



Bharatiya Vidya  
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( Founded in 1938 by Kulapati Dr. K. M. Munshi with the blessings of Mahatma Gandhi )

आ नो भद्रा : क्रतवो यन्तु विश्वतः।

Let noble thoughts come to us from every side

## **SARDAR PATEL INSTITUTE OF TECHNOLOGY**

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Date: July 27, 2022

### **NOTICE INVITING QUOTATION**

I have to request you to please give your lowest quotations for the items given in the following required by our institute. Please note that the quantity mentioned against each item is tentative. Your quotation should include the lowest price offered by you inclusive of free delivery at the college premises and installation. All the Levis applicable, if any, should be clearly mentioned. Full technical literature should be included with your quotations. Please send your quotations in a sealed envelope well as mail the soft copy latest by 15<sup>th</sup> August 2022, 11 am.

#### **List of Equipment & Specifications: As attached**

#### **Eligibility Criteria, Terms, and Conditions:**

1. The rates are inclusive of Taxes, Transportation, Loading unloading, and any other incidental charges, P and F, Insurance.
2. Payment: 100% against delivery after a satisfactory demonstration of the equipment. However, in the case of an advance payment, the bank guarantee is mandatory.
3. Material should be accepted only after Inspection.
4. The material shall be delivered at S.P.I.T, Andheri (W) within three to four weeks.
5. Payment will be made within 15 days of the receipt of material.
6. Payment shall be made by Cross Cheque only.

Thanking you.

Yours faithfully,  
**(PRINCIPAL)**

### List of Equipment

Sr No	Device Description	Qty	Specification
1	PV Solar Emulator	1	Refer Annexure
2	AC-DC Rectifier power Supply@48V/100A	1	Refer Annexure
3	High Power DC Power Supply	1	Refer Annexure
4	3-Phase Power Quality Analyzer with Current Sensor Probe up to 600A	1	Refer Annexure
5	Emulation of Electrical Load Test Facility	1	Refer Annexure
6	Inverter Stack and DC-DC Converter	1	Refer Annexure
7	Multifunctional Control Card	2	Refer Annexure
8	Electric Motors	2	Refer Annexure
9	Battery Management System	2	Refer Annexure
10	5KVA Off Grid Solar Inverter with protection features	1	Refer Annexure

For additional information Contact us:

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## Product Specifications:

### 1. PV Solar Emulator:

PV Emulator is a programmable power supply designed to mimic the characteristics of Solar Panels. With fast transient response, the emulator responds to change in load conditions and maintains the output on IV characteristics of the panels defined by user for a given ambient condition.

Specifications:

Features:

- An active measurement panel to measure voltage, current, power and energy
- User controlled, cost effective way to test response of PV system for wide range of solar panels
- Simulate the I-V curve under varying environmental conditions
- Test and verify different parameters of PV system like – MPPT tracking algorithm of PV inverter, efficiency of MPPT tracking
- Measure and verify the overall efficiency and conversion efficiency of PV inverter for variety of solar panels and in varying weather conditions
- User can simulate Partial Shading effects and obtain up to four peaks
- Two users can use single PV Emulator to carry out different results using PV Emulator in 1kW mode
- Tracking of load point and load line is possible
- IV-PV graphs can be seen using the proprietary software
- Data can be saved in excel format
- Graphs can be saved in image formats

Purpose:

- MPPT algorithm testing
- Inverter control testing for different operating conditions
- Performance Analysis and Comparison of Modelled PV Panel with PV Emulator
- Testing of Charge Controller
- Micro-grid and smart grid control testing
- Performance analysis of various PV pan

Technical Specifications:

Sub- Components	Specifications	
Solar PV Emulator Total Capacity – 2 KW	Input	
	Supply Voltage	230V AC/ 50Hz
	Output	
	No. of Channels	2
	Short Circuit Current (Isc)/Channel	0-20 A
	Open Circuit Voltage (Voc)/Channel	0-50 VDC

Max Output Power /Channel	1000 W
Maximum Channels in Parallel	2
Maximum absolute voltage at output	50 VDC
Voltage Slew Rate Range	0.01V/ms-2V/ms*
Current Slew Rate Range	0.01A-1A/ms or INF
Physical Box	
Connector at Output	Banana Type
Number of leads in output connector	4
Operating Environment	Indoor Use

## 2. AC-DC Rectifier power Supply@48V/100A:

Input Voltage	170V AC to 260V, 50/60 Hz
Input PF	0.9
Output Voltage	44V to 55V @ 2% tolerable ripple
Max Output Current	100A @ 5% tolerable ripple OR 4-Channels in Parallel with 25A each
Output Power	3000 W (170–260 V AC); 1250 W (85–170 V AC decreased linearly)
Operating Modes	CC + CV
References	O/P Voltage and Current Digitally settable
Surge protection capability	2 kV in differential mode 4 kV in common mode
Protections	OV/UV Output and Input side, Short Circuit Output and Reverse Polarity Battery

Applications: 48V EV Battery Chargers, Solar and Telecom Applications

## 3. High Power DC Power Supply:

Input Voltage	3-Phase 380V-440V, 50 Hz AC
Input PF	0.9
Output Voltage	300-320V @ 2% tolerable ripple
Max Output Current	20A @ 5% tolerable ripple
Output Power	6000 Watts
Operating Modes	CV

References	O/P Voltage and Current Digitally settable
Surge protection capability	2 kV in differential mode 4 kV in common mode
Protections	Regular, OV/UV Output and Input side, Short Circuit Output and Thermal Protections

Applications: Testing of Solar Inverter, Wind Inverter, AC Drive and BLDC Drive

#### 4. 3-Phase Power Quality Analyzer with Current Sensor Probe up-to 600A:

##### *Preferred Model:*

Hioki PQ3100, Fluke 435-II Power Quality and Energy Analyzers,

Features

Standard compliance IEC 61000-4-30 Class A

Measurements: Volt Amp Hz, Dips and swells, Harmonics, Power and energy, Energy loss calculator, Unbalance, Monitor Inrush, Event waveform capture, Flicker, Transients, Mains signaling, Power wave, Power inverter efficiency, SD-Card Storage Facility

#### 5. Emulation of Electrical Load Test Facility:

This is three phase inverter-based load emulator device which can emulate Single/Three Phase Resistive, inductive, capacitive, induction Motor @ 440V, 50/60Hz 3=Phase supply up-to 6kW Loading condition. User will have option to select load from a self-contained HMI device with a facility to select the type load and power. Both steady state and transient behavior should be emulated to get the desired realistic loading conditions.

Key Features:

The emulator is grid interfaced converter capable emulate linear, non-linear and AC Motor loads within the prescribed power ratings

Emulation of Linear Loads: The emulator is capable to draw a sinusoidal current at different power factor from Unity to 0.2 lagging/leading

The Emulator mimics the 4-quadrant electrical output of a 3-phase synchronous or induction motor/generator under user-controlled speed, torque and temperature conditions thereby simulating an electric drive train.

Supports multiple motor/generator characteristics in a single set of hardware. Unique machine types (PM and Induction) and characteristics (voltage/speed; inductance; thermal variations) are emulated based on User defined criteria.

Compatible with most known PWM switching methods (space-vector, sine-triangle, LHC & others)

Re-circulates power between the ELE and Inverter Under Test thereby eliminating cost and complexity of re-circulating power back to facility mains. 208/380 or 480 VAC facility power sized for make-up power only (about 25% of system rating).

Specifications:

Input: Three-Phase 440V 50Hz AC

Output: Three Phase AC Emulated controlled load current as per load requirements:

Max Output Power: 6kVA @ 440V, Three Phase AC

Regenerative Grid-feeding is essential to save Power (Bidirectional Power Conversion)

HMI with the settable load and Power, speed, pf, etc. references

## 6. Inverter Stack and DC-DC Converter:

Loads	Battery Charger, Linear and Non-linear dynamic load
Type:	Constant Voltage with Current Limit
Rating:	135 V / 35 Amps.
Input: DC at 350V	475 V DC to 560V DC, 5 % ripple
operating Temp.:	0 to +55 °C
Cooling:	Natural cooling
Output Voltage:	110 V to 135 V settable via keypad
Output Current:	Total current : 35 Amps
Battery current :	settable from 10 Amps - 20 Amps
Load current:	15 Amp
Output Ripple:	2 % rms @ 122 V
Output Regulation:	± 2% @ 122 V for 10 % - 100 % Load
Efficiency:	≥85 % at half load & ≥ 92 % at full load for 475 V to 550 V
Protections:	output over voltage Trip @ 135 V
output short circuit protection	
Constant current mode after 35 Amps.	
Reverse Battery Protection	
Thermal Trip for Transformer	
Thermal Trip for Power Devices	
Charger shall work on 35 % Load when external safety signal turns ON	
Front Panel Control:	ON - OFF switch, Fault Reset push button
Front Panel indications:	Battery Charging Indication
Output Fuse Fail Indication	
Reverse Polarity Indication	
Earth Fault Indication	
Push Button for Fault Reset	
Interface module:	Detachable - should work on serial protocol
LCD & Keypad :	LCD Display for parameter setting
Fault diagnosis of	
input under / over voltage	
output short circuit	
reverse polarity	
Thermal shutdown	
output over voltage	
RTC setting & other parameter setting via key pad	
command for Data Down load	

## 7. Multifunctional Control Card:

This is a Data Acquisition, Sensing and Control Card with direct output to 6-8 Channel PWM Gate Drive to IGBT Stack with Motherboard + Piggyback PCB Architecture for controller accommodation.

- (a) AC/DC Voltage sensing Channels: 4 Nos.
- (b) Current Sensing Channels: 4 Nos. upto 50A
- (c) Temp Sensing Channels: 2 Nos.
- (d) Alarm Outputs (Potential Free Relay based ) : 6
- (e) Display Interface: 16x2
- (f) Keypad Interface: 4x4
- (g) Microcontroller: dsPIC33xxxx, TMS320xxx, etc.
- (h) DC Supply Inbuilt, with input from 1-Phase 230V/AC Supply
- (i) PWM Channels : Max 8

Applications: Induction Motor Drive, Active Power Filters, Solar Inverter, etc.

## 8. ELECTRIC MOTORS:

### (1) BLDC Motor Based 5 HP Submersible Solar Water Pump

Sr. No.	Type	Single Stage, Mono-block, Centrifugal pump driven by BLDC motor
2	Head Range	17 to 26 m
3	Flow Rate	840 to 480 lpm
4	Suction/ Delivery Size	80/65 mm
5	Motor	3.7 kW / 5 HP, BLDC 225 V, 15 A, 2880 RPM, S1 Duty, Class B insulation, Efficiency 92%, IP 55

### (2) ABB Synchronous reluctance (SynRM) motors

IE5 Synchronous reluctance motors by ABB,

High output Synchronous reluctance motors.

By upgrading to ABB's IE5 SynRM motor, you can reduce energy losses by 40%, save electricity 18 terawatt-hours in a year and reduce CO<sub>2</sub> emissions by 6 million tonnes over the motor lifetime.

Changing just one motor can make a difference.

Features :

- qVerified IE5 efficiency
- Lower bearing and winding temperatures
- Longer bearing life-time
- Better partial load efficiency
- More precise process control
- Permanent magnet motor performance - without rare earth magnets

Product range:

- Motor type: M3AL/M3BL
- Output: 5.5 kW
- Frame sizes: IEC 132–315

## Kirloskar 5 HP Borewell Submersible Pump Set 60HHN-0508

Power	: 3.7 KW
Voltage	: 200-440 V
Frequency	: 50-60 Hz
Power (HP)	: 5 HP
Size OD (mm)	: 142 mm
Model No	: 60HHN-0508
Stage	: 8
Warranty Details	: on site

Type of Product	: Borewell Submersible Pump Set
Suitable For	: 150 mm Boring
Borewell Size	: 6 Inch
Head (mm)	: 1-447 m
Discharge Range	: 740-30 LPM
Outlet (mm)	: 50 mm
Phase	: Three Phase
Del Size (inch)	: 50 mm
Material	: Stainless Steel
Product Code	: D12270502154
NRV Size	: CI

### 9. Battery Management System:

Expected Specifications:

- Capable to support up-to 120 Cell Configuration
- State of charge calculations with dynamic drifts
- Cell over-voltage and under-voltage protection.
- Intelligent battery balancing (passive).
- Battery charger control.
- Pack temperature monitoring.
- Monitors health of both battery pack and individual cell.
- Rugged and EMI Resistant
- Programmable on the Field
- Charge and Discharge Current Limit Calculations
- Fully Programmable Dual CAN bus interfaces (• CAN2.0B (11-bit and 29-bit IDs supported) • Independently operate at different baud rates • Fully customizable message formatting • Field upgradable firmware and settings using CAN interface)
- Automotive Grade design
- Data Logging and Visualization Support

Battery Pack System:

12V battery pack - Lithium Iron-Phosphate (LiFePO4) - 100Ah ..... 04 Nos.

Salient Specifications:

- High lifespan: 3000 cycles and more (see chart)
- Deep discharge allowed up to 100 %



- Ultra safe Lithium Iron Phosphate chemistry (no thermal run-away, no fire or explosion risks)
- Embedded BMS (Battery Management System) : improve lifespan AND secure the battery
- No Lead, no rare earths, no acid, no degassing
- Calendar life > 10 years
- Excellent temperature robustness (-20 °C up to +60 °C)
- Flexible deployment: up to 16 packs in parallel and 4 in series
- Constant power during discharge (very low internal resistance)
- Very low Peukert's losses (energy efficiency >98 %)
- Certification : CE, RoHS, UN 38.3
- Very low self-discharge (3000 cycles (see chart)

Self-discharge	(< 3%
per month Energy efficiency	> 98%
Standard Charge voltage	14.4 V $\pm$ 0.2V
Charge mode	CC/CV : Constant Current / Constant Voltage Continuous charge current
BMS charge cut-off voltage	14.8 V $\pm$ 0.1V
Instant peak discharge current	300 A $\pm$ 30 A
Continuous discharge current	125 A (1.6 kW)
BMS discharge cut-off voltage	10 V
Charge temperature range	0°C to +60°C
Discharge temperature range -	20°C to +60°C
Storage temperature	0°C to +50°C
Dimensions (Suggested)	L : 260mm x W : 168mm x H : 212 mm
Weight	10-15 kg

## 10. 5KVA Off Grid Solar Inverter with protection features.