Department of Electrical Engineering
Punjab Engineering College (Deemed to be University), Chandigarh
QUOTATION NOTICE

Subject: One kW Two-Stage Three-Phase Grid Connected Solar PV System

Quotation are hereby invited in respect of the item mentioned below. The quotation should be sent in the sealed cover with wax/ transparent fixing tape duly signed marked Quotation for purchase of '*One kW Two-Stage Three-Phase Grid Connected Solar PV System*' and due date on the top of the envelop so as to reach this office to Head, Electrical Engineering Department, Punjab Engineering College (Deemed to be University), Sector 12, Chandigarh on or before, 1st July 2025 by 05:00 PM.

S.No.	Item Description	Quantity
1	*One kW Two-Stage Three-Phase Grid Connected Solar PV System* (The detailed specifications are attached with this letter)	1

The quotation will be opened on 2nd July 2025, Wednesday at 02:30 PM by the committee members in the presence of the bidders or their representative who may like to be present during opening of quotations. The right of acceptance or rejection of any quotation without assigning any reason is reserved. Necessary literature of the equipment may please be sent. Please quote of F.O.R PEC, Chandigarh basis. No advance payment will be made; 100% payment will be released after successful delivery & installation.

Note: The quotation notice may be downloaded from the institute website i.e. www.pec.ac.in

16/6/25

Head,
Department of Electrical Engineering

Annexure - 1

Detailed Specification of 1 kWp Two-Stage Three-Phase Grid Connected Solar PV System

Two-Stage Solar MPPT trainer with solar panels, boost converter for MPPT tracking and three-phase grid synchronized inverter for interfacing with grid supply is required. Latest 32-bit microcontroller-based control circuit for interfacing solar PV voltage and current and experimenting MPPT tracking is required. The microcontroller should also sense the DC link voltage, grid voltage and grid current and establish power equilibrium between solar PV generation, load and grid power. The intermediate control algorithm development control signal should be studied for the easy understanding of the control algorithm. The control algorithm should be developed using MATLAB/Simulink based model-based programming of the selected microcontroller. A computer is provided along with the system. Accordingly, the system should be embedded with following components:

- 1.32 kWp solar panels
- Boost Converter
- Three Phase Inverter
- Isolated AC/DC sensing for voltage/current Measurement.
- STM32XX Microcontroller Board.
- Three Phase Transformer
- Filter and Load Resistor
- Computer

The detailed specifications of each component are as following:

- Solar Panel: 1.32 kWp; four numbers of 330 Wp panels connected in series.
  - **Capacity rating: 330 Wp**
  - Module efficiency: 16.57%
  - Rated voltage: 37.96 V
  - Current: 8.70 A
  - Open Circuit Voltage: 46.70 V
  - Short circuit current: 9.25 A
- Boost Converter:
  - Power Rating: 2 kW

- Input: 100-200 V
- Output: 250-300 V
- Switching frequency 40 kHz.

❖ Three Phase Inverter:

- DC Input Voltage: 250-300 V
- AC output voltage: 150V ± 5% V
- Output frequency: 50 Hz ± 5 Hz
- Recommended switching frequency of the inverter 20 kHz
- Port for connecting 04 gate pulses to drive IGBTs of the inverter circuit
- Fault output for communicating FAULT status to the Digital Controller
- All cards are mounted in Acrilyc box and power terminals and control terminals are terminated on front panel.

❖ Isolated AC/DC sensing for voltage/current Measurement.

- Sensors are calibrated to 0-3.3 V for direct interfacing with the unipolar ADC channels of the Digital Controller.
- Sense AC/DC Voltage and Current

❖ 32-bit ARM-Cortex controller kit:

- STM32F407VGT MCU @168MHz
- Buffered I/O Ports using 74HC573
- 2 DAC outputs
- 9 ADC input channels with buffering using LM324 IC
- On board QEI (Quadrature Encoder Interface) section
- 5 Keys push to ground
- 16*2 LCD (JHD162A) display
- UART section (RS-232) (IC Max 232)
- RS-485 serial communication port

❖ Transformer Power rating: 3 kVA, 415 V_{LL} / 150 V_{LL}

❖ Filter and Load Resistor: Suitable rated inductors should be provided as filters and suitable load resistor to perform experiment 1 and 2.

❖ Computer: Complete arrangement with personal computer having minimum following configuration should provide for programming the drive. Intel Core-i3 (6th generation) 3.3

GHz processor, Mother Board - ASUS/GIGA-BITE or equivalent, RAM- 8 GB, Hard disk min.- 500 GB, DVD writer, Screen (18.5 Inch) – LG or equivalent, with required essential accessories. Facility for self-written C program as well as model based programming. MATLAB and C Language Coding support.

- ❖ Control algorithm development based on instantaneous power theory; and operation of grid-synchronized inverter is studied.
- ❖ PLL development to study grid synchronization.
- ❖ Test points for intermediate signal observations are provided.

The following experimental facility should be available on the experimental setup:

1. Study of open loop control of Boost Converter. (Manual duty ratio control)
2. MPPT control of solar PV panel using Boost Converter. (Duty controlled by MPPT algorithm)
3. Study of grid-synchronised algorithm development for single-phase inverter.
4. Study of two-stage PV Inverter performance under open loop control of Boost Converter. (Duty control manually)
5. Study of two-stage PV Inverter performance under MPPT control of Boost Converter (Duty controlled by MPPT algorithm)