclosed : Yes / No if (Yes)

D.D. No._____ Bank_____

6. Name and address of the Officer/contact person to whom all references shall be made regarding this tender enquiry.

Name :

Address :

Telephone No. :

Fax No. :

Mobile No :

e-Mail :

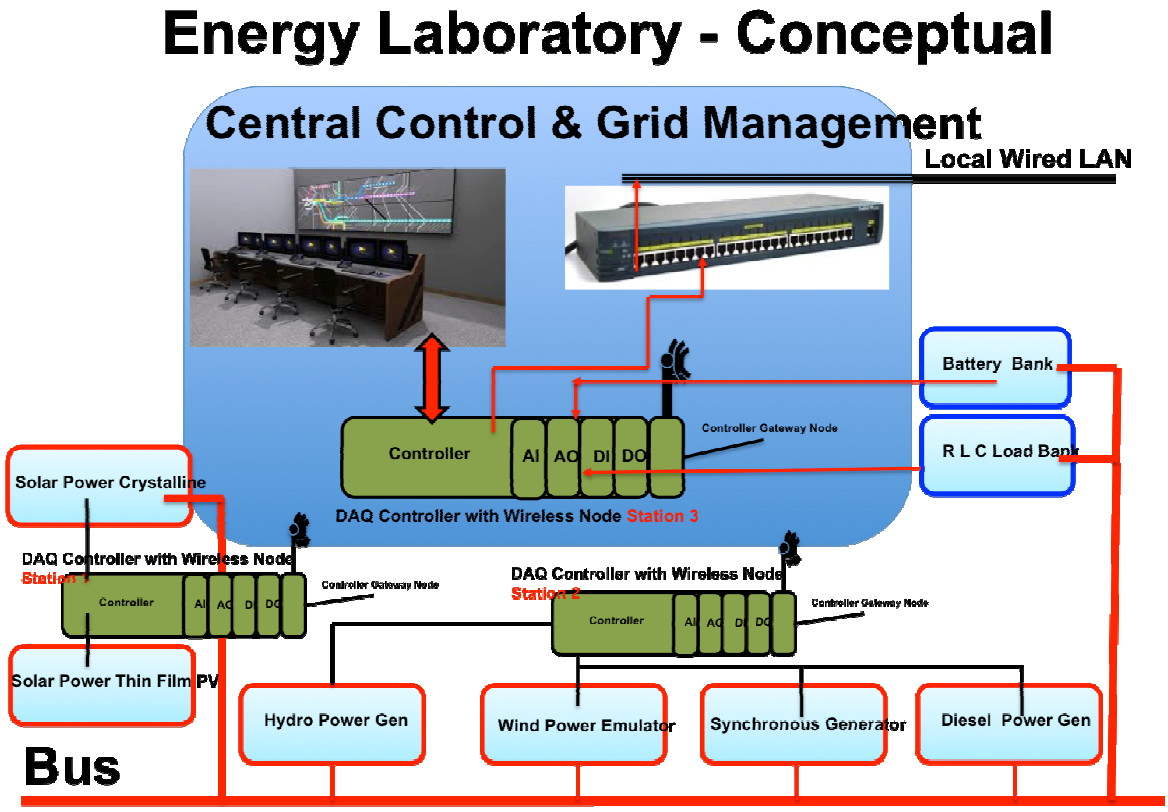
Web

Annexure – 1

Ref:-ENQUIRYNO:-IITMANDI/S&P/PUR-68/2015-16/Multi-Dimensional Smart Energy Grids Analysis

Smart Grid Energy Research Lab

Conceptual representation of the system:



Solar Power Generator System(1 Quantity):

1. ***Mono Polycrystalline Solar Panel 2 kW:***

- Cell Size 156mm x 156mm, Qty 72 cells
- Performance Class - 295 to 315Wp.
- Total Dimension of panel 1968 x 987 x 42 mm
- Certificates IEC 61215 & 61730. UL 1703, TUV
- Rated Power output - 315W
- Open Circuit Voltage - 45.6VDC
- Max Power Voltage - 37.85VDC
- Short Circuit Current - 8.77A
- Max Power Current - 8.33A
- Module Efficiency - 16.2%

- Connectors MC4 Compatible.
- Protection Schottky Bypass Diodes.
- No of Panels - 7 or 8.
- Operating Temp of -40degC to +85degC.

2. ***Power Conditioning Unit :***

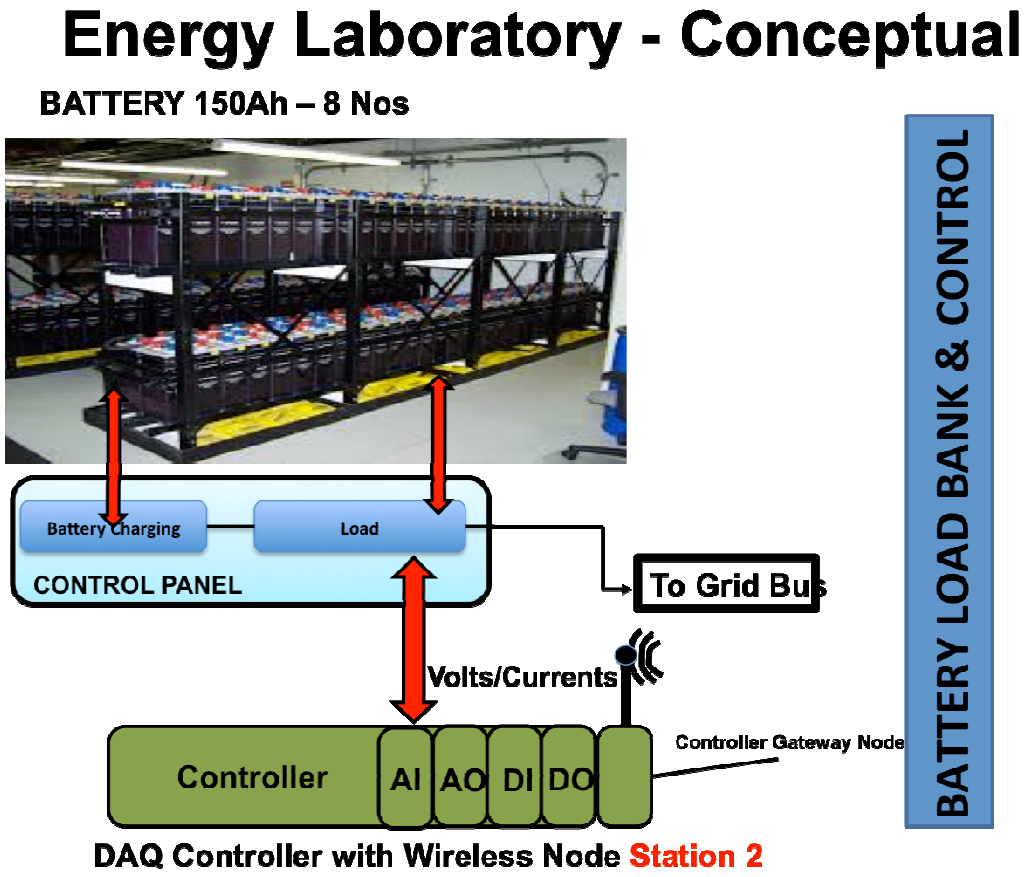
- 3kVA with DSP based PWM technology.
- PV Charge Controller - 3kWp
- Power Device IGBT cum MOSFETs.
- Inverter Input Voltage - 48V
- I/P Voltage range DC - 44V – 60V +/- 2%
- Low Battery Cutoff - 44V +/-2%
- High Battery Cutoff Voltage - 65V +/-2%
- For Load <=40Watt permanent off after 5 minutes.
- Inverter Output @30VAC +/-5% regulated.
- Frequency regulated - 50Hz +/- 0.2Hz.
- Efficiency >85%
- ***Grid Charger***
  - I/P Voltage WW-155 to 280 VAC, NW-185 to 265VAC +/-10V
  - Charging Current Max 30Amp +2 Amp
  - External Programmable through software as a option.
- ***Solar Charge Controller***
  1. Series regulator Common Negative.
  2. Max I/p PV Voltage 25V
  3. Solar Array
     i. Charging Current max 30A
     ii. Float Voltage 54V +/-2%
     iii. Protection Over Charging current, PV/Battery Reverse Polarity, Reverse Current Flow, High Temp.
  4. Operating Temp 0 to +45deg C
  5. Relative Humidity 0-95% non condensing
  6. External Programmable through software as an option.

3. ***Thin Film Si Hybrid Solar Panel 2 kW:***

Thin Film silicon Hybrid Solar panel at Standard Test Condition

- Max Power 120 W(Pmax) - Type U-EA120.
- Tolerance -5 to +10%
- Minimum value of power Pmax 114 W.
- Open Circuit Voltage (Voc) 71 V
- Short circuit current (Isc) - 2.60 A
- Voltage at Pmax (Vmpp) - 55 V.
- Current at Pmax (Impp) - 2.18 A
- Module efficiency - 9.8%.

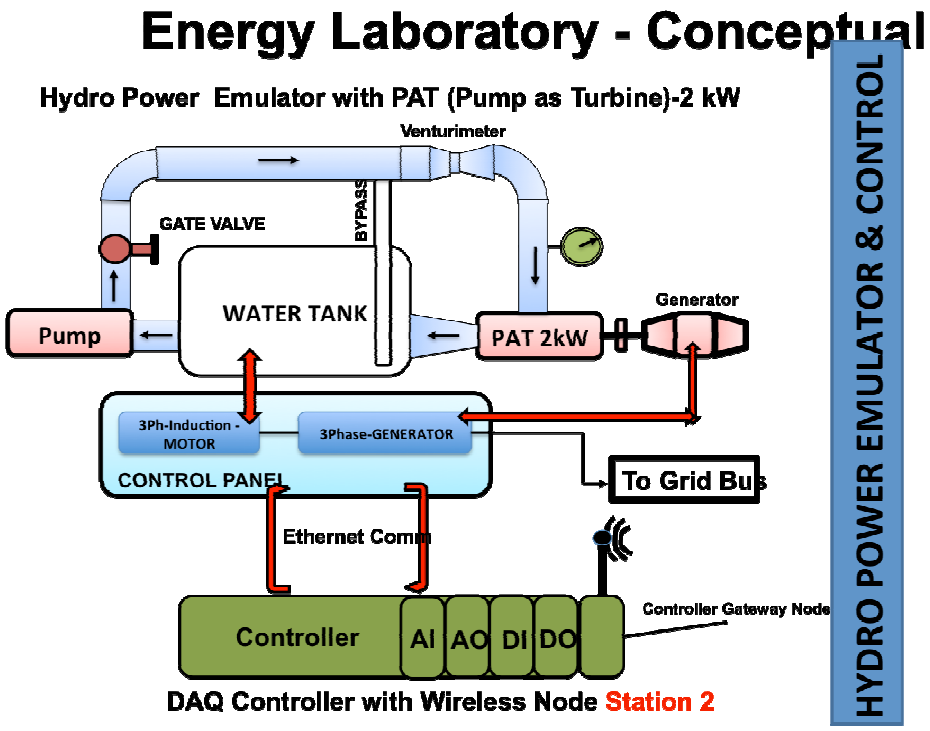
Solar Battery Bank(1 Quantity):



Specifications should include the following:

- 150Ah Rating Quantity - 8 Nos
- Tubular Plate Cast at High Pressure
- Heavy duty spines for excellent Cyclic life & deep discharge
- Reliable at High Temp applications
- Mounting Frames and storage Racks
- All Cables, Terminals, Control Panel and accessories should be included

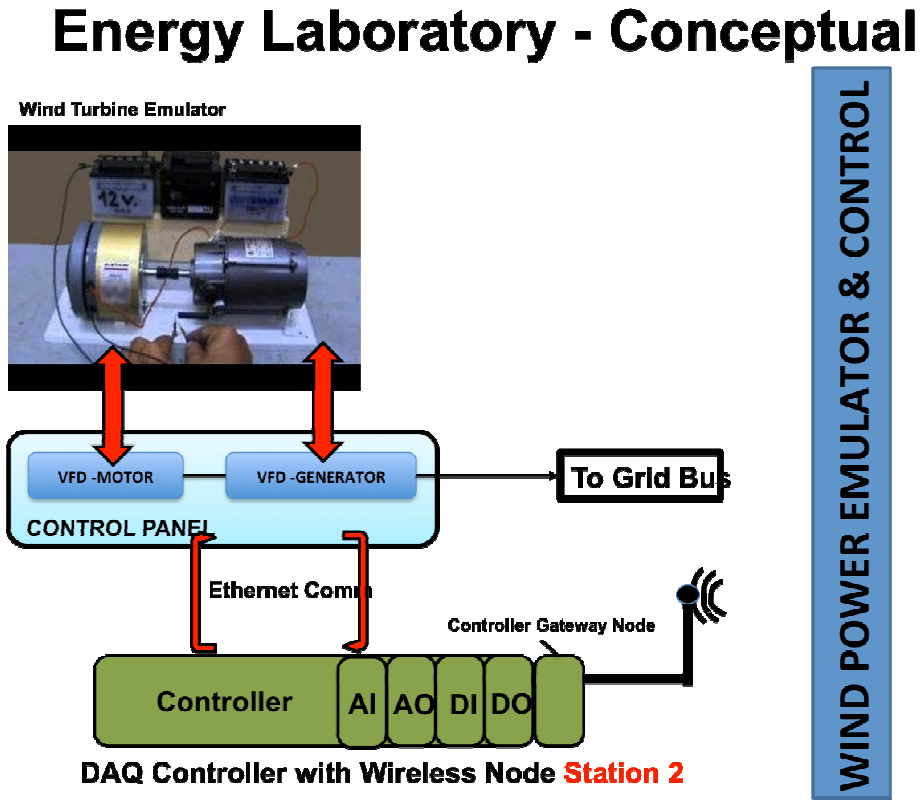
Hydro Power(PAT) System(1 Quantity):



The PAT system should have the following specifications:

- Power Range 3.5kW CF Series Centrifugal Pump working as Turbine.
- Speed up to 1440 CF Series
- Power Supply for working as pump 380 – 415 VAC at 50 Hz.
- Max Total Head CF Series - 20m
- Max Flow - 31 lps for CF series.
- Degree of protection - IP44.
- Insulation Class - A & E.
- Type of Duty -S1 (Continuous).
- PAT Size (Suction x delivery) - 50x40mm
- Dynamically Balanced rotating parts.
- Bronze Impeller with graphite coated asbestos packing rope to improve bush life.
- Water Tank capacity 1.5m x1.5m x1.5 m with all suction strainer, Gate Valves, Venturi meter, shut off valves, Check valves &Pipes (all 2-3” sizes).
- All other related accessories should be provided
- AC Induction Motor 3 Phase working as Generator

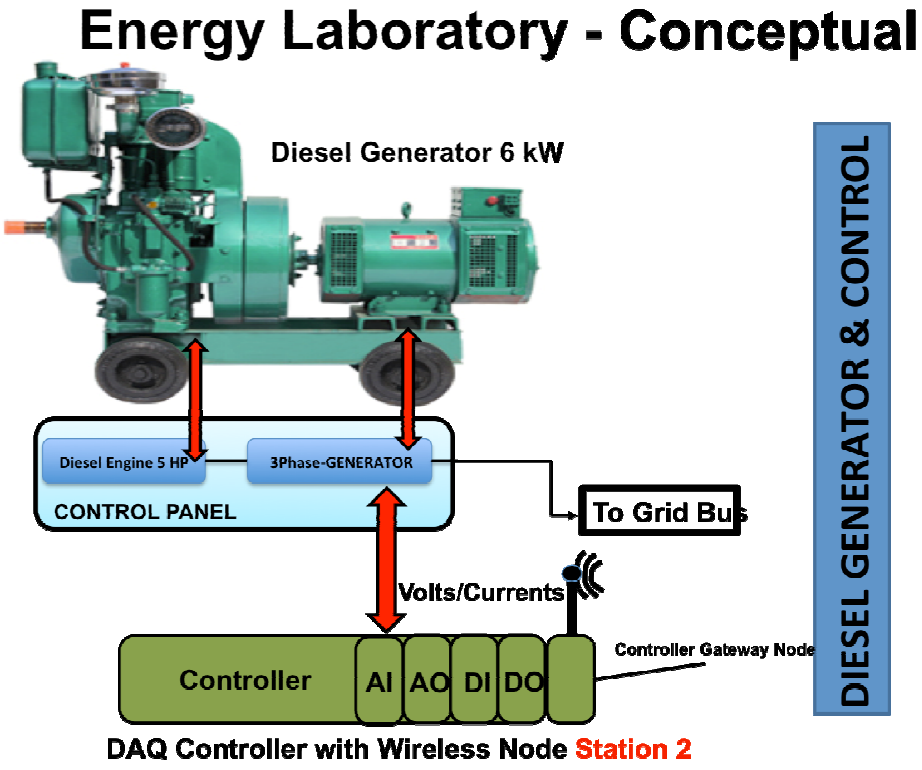
Wind Turbine Emulator System (Induction motor coupled with generator)(1 Quantity):



The system should have the following specifications:

- Variable Frequency Drive
- Input Supply Voltage 230 – 480 VAC – 3 Phase.
- Operating Control Mode V/Hz, Sensor less vector, Close loop vector, Active Front end
- Communication Interface – RS232, RS485,CANopen, Devicenet, Profibus, Profinet, Ethernet
- Certifications CE (EMC & LVD), UL Listed, cUL Listed.
- Operating temp 0- 45 degC for Frame Size F.
- Overload Rating – Heavy Duty Rating (Constant Torque)
- Normal Duty Rating (variable Torque) - 110% for 60 secs.

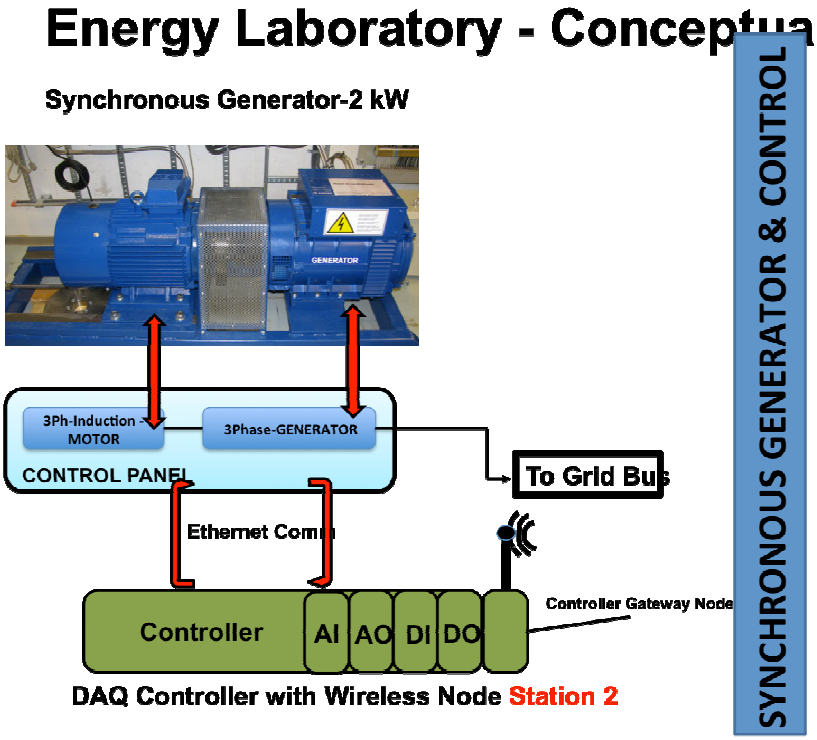
Diesel Generator System of 5kVA (Coupled with Alternator)(1 Quantity):



This system should have the following specifications:

- Power 9HP Displacement 442 cc, RPM 3000
- Cooling System Air Cooled with natural aspiration.
- Governing Class A2.
- ***Alternator***:
  - Type Brushless, Three Phase Class H, Voltage AC 230VAC.
  - Speed Frequency 1500/50 Hz.
  - Control Panel – AMF / Manual Control
  - Fuel Tank capacity – 21 ltrs.
  - Acoustic Enclosure

Synchronous Generator 2kW (Coupled with Induction Motor)(1Quantity):



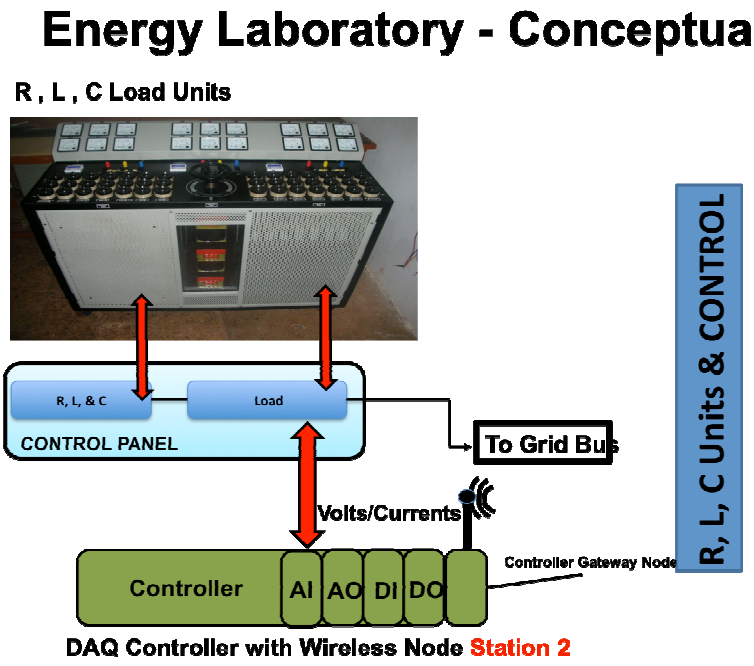
This system should have the following specifications:

2kW Induction Motor with VFD Drive

Variable Frequency Drive

- Input Supply Voltage 230 – 480 VAC – 3 Phase.
- Operating Control Mode V/Hz, Sensor less vector, Close loop vector, Active Front end.
- ***Communication Interface:***
  - RS232, RS485, CANopen, Devicenet, Profibus, Profinet, Ethernet TCP/IP.
- Certifications CE (EMC & LVD), UL Listed, cUL Listed.
- Operating temp 0- 45 degC for Frame Size F.
- Overload Rating – Heavy Duty Rating (Constant Torque),150% for 60secs
- Normal Duty Rating (variable Torque) 110% for 60 secs.

Load Bank(R,L,C)(1 Quantity):



The above system should have the following specifications:

1. ***Resistive Load(5kW):***
    - 3 Phase 415VAC through MCB
    - Max 20A per Phase Loading
    - 2A step loading per Phase of Max 20A – 10 Steps thorugh Rotary Switch.
    - Accuracy +/-5%.
    - Sealed in enclosure combined with Other Load Banks like Inductive & Capacitor
2. ***Inductive Load(5kW):***
    - Smooth variable maintaining the air gap through motorised wheel.
    - 3 Phase 415 VAC.
    - Air cooled system
    - Max 20A per phase.
    - Sealed in enclosure combined with Resistive and Capacitor load banks
3. ***Capacitive Load:***
    - Steps for 20Amp – 10 steps of 2Amps per phase, total 30 steps for three phase.

General specifications of the system:

- MCB for Mains On/OFF.
- RLC Unit on Caster wheel.

- Analogue type AC & Voltmeters 3 Nos each per Bank with Total of 18 Nos.
- Input Main Voltage 230V/415VAC
- Voltmeter Range 0-300/500VAC
- Ammeter Range 5-100A AC

Controllers and Data Acquisition Requirements:

The connectivity between controller chassis and PC should be through Ethernet. The Control and Data Acquisition system should be able to meet real time requirements imposed on it by the application and the Real time OS running on the system controller. Each component of the Control and Data Acquisition system Hardware and Software should be from the same OEM to ensure compatibility and scalability. The Control and Data Acquisition system specifications are as under:

1. ***Main Controller with Chassis(1 Quantity):***

This controller will be connected to Hydro Power generator, wind power emulator, synchronous generator and diesel power generator. It should have the following specifications:

- Intel Core i7 processor with 1.33 GHz CPU frequency with Windows 7 embedded Real Time
- Rugged Chassis with minimum 8 slots for data acquisition/signal conditioners
- Environmental working Temperature of 0- 55 degC
- Operating Humidity of 10 -90%RH, non condensing
- Dimensions with LxWxH – approx. 405 x 90 x 125 mm and max weight of 4.5 Kgs
- Ethernet Network interface with IEEE 802.3 compatibility
- 232C - Serial port communication with maximum baud rate of 115,200 bps.
- RS 485/422(DTE) serial port with max baud rate of 320,400 bps
- USB 2.0 Hi speed interface with Max Data Rate of 480Mb/s
- VGA port with Max Resolution 1600x1200.
- Upto 32 GB nonvolatile and 2GB of system Memory
- Spartan-6 LX 150 reprogrammable FPGA with 184,304 Flip Flops; 92,152 6 input LUTs; 132 DSP48A1 slices; 4824kbit embedded block RAM; 40 and 80MHz timebase
- Max Battery Life of 10yrs with power applied to Power connector
- Input Power Supply of 9 to 30VDC, 100W

- Shock & Vibration - Random as per IEC 60068-2-64 – upto 5g rms (10 – 500 Hz) and Sine wave as per IEC 60068-2-27 – upto 50g 3sm half sine and 18shocks at 6 orientation

2. ***Distributed Controllers with Chassis (2 Quantity):***

One controller will be required for control of central battery bank and RLC load bank; one controller will be required for the control of solar power generation. It should have the following specifications:

- Controller with minimum 1.33 GHz dual-core Intel Atom processor, 4 GB nonvolatile storage, 1 GB DDR3 memory
- Real-Time operating system with embedded UI and Mini DisplayPort to implement a local HMI
- -20 °C to 55 °C operating temperature range
- Dual core Intel Atom E3825 processor, 1.33 GHz
- 2 Network/Ethernet Ports with IEEE 802.3 Compatibility
- 1 RS-232 Serial Port with Maximum baud rate - 115,200 bps
- 1 RS-485/422(DTE) Serial Port with Maximum baud rate - 115,200 bps
- 2 USB 2.0 high speed Ports with maximum data rate - 480 Mb/s per port
- 1 Mini display port with Maximum resolution - 2560 × 1600 at 60 Hz
- 1 SD removable (user supplied) memory - Up to 32 GB and 4GB Solid-state drive and Volatile Processor memory of type DDR3L and 1GB density
- 1 Reconfigurable FPGA - type Xilinx Kintex-7 7K70T; with 82,000 flipflops; 41000 LUTs, 4860kbits block RAM; 16 DMA channels and 32 logical interrupts
- 1 CMOS Battery with Typical battery life with power applied to power connector - 10 years
- Voltage input range of 9 V to 30 V

3. ***400 Vrms voltage input modules (3 Quantity):***

One voltage input module will go in each of the Controller and data acquisition system mentioned above. It should have the following specifications:

- Max Voltage input range 400 Vrms between Line & neutral and 800Vrms between Line to line

- No of input channels per signal conditioner- 03 and 01 for neutral
- Data sampling rate Max 50 ksamples/sec; all sampling simultaneous
- Signal ADC resolution 24bits
- Input connectivity with 12-24 AWG cables
- 12.8MHz internal master time base with maximum accuracy of +/- 100ppm
- Should withstand over voltages of 800 Vrms continuous and 1000Vram for 1 sec
- Surge withstand of 5kV (1.2 micro secs/50 micro secs)
- Input impedance of 2Mohms between Analog input to ground & Neutral to Ground
- 4.22 mVrms Input noise at Line to earth and Neutral to earth
- Power consumption from Chassis – 332mW during active mode.
- Should be able to withstand Shock & Vibration of 5g (10 – 500 Hz)- random and sine and Shock of 30g for 11 ms Half sine, 50g for 3 ms Half sine and 18 shocks at 6 orientations.
- Temperature operability of - 40degC to +70degC.
- Must have Strain relief connector at input side for cable with 12 – 24 AWG
- All connecting accessories must be provided

4. ***Analog current input modules(3 Quantity):***

One voltage input module will go in each of the Controller and data acquisition system mentioned above. It will be used to record the analog current values. It should have the following specifications:

- No of input channels - 4 per signal conditioning module
- ADC Resolution - 24bits
- Data sampling mode - simultaneous with ADC type Delta-Sigma.
- Internal master time base- 12.8 MHz.
- Accuracy of +/- 100 ppm max.
- Max sampling frequency- 50 kS/sec
- Safe operating range - 5Amp maximum
- Over current handling of maximum 10Amps for 1sec max.
- Instantaneous measuring range 14.051 Amp peak
- Input Coupling - DC
- Input impedance AI+ to AI- 12mOhms
- Power requirements- 730mW max in active mode.
- Channel to channel isolation 250Vrms- continuous and 1390Vrms- withstand.

- EMC compatibility for standard (IEC 61326-2-2) and CE compliance to 2006/95/EC and EMC compatibility 2004/108/EC
- Shock & Vibration – upto 5g (10 – 500 Hz) random and sine **and** 30g for 11 ms Half sine, 50g for 3 ms Half sine
- Temperature operability range of -40degC to +70degC
- Must have Strain relief connector at input side for cable with 12 – 24 AWG
- All connector accessories need to be provided

5. ***30V DC Relay modules (3 Quantity):***

One relay module will go in each of the Controller and data acquisition system mentioned above. It should have the following specifications:

- 04 Number of Channels, electromechanical type with single pole single through (SPST)
- Power on output state - Channel Off
- Switching Voltage 60VDC Max & 250Vrms max
- Switching current /channel of 2.5Amp max at 30VDC, 1Amp max at 60VDC & 2.5amp max at 250Vrms
- Resistance per channel when channels are on - 0.2 Ohms
- Switching rate 1 operation per sec with Relay release time 10 ms max ; Relay Bounce Time of 03 ms max and Relay operate time 15 ms max.
- Life Mechanical (no Load) – up to 20,000K operations, and electrical (connecting to load) – up to 100K operations
- Power 580 mWatt max when active
- 250 Vrms channel to channel isolation in continuous mode
- EMC compatibility to standard IEC 61326 and CE compliance to 2006/95/EC & 2004/108/EC.
- Shock & Vibration 5g (40 – 500 Hz) - sinusoidal - 10Hz to 40 Hz
- Temperature operability of -40degC to +70degC
- Must have Strain relief connector at input side for cable with 12 – 24 AWG
- All connector accessories for connecting connector block

6. ***GPS Time Synchronization Module (3 Quantity):***

One GPS module will go in each of the Controller and data acquisition system mentioned above. It will be used to synchronize multiple readings between the three data acquisition and control systems. It should have the following specifications:

- GPS signal L1 Frequency 1575.42 MHz
- Signal Strength SMA -135 dBm to -120 dBm
- Max RF Power at input of 3dBm
- Input Impedance of 50 Ohms
- Mean Time Between Failure (MTBF) – 2234702 Hrs
- DC Output for Antenna + 5V DC +/- 10%
- Max Current Output of 30mA
- Min current for antenna - 6mA
- Temperature operability of -40 degC to +70 degC.
- Shock & Vibration 5g (10 – 500 Hz)- random and sine and Shock upto 30g for 11 ms Half sine, 50g for 3 ms Half sine and 18 shocks at 6 orientations
- EMC compatibility to standard IEC 61326 – 1
- CE compliance to 2006/95/EC & 2004/108/EC
- Over Voltage Protection +/- 30 VDC
- Power Requirements 550mW max
- All connecting accessories must be provided

Remote Wireless networking modules:

7. ***Gateway modules (3nos)***

One gateway module will go in each of the Controller and data acquisition system mentioned above. It will help to create complete wired and wireless measurement and control system. It should have the following specifications:

- The RS 232C Port compatibility with ANSI/EIA/TIA-232 standard.
- The operating mode through four wire or 2 wire auto operating mode.
- Battery Life at 9600 Baud rate >3 yrs
- The built in 6 DIO ports/lines, with 2 bidirectional I/O channels
- The DO channels support Sourcing, Sinking, 3V TTL logic (Open collector with pull up) and Drive High and Low (sourcing and sinking)
- DI operations with 24V sinking, 24V sinking with power management, TTL Logic and Contact closure
- All connecting accessories must be provided

8. ***Remote RS 232 node (1no):***

This wireless node will provide RS 232 connectivity to the solar on grid converter and wirelessly transmit the data to the corresponding controller and data acquisition system. It should have the following specifications:

- Baud rates of - 300,600,1200,1800,4800,7200,9600,14400,19200,28800,38400,56000,57600,115200,128000,153600,230400 bps should be supported
- Flow control - RTS/CTS at hardware level and XON/OFF at software level
- Max RS232 Continuous Voltage level of +/-15V should be supported
- Overvoltage Protection of +/- 30VDC
- Sensor Power - 12V +/- 10% & current - 50mA max
- Should be Short circuit proof
- Digital I/O Lines - No of channels 02
- Digital pin capacitance 2000pF
- Digital Input Mode - 24V sinking, 24V sinking with power management, TTL logic, contact closure
- Input range of 0 to 30 VDC max
- Operating Voltage Range of 3.3 to 24 VDC
- RF data rate of up to 250 Kbps.
- Range of up to 300m should be supported
- Frequency Band support f ISM 2.4GHz (2400 MHz to 2483.5 MHz)
- Antenna - Female RP-SMA connector
- External power of 5 to 30 VDC
- Weight of maximum 250 gm
- Temperature operability of -40degC to +70degC
- All connecting accessories must be provided

9. ***Wireless Remote Data Monitoring Node (8nos)***

These will be used to wirelessly transmit data between Hydro Power Generation, Wind Emulator, Synchronous Generator, Diesel Power Generator, R L C Load management, Battery Load Bank System and the data acquisition & control systems. It should have the following specifications:

- No of Analogue Channels – 04 - single ended with 16 bit resolution
- Min sampling rate - 1 sec
- Coupling mode - DC.
- Input ranges ±10V,±5V,±2V,±0.5V
- Over Voltage Protection - +/- 30 VDC.
- 4 bi directional and individually settable digital input/output channels with Configurable modes per channel - Drive High Only, Drive Low only, Drive High and Low and tri state
- Total Digital Output current (all Channels) - 1A max, and one channel 0.5 A max.

- RF data Rate - 250 kbit/s should be available
- Frequency Band - ISM 2.4 GHz(2400 MHz to 2483.5 MHz)
- Range of up to 300m should be supported
- Antenna – Female RP with SMA connector.
- Impedance - 50 Ohms.
- Battery Power - 3.6 to 7.5 VDC. External 9 to 30 VDC.
- Battery Life of minimum 3 Yrs
- Light weight of maximum up to 250 gm
- Temperature operability of -40degC to +70degC
- All connecting accessories must be provided

H. Software, Control Development and Integration

Software Development for DAS and Control from all sub System as per Layout.

Integration of hardware, Sensors, Instrumentation & software. All Operation and Service manual one Copy both in Soft and Hard bound.

COMPLIANCE STATEMENT FOR THE TENDER SPECIFICATIONS

INDIAN INSTITUTE OF TECHNOLOGY MANDI
HIMACHAL PRADESH-175001

Ref:-ENQUIRYNO:- **IITMANDI/S&P/PUR-68/2015-16/Annexure 1**

S. NO	**Check list of documents/ Undertakings ?**	**YES/NO**	**Remarks (Give explanation if answer is No)**
1	Is Tender fees attached?		
2	Is EMD attached? (if applicable)		
3	Is the bidder original equipment manufacturer (OEM)/authorised dealer?		
4	If authorised dealer, recent dated certificate to this effect from OEM, attached or not?		
5	Undertaking from OEM regarding technical support & extended warranty period		
6	Validity of 180 days or not?		
7	Undertaking from bidder regarding acceptance of tender terms & conditions		
8	Whether list of reputed users (along with telephone numbers of contact persons) for the past three years specific to the instrument attached.		
9	Whether special educational discount for Indian Institute of Technology (IIT) Mandi (H.P) given.		
10	Whether two weeks training of operator and research students without any charges offered.		
11	**Does the instrument complies with all the required specifications as per annexure 1. Attach a separate sheet showing compliance with the specifications and explanations thereto if the equipments varies from the requested specifications.**		
12	Whether free Installation, Commissioning and Application Training offered.		
13	Whether three years comprehensive onsite extended warranty offered.		
14	Whether Annual maintenance after expiry of comprehensive onsite warranty quoted separately as optional.		