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Name of Work: **Supplying, installation, testing and commissioning of online grid 200 kW roof top solar PV plant on the terrace of new core lab building.**

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Executive Engineer
I.W.D. Elect. & AC Divn.
I.I.T., Kanpur

Superintending Engineer
& Head, I.W.D.
I.I.T., Kanpur

PART-A

**INDIAN INSTITUTE OF TECHNOLOGY KANPUR
INSTITUTE WORKS DEPARTMENT
Electrical & Air-conditioning Division
E-TENDER NOTICE**

NIT No. 34/SOLAR/2021/249

Dated: 16.12.2021

The Superintending Engineer - IWD, IIT Kanpur on behalf of Board of Governors of IIT Kanpur invites online **percentage rate tender** from eligible specialized agencies for the following work:-

Sl. No	Name of work and location	Estimated cost put to tender (In Rs.) (excluding GST)	Earnest Money (In Rs.)	Period of Completion (in Month)	Last date & time of submission of tender	Period during which EMD Declaration , and other Documents shall be open online on	Time & date of opening of tender
1	Supplying, installation, testing and commissioning of online grid 200 kW roof top solar PV plant on the terrace of New core lab building	89,89,113	NIL with Bid Security Declaration (see Page 26)	3 Months	Upto 3.30 PM on 31.12.2021	Upto 3:30 PM on 03.01.2022	At 3:30 PM on 05.02.2022

The E-tender documents is available on <http://eprocure.gov.in/eprocure/app>

Superintending Engineer

Copy to:

1. Institute website: www.iitk.ac.in/iwd/tenderhall.htm
2. Notice Board

Information of e-Tendering for Contractors

1. The intending tenderer must read the terms and conditions of FORM-6 for e-Tendering carefully. He should only submit his tender if he considers himself eligible and he is in possession of all the documents required.
2. Information and Instructions for tenderer posted on website shall form part of tender document.
3. The tender document consisting of plans, specifications, the schedule of quantities of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents can be seen and downloaded from website <https://eprocure.gov.in/eprocure/app> or www.iitk.ac.in free of cost.
4. But the tender can only be submitted after uploading the mandatory scanned documents as per list given below.
5. Those contractors not registered on the website mentioned above, are required to get registered beforehand. If needed they can be imparted training on online bidding process as per details available on the website.
6. The intending bidder must read the terms and conditions carefully. He should submit his bid only if he considers himself eligible and he is in possession of all the documents as required
7. The intending bidder must upload all the documents as detailed in this tender document .
8. Applicants are advised to keep visiting www.iitk.ac.in/iwd/tenderhall.htm, <http://eprocure.gov.in/eprocure/app>, www.tenderhome.com, and www.eprocure.gov.in/cppp/latestactivetenders, from time to time (till the deadline for bid submission) for any updates in respect of the tender documents, if any. Failure to do so shall not absolve the applicant of his liabilities to submit the applications complete in all respect including updates thereof, if any. An incomplete application may be liable for rejection.
9. The defect liability period is 36 months from the date of handing over the completed building to the Engineer- in-charge. Other related details are elaborated in the tender document. **EMD is not applicable for this tender as Govt. orders No. F.9/4/2020-PPD, Ministry of Finance dated 12th November 2020.**
10. Site inspection, if desired, by the intending bidders will be arranged on **27.12.2021** at 03:00 PM. The intending bidders must reach the O/o the Executive Engineer (Elect. & AC), IWD, IIT Kanpur -208016. The construction site is inside the IIT Kanpur Campus. The intending bidders shall arrange for the conveyance themselves.
11. The indicative drawings are enclosed.
12. The following condition pertains to GST of Clause 37 & 38 of General Condition of contracts and corresponding amendments should be read as follows:-
 - a) The quoted rate should be exclusive of GST
 - b) The GST as applicable shall be paid extra. *The total bid price quoted shall be inclusive of all statutory liabilities, taxes, cess, duties, levies as applicable under the prevailing statutes or levy by the statutory authorities/State/Central Government and payable by the bidder under the contract. All the GST benefits and credits on inputs as available to the bidder shall be taken into consideration in the quoted price and pass on the benefits/credits to the Corporation. Bidder shall also comply with the provision of Anti-Profiteering under GST act.)*

BID DOCUMENT

Online bids (Technical & Financial) from eligible bidders which are valid for a period of 90 days from the date of financial Bid opening are invited for and on behalf of the Board of Governor (BOG), IIT Kanpur for “**Supplying, installation, testing and commissioning of online grid 200 kW roof top solar PV plant on the terrace of New core lab building.**”

Notice Inviting Tender No.	34/SOLAR/2021/249 dated 16.12.2021
Name of Work	Supplying, installation, testing and commissioning of online grid 200 kW roof top solar PV plant on the terrace of New core lab building
Estimated Cost	Rs.8989113/-
Earnest Money	Nil with Bid Security Declaration (Attached Later)
Date of Publishing	16.12.2021
Clarification Start Date and Time	17.12.2021 (working days only)
Clarification End Date and Time	29.12.2021 (working days only)
Queries (if any)	No queries will be entertained after clarification end date and time
Bid Submission Start Date	17.12.2021 (11:00 hrs)
Pre Bid Meeting Date and Time	27.12.2021 (at 11:00 hrs.)
Last Date and time of uploading of Bids	31.12.2021 (15.30 hrs)
Last Date and time of submitting , EMD Declaration and other documents online	31.12.2021 (15:30 hrs)
Date and time of opening of Technical, Bids	03.01.2022 (15.30 hrs)
Date and time of opening of Financial Bids	05.01.2022 (15.30 hrs)

Interested parties may view and download the tender document containing the detailed terms & conditions from the website <http://eprocure.gov.in/eprocure/app>

(The bids have to be submitted online in electronic form on www.eprocure.gov.in only. No physical bids will be accepted. No hardcopy of any documents will be accepted)

INSTRUCTION FOR ONLINE BID SUBMISSION

The bidders are required to submit soft copies of their bids electronically on the Central Public Procurement (CPP) Portal ie <http://eprocure.gov.in/eprocure/app> , using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP Portal.

REGISTRATION

- (i) Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal (URL:<https://eprocure.gov.in/eprocure/app>)by clicking on the link “Online Bidder Enrollment” option available on the home page. **Enrolment on the CPP Portal is free of charge.**
- (ii) During enrolment/ registration, the bidders should provide the correct/ true information including valid email-id & mobile no. All the correspondence shall be made directly with the contractors/ bidders through email-id provided.
- (iii) As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.
- (iv) For e-tendering possession of valid Digital Signature Certificate (Class II or Class III Certificates with signing key usage) is mandatory which can be obtained from SIFY /nCode/eMudra or any Certifying Authority recognized by CCA India on eToken/ SmartCard.
- (v) Upon enrolment on CPP Portal for e-tendering, the bidders shall register their valid Digital Signature Certificate with their profile.
- (vi) Only one valid DSC should be registered by a bidder. Bidders are responsible to ensure that they do not lend their DSCs to others which may lead to misuse and should ensure safety of the same.
- (vii) Bidders can than log into the site through the secured login by entering their userID/ password and the password of the DSC/ eToken.

SEARCHING FOR TENDER DOCUMENTS

- 1) There are various search options built in the CPP Portal to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, organization name, location, date, value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as organization name, form of contract, location, date, other keywords, etc., to search for a tender published on the CPP Portal.
- 2) Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective ‘My Tenders’ folder. This would enable the CPP Portal to intimate the bidders through SMS / e-mail in case there is any corrigendum issued to the tender document.

- 3) The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.

PREPARATION OF BIDS:

- (i) For preparation of bid Bidders shall search the tender from published tender list available on site and download the complete tender document and should take into account corrigendum if any published before submitting their bids.

After selecting the tender document same shall be moved to the 'My favourite' folder of bidders account from where bidder can view all the details of the tender document.

- (ii) Bidder shall go through the tender document carefully to understand the documents required to be submitted as part of the bid. Bidders shall note the number of covers in which the bid documents have to be submitted, the number of documents – including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.
- (iii) Any pre-bid clarifications if required, then same may be obtained online through the tender site, or through the contact details given in the tender document.
- (iv) Bidders should get ready in advance the bid documents in the required format (PDF/xls/rar/formats) to be submitted as indicated in the tender document/schedule. **Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document.**
- (v) Bidders can update well in advance, the documents such as experience certificates, annual report, PAN, EPF & other details etc., under "My Space/ Other Important Document" option, which can be submitted as per tender requirements. This will facilitate the bid submission process faster by reducing upload time of bids.

SUBMISSION OF BIDS:

- (i) Bidder should log into the site well in advance for bid submission so that he/ she upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay.
- (ii) Bidder should prepare the **EMD Declaration** as per the instructions specified in the NIT/ tender document. Otherwise, the uploaded bid will be rejected.
- (iii) While submitting the bids online, the bidder shall read the terms & conditions (of CPP portal) and accepts the same in order to proceed further to submit their bid.
- (iv) Bidder shall digitally sign and upload the required bid documents one by one as indicated in the tender document.
- (v) Bidders shall note that the very act of using DSC for downloading the tender document and uploading their offers is deemed to be a confirmation that they have read all sections and pages

of the tender document without any exception and have understood the complete tender document and are clear about the requirements of the tender document.

- (vi) Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document. For the file size of less than 1 MB, the transaction uploading time will be very fast.
- (vii) **If price quotes are required in XLS format, utmost care shall be taken for uploading Schedule of quantities & Prices and any change/ modification of the price schedule shall render it unfit for bidding.**

Bidders shall download the Schedule of Quantities & Prices i.e. Schedule-A, in XLS format and save it without changing the name of the file. Bidder shall quote their rate in figures in the appropriate cells, thereafter save and upload the file in financial bid cover (Price bid) only.

If the template of Schedule of Quantities & Prices file is found to be modified/corrupted in the eventuality by the bidder, the bid will be rejected and further dealt as per provision of clause no 23.0 of ITB.

The bidders are cautioned that uploading of financial bid elsewhere i.e., other than in cover 2 will result in rejection of the tender.

- (viii) Bidders shall submit their bids through online e-tendering system to the Tender Inviting Authority (TIA) well before the bid submission end date & time (as per Server System Clock). **The TIA will not be held responsible for any sort of delay or the difficulties faced during the submission of bids online by the bidders at the eleventh hour.**
- (ix) After the bid submission (i.e. after Clicking “Freeze Bid Submission” in the portal), the bidders shall **take print out of system generated acknowledgement** number and keep it as a record of evidence for online submission of bid, which will also act as an entry pass to participate in the bid opening.
- (x) Bidders should follow the server time being displayed on bidder’s dashboard at the top of the tender site, which shall be considered valid for all actions of requesting, bid submission, bid opening etc., in the e-tender system.
- (xi) All the documents being submitted by the bidders would be encrypted using PKI (Public Key Infrastructure) encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128 bit encryption technology.

ASSISTANCE TO BIDDERS:

- (i) Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contract person indicated in the tender. The contact number for the helpdesk is **0512-2597059 between 10:30 hrs to 17:00 hrs. The email id for the helpdesk is: vktiwari@iitk.ac.in.**

Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24X7 CPP Portal Helpdesk. The 24 x 7 Help Desk Number 0120-4200462, 0120-4001002 and 0120-4001005. The helpdesk email id is support-eproc@nic.in

INSTRUCTION FOR e-PROCUREMENT

1. PREPARATION AND SUBMISSION OF BIDS :

- a. The detailed tender documents may be downloaded from <http://eprocure.gov.in/eprocure/app> till the last date of submission of tender. The Tender may be submitted online through CPP Portal <http://eprocure.gov.in/eprocure/app>
- b. The bidder should submit the bid online in two parts viz. Technical Bid and Financial Bid. Technical Bid should be upload online in cover- 1 and Financial Bid in “.Xls” should be upload online in cover-2

2. SUBMISSION OF THE BID : All interested eligible bidders are requested to submit their bids online on CPP Portal: <http://eprocure.gov.in/eprocure/app> as per the criteria given in this document:

- a. Technical Bid should be upload online in cover-1.
- b. Financial Bid should be upload online in cover-2

Both Technical and Financial Bid covers should be placed online on the CPP Portal (<http://eprocure.gov.in/eprocure/app>).

3. TECHNICAL BID: Signed and Scanned copies of the Technical bid documents as under must be submitted online on CPP Portal: <http://eprocure.gov.in/eprocure/app> .

List of Documents to be scanned and uploaded (Under Cover-1) within the period of bid submission:-

- Copy of Registration with the Department if any or specialized agencies.
- Copy of the documents showing the proof of Original Equipment Manufacturer of the solar PV panels or their authorized dealership/channel partner
- Required experience / completion certificates of similar nature of works.

The works certificates submitted by the bidder clearly indicate that:

1. The completion certificate of the **Supply, installation, testing & commissioning of at least single work of 160 kW Capacity solar PV system with on grid tied inverters and associated controls.**

2. Actual date of completion of the similar work.

- **Registration of EPF & Registration of ESIC**

- Details of turn over during the last five years.
- Copy of bank solvency certificate
- Copy of Networth certificate of minimum Rs. 35.96 lacs issued by the certified Chartered Accountant.
- Scanned copy of EMD Declaration has to be uploaded
- Copy of GST Registration **& PAN card**
- Technical data sheets for the major equipment's i.e. Solar PV panel & Grid tied inverter as specified at Annexure 1 to 2 of Appendix-VIII tender document.

Note: No hardcopy of any documents will be accepted.

Please note that no indication of the rates/amounts be made in any of the documents submitted with the TC-BID.

4. Financial Bid

- a. The currency of all quoted rates shall be Indian Rupees. All payment shall be made in Indian Rupees.
- b. In preparing the financial bids, bidders are expected to take into account the requirements and conditions laid down in this Tender document. The financial bids should be uploaded online as per the specified “.Xls” format i.e. Price Bid in Excel sheet attached as ‘.Xls’ with the tender and based on the scope of work, service conditions and other terms of the Tender document. It should include all costs associated with the Terms of Reference/Scope of Work of the assignment.
- c. Being an individual work contract no other tax is payable other than GST. The GST shall be paid extra as applicable.

5. Last Date for Submission of Tender:

- a. Online bids complete in all respects, must be submitted on or before the last date and time specified in the schedule of events.
- b. The IIT, Kanpur may, at its own discretion, alter/extend the last date for submission of tenders.

6. Bid Validity

- a. All the Bids must be valid for a period of 90 days from the date of financial bid opening of the tender for execution of Contract. However, the quoted rates should be valid for the initial/ extended period of the Contract from the effective date of the Contract. No request will be considered for price revision during the original Contract period.
- b. A bid valid for a shorter period shall be declared as non-responsive.
- c. In exceptional circumstances, prior to expiry of the original time limit, the IIT may request the bidders to extend the period of validity for a specified additional period beyond the original validity of 90 days. The request and the bidders' responses shall

be made in writing. The bidders, not agreeing for such extensions will be allowed to withdraw their bids without forfeiture of their Bid Security.

7. Modification / Substitution/ Withdrawal of bids:

- a.** No Bid shall be modified, substituted or withdrawn by the Bidder after the Bid 's due Date.
 - b.** Any alteration/ modification in the Bid or additional information supplied subsequent to the Bid's due Date, unless the same has been expressly sought for by the Authority, shall be disregarded.
- 8. Rejection of the Bid:** The bid submitted shall become invalid if:-
- a) The tenderer is found ineligible.
 - b) The tenderer does not upload all the documents as stipulated in the tender document.
 - c) **If any discrepancy is noticed between the documents as uploaded at the time of submission of tender and hard copies required after tender opening.**

FORM -6 FOR e-Tendering

The Superintending Engineer, IWD, IIT, Kanpur on behalf of the Board of Governors of IIT Kanpur invites online percentage rate tenders for the following works from eligible **specialized agencies**:
“Supplying, installation, testing and commissioning of online grid 200 kW roof top solar PV plant on the terrace of New core lab building.

The work is estimated to cost **Rs. 89,89,113/-** This estimate, however, is given merely as a rough guide.

1.1 The authority competent to approve NIT for the combined cost and belonging to the major discipline will consolidate NITs for calling the tenders. He will also nominate Division which will deal with all matters relating to the invitation of tenders.

2. Initial Eligibility & Technical Criteria: Joint ventures are not accepted. **The bidders satisfying the initial eligibility & Technical criteria shall only be considered for financial bid opening.** Should have satisfactorily completed the works as mentioned below during the last seven years ending previous day of last date of submission of bids.

* 3 (three) similar completed works costing not less than **Rs. 35.96 Lacs** or 2 (two) similar completed works, not less than **Rs 53.93 Lacs** or 1 (one) similar completed work of aggregate cost not less than **Rs 71.91 Lacs**.

And

One completed work of similar nature (either part of (a) or a separate one) costing not less than Rs. 35.96 Lacs with some Central Government Department / State Government Department / Central Autonomous Body / Central Public Sector Undertakings).

Note: 1. The similar nature works means experience of Supply, installation, testing & commissioning of at least **160kW** Capacity roof top solar PV system with grid tied inverter and associated controls

2. The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum; calculated from the date of completion to the previous day of last date of submission of bids.

- a) Should have average annual financial turnover of **Rs. 89.89 Lacs** construction works during the last three years ending 31-03-2020.
- b) Should not have incurred any loss in more than two years during the last five years ending 31-03-2020.
- c) Should have solvency of **Rs. 35.96 Lacs**.
- d) Should have Networth certificate of minimum Rs. 35.96 lacs issued by the certified Chartered Accountant.
- e) Should have valid registration of EPF, ESIC and GST.
- f) Technical Datasheets: The bidder's proposed equipment's technical parameters/specification shall be matching with the required parameters/specifications by IIT Kanpur as per the Technical Datasheet for all major items as specified at Annexure- 1 to 2 at Appendix-VIII of the Tender Document.

g) **After the award of the tender,** the tenderer shall have to furnish an affidavit on non judicial stamp paper of Rs. 10.00 as under:

“I/We undertake and confirm that eligible similar work(s) has /have not been got executed through another contractor on back to back basis. Further that, if such a violation comes to the light, then I/We shall be debarred for tendering in IIT Kanpur contracts in future forever. Also, if such a violation comes to light before date start of work, the Superintending Engineer shall be free to forfeit the entire amount of Performance Guarantee along with other procedures.”

Note: Pls. refer the Pre-Qualification Document and submit all required documents online as well in hardcopy for Pre-qualification evaluation as mentioned.

3. Agreement shall be drawn with the successful tenderers on prescribed Form No. CPWD 7 (or other Standard Form as mentioned) which is available as a Govt. of India Publication and also available on website www.iitk.ac.in Tenderers shall quote his rates as per various terms and conditions of the said form which will form part of the agreement.
4. The time allowed for carrying out the work will be 3 **Months** from the date of start as defined in schedule ‘F’ or from the first date of handing over of the site, whichever is later, in accordance with the phasing, if any, indicated in the tender documents.
5. The site for the work is available for execution of the works.
6. The tender document consisting of plans, specifications, the schedule of quantities of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents except Standard General Conditions of Contract Form can be seen on website <http://eprocure.gov.in/eprocure/app>, <https://eprocure.gov.in/cppp/latestactivetenders> or www.iitk.ac.in other necessary documents also can be seen in the office of the EE , IWD Electrical and Air conditioning Division, IIT, Kanpur between hours of 11:00 AM to 3:00 PM from **17.12.2021 to 31.12.2021** free of cost.

Pre Bid Meeting shall be held in the office of Office of Superintending Engineer, **IWD IIT Kanpur** at 11.00 AM on **27.12.2021** to clear the doubt of intending bidders/ associates, if any. For physical attendance in pre bid meeting only one representative of firm shall be allowed to maintain the physical distance. Bidders are advised to send their queries/ doubts by email to the executive engineer on email id: **vktiwari@iitk.ac.in** least one day prior to the pre-bid meeting. A bidder can send multiple mails with different queries/doubts in each mail. The bidder may also raise query on the date of prebid meeting. If found necessary, an addendum/corrigendum to the tender document and /or minutes of meeting shall be issued and same shall be uploaded on the website and no further queries after pre-bid meeting shall be entertained. Such addendum/corrigendum shall become part of tender.

7. After submission of the tender the contractor can re-submit revised tender any number of times but before last time and date of submission of tender as notified.
9. When tenders are invited in three stage system and if it is desired to submit revised financial tender then it shall be mandatory to submit revised financial tender. If not submitted then the tender submitted earlier shall become invalid.

10. Copy of Enlistment Order and certificate of work experience wherever applicable and other documents as required and specified in this bid document shall be scanned and uploaded to the e-Tendering website within the period of tender submission.

Online tender documents submitted by intending tenderers shall be opened only of those tenderers, whose Earnest Money Declaration Document and other documents as mentioned are found in order.

The financial bid of only pre-qualified eligible bidders shall be opened at 03:30 PM on **05.01.2022**.

11. The tender submitted shall become invalid if:
 - (i) The tenderer is found ineligible.
 - (ii) The tenderer does not upload all the documents as stipulated in the tender document.
 - (iii) **If any discrepancy is noticed between the documents as uploaded at the time of submission of tender and hard copies required after opening of the tender.**
12. The contractor whose tender is accepted will be required to furnish performance guarantee of 3% (Three Percent) of the tendered amount within the period specified in Schedule F. This guarantee shall be in the form of cash (in case guarantee amount is less than ` 10,000/-) or Deposit at Call receipt of any scheduled bank/Banker's cheque of any scheduled bank/Demand Draft of any scheduled bank/Pay order of any Scheduled Bank of any scheduled bank (in case guarantee amount is less than ` 1,00,000/-) or Government Securities or Fixed Deposit Receipts or Guarantee Bonds of any Scheduled Bank or the State Bank of India in accordance with the prescribed form. **In case the contractor fails to deposit the said performance guarantee within the period as indicated in Schedule 'F', the contract would be liable to rejection by competent authority along with other procedures.**
13. Intending Tenderers are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders as to the nature of the terrace/ground and sub-soil (so far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their tender. A tenderers shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charge consequent on any misunderstanding or otherwise shall be allowed. The tenderers shall be responsible for arranging and maintaining at his own cost all materials, tools, & plants, water, electricity access, facilities for workers, and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a tender by a tenderer implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work and local conditions and other factors having a bearing on the execution of the work.
13. The competent authority on behalf of the Board of Governors, IIT, Kanpur does not bind itself to accept the lowest or any other tender and reserves to itself the authority to reject any or all the tenders received without the assignment of any reason. All tenders in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the tenderers shall be summarily rejected.
14. On opening date, the contractor can login and see the bid opening process. After opening of bids, he/she will receive the competitor bid sheets.

15. **Certificate of Financial Turn Over:** At the time of submission of bid, contractor has to upload Affidavit/Certificate from CA mentioning Financial Turnover on construction work of last 5 years or for the period as specified in the bid document and further details if required may be asked from the contractor after opening of technical bids containing pre-qualification documents. The balance sheet in case of private public limited company shall include its standalone finance statement and consolidated financial statement both. There is no need to upload entire voluminous balance sheet
17. Canvassing whether directly or indirectly, in connection with tenderers is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable for rejection.
18. The competent authority on behalf of Board of Governors, IIT, Kanpur reserves to himself the right of accepting the whole or any part of the tender and the tenderers shall be bound to perform the same at the rate quoted.
19. The contractor shall not be permitted to tender for works in the IIT Kanpur responsible for award and execution of contracts, in which his near relative is posted a Divisional Accountant or as an officer in any capacity between the grades of Superintending Engineer and Junior Engineer (both inclusive). He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any gazetted officer in the IIT Kanpur. Any breach of this condition by the contractor would render him liable to be removed from the approved list of contractors of this Department.
20. No Engineer of Gazetted Rank or other Gazetted Officer employed in Engineering or Administrative duties in an Engineering Department of the Government of India is allowed to work as a contractor for a period of one year after his retirement from Government service, without the prior permission of the Government of India in writing. This contract is liable to be cancelled if either the contractor or any of his employees is found any time to be such a person who had not obtained the permission of the Government of India as aforesaid before submission of the tender or engagement in the contractor's service.
21. The tender for the works shall remain open for acceptance for a period of **ninety (90) days** from the date of opening of tenders if any tenderer withdraws his tender before the said period or issue of letter of acceptance, whichever is earlier, or makes any modifications in the terms and conditions of the tender which are not acceptable to the department, the tenderers shall not be allowed to participate in the retendering process of the work.
22. This Notice Inviting Tender shall form a part of the contract document. The successful tenderers/contractor, on acceptance of his tender by the Accepting Authority shall within **07** days from the stipulated date of start of the work, sign the contract consisting of:-
- a) The Notice Inviting Tender, all the documents including additional conditions, specifications and drawings, if any, forming part of the tender as uploaded at the time of invitation of tender and the rates quoted online at the time of submission of tender and acceptance thereof together with any correspondence leading thereto.
 - b) Standard C.P.W.D. Form 7 or other Standard C.P.W.D. Form as applicable.
- 22.1 The tender document will include following three components:

Part A:-

CPWD-6, CPWD-7 including schedule A to F for the major component of the work, Standard General Conditions of Contract for CPWD 2020 as amended/modified up to **31.12.2021**.

Part B:-

General/specific conditions, specifications and schedule of quantities applicable to major component of the work.

Part C:-

Schedule A to F for minor component of the work. (SE/EE in charge of major component shall also be competent authority under clause 2 and clause 5 as mentioned in schedule A to F for major components), General/specific conditions, specifications and schedule of quantities applicable to minor component(s) of the work.

22.1.1 The tenderers must associate himself, with agencies of the appropriate class eligible to tender for each of the minor component individually.

22.1.2 **Entire work under the scope of composite tender including major and all minor components shall be executed under one agreement.**

22.1.3 Security Deposit will be worked out separately for each component corresponding to the estimated cost of the respective component of works.

23. The EPF & ESI contribution paid to the contract workers shall be reimbursed on actual basis.

24. Protocols pertaining to COVID-19 to be followed at site by the contractor as decided by the Government of India time to time. Nothing extra shall be payable on this account.

25. Construction equipment proposed to be deployed for the project and proof of its availability; equipment proposed to be purchased or leased.

26. Key personnel available and proposed to be engaged for management and supervision of the Project, their qualifications and experience. Valid certificates by a recognized University, technical Board, or Ministry of Government of India would only be taken cognizance of.

Superintending Engineer

For & on behalf of the Board of Governors, IIT, Kanpur

PERCENTAGE RATE TENDER AND CONTRACT FOR WORK

- (A) **Tender for the work of:** *Supplying, installation, testing and commissioning of online grid 200 kW roof top solar PV plant on the terrace of New core lab building*

TENDER

I/We have read and examined the Notice Inviting tender, schedule, A,B,C,D,E&F. Specifications applicable, Drawings & Designs, General Rules and Directions, Conditions of Contract, clauses of contract, Special conditions, Schedule of Rate & other documents and rules referred to in the conditions of contract and all other contents in the tender document for the work.

I/We hereby tender for the execution of the work specified for the Board of Governors, IIT, Kanpur within the time specified in Schedule 'F', viz., schedule of quantities and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to in Rule-1 of General Rules and Directions and in Clause 11 of the Conditions of contract and with such materials as are provided for, by, and in respects in accordance with, such conditions so far as applicable.

We agree to keep the tender **open for (90) ninety days from the date of opening of tender (financial bid)** and not to make any modifications in its terms and conditions.

If I/we, fail to furnish the prescribed performance guarantee or fail to commence the work within prescribed period I/we agree that the said Board of Governors, IIT, Kanpur or his successors in office shall without prejudice to any other right or remedy be at liberty to be debarred for participation in the re-tendering process of the work. Further, if I/we fail of commence work as specified, I/we agree that Board of Governors, IIT, Kanpur or his successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the performance guarantee absolutely and security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be ordered, up to maximum of the percentage mentioned in Schedule 'F' and those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 12.2 and 12.3 of the tender form.

Further, I/We agree that in case of forfeiture of Performance Guarantee/Security Deposit as aforesaid, I/We shall be debarred for participation in the re-tendering process of the work.

I/We undertake and confirm that eligible similar work(s) has/ have not been got executed through another contractor on back to back basis. Further that, if such a violation comes to the notice of Department, then I/we shall be debarred for tendering in IIT, Kanpur in future forever. Also, if such a violation comes to the notice of Department before date of start of work, the Engineer-in-Charge shall be free to forfeit the entire amount of Performance Guarantee.

I/We hereby declare that I/we shall treat the tender documents drawings and other records connected with the work as secret/confidential documents and shall not communicate information derived there from to any person other than a person to whom I/we am/are authorized to communicate the same or use the information in any manner prejudicial to the safety of the State.

Dated _____**_____

Witness: **
Address: **
Occupation: **

**
Signature of contractor
Postal Address **

ACCEPTANCE

The above tender (as modified by you as provided in the letters mentioned hereunder) is accepted by me for and on behalf of the Board of Governors, IIT, Kanpur for a sum of Rs. _____ (Rupees _____)

The letters referred to below shall form part of this contract Agreement:-

- a) _____
- b) _____
- c) _____

For & on behalf of the Board of Governors, IIT, Kanpur

Dated _____

Signature _____
Designation _____

Operative schedules shall be supplied separately to each intending tenderer)

SCHEDULE 'A'

Schedule of Quantities:

SCHEDULE 'B'

Schedule of materials to be issued to the contractor:

S. No.	Description of item	Quantity	Rates in figures & words at which the material will be charged to the contractor	Place of issue
1	2	3	4	5
-----NIL -----				

SCHEDULE 'C'

Schedule of Tools and Plants to be hired to the contractor

S. No.	Description	Hire charges per day	Place of issue
1	2	3	4
-----NIL -----			

SCHEDULE 'D'

Extra schedule for specific requirements/document for the work, if any:

As attached in tender form.

SCHEDULE 'E'

Schedule of component of other Materials, Labour, POL etc. for price escalation on SITC part: N.A.

SCHEDULE 'F'

Reference to General Conditions of contract.

Name of Work:	<i>Supplying, installation, testing and commissioning of online grid 200 kW roof top solar PV plant on the terrace of New core lab building</i>		
Estimated cost of the work:	Items of Work	8989113/-	
Earnest money	Bid Security Declaration		
Performance Guarantee	3% of the tendered value of the work valid up to defect liability period, has to be submitted post award of work within stipulated time period as per Annexure-F		
Retention Money.	3% of the tendered value of the work, will be		

	deducted from each bill progressively as 6% of work done value, up to a maximum of 3% of W.O value. Same would be released after one (1) month of date of completion.
General rules and direction :	

Definitions:

2(v) **Engineer-in-Charge**

For Solar/Electrical items of work

**Executive Engineer,
Institute Works Department
IIT, Kanpur**

2(vi) **Accepting Authority**

**Superintending Engineer,
Institute Works Department
IIT, Kanpur**

2(vii) Percentage on cost of materials and labour to cover all overheads and profits

15%

2(viii) **Standard Schedule of Rates:**

Electrical Items of Work:

D.S.R. 2018 with up to date correction slips

2(ix) Department:

Central Public Works Department

2(x) Standard CPWD contract Form:

GCC 2020, CPWD **form-7** as modified & corrected up to **31.12.2021** (Whether correction vide latest circulars are incorporated or not in this document).

Clause 1

i) Time allowed for submission of Performance Guarantee, programme chart (Time and Progress) and applicable labour licenses, registration with EPFO, ESIC and BOCW welfare board or proof of applying there off from the date of issue of letter of acceptance.

7 Days, from the award of work

ii) Maximum allowable extension with late fee @.01% per day of Performance Guarantee amount beyond the period as provided in i) above

7 Days, after expiry of time period mentioned in Clause 1(i) above.

Clause 2

Authority for fixing Compensation under Clause 2

**Superintending Engineer,
Institute Works Department
IIT, Kanpur.
Or successor thereof**

Clause 2

Whether Clause 2 shall be applicable

Yes

Clause 5

i) Number of days from the date of issue of letter of acceptance for reckoning date of start

15 Days

ii) Time allowed for execution of work

3 Months

Authority to decide

Extension of time

**Superintending Engineer,
Institute Works Department**

IIT, Kanpur

Clause 6			Applicable.
Clause 7	Gross work to be done together with net payment/Adjustment of advances for material collected, if any, since the last such payment for being eligible to interim payment		Not applicable <i>Applicable</i>
<i>Clause 7A</i>			
Clause 10A	Material to be provided by the contractor.		Applicable
Clause 10B (i),(ii), (iii),iv	Whether clause 10-B (ii) and 10-B (iii) shall be applicable.		Applicable
Clause 10 C	Component of labour expressed as percentage of value of work		Not Applicable
Clause 10 CA	Materials covered under this clause.	Nearest material(other than cement, reinforcement bars and structural steel) for which All India Whole sale price Index is to be followed.	Not Applicable
	1. Cement (PPC)	Nil	NIL
	2. Steel	Nil	Nil
Clause 10 CC	Increase/Decrease in Price of materials/wages except Annual operation part		Not Applicable
Clause 11	Specification to be followed for execution of work:		
For electrical works	CPWD specifications 2013 internal and 2013 external electrical works		
For Air conditioning & Refrigeration item of works	CPWD Specifications <i>Part-I Internal - 2013</i> , for electrical works with up to date correction slips.(Hereinafter called CPWD specifications also)		
Clause 12			
12.2 & 12.3	Deviation limit beyond which clause 12.2 & 12.3 shall apply for building work		Applicable
Clause 16	Competent Authority for Deciding reduced rates:		
	For electrical/civil/Air-conditioning& refrigeration items of work	Superintending Engineer, Institute Works Department IIT, Kanpur	

Clause 18	List of mandatory machinery, tools & plants to be deployed by the contractor at site.	Hydra Crane, Chain Pulley block, welding machine with safety kit, Gas cutter machine with safety kit, Hydro Testing Equipment, Ultra Sonic Flow meter, Multimeter, drill machine, crimping tools, spanner set, blower, welding torch, vacuum pump, air compressor, meggar etc.
Clause 32		Requirement of technical Representative(s)

Requirement of technical Representative(s)

Requirement of Technical Representative (S) and recovery Rate

Sl. No	Minimum Qualification of Technical Representative	Discipline	Designation (Principal Technical / Technical representative)	Minimum Experience	Number	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision of clause 36(i)	
						Figures	Words
1.	B.E./B.Tech	Electrical	Project Manager/ Site Engineer	5	1	Rs. 25,000/- p.m	Twenty Five Thousand per month

For supervision of solar PV installation as well as electrical items of work, technical representatives of the respective disciplines will be required to be deployed.

MANDATORY REQUIREMENTS FOR THE TENDER

Name of Work: *Supplying, installation, testing and commissioning of online grid 200 kW roof top solar PV plant on the terrace of New core lab building.*

- 1 The tenderer is advised to read and examine the tender documents for the work and the set of drawings available with Engineer-in-charge. He should inspect and examine the site and its surroundings by himself before submitting his tender.
- 2 Separate schedule of quantity is included in this tender for air conditioning & refrigeration items of work. If the tenderer wants to offer any unconditional rebates on their rates, the same should also be offered in the respective components of schedule separately. The contractor shall quote the percentage rates in figures
- 3 Time allowed for the execution of work is **3 Months**.
- 4 The contractor(s) shall submit a detailed program of execution in accordance with the master programme/milestone within ten days from the date of issue of award letter.
- 5 Contractor has to arrange and install field laboratory during the currency of work and nothing extra will be paid on this account.
- 6 Quality of the project is of utmost importance. This shall be adhered to in accordance with the provisions of CPWD specifications and guidelines given in the relevant paras.
- 7 Contractor has to deploy required Plant and machinery on the project. In case the contractor fails to deploy the plant and machinery whenever required and as per the direction of the Engineer-in-charge, he (Engineer-in-charge) shall be at a liberty to get the same deployed at the risk and cost of the contractor.
- 8 The contractor shall comply with the provisions of the Apprentices Act 1961, and the rules and orders issued there under from time to time. If he fails to do so, his failure will be a breach of the contract and the Superintending Engineer/Executive Engineer may in his discretion, without prejudice to any other right or remedy available in law, cancel the contract. The contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the said Act.
- 9 Temporary Electric connection shall be issued as per request and the water charges shall be recovered as per rule.

Performa of Bid Security Declaration

*(To be submitted by bidder on its Company Letterhead (scanned copy) on
<http://eprocure.gov.in/eprocure/app>)*

It is here by submitted that if I/We ----- (Name of bidder/firm/company) withdraw or modify the bids during period of validity, or if I/We ----- (Name of bidder/firm/company) are awarded the contract and I/We ----- (Name of bidder/firm/company) fail to sign the contract or to submit a performance security before the deadline defined in the tender documents, I/We ----- (Name of bidder/firm/company) will be suspended to take part in IIT Kanpur's tendering process for the period of two years from the date of occurrence of the above mentioned default."

Date:

Authorized Signatory

PART-B

QUALITY ASSURANCE OF THE WORK

Sampling of Materials:

1. The contractor shall procure all the materials at least in advance so that there is sufficient time to testing and approving of the materials and clearance of the same before use in work.
2. All materials brought by the contractor for use in the work shall be got checked from the Engineer-in-Charge or his authorized representative of the work on receipt of the same at site before use.
3. The contractor shall be fully responsible for the safe custody of the materials issued to him even if the materials are in double lock and key system.
4. There shall be pre dispatch factory inspection for all major equipment's like Solar PV Panels and Grid tied inverters. The solar PV Panels shall be TUV/NISE Certified. The sample of Solar PV panel shall be tested at TUV/NISE labs.
5. The testing charges shall be borne by the bidder.
6. The visiting & lodging expenses shall be borne by the Institute and not to be loaded into the contract except the testing charges. The contractor shall only facilitate the inspection at manufacturing works. However any transportation, freight, loading & unloading of solar panels for testing at the TUV/NISE lab shall be included in the price quote.
7. The Panel mounting structure design report shall have to be done by the executing agency as per the indicated layout in the attached drawing. The overall load on the terrace shall not to be exceeded by 150 kg/m². The proposed design shall be got approved by the IIT Kanpur before execution by the agency.
8. The Solar PV modules shall be handled with care during the course of installation work, any damage caused to the modules shall be made good by the contractor at his own cost.
9. Unless otherwise provided in the Schedule of Quantities/Specifications, the rates tendered by the contractor shall be all inclusive and shall apply to all heights, lifts, leads and depths of the work and nothing extra shall be payable to him on account of the same. Extra payment for centering/shuttering, if required to be done for heights greater than 3.5 m shall however be admissible at the rates arrived at in accordance with clause 12 of the agreement, if not already specified.
10. Other agencies doing works related with this project may also simultaneously execute their works and the contractor shall afford necessary facilities for the same. The contractor shall leave such necessary holes, openings etc. for laying/burying in the work, pipes cables, conduits, clamps, boxes and hooks for fan clamps etc. as may be required for the other agencies. Nothing extra over the Agreement rates shall be paid for doing these.
11. Some restrictions may be imposed by the security staff etc. on the working and for movement of labour, materials etc. The contractor shall be bound to follow all such restrictions/instructions and nothing extra shall be payable on account of the same.
12. The contractor shall fully comply with all legal orders and directions of the Public or local authorities or municipality and abide by their rules and regulations and pay all fees and charges for which he may be liable in this regard. Nothing extra shall be paid/reimbursed for the same.

- a. The building work shall be carried out in the manner complying in all respects with the requirements of the relevant bylaws and regulations of the local body under the jurisdiction of which the work is to be executed or as directed by the Engineer-in-charge and nothing extra shall be paid on this account.
13. If as per local Municipal regulations, huts for labour are not to be erected at the site of work; the contractor shall be required to provide such accommodation at a place as is acceptable to the local body and nothing extra shall be paid on this account.
14. The structural and architectural drawings shall at all times be properly co-related before executing any work. However, in case of any discrepancy in the item given in the schedule of quantities appended with the tender and Architectural drawings relating to the relevant item, the former shall prevail unless otherwise given in writing by the Engineer-in-charge.
15. For the purpose of recording measurements and preparing running account bills, the abbreviated nomenclature indicated in the publications Abbreviated Nomenclature of Items of DSR 2018 shall be accepted. The abbreviated nomenclature shall be taken to cover all the materials and operations as per the complete nomenclature of the relevant items in the agreement and relevant specifications.
 - a. In case of items for which abbreviated nomenclature is not available in the aforesaid publication and also in case of extra and substituted items for which abbreviated nomenclature are not provided for in the agreement, full nomenclature of item shall be reproduced in the measurement books and bill forms for running account bills.
 - b. For the final bill, however, full nomenclature of all the items shall be adopted in preparing abstract in the measurement books and in the bill forms.
16. The contractor shall take instructions from the Engineer-in-charge for stacking of materials. No excavated earth or building materials etc. shall be stacked/collected in areas where other buildings, roads, services, compound walls etc. are to be constructed.
- 16. Any trenching and digging for laying sewer lines/water lines/cables etc. shall be commenced by the contractor only when all men, machinery's and materials have been arranged and closing of the trench(s) thereafter shall be ensured within the least possible time. All the excavation and digging of the trenches shall be done manually as numbers of service line are passing inside the campus except in certain cases as approved by IITK. **No Hydraulic Excavator shall be allowed for earth digging work** except in certain cases as approved by IITK.**
17. It shall be ensured by the contractor that no electric live wire is left exposed or unattended to avoid any accidents in this regard.
18. In case the supply of timber/steel frames/shutters for doors, windows etc. is made by some other agency, the contractor shall make necessary arrangements for their safe custody on the direction of the Engineer-in-charge till the same are fixed in position by him & nothing extra shall be paid on this account.
19. The contractor shall maintain in perfect condition, all portions executed till completion of the entire work allotted to him. Where however phased delivery of work is contemplated these provisions shall apply separately to each phase.
20. The entire royalty at the prevalent rates shall have to be paid by the contractor on all the boulders, metals, shingle sand etc. collected by him for execution of the work, directly to the

Revenue authority or authorized agents of the State Government concerned or the Central Government, as the case may be.

- 21.10 The contractor shall bear all incidental charges for cartage, storage and safe custody of materials issued by the departments and shall construct suitable go downs, yards at the site of work for storing all materials as to be safe against damage by sun, rain, dampness, fire, theft etc. at his own cost and also employ necessary watch and ward establishment for the purpose, at his own cost. Materials to be charged directly to work and stipulated for issue free of cost shall also be issued to the contractor as soon as those are received at site or at the stipulated place of issue. The provision of this para shall apply equally and fully to those as well.
- 21.11 All materials obtained from the Institute Works Department store or otherwise on receipt shall be got checked by the Engineer-in-charge of the work or his representations before use.
- 21.12 Registers for the materials to be issued by the department shall be maintained as required by the Engineer-in-charge and these shall be signed by the contractor or his authorized agent and representative of Engineer-in-charge on each day of transactions.

SPECIAL TERMS & CONDITIONS

1. In the Contract (as hereinafter defined) the following definitions words and expressions shall have the meaning hereby assigned to them except where the context otherwise required.
 - i) Institute shall mean the Indian Institute of Technology (IIT), Kanpur
 - ii) The President shall mean the Board of Governor, IIT Kanpur.
 - iii) The Engineers In-charge, who shall administer the work, shall mean the Executive Engineer for Eelectrical and Air-conditioning works.
 - iv) Government or Govt. of India shall mean the Indian Institute of Technology represented by its Director.
 - v) The term Director General of Works shall mean the Chairman, Building & Works Committee of the Institute.
 - vi) Accepting authority shall mean the Director, IIT Kanpur or his authorized representative.
 - vii) Superintending Engineer shall mean the Superintending Engineer of the Institute, who as overall In-charge and head of the Institute Works Department shall direct the contract.
 - viii) Site Engineers shall mean the Assistant Engineer (Electrical) & Jr. Engineer (Elect/AC) for Electrical & Air-conditioning works, appointed by the Institute Works Department.

2. **Duties & Powers :**

- i) **Site Engineers:**

The duties of the Site Engineer(s) are to watch and supervise the works and the workmanship employed in connection with the works, and to test and examine any materials to be used. He shall have no authority to relieve the contractor of any of his duties or obligations under the contract nor, except as expressly provided here under, to order any work involving delay or any extra payment by the Institute, nor to make any variation in the works.

The Engineer-in-charge, from time to time in writing, delegate to the Site Engineer (s) any of the powers and authorities vested in them. Any written instruction or written approval given by the Site Engineer (s) to the contractor within the terms of such delegation (but not otherwise) shall bind the contractor and the Institute as though it had been given by the Engineer-in-charge provided always as follows :

- a) Failure of the Site Engineer (s) to disapprove any work or materials shall not prejudice the power of the Engineer In-charge to subsequently disapprove such work or materials and to order the pulling down, removal or breaking up thereof.
- b) If the contractor is dissatisfied by reason of any decision of the Site Engineer (s), he shall be entitled to refer the matter to the Engineer-in-charge, who shall thereupon confirm reverse or vary such decision.

3. The scope of contract comprises the supply, installation, testing & commissioning of 200 kW capacity rooftop on grid type solar PV plant on the GI mounted structure on the terrace of New

Core Building with 3 years of defect liability. The provision of all labour, materials, construction of plant equipment and transpiration, temporary works and everything, whether of temporary or permanent nature required in and for such construction, completion and maintenance so far as the necessity for providing the same is specified in or reasonably be inferred from the contract. The contractors shall make his own arrangements for the store/ storage of materials, accommodation for his staff etc. and no claim for the temporary accommodation from the contractor shall be entertained.

The contractor shall carry out and complete the said work in every respect in accordance with this contract and as per the directions and to the satisfaction of the Engineer-in-charge. Issue of further drawings and /or written instructions, detailed directions and explanations which are hereinafter collectively referred to as instructions of the engineer-in-charge in regards to:-

- a. The variation or modification of the design, quality, or quantity of works or the addition or omission or substitution of any work.
- b. Any discrepancy in the drawings or between the schedule of quantities and /or drawings and/or specifications.
- c. The removal from the site of any materials brought thereon by the contractor and the substitution of any other material thereof.
- d. The dismissal from the works of any persons employed thereupon.
- e. The opening up for inspection of any work covered up.
- f. The amending /making good of any defects.

The contractor shall forthwith comply with and duly execute any instructions of work comprised in such engineers-in-charge instructions, provided always that the verbal instructions and explanations given to the contractor or his representative upon the works shall, if involving a variation , be confirmed in writing by the contractor within seven days and is not dissented in writing within a further seven days by the Engineer-In-Charge, such shall be deemed to be instructions of the Engineer-In-charge within the scope of the contract.

4. **Contract Document:**

- 4.1 The several documents, forming the contract, are to be taken as mutually explanatory of one another and in case of ambiguities or discrepancies the same shall be explained and adjusted by the Engineer-In-Charge who shall thereupon issue to the contractor its interpretation directing in what manner the work is to be carried out. In case the contractor feels aggrieved by the interpretation of the Institute then the matter shall be referred to the Superintending Engineer and his decision shall be final, conclusive and bind on both parties.
- 4.2 The drawings etc. shall remain in the custody of the Institute. One complete sets of drawings, specification and bill of quantities shall be furnished by the Engineer-In-Charge to the contractor in such time which must not delay the progress of the construction and the Institute shall furnish copies of any additional drawings, which in their opinion may be necessary for the execution of any part of the work. One complete set shall be kept on the work site and the Engineer-In-Charge and his representatives shall be, at all reasonable times, have access to the same. The contractor shall study the drawings thoroughly before the commencement of work. In case of any discrepancy, the contactor shall seek clarification before proceeding with the works. Figured dimensions are in all case to be accepted in preference to the scaled sizes. Large scale details shall take preference over small scale one.

The contractor shall give adequate notice in writing to the Engineer-in-charge of any further drawings or specification that may be required for the execution of the works or otherwise under the contract.

The Engineer-in-charge shall have full powers and authority to supply the contractor from time to time during the progress of the work such drawings and instructions as shall be necessary for proper execution and the contractor shall carry out and be bound by the same.

- 4.3 The successful tenderer shall be required to enter into an agreement with the Institute. The Bill of Quantities & rates filled by the successful tenderer in, the General Condition of the Contract for CPWD works 2020 , CPWD specifications for Civil, Electrical & Air-conditioning works, the special conditions, additional specifications, negotiation letter and the award letter etc. shall form part of the agreement to be signed by the successful tenderer. The cost of stamp paper and stamp duty, required for the agreement, shall be borne by the contractor.

5. **Contract Agreement:**

The contractor shall, when called upon to do so, enter into and execute a contract agreement in the form annexed as Appendix `VII' with such modifications as may be necessary. The contract agreement, inclusive of its enclosures, shall remain in the custody of the Superintending Engineer, Institute Works Department, IIT Kanpur and the made available him as and when required contractor shall however be supplied, an attested copy there free of cost.

7. Canvassing in connection with tenders is prohibited and the tenders, submitted by the tenderers who resort to canvassing, are liable for rejection.
8. Tenderers shall have to sign the attached declarations and if the declaration is not found to represent a true statement of facts the contract is liable to be cancelled, and the contractor shall have no claim on the Institute.
9. Tenderers are not allow to make additions and alterations in the tender document. Any additions and alternations, if incorporated in the tender, shall be at the tender's risk since the modified tender is liable for rejection.

Conditional tenders violative of the sprit and the scope or the terms & conditions of the tender, are liable to be rejected without assigning any reasons. Tenders with any form of rebate shall be rejected summarily.

10. Water and electricity required for electrical & air-conditioning works shall be supplied free of charge.
11. Stamps duty on the security money shall also be the borne by contractor as per prevailing notification of U.P Govt.
12. Income tax shall be deducted as per prevalent law.
13. **Conditions for Electrical and Air-conditioning Works:-**

- 14.1 All chase cuttings in the wall, for recessed conduits & boxes and drilling the holes shall be done with power operated machines only. No chase shall be allowed to be cut manually with the use of hammer & chisel.

- 14.2 All cuttings in cement plaster and brick shall be made good by using cement mortar 1:3 (1 part cement, 3 part coarse sand)
- 14.3 The cut surfaces shall be repaired by an experienced mason only so as to match the repaired plaster with the original.
- 14.4 All such repaired surfaces shall be cured for 3 to 4 days to keep the surfaces wet, using water spray machine (hand/motor operated) and avoid unnecessary flooding of the area.
15. **Payment shall be regulated as under**
- a.) 75% of the tendered rate on receipt of materials at site.
 - b.) 15% of the tendered rate on installation and connection.
 - c.) 10% of the tendered rate on testing and commissioning.
 - d.) The corresponding deducted security (3%) from the total completed cost item wise, shall be retained by IIT Kanpur till the completion of the comprehensive warranty of the major equipment's/completion of the defect liability period of 3 years or it may be released against the Bank Guarantee of same amount for the above said period.**
16. **Drawings/Data required prior to commencement of electrical/air-conditioning works:-**
- 17.1 The following drawings shall be provided by the Engineer-In-Charge of the work:-
- 1. Solar PV array layout, Single line drawings showing details of size, type, and mode of installation of solar PV modules, inverters and electrical panels.
- 17.2 Following drawings shall be furnished by the contractor for the approval of the Engineer-In-charge after detailed design calculation before execution of the above work.
- a. Solar PV plant detailed equipment layout, Solar PV array layout with mounting structure on the terrace, **Structural** analysis of the mounting structure to withstand wind speed of 160kmph or higher, single line diagram, Communication architecture, cable schedule, earthing detailed drawing, lightning arrestor calculation and drawing & electrical connection drawings showing details of size, type, and mode of installation.
 - b. GFC for 200 kW solar PV plant showing inverter detail, ACDB panel connection, earthing and LA connection.
18. **Completion drawings:**
- On completion of works and before issuance of completion certificate, the contractor submit completion drawings in the form of four complete set of originals (reproducible) in hardcopy and softcopy.
- a. As built GA and schematic layout drawings of solar PV plant detailed equipment layout, Solar PV array mounting structure on the terrace, **Structural** analysis of the mounting structure to withstand wind speed of 160kmph or higher, single line diagram, Communication architecture, cable schedule, earthing detailed drawing, lightning arrestor calculation and drawing & electrical connection drawings showing details of size, type, and mode of installation.
 - i) Technical literature, TUV/NISE solar pv panel, inverter test certificates, and operation and maintenance manuals for inverters,.
19. **Works Inspection and Testing of Equipment:**
- Prior to dispatch of the solar pv panels, inverters and other equipment's the Institute reserves the right to inspect the same at the manufacturer's works and the contractor shall provide and secure every reasonable access and facility at the manufacturers works for inspection, for witness of all

acceptance and routine tests as per relevant Indian/International Standards. Contractor shall give a reasonable notice of about 15 days for the purpose of test, and witness of all major equipment's. The solar PV Panels shall be TUV/NISE Certified. The sample of Solar PV panel shall be tested at TUV/NISE labs.

The testing charges shall be borne by the bidder. The visiting & lodging expenses shall be borne by the Institute and not to be loaded into the contract except the testing charges. The contractor shall only facilitate the inspection at manufacturing works. However, any transportation, freight, loading & unloading of solar panels for testing at the TUV/NISE lab shall be included in the price quote. The expenses shall be borne by the Institute and not to be loaded into the contract. The contractor shall only facilitate the inspection at manufacturing works.

- a.) Pre-commissioning test: All routine tests shall be carried out on the electrical & solar pv plant equipment. Protective & measuring devices should be checked for calibration. The checklists and pre commissioning tests for different equipment's have to be provided by the lowest tenderer at the time of equipment's specification approval.

20. Rates: The work shall be treated as on works contract basis and the rates tendered shall be for complete item of work and all charges for items contingent to the work, such as packing, forwarding, insurance, freight, testing charges of sample solar PV panel at TUV/NISE lab and delivery at site for the materials to be supplied by the contractor, watch and ward of all materials at the site, labour related expenses as per relevant labour laws, testing of materials/ samples etc. excluding Goods & Service tax (GST).

NOTE:- All the excavation and digging of the trenches shall be done manually as numbers of service line are passing inside the campus except in certain cases as approved by IITK. **No Hydraulic Excavator shall be allowed for earth digging work** except in certain cases as approved by IITK.

- 20.1. Taxes & Duties:

- 20.1.1 Being an indivisible works contract, no other tax is payable other than GST. The GST shall be as applicable to IIT Kanpur as per Government rules.

23. The tender document & drawings in respect of the work can be seen in the o/o Executive Engineer(Electrical & AC)

24. The tender document contains **77** pages. No page of the tender document shall be removed, mutilated, detached, or cancelled.

25. Rates for finished works shall be given for each items separately, in both words & figures. In the event of non-compliance, the tender shall be deemed incomplete and liable for rejection.

26. The work shall be executed on the basis of the following CPWD specifications:

- i) Electrical & HVAC Works:

- General specifications for Electrical Works Part-1 (Internal) 2013 with up to date corrections.
- General specifications for electrical works (external) 2013 with upto date corrections.
- General specifications for electrical works Part-IV Sub-station- 2013with upto date corrections.
- General specifications of HVAC works 2017 with up to date corrections.

28. For the purpose of clause 12 of the General conditions of contract the following schedule of rates shall be applicable.

- i) Electrical Works: Electrical Works, air-conditioning & refrigeration works: Based upon prevailing market rates
29. The special conditions listed above shall take precedence over all above provisions of the contract. The General Condition of contract for CPWD works shall be generally followed including the clause 21 i.e. work shall not be sublet.
30. The contractor shall have to execute the work in such place and condition where other agencies will also be engaged for other works such as site grading, filling and leveling, interiors, landscape, and electrical and mechanical engineering works, etc. No claim shall be entertained due to work being executed in the above circumstances.
31. No contractor, to whom the provisions of the BOCW Act apply, shall be allowed to commence work on the campus unless he has produced the 'Registration Certificate' issued by the office of Dy. CLC (Central).
32. The contractor shall engage only such workers who are registered as beneficiaries with U.P. BOCW Welfare Board and in case of engagement of new workers; he shall ensure the submission of applications for registration of such workmen within appropriate time.
33. A certificate for administrative convenience shall be obtained from the contractor covered under BOCW Act whether he has engaged 10 or more workmen while working in the Institute and only thereafter, Cess @1% from the bills raised by him shall be deducted at source for all running works. Cess, so deducted shall be deposited with the BOCW Welfare Board.
34. As per clause 36 (I) of GCC: It should be noted that license & competent welder and fitter shall only be allowed for the piping work.
35. ***Contractor must submit post award of work within 7days complete schedule of work along with deployment details of resources, i.e. manpower and machinery. Schedule so submitted by the contractor, within the defined time period of the work, will be considered to be sacrosanct except for delays as might be considered by Engineer-in-Charge.***

Scope of Works and Special Conditions

1. Scope of supply & work includes supply, installation ,testing & commissioning of Solar PV panels, grid tied inverters ,equipment and materials, testing at manufacturers works, inspection, packing and forwarding, unloading at site, associated civil works, services, permit and incidentals, insurance at all stages of 200 kWp Grid connected Solar PV plant at New Core Lab Building of IIT Kanpur.
2. The equipment and materials for 200 kWp Grid connected Solar PV power plant with associated system shall include but not be limited to the Supply, Erection, Testing & commissioning of the following:-
 - a) Solar PV modules in array including mounting frames, structures foundation for holding structures and module, inter connection etc.
 - b) Array junction boxes, distribution boxes / boards and fuse boxes, MCBs, Surge Arrestors, isolation system etc.
 - c) Solar Inverters, / Data logger inbuilt with inverter to check Solar Irradiation.
 - d) Digital Voltage meter and ammeter, smart Kwh Meters. Metering instrument and protection relays.
 - e) LT Power and control cables including end terminations and other required accessories for both AC & DC power.
 - f) Lightning arrestors for lightning protection.
 - g) Tool kit and Earthing kit.
 - h) Suitable Earthing system with necessary earthing strips as per CPWD specification, for PV Array, DC power system, lightning protection system and for AC Panel.
 - i) Covered enclosure made of suitable material for protection of wiring from PV Module to AIB and AIB to inverter.
3. In addition to above, the bidder is required to measure the Solar Radiation and other climatic conditions. The major categories of site-specific assessment required are:
 - i) Global Solar Radiation (GSR).
 - ii) Diffuse Solar Radiation (DSR).
 - iii) Sunshine Duration.
 - iv) Atmospheric Turbidity.
 - v) Temperature & Humidity.
 - vi) Wind Speed.
4. Civil works shall be performed with respect to the following but not limited to:
 - i) Site grading, leveling, cleaning.
 - ii) Design and construction of self-supported module mounting structures having modules and for Inverters, panels etc.
5. Galvanized steel rigid / flexible conduits and accessories, Hume pipes, ferrules, lugs, glands, terminal blocks, galvanized sheet steel junction boxes, cable fixing clamps, nuts and bolts etc. as required.
6. Any other items not specifically mentioned in the specification but which are required for erection, testing and commissioning and satisfactory operation of the solar power plant are deemed to be included in the scope of the specification unless specifically excluded on Trunkey basis.
7. Obtaining statutory approvals / clearances from Government Departments (if any).
8. Submission of following documents drawings data design and engineering information to the

Executive Engineer, IWD, IIT Kanpur for review and approval.

- i) Detailed technical specification of all the equipments.
- ii) Design criteria.
- iii) Design calculations.
- iv) General arrangement and assembly drawings.
- v) Contour plan for the area.
- vi) Solar radiation data.
- vii) Schematic diagram of entire electric system.
- viii) G.A./ detailed layout drawings for all types of structures.
- ix) Quality assurance plans.
- x) Test report (for type, acceptance and routine tests)

Module & inverter

- xi) O & M instruction's manuals and its drawings.

9. All drawings shall be fully corrected to agree with the actual "as built" site conditions and submitted after commissioning of the project for record purpose.

10. VARIOUS SUPPLIES TO MEET OUT LOAD —

- 1. Grid supply : 3 Phase, 415 volts.

11. PRIORITY OF UTILIZATION OF SOLAR PLANT GENERATION FOR LOAD —

Solar plant shall be connected & synchronized to existing grid directly and generated load shall be supplied to local distribution system.

TECHNICAL SPECIFICATION

Section 1: Solar PV Panels

Section 2: Inverters

Section 3: Electrical Works

SECTION — I SOLAR PV PANEL

- 1.1. The SPV array generally consisting of number of SPV modules that directly produces DC electricity power on receipt of solar radiation. This DC power is converted to AC power by inverter. The AC output of 200 kWp solar plant at 415 V level will work in combination with IITK grid, feed existing LT system at New Core lab Building LT panels at 2 locations. Modules may be connected in series or parallel to increase the voltage and current and to achieve the required solar array characteristics that will match the load.
- 1.2.
- a) Solar PV Mono crystalline cells shall have high efficiency and the modules shall be of Indian origin.
 - b) The Stabilized output of solar Power plant shall be 200 kWp DC after One year. The bidder shall demonstrate the capacity of plant after One year from the date of commissioning of plant and shall also be part of guarantee. The security deposit shall be released only after the testing results are found satisfactory. The bidder shall use adequate capacity of SPV module, Inverter, Junction boxes etc to ensure generation of power as per design estimates. This is to be done by applying liberal de-rating factors for the array and recognizing the efficiency parameters of Inverter etc. The output at Inverters (s) will be considered for verification purpose. Bidder shall indicate procedure and details of software or formula for demonstration of capacity of plant in tender itself. For other purpose the meter reading will be considered.
 - c) Selection of the equipment and adoption of a plant layout to ensure ease of maintenance.
 - d) Strict compliance with the approved and proven quality assurance norms and procedures.
 - f) Proper monitoring in the synchronizations which ensures the availability of power to the grid. Generation voltage of 415V has to fed to grid voltage at the point of interconnection.
 - g) Ripple content must not exceed 3% on DC side.
 - li) The power plant shall operate in parallel with the grid system which is infinite electrical system. Any faults not taken care will result in damage of only SPV power plant without effecting IIT Kanpur grid infinite system. Thus the Solar Power Plant has to protect its equipment against any of possible fault or other disturbances from the grid.
- 1.3. The basic and detailed engineering of the plant will aim at achieving high standards of operational performance especially considering following:
- a) Optimum availability of modules during the day time.
 - b) Ensuring module layout to prevent shading.
 - c) Selection of Inverter with high track record and readily availability of requisite spares.
 - d) Flat plate arrays are held fixed at a tilted angle and face towards the equator. The angle of tilt should be approximately equal to the angle of latitude for the site. A steeper angle increases the output in winter: while a shallower angle, more output in summer. It should be arranged in such a manner that optimize generation is achieved.
 - e) Based on the Solar insolation data, the solar PV system should be so designed that it shall take into account the mean energy output after allowing for various losses, temperature correction, on an average day for each month of the year.
- 1.4. The bidders are advised to visit the site before quoting their bid. The bidders are also required to incorporate all the system required for efficient operation of 200 kWp solar Plant in parallel with grid supply.

2 Solar PV Module Specifications

- 1.5. The equipment and material for 200 kWp Solar Photovoltaic Power Plant with associate system (typical) shall include following but not be limited to the following: (Only The technical features of major equipment's are described here under).
- 1.6. SPV Modules:
 - 1.7. SPV Mono crystalline modules to be supplied, shall have minimum declared output of 300 Watt peak or more. Number of modules to be supplied shall be worked out accordingly.
 - 1.8. Stabilized output of the Solar Power Plant should not be less than 200 kWp under Standard Test Condition after one year of operation front date of Commissioning of solar plant.
 - 1.9. Each module shall have low iron tempered glass front for strength & superior light transmission. It shall also have tough multi-layered polymer back sheet for environmental protection against moisture & provide high voltage electrical insulation.
 - 1.10. The module frame shall be made of hot dipped Galvanized (at least 85 microns) iron for mounting the PV modules. The thickness of section should not be less than 2 new. The legs / columns of the structure shall be self-supported/ standing. The supports shall be design to given required orientation to take maximum ionization, absorb and transfer the mechanical loads to the ground properly.
 - 1.11. SPV module shall contain Mono crystalline high power silicon solar cells. The solar cell shall have surface anti-reflective coating to help to absorb more light in all weather conditions.
 - 1.12. The solar modules shall have suitable encapsulation and sealing arrangements to protect the silicon cells front the environment. The arrangement and the material of encapsulation shall be compatible with the thermal expansion properties of the Silicon cells and the module framing arrangement/material. The encapsulation arrangement shall ensure complete moisture proofing during entire life of the solar modules. Protective devices against surges at the PV module shall be provided. Low voltage drop bypass diodes shall be provided. The module frame shall be made of corrosion resistant materials having anodized aluminum or as per manufacturer standard.
 - 1.13. Photo conversion efficiency of SPV Module should be greater than 19.5%. Module shall be made of high transmittance glass front surface giving high encapsulation gain.
 - 1.14. Module rating is considered under standard test conditions, however Solar Modules shall be designed to operate and perform under site condition including high temperature & dust (sometimes).
 - 1.15. All materials used shall be having a proven history of reliable, light weight and stable operation in external outdoor applications.
 - 1.16. Solar PV Module design shall conform to following requirement: a. Weather proof DC rated MC connector and a lead cable coming out as a part of the module, making connections easier and secure. not allowing for any loose connections.
 - 1.17. Resistant of water, abrasion, hail impact, humidity & other environment factor for the worst situation at site.
 - 1.18. The module type must be qualified as per IEC 61215 latest edition. Modules must quality to IEC 61730 Part I and II for construction and safety qualification testing. Certificate for module qualification from IEC or TUV/NISE to be submitted as part of the bid offer.
 - 1.19. Other general requirement for the PV modules and subsystems shall be the Following:
 - 1.20. The rated output power of any supplied module shall have tolerance of 3% (three per cent).
 - 1.21. The peak-power point voltage and the peak-power point current of any supplied module and/or any module string (series connected modules) shall not vary by more than 2% (two per cent) from the respective arithmetic means for all modules and/or for all module strings, as the case may be.
 - 1.22. The module shall be provided with a junction box with weather proof lid of sealed type and IP-65 rated.
 - 1.23. Warranties: The PV Modules must be warranted for output wattage, which should not be less than 90% at the end of 10 years and not less than 80% at the end of 25 years.

- 1.24. Each PV module used in any solar plant shall use a RF identification tag. The following information must be mentioned in the RFID used on each module. This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions.
 - 1.24.1. Name of the manufacturer of PV module
 - 1.24.2. Name of the manufacturer of Solar cells
 - 1.24.3. Month and year of the manufacturer (Separately for Solar cell and module)
 - 1.24.4. Country of origin (Separately for Solar cell and module)
 - 1.24.5. I-V curve for the module
 - 1.24.6. Wattage, I_{sc} , V_{oc} and FF for the module
 - 1.24.7. Unique Serial No and Model No of the module
 - 1.24.8. Date and year obtaining IEC PV module qualification certificate
 - 1.24.9. Name of the test lab issuing IEC certificate
 - 1.24.10. Other relevant information on traceability of Solar cell and module as per ISO 9001 & ISO 14001.
- 1.25. Test Certificate to be issued by TUV/NISE after witness testing by IIT Kanpur.

2. MODULE MOUNTING STRUCTURE (FIXED):

- 2.1 Design drawings with material selected shall be submitted for prior approval of 'Engineer in-charge. The bidder/manufacturer shall specify installation details of the PV modules and the support structures with appropriate diagram and drawings. The work will be carried out as per design approved by the Engineer-in-charge.

1) MS Galvanized mounting structure cold formed members 2mm thick with galvanizing coating of 85 microns is to be used as per requirements of this project and maximum nos. of modules is to be installed in min. area.

The structure design shall be appropriate and innovative and corrosion resistant and electronically compatible with the materials used in the module frame, its fasteners, nut and bolts. The bidder may choose to offer module mounting structure as per their design fulfilling the detailed in NIT and shall be capable of withstanding wind speed of 170 kmph..

2.1.1. The module alignment & tilt angle shall be calculated to provide the maximum annual energy output to take maximum insolation. This shall be decided based on the location of array installation.

Each structure shall have a provision to adjust its angle of inclination to the horizontal as per the site conditions.

2.1.2. The structure shall be designed to allow easy replacement of any module and shall be in line with site requirement. Structure shall be supplied complete with all members to be compatible for allowing easy installation at the rooftop site.

2.1.3 The rooftop mounted structure shall be designed for simple mechanical and electrical installation. It shall support SPV modules at a given orientation, absorb and transfer the mechanical loads to the base properly. It should be less than 60 kg/m^2 . The overall load including solar PV panel shall not be greater than 100 kg/m^2 .

- 2.1.4 The mounting steel structure shall be as per latest BIS 2062 (amended up to date) and galvanization of mounting structure shall be in compliance of BIS 4759 (amended up to date). The array structure shall be so designed that it will occupy minimum space without

sacrificing the output from SPV panels at the same time and the minimum clearance of the structure from the roof level should be 2100 mm. Adequate spacing shall be provided between any two modules secured on PV panel for improved wind resistance. The structure shall be designed to withstand operating environmental conditions for a period of minimum 25 years.

2.1.5 All fasteners, nut and bolts are made of Stainless steel - SS 304. (1 bolt+2 plain washer+ 1 spring washer+ 1 nut all hot dipped galvanized. The structure shall be strengthened by CC foundation cubes/block as per the design approved by IIT Kanpur and as indicated in the tender drawings.

2.1.6 PV modules shall be secured to support structure using screw fasteners and/or metal clamps. Module fasteners/clamps shall be adequately treated to resist corrosion.

2.1.7 The array structure shall be grounded properly using as per CPWD specifications.

2.1.8 The support structure & foundation shall be so designed as to be fixed on the rooftop column / wall structures to withstand speed 170 kmph for wind zone of the location as given in relevant Indian wind load codes/ standards. There shall be no requirement of welding or complex machinery at the installation site.

2.2 ARRAY JUNCTION BOXES:

2.2.1 The junction box shall be dust, vermin, and waterproof for outdoor application IP 65 and made of Thermoplastic / Polycarbonate material.

2.2.2 The terminal will be connected to copper bus-bar arrangement of proper size to be provided with terminal blocks should be housed in the junction box with suitable termination threads Conforming to IP65 standard and IEC 62208. The junction boxes shall have suitable cable entry points fitted with cable glands of appropriate sizes for both incoming and outgoing cables.

2.2.3 Suitable markings shall be provided on the bus-bars for easy identification and cable ferrules will be fitted at the cable termination points for identification.

2.2.4 Each array junction Box will have suitable Reverse Blocking Diodes of maximum DC blocking voltage of minimum 600 V with suitable arrangement for its connecting.

2.2.5 The array junction Box will also have suitable surge protection device. Hinged door should be used with EPDM rubber gasket to prevent water entry.

2.2.6 The junction Boxes shall have suitable arrangement for the followings (typical):

2.2.7 Combine groups of modules into independent charging sub-arrays.

2.2.8 Provide arrangement for disconnection of each of the groups.

2.2.9 Provide a test point for each sub-group for quick fault location.

2.2.10 To provide group array isolation.

2.2.11 The current carrying ratings of the junction Boxes shall be suitable with adequate safety factor, to inter connect the Solar PV system corresponding to 200 kWp.

Section-II SOLAR INVERTER

1. Solar inverter shall be grid interactive in nature and mainly consist of dual MPPT (with 4 no. inputs of 5kw each) controller, inverter of rating 20 kWp, 3 phase, 415 V, IP 65 each, associated control and protection devices etc. all integrated. It shall provide necessary protections for Grid Synchronization and Data Logging/Monitoring .The inverter shall have communication protocol RS485 over Modbus & Ethernet for remote monitoring. The inverter should convert DC power produced by the PV modules into AC power and must synchronize automatically its AC output to the exact AC Voltage and frequency of Grid.
2. The DC energy produced shall be utilized to maximum and supplied to the bus for inverting to AC voltage to extract maximum energy from solar array and provide 3-ph, 415V AC (-10% to +15%), 50+/- 3% Hz. to synchronize with the grid.
 - 2.1.1. The inverter shall be of very high quality having efficiency not less than 98% and shall be capable of running in integrated mode.
 - 2.1.2. Degree of protection of the inverter shall be at least IP-65 for outdoor. Provision for built in with data logging to remotely monitor plant performance though external PC shall be provided (only provision). Logged data must be directly accessible to IIT Kanpur and made available to the internal designated data servers. In any circumstance no process or performance data acquired though any data acquisition component of the installation shall be routed through vendor website or any data server external to IIT Kanpur. This clause must be strictly enforced.
 - 2.1.3. The inverter shall be designed for continuous, reliable power supply as per specification.
 - 2.1.4. The inverter shall be capable of complete automatic operation, including wake-up, synchronization & shut down independently & automatically.
 - 2.1.5. Both AC & DC lines shall have suitable fuses/MCB/MCCBs Metal Oxide Arrestors/surge arrestors and contactors to allow safe start up and shut down of the system. Fuses/MCB/MCCBs used in the DC circuit should be DC rated.
 - 2.1.6. The inverter shall operate in sleeping mode when there will be no power connected.
 - 2.1.7. The following Protections must be included and operational at all times of inverter operation
 - 2.1.7.1. Over voltage both at input & output.
 - 2.1.7.2. Over current both at input & output.
 - 2.1.7.3. Over/under grid frequency.
 - 2.1.7.4. Heat sink over temperature.
 - 2.1.7.5. Short circuit.
 - 2.1.7.6. Protection against lightning.
 - 2.1.7.7. Surge arrestors to protect against Surge voltage induced at output due to external source.
 - 2.1.7.8. Any other protection in view of grid supply.
 - 2.1.7.9. Anti - Islanding Protection
 - 2.1.8. It should have user friendly LED/LCD display for programming and viewing on line parameters such as:
 - 2.1.8.1. Inverter 5.11 per phase Voltage, current, kW, kVA and frequency,
 - 2.1.8.2. Grid Voltage and frequency,
 - 2.1.8.3. inverter (Grid) on Line status,
 - 2.1.8.4. PV panel voltage,
 - 2.1.8.5. Solar charge current and ambient temperature,
 - 2.1.8.6. individual power stage heat sink and cabinet temperature, - Solar Radiation (with external pyrano meter with in scope) - Inverter on
 - 2.1.8.7. Grid on
 - 2.1.8.8. inverter under voltage/over voltage
 - 2.1.8.9. inverter over load

2.1.8.10. inverter over temperature.

2.1.9. The inverter shall have arrangement for adjusting DC input current and should trip against sustained fault downstream and shall not start till the fault is rectified.

2.1.10. The inverter shall be able to withstand an unbalanced load conforming to relevant IEC standard and Indian electricity condition. The inverter shall include appropriate self-protective and self-diagnostic features to protect itself and the PV array from damage in the event of inverter component failure or from parameters — beyond the safe operating range due to internal or external causes. The self-protective features shall not allow signals from the inverter front panel to cause the inverter to be operated in a manner which may be unsafe or damaging. Faults due to malfunctioning within the inverter, including commutation feature, shall be cleared by the inverter protective devices and not by the existing site utility grid service circuit breaker.

2.1.11. The inverter shall go to shutdown/standby mode with its contacts open under the following conditions before attempting an automatic restart after an appropriate time delay.

2.1.11.1. When the power available from the PV array is insufficient to supply the losses of the inverter, the inverter shall go to standby/shutdown mode.

2.1.11.2. The inverter control shall prevent excessive cycling of shut down during insufficient solar radiance.

2.1.11.3. Operation outside the limits of power quality should cause the power conditioner to disconnect the grid. Additional parameters requiring automatic disconnection are

2.1.11.4. Neutral voltage displacement

2.1.11.5. Over current

2.1.11.6. Earth fault

2.1.11.7. Reverse power

2.1.12. in each of the above cases, tripping time should be sufficiently small to avoid damage to the inverter including all its components and accessories.

2.2. The Bidder shall provide data sheet for inverter along with their offer as per Guaranteed Technical Particular.

2.3. Inverter shall be tested from the test centers / NABL / BIS / IEC accredited testing & calibration laboratories.

3. AC DISTRIBUTION BOARD (ACDB)

3.1. The AC power output of the inverter shall be fed to the ACDB (metering panel & isolation panel) which also houses energy meter. The 4 UV AC output of the isolation panel shall be fed to the grid. AC energy is then synchronized with the grid and power is consumed by the grid.

3.2. ACDB shall be floor mounted type and shall have all the measuring instruments such as voltmeter, ammeter, frequency meter, Energy Meter, for measuring the deliverable unit, kWh, selector switches etc as per specification mentioned in BOQ.

3.3. All the power cables shall be taken through top/ Bottom of the panel as per site requirement.

3.4. The ACDB shall be fitted with suitable rating & size copper bus, MCCB, indicators for all incomer and outgoing terminals, LED, Multi-function meter to monitor & measure the power to be evacuated.

3.5. Nuts & bolts and all metallic parts shall have to be adequately protected against atmosphere and weather prevailing in the area.

3.6. Modifications/ addition if any, in existing L T panel shall be done at site for connection the supply ACDB and covered in scope of Bidder.

4. WIRING

All instruments and Panel wiring shall be of heat resisting and extinguishing type in compliance with IS. Plastic or porcelain cleats of the limited compression type shall be used for holding wiring runs. All wires shall be suitable for bending to meet the terminal studs at right angles. Metal cases of all apparatus mounted on panels shall be separately earthed.

5. CABLE ACCESSORIES

Only terminal cable Joints shall be accepted. No cable Joints to Join two cable ends shall be accepted.

Cable terminations shall be made with suitable cable lugs & sockets etc., crimped properly and passed through brass compression type cable glands at the entry and exit point of the cubicles. The panels bottoms should be properly sealed to prevent entry of snakes/lizard etc. inside the panel.

The terminal end of cables and wires are to be fitted with good quality numbered ferrules of proper sizes so that the cables can be identified easily.

6. EARTHING

Each array structure of the SPV shall be earthed properly. The array structure are to be connected to earth pits as per CPWD General Specifications. Junction boxes shall be connected to the main earthing conductor/ electrode.

Earthing system installation shall be in strict accordance with CPWD General Specifications Part-I internal 2013 as amended upto date and as per Indian Electricity Act 2003 upto date..

Necessary Test Point provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.

Earth resistance of the earth pits shall be tested in presence of the representative of Engineer- in-Charge

7. LIGHTNING & OVER VOLTAGE PROTECTION

The PV Power Plant should be provided with Lightning Arrester and over voltage protection connected to proper earth system. The main aim of over voltage protection is to reduce the over voltage to a tolerable level before it reaches the PV or other sub-system components. The source of over voltage can be lightning or other atmospheric disturbance.

The lightning system / Conductors shall be made as per applicable CPWD General Specifications.

8. MAINTENANCE DURING DEFECT LIABILITY PERIOD

1. The system will be comprehensively maintained by the contractor with no extra cost for three years- from the date of taking over by the department i.e. during warranty / guaranty period.

2. The contractor has to depute experienced service engineer for checking the complete installations on regular basis or as and when required for period of three year from date of taking over of the installations by the department i.e during warranty / guarantee period, for which nothing extra shall be paid

3. Immediate fault rectification on lodging of complaint. The fault rectification shall be carried out by skilled staff. All fault rectification shall be done within reasonable time preferably within 24 hrs and all faulty equipment shall be collected from site and repaired equipment delivered at site.

4. Maintenance will also include :-

i) Providing on call services for any breakdown and rectification of fault within 24 hours of the reporting of the problem.

ii) Any delay in attending the complaints beyond 24 hours of lodging complaint will attract a penalty of

Rs. 1000/- per day.

5. The maintenance service provided shall ensure proper functioning of the SPV system as a whole to the extent covered in the contract. All preventive /routine maintenance and breakdown/corrective maintenance required for ensuring maximum uptime shall have to be provided.

a) The bidder shall submit the preventive/Routine/breakdown maintenance schedule as per their standard practice along with the bid. During warranty period of 10 years for PV modules, contractor shall check / inspect the complete system once every year in the month of March and submit the detail report of working of the system.

SECTION 3:- GENERAL ELECTRICAL WORK

1. SCOPE

This chapter covers the requirements for the electrical works associated with heating, air conditioning, ventilation and cold room applications, namely, switch boards, power cabling, control wiring, earthing, p.f. capacitors and remote control-cum-indicating panels. Electric motors are not covered here, as these are covered as part of the respective equipment specifications.

2. GENERAL

i) Unless otherwise specified in the tender specifications, all equipments and materials for electrical works shall be suitable for continuous operations on 415 V / 240 V + 10% (3 phase/single phase), 50 Hz. AC system. Where the use of high voltage equipments is specified in particular works, all the respective equipment's shall be suitable for continuous operation on such specified high voltage.

ii) All electrical works shall be carried out complying with the Indian Electricity Rules, 1956 as amended to date.

iii) All parts of electrical works shall be carried out as per appropriate CPWD General specifications for Electrical works, namely, Part I (Internal) 2013, Part II (External) 1994 work, and Part IV (Sub-station), 2013 all as amended to date.

iv) All materials and components used shall conform to the relevant IS specifications amended to date.

3. SWITCH BOARDS

i) The main switch board in the A.C. plant room shall be floor mounted, free standing cubical type and shall be factory built fabricated by one of the reputed switch board manufacturer. It shall be suitable for termination of the incoming cable(s)/ bus trunking from top/ bottom. The switchboards in air handling unit (AHU) rooms shall be wall mounted, or floor mounted as feasible at site and as approved by the Engineer-in-charge, but they shall be cubical design, unless otherwise specified and open able from front.

ii) The capacity of switch gear, starters etc. shall be suitable for the requirements of loads fed/controlled. Starting currents shall be duly considered in case of motor loads.

iii) Switch fuse units shall be used upto and including 63 A and fuse switch units shall be used for 100 A and above. ACB shall be used for 630 A and above ratings.

iv) All switch fuses/fuse switches dis-connector switches shall be of AC 23 duty as per IS: 4064-1978 as amended upto date. They shall be complete with suitable HRC cartridge type fuses.

v) Switch boards controlling motors shall house starters for motors, unless otherwise specified. Independent single phasing preventors for each such starter shall be provided. The starter and SPP shall be located adjacent to the controlling switch gear.

- vi) One volt meter with selector switch, a set of indicating lamps and fuses for voltmeter and lamps shall be provided at each switchboard. One ammeter with CTS, and selector switch shall be provided with each motor starter. Instruments shall be flush mounted with the panel and have a glass index not higher than 1.5. The instruments and accessories shall be provided whether or not specifically indicated in the tender specifications.
- vii) The fabrication of switchboard shall be taken up only after the drawings for the fabrication of the same are approved by the Engineer-in-charge.
- viii) Switchboards shall be fabricated as per specifications indicated in subpara above.
- ix) The layout of bus bars and cable alleys shall be designed for convenient connections and inter-connections with the various switchgear. Connections from individual compartments to cable alleys shall be such as not to shut down healthy circuits in the event of maintenance work becoming necessary on a defective circuit.
- x) Care shall be taken to provide adequate clearances between phase bus bars as well as between phase bus bars, neutral and earth.
- xi) Where terminations are done on the bus bars by drilling holes therein, extra cross section shall be provided for the bus bars. Alternatively, terminations may be made by clamping.
- xii) Provision shall be made for proper termination of cables at the switchboards such that there is no strain either on the cables, or on the terminators. Cables connected to the upper tiers shall be duly clamped within the switchboard.
- xiii) Identification labels shall be provided against each switchgear and starter compartment, using plastic engraved labels.
- xiv) Metallic danger board conforming to relevant IS shall be fixed on each electrical switchboard.
- xv) Switchboard housing only isolators near cooling towers shall be housed in weather proof enclosure. The mounting arrangement shall be as approved by the Engineer-in-Charge to suit the site conditions.

12.3 POWER CABLING

- i) Unless otherwise specified, the power cables shall be XLPE insulated, PVC outer sheathed aluminium conductor, armoured cables rated for 1100 V grade. The power cables shall be of 2 core for single phase, 4 core for sizes upto and including 25 sq.mm, 3-1/2 core for sizes higher than 25 sq.mm for 3 phase. Where high voltage equipments are to be fed, the cables shall be rated for continuous operation at the voltages to suit the same.
- ii) Power cables shall be of sizes as indicated in the tender specifications. In all other cases, the sizes shall be as approved by the Engineer-in-Charge, after taking into consideration the load, the length of cabling and the type of load.
- iii) Cables shall be laid in suitable metallic trays suspended from ceiling, or mounted on walls, or laid directly in ground or clamped on structures, as may be required. Cable ducts shall not be provided in plant rooms. Cable trays shall be fabricated from slotted angle/solid angles to make ladder type cable tray, designed with adequate dimensions for proper heat dissipation and also access to the cables. Alternatively, cable trays may be of steel sheet with adequate structural strength and rigidity, with necessary ventilation holes therein. In both the cases, necessary supports and suspenders shall be provided by the Airconditioning Contractor as required.

iv)Cable laying work shall be carried out in accordance with 13.4 (iii) above. The scope of work for the Air-conditioning Contractor shall include making trenches in ground and refilling as required, but excludes any masonry trenches for the cable work.

4. CONTROL WIRING

i)Control wiring in the plant rooms and AHU rooms shall be done using ISI marked PVC insulated and PVC sheathed, 1.5 sq.mm copper conductor, 250 V grade, cables drawn in ISI marked steel or PVC conduits. Alternatively, armoured multi-core copper conductor cables may also be used for the purpose. The control cables interconnecting the plant room and the AHU rooms shall be of multi-core armoured type only, and suitable for laying direct in ground.

ii)The number and size of the control cables shall be such as to suit the control system design adopted by the Air-conditioning Contractor.

iii)ISI marked steel conduit pipes, wherever used, shall be of gauge not less than 1.6 mm thick for conduits upto 32 mm dia and not less than 2.0 mm thick for higher sizes. All conduit accessories shall be threaded type with substantial wall thickness.

iv)Control cables shall be of adequate cross section to restrict the voltage drop.

v)In the case of control wires drawn through steel conduits, the wire drawing capacity of conduits as specified under the CPWD General Specifications for Electrical Works (Part I) 1994 shall not be exceeded.

vi)Runs of control wires within the switchboard shall be neatly bunched and suitably supported/clamped. Means shall be provided for easy identification of the control wires.

vii)Control wiring shall correspond to the circuitry/sequence of operations and interlocks approved by Engineer-in-Charge.

viii)In cold storage involving temperatures below zero deg. C, polythene cables shall be used instead of PVC cables.

5. EARTHING

i)Provision of earth electrodes and the type of earthing shall be as specified in the tender specifications.

ii) The earth work shall be carried out in conformity with CPWD Specifications for Electrical works (Part-I), Internal 1994.

iii)Metallic body of all medium voltage equipments and switch boards shall be connected by separate and distinct earth conductors to the earth stations of the installations; looping of such body earth conductors is acceptable from one equipment, or switch board to another.

iv)G.I. plate earthing shall be provided for PTAC plants and reciprocating central AC plants upto 100 TR capacity. Above 100 TR reciprocating units and centrifugal/ screw chilling units copper plate earthing shall be provided.

v)The size of earth conductors for body earthing of equipments shall be as under:

Motors upto and including 10 HP rating	2 Nos. 3 mm dia copper wire/ 2 nos. 4mm dia GI wire
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12.5 HP to 40 HP	2 Nos. 4 mm dia copper wire/ 2 nos. 6mm dia GI wire
50 HP to 75 HP	2Nos. 6 mm dia copper wire/ 2 nos. 25x3mm GI strip
Above 75 HP	2Nos. 25mm x 3mm copper strip/ 2 nos. 25x6mm GI strip

Switch boards with incoming rating

Upto 100 A	2 Nos. 3 mm dia copper wire/ 2 nos. 4mm dia GI wire
125 A to 200 A rating	2 Nos. 6mm dia copper wire/ 2 nos. 25x3mm GI strip
Above 200 A rating	2Nos. 25mm x 3mm copper strip/ 2 nos. 25x6 mm GI strip

vi) Armouring of cables shall be connected to the body of the equipments/switch board at both the ends. Compression type glands shall be used for all such terminations in the case of PVC cables.

6. POWER FACTOR CAPACITORS

i) PF capacitors shall be provided for all motor loads of 5 HP and above. These capacitors shall come into circuit when the respective motor load is switched on. For this purpose, necessary interconnections between the capacitors and the motors/starters shall be included in the scope of work of the Air-conditioning Contractor.

ii) The power capacitors shall be of such value as to improve the PF to 0.90 lagging when the motor is running at full load. In the case of large size motors, the capacitors may be made in suitable banks so that the required bank(s) of capacitors may be switched under partial load conditions. Such operations of individual banks shall be automatic.

iii) Where the PF capacitors are provided in banks, each bank shall be controlled by suitably rated switch gear with HRC fuses.

iv) The capacitor banks and the controlling switchgear may be fabricated in independent cubical or may form part of the switchboard in the installations. In the latter case, the capacitors are permitted to be mounted on the switchboard, if so desired.

SPECIAL CONDITION FOR SAFETY AT THE WORK SITE

The contractor will identify one of the supervisors for taking care of implementation of Safety systems. The Contractor should follow the following General Guidelines governing the safety rules as laid down under:

1. Smoking is strictly prohibited at workplace.
2. Nobody is allowed to work without wearing safety helmet. Chinstrap of safety helmet shall be always on. Drivers, helpers and operators are no exception.
3. No one is allowed to work at or more than three meters height without wearing safety belt and anchoring the lanyard of safety belt to firm support preferably at shoulder level.
4. No one is allowed to work without adequate foot protection.
5. Usage of eye protection equipment shall be ensured when workmen are engaged for grinding, chipping, welding and gas-cutting. For other jobs as and when site safety co-coordinator insists eye protection has to be provided.
6. All safety appliances like Safety shoes, Safety gloves, Safety helmet, Safety belt, Safety goggles etc. shall be arranged before starting the job.
7. All excavated pits shall be barricaded & barricading to be maintained till the backfilling is done. Safe approach to be ensured into every excavation.
8. Adequate illumination at workplace shall be ensured before starting the job at night.
9. All the dangerous moving parts of the portable / fixed machinery being used shall be adequately guarded.
10. Ladders being used at site shall be adequately secured at bottom and top. Ladders shall not be used as work platforms.
11. Material shall not be thrown from the height. If required, the area shall be barricaded and one person shall be posted outside the barricading for preventing the tre-passers from entering the area.
12. Other than electricians no one is allowed to carry out electrical connections, repairs on electrical equipment or other jobs related thereto.
13. All electrical connections shall be made using 3 or 5 core cables, having a earth wire.
14. Inserting of bare wires for tapping the power from electrical sockets is completely prohibited.
15. A tools and tackles inspection register must be maintained and updated regularly.
16. Debris, scrap and other materials to be cleared from time to time from the workplace and at the time of closing of work everyday.
17. All the unsafe conditions, unsafe acts identified by contractors, reported by site supervisors and / or safety personnel to be corrected on priority basis.

18. No children shall be allowed to enter the workplace.
19. All the lifting tools and tackles shall be stored properly when not in use.
20. Clamps shall be used on Return cables to ensure proper earthing for welding works.
21. Return cables shall be used for earthing.
22. All the pressure gauges used in gas cutting apparatus shall be in good working condition.
23. Proper eye washing facilities shall be made in areas where chemicals are handled.
24. Connectors and hose clamps are used for making welding hose connections.
25. All underground cables for supplying construction power shall be routed using conduit pipes.
26. Spill trays shall be used to contain the oil spills while transferring / storing them.
27. Tapping of power by cutting electric cables in between must be avoided. Proper junction boxes must be used.

Superintending Engineer

(TECHNICAL SPECIFICATIONS OF MAJOR EQUIPMENT)

<i>SL No.</i>	<i>Description</i>	<i>As Per NIT</i>
1	<i>Minimum. Output (Pmax) as per STC</i>	<i>300 Wp-400Wp</i>
2	<i>Voc/Isc</i>	<i>40V/10A or higher</i>
3	<i>MPP Voltage (Vmpp) V</i>	<i>33.43V (Min)</i>
4	<i>MPP current (Imp) A</i>	<i>9.73A</i>
5	<i>Open circuit voltage (Voc)V</i>	<i>40 V (min)</i>
6	<i>Normal operating cell temperature</i>	<i>45 ± 2 Degree C</i>
7	<i>Module dimensions (LxWxH)</i>	<i>Approx. 1960mmx990mmx40mm</i>
8	<i>PV Module type</i>	<i>Mono Crystalline (High eff.)</i>
9	<i>No. of PV cells per Module</i>	<i>72/As per Manufacturer Standard</i>
10	<i>Min. efficiency of solar cell</i>	<i>> 19.5 %</i>
11	<i>Solar module frame material</i>	<i>Aluminum</i>
12	<i>Weather resistant junction</i>	<i>IP65/IP67</i>
13	<i>Glass</i>	<i>Toughened/Tempered</i>
14	<i>Glass iron content</i>	<i>Low Iron</i>
15	<i>glass transmissivity</i>	<i>High transmissivity</i>
16	<i>Frame</i>	<i>Anodized aluminum</i>
17	<i>Encapsulation</i>	<i>Ethyl Vinyl Acetate (EVA)</i>
18	<i>Trilaminate back surface</i>	<i>Tedlar / Polyester</i>
19	<i>By-pass diode</i>	<i>To be provided</i>
20	<i>Standard</i>	<i>IEC 61215 / IS 14286 & IEC 61730 Part 1 & Part 2</i>
21	<i>Performance guarantee</i>	<i>10 years of 90% power output 25 years of 80% power output</i>
22	<i>Product Warranty</i>	<i>10 years against manufacturing defects.</i>
23	<i>PV Panel certification & sample testing witness by IIT Kanpur</i>	<i>TUV/NISE</i>

1.2	SPECIFICATION OF SOLAR INVERTER (GRID connected)	
SL No.	Description	As Per NIT
1	Type	Grid connected
2	Max. DC Array Input Voltage & power	1000 V & less than 25000 W
3	DC voltage tolerance	20% to +15% of the DC array input voltage in Sr. 1 above
4	Type of inverter	Dual MPPT based inverter (4X 5Kw input string)
5	Switching Device	MOSFET \ IGBT BASED
6	Continuous inverter output rating	20 kWp
7	Output wave form	Pure Sine wave output
8	Total harmonic distortion	< 5% with rectifier load
9	Nominal AC output voltage and frequency	415V 3 phase 50Hz, 50 Hz +0.5 Hz
10	Output frequency	0.05
11	Grid frequency tolerance	3Hz
12	Grid frequency synchronization range	<1%
13	No-Load losses	> 0.9 Lagging
14	Power factor	>98 % at nominal voltage & power
15	Inverter efficiency	< 57 db
16	Noise level	IEC 61727, CE, IEC 62109-1, IEC 62109-2,
17	Certifications	IEC 61683/IS 61683, IEC 60068-2(1,2,14,30)
18	Idle current	< 4 % of rated capacity
19	Regulation Line regulation and load regulation	-0.02
20	Over load features	150% for one minute '
21	Cooling	Forced air cooling with temperature controlled cooling/Regulated air cooling
22	Operating Temperature	(-)10°C to 55°C
23	Relative Humidity	0.95
24	LED/LCD display	Indications display shall indicate system functional parameters and protection functional indicators
25	Data Monitor and display controls	. RS 485, Ethernet connectivity
26	Protections	1) Input over Voltage
		2) Low/High frequency
		3) Short Circuit
		4) Under/over output voltage
		5) Over Temperature
		6) Grid input under voltage/over voltage with auto recovery
		7) DC disconnect device
		8) DC reverse polarity

		9) Anti Islanding protection as per the standard
27	Enclosure Protection Safety	IP 65 /IP 66(for outdoor)
28	Warranty	5 years.

1.3	SPECIFICATIONS FOR ARRAY JUNCTION BOX (DCDB)	
Sl. No	Description	As per NIT
1	No. of module in series	As per NIT
2	No. of module in parallel	As per manufacturer standard as per manufacturer standard 300Wp -400Wp
3	Minimum Capacity of each SPV panel	MCB / MCCB
4	Switch gears	1.1 KV grade 100 Amps capacity
5	Connectors	FRLS copper conductor single core cable
6	Wiring	1.1 KV grade of required size.
7	Enclosure Protection	IP 65 (outdoor) dust & vermin proof weather resistance
8	Enclosure	Thermoplastic / Polycarbonate material
9	Size	As per manufacturer standard/ Site requirement.

1.4 SPECIFICATIONS FOR PV PANEL SUPPORT STRUCTURE

Sl.No.	Description	As per NIT
1	Material	Hot dip galvanized steel (85 Microns)
2	Thickness of member	2 mm
3	Over all dimensions	As per manufacturer standard
4	Wind rating	170Km/H
5	Tilt angle and adjustment	Adjustable as per site requirement
6	Peach of structure	
7	Hard wears & fastener	To be approved by the Engineer In Charge
8	Foundation	To be approved by the Engineer In Charge

1.5 SPECIFICATIONS FOR ACDB (AC PANEL)

SL.No	Description	As per NIT
1	Make	As per approved make list

2	<i>Thickness of sheet metal</i>	<i>2 mm</i>
3	<i>Size of bus bar</i>	<i>25mmX5mm copper</i>
4	<i>Material of bus bar</i>	<i>Copper</i>
5	<i>Bus bar Insulation</i>	<i>PVC Sleeve</i>
6	<i>Over all dimension</i>	<i>As per design</i>
7	<i>Degree of protection</i>	<i>IP 42 as per IS 13947 (Part-I)</i>

Technical Submittals

The successful tenderer after award of work shall furnish technical submittals for various items incorporating complete technical details prior to procurement of equipment/materials, for the approval of the Engineer-in-charge. The submittals for items mentioned in the tender document but not restricted to the following:

a.	Solar PV Module/Panel
b.	Grid Tie Inverter
c.	Smart Energy Meter
d.	Communication architecture for the Inverter and smart meter
e.	ACDB /Electrical panel
f.	Cable/Wires
g.	Mounting Structure STAAD analysis
h.	Shadow Analysis report
i.	Earthing Calculation sheet and drawing
j.	Lightning Arrestor calculation sheet and drawing
k.	SLD of the Solar PV plant
l.	Pyranometer/solar irradiance sensor
m.	Cable Tray

Test certificates for various items shall also be submitted by the contractor.

APPENDIX- I

GUARANTEE PROFORMA FOR 200 kWp SOLAR PV PLANT INSTALLATION ON THE TERRACE OF NEW CORE LAB BUILDING

Owner : **IIT KANPUR**

Location : **IITK Campus**

1. The Contractor shall furnish the following guarantee:

“We warrant that everything supplied by us including all components fitted into the equipment manufactured by others also, shall be in all respects free from all defects and faults in material, workmanship and manufacture and shall be of the highest grade and quality to acceptable standards for all materials of the type ordered and shall be in full conformity with all the specifications, drawings or samples if any and we shall be fully responsible for its efficient performance. This guarantee shall survive inspection for acceptance and payment for the equipment and installation, but shall expire (except in respect of the complaints notified to us) **36** months from the date of issue of completion certificate by the Engineer In Charge. The complaints, workmanship, manufacturer, or performance of any of the equipment or part/parts thereof shall be notified by mail/telephonic within **36** months from the date of issue of such completion certificate.”

2. The Contractor shall replace such of these parts which require replacement under these conditions free of cost, charge and expenses to the purchaser. In addition, the Contractor shall be responsible for a period of **36** months from the date of issue of completion certificate for any defect that may develop or appear under the conditions provided by the Contractor or use thereof arising from faulty material design or workmanship in the equivalent or any part thereof or faulty installation of the equipment by the Contractor but not otherwise and shall correct such defects within one week from the date of notification at his own cost when called upon to do so by the purchaser who shall state in writing in what respect the portion is faulty.
3. Any faulty component replaced or renewed under the clause shall also be guaranteed for a period of six months from the date of such replacement or removal of until the end of the above mentioned period whichever is later.
4. If defects are not rectified within a reasonable time as mentioned in the written notice, the Engineer In-Charge shall proceed to do so at the Contractor’s risk and cost without prejudice to any other right thereof.

SIGNATURE AND STAMP OF THE CONTRACTOR

DATE :

APPENDIX-II

200 Kw SOLAR PV PLANT TENDER DRAWINGS (Attached in tender separately)

Drg. No.	Title
01	200 kW _p ROOFTOP SOLAR PV PLANT SLD
02	SOLAR ARRAY LAYOUT PLAN ON THE TERRACE
03	MOUNTING STRUCTURE INDICATIVE DRAWING-I
04	MOUNTING STRUCTURE INDICATIVE DRAWING-II

APPENDIX-III

INTERNATIONAL CODES AND STANDARDS

Apart from the specific equipment standards and specifications, the following broad certifying agency / standards will be considered while designing the system:

1. Appropriate PV Design – IEC 62548
2. Electrical activities of a Utility Scale Power Plant – IEC 62738
3. Installation Quality – IEC 63049
4. Commissioning & Operations – IEC 62446-1
5. Onsite IV measurement – to be in-line with IEC 61829
6. System Maintenance – IEC 62446-2
7. Performance Monitoring – IEC 61724-1
8. Capacity Evaluation – IEC 61724-2
9. Energy Evaluation – IEC 61724-3
10. ISO - International Standards Organization
11. IEC - International Electrochemical Commission

APPENDIX-IV

A. LIST OF BUREAU OF INDIAN STANDARDS CODES

IS : 554 - 1985 (Reaffirmed 1996)	Dimensions for pipe threads where pressure tight joints are required on the threads.
IS : 655 - 1963 (Reaffirmed 1991)	Metal air ducts.
IS : 694 - 1990 (Reaffirmed 1994)	PVC insulated (HD) electric cables for working voltage upto and including 1100 volts.
IS : 732 - 1989	Code of practice for electrical wiring.
IS : 780 - 1984	Sluice valves for water works purposes.
IS : 822-1970 (Reaffirmed 1991)	Code of procedure for inspection of welds.
IS : 1239 (Part - I) - 1990	Mild steel tube
IS : 1239 (Part - II) - 1992	Mild steel Tubular and other wrought steel pipe fittings.
IS : 1255 – 1983	Code of Practice for installation and maintenance of Power Cables upto and including 33 KV rating (Second Revision)
IS : 1554 - 1988 (Part – I)	PVC insulated (Heavy Duty) electric cables for working voltages upto and including 1100 volts.
IS : 1897 - 1983(Reaffirmed 1991)	Copper bus bar / strip for electrical Purposes
IS : 2379 - 1990	Color code for the identification of pipelines.
IS : 2551 - 1982	Danger notice plate
IS : 3043 – 1987	Code of practice for earthing.
IS : 3103 – 1975 (Reaffirmed 1999)	Code of practice for Industrial Ventilation
IS : 3837 – 1976 (Reaffirmed 1990)	Accessories for rigid steel conduit for electrical wiring.
IS : 4736 – 1986 (Reaffirmed 1998)	Hot-dip zinc coatings on steel tubes.
IS : 4894 - 1987	Centrifugal Fan.

IS : 5133 -1969 (Part-I) (Reaffirmed 1990)	Boxes for the enclosure of electrical accessories.
IS : 5312 (Part-I) -1984 (Reaffirmed 1990)	Swing - check type reflux Non return valves for water works
IS : 5424 – 1989 (Reaffirmed 1994)	Rubber mats for electrical purposes.
IS : 5578 & 11353-1985	Marking and identification of conductors
IS : 6392 - 1971(Reaffirmed 1988)	Steel pipe flanges.
IS : 8623 – 1993	Low voltage switchgear and control gear Assemblies (Requirement for type / partly type tested assemblies)
IS : 8623 - 1993	Bus Bar trunking system(Part - II)
IS : 8828 - 1996	Circuit Breakers for over current Protection For house hold and similar installation.
IS : 9537 - 1981(Part II)	Rigid Steel Conduits for electrical wiring
IS : 10810 - 1988	Methods of test for cables.
IS : 13947-1993 (Part-I)	General rules for low voltage switch gears and control gears.
IS : 13947-1993 (Part-II) IEC 947 – 2	Circuit Breakers
IS : 13947 - 1993 (Part-III)	Switches, dis connectors and fuse for low volta switch gear and control gear.
IS : 13947 - 1993 (Part-IV)	Low voltage switch gear and control Gear for contactors and motor starters
IS : 13947 – 1993 (Part-V) IEC NBC	Control Circuit Devices. Relevant Sections. National Building Code
ISHRAE	Indian Society for Heating, Refrigerating and Air-conditioning Engineers – ISHRAE 2005 Edition .

B. I.S. SAFETY CODES

IS : 659 – 1964 (Reaffirmed 1991)	Safety Code for Air Conditioning.
IS : 660 – 1963 (Reaffirmed 1991)	Safety code for Mechanical Refrigeration.
IS : 3016	Code of Practice for Fire Precautions in Welding and Cutting operations.
IS : 818	Code of practice for Safety and Health Requirements in Electrical & Gas Welding and cutting operations.
IS : 5216–1982 (Part-I) (Reaffirmed 1990)	Guide for safety procedure and Practices in electrical work.
IS : 3696	Safety Code for Scaffolds and Ladders.

C. Quality Certification, Standards and Testing for Grid-connected Rooftop Solar PV Systems/Power Plants

Quality certification and standards for grid-connected rooftop solar PV systems are essential for the successful mass-scale implementation of this technology. It is also imperative to put in place an efficient and rigorous monitoring mechanism, adherence to these standards. Hence, all components of grid-connected rooftop solar PV system/ plant must conform to the relevant standards and certifications given below:

Solar PV Modules/Panels	
IEC 61215/ IS14286	Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
IEC 61701	Salt Mist Corrosion Testing of Photovoltaic (PV) Modules
IEC 61853- Part 1/ IS 16170: Part 1	Photovoltaic (PV) module performance testing and energy rating –: Irradiance and temperature performance measurements, and power rating
IEC 62716	Photovoltaic (PV) Modules – Ammonia (NH ₃) Corrosion Testing (As per the site condition like dairies, toilets)
IEC 61730-1,2	Photovoltaic (PV) Module Safety Qualification – Part 1: Requirements for Construction, Part 2: Requirements for Testing
IEC 62804	Photovoltaic (PV) modules - Test methods for the detection of potential-induced degradation. IEC TS 62804-1: Part 1: Crystalline silicon (mandatory for applications where the system voltage is > 600 VDC and advisory for installations where the system voltage is < 600 VDC)
IEC 62759-1	Photovoltaic (PV) modules – Transportation testing, Part 1: Transportation and shipping of module package units
Solar PV Inverters	
IEC 62109-1, IEC 62109-2	Safety of power converters for use in photovoltaic power systems – Part 1: General requirements, and Safety of power converters

	<p>for use in photovoltaic power systems</p> <p>Part 2: Particular requirements for inverters. Safety compliance (Protection degree IP 65 for outdoor mounting, IP 54 for indoor mounting)</p>
IEC/IS 61683 (as applicable)	Photovoltaic Systems – Power conditioners: Procedure for Measuring Efficiency (10%, 25%, 50%, 75% & 90-100% Loading Conditions)
BS EN 50530 (as applicable)	<p>Overall efficiency of grid-connected photovoltaic inverters:</p> <p>This European Standard provides a procedure for the measurement of the accuracy of the maximum power point tracking (MPPT) of inverters, which are used in grid- connected photovoltaic systems. In that case the inverter energizes a low voltage grid of stable AC voltage and constant frequency. Both the static and dynamic MPPT efficiency is considered.</p>
IEC 62116/ UL 1741/ IEEE 1547 (as applicable)	Utility-interconnected Photovoltaic Inverters - Test Procedure of Islanding Prevention Measures
IEC 60255-27	Measuring relays and protection equipment – Part 27: Product safety requirements
IEC 60068-2 (1, 2, 14, 27, 30 & 64)	<p>Environmental Testing of PV System – Power Conditioners and Inverters</p> <p>a) IEC 60068-2-1: Environmental testing - Part 2-1: Tests - Test A: Cold</p> <p>b) IEC 60068-2-2: Environmental testing - Part 2-2: Tests - Test B: Dry heat</p> <p>c) IEC 60068-2-14: Environmental testing - Part 2-14: Tests - Test N: Change of temperature</p> <p>d) IEC 60068-2-27: Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock</p> <p>e) IEC 60068-2-30: Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)</p> <p>f) IEC 60068-2-64: Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance</p>
IEC 61000 – 2,3,5 (as applicable)	Electromagnetic Interference (EMI) and Electromagnetic Compatibility (EMC) testing of PV Inverters

Fuses

IS/IEC 60947 (Part 1, 2 & 3), EN 50521	General safety requirements for connectors, switches, circuit breakers (AC/DC): a) Low-voltage Switchgear and Control-gear, Part 1: General rules b) Low-Voltage Switchgear and Control-gear, Part 2: Circuit Breakers c) Low-voltage switchgear and Control-gear, Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units d) EN 50521: Connectors for photovoltaic systems – Safety requirements and tests
IEC 60269-6	Low-voltage fuses - Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems
Surge Arrestors	
IEC 62305-4	Lightening Protection Standard
IEC 60364-5-53/ IS 15086-5 (SPD)	Electrical installations of buildings - Part 5-53: Selection and erection of electrical equipment - Isolation, switching and control
IEC 61643-11:2011	Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods
Cables	
IEC 60227/IS 694, IEC 60502/IS 1554 (Part 1 & 2)/ IEC69947	General test and measuring method for PVC (Polyvinyl chloride) insulated cables (for working voltages up to and including 1100 V, and UV resistant for outdoor installation)
BS EN 50618	Electric cables for photovoltaic systems (BT(DE/NOT)258), mainly for DC Cables
Earthing /Lightning	

IEC 62561 Series (Chemical earthing)	IEC 62561-1 Lightning protection system components (LPSC) - Part 1: Requirements for connection components IEC 62561-2 Lightning protection system components (LPSC) - Part 2: Requirements for conductors and earth electrodes IEC 62561-7 Lightning protection system components (LPSC) - Part 7: Requirements for earthing enhancing compounds
Junction Boxes	
IEC 60529	Junction boxes and solar panel terminal boxes shall be of the thermo-plastic type with IP 65 protection for outdoor use, and IP 54 protection for indoor use
Energy Meter	
IS 16444 or as specified by the DISCOMs	A.C. Static direct connected watt-hour Smart Meter Class 1 and 2 — Specification (with Import & Export/Net energy measurements)
Solar PV Roof Mounting Structure	
IS 2062/IS 4759	Material for the structure mounting

Note- Equivalent standards may be used for different system components of the plants. In case of clarification following person/agencies may be contacted.

- Ministry of New and Renewable Energy (Govt. of India)
- National Institute of Solar Energy
- The Energy & Resources Institute
- TUV Rheinland
- UL

APPENDIX V

LIST OF APROVED MAKES

1.	Solar PV Panel	<ul style="list-style-type: none"> • Waaree, Vikram, Adani, Emvee, Tata solar, BHEL
2.	Grid Tie Inverter	<ul style="list-style-type: none"> • Delta ,SMA, Schneider, Vertiv, ABB, Statcon, Fronius, Kaco
3.	Conduit pipe painted inside & outside 16 SWG ISI marked.	<ul style="list-style-type: none"> • BEC • M-Kay • AKG • S.K. (E.R.W.)
4.	Conduit Accessories & Junction boxes	<ul style="list-style-type: none"> • All made out of 16G MS sheet • All made out of 14G MS sheet
5.	Wires PVC insulated and PVC sheathed FR/ FRLS /control wires (IS marked)	<ul style="list-style-type: none"> • Finolex • Havells • R.R. Kabel • KEI • Gloster
6.	PVC/XLPE insulated LT cables	<ul style="list-style-type: none"> • Universal • Gloster • KEI • Havells
7.	XLPE insulated HT cables	<ul style="list-style-type: none"> • Universal • Gloster • KEI • Havells
8.	Modular switches and sockets	<ul style="list-style-type: none"> • Legrand (ARTEOR) • ABB • L&T • MK Honeywell (wrap around plus)
9.	Flush type switch and sockets	<ul style="list-style-type: none"> • Anchor • Kinjal • SSK • Havells Reo
10.	Air circuit breaker	<ul style="list-style-type: none"> • L&T • ABB • Siemens • C & S
11.	Fuse switches Unit/Switch Fuse Unit & HRC fuses	<ul style="list-style-type: none"> • L&T • Siemens • Havells • C & S
12.	Distribution boards MCB	<ul style="list-style-type: none"> • Legrand • Siemens • ABB • C & S
13.	Loose wire box for distribution boards	<ul style="list-style-type: none"> • Legrand • Siemens • ABB • C & S

14.	MCB's	<ul style="list-style-type: none"> • Legrand • ABB • Siemens • C & S
15.	MCCB	<ul style="list-style-type: none"> • Legrand • Siemens • L&T • ABB • C & S
16.	Cable lug	<ul style="list-style-type: none"> • Ascon (Heavy gauge) • Jainson • Dowells
17.	Safe trip/RCCB/ELCB	<ul style="list-style-type: none"> • Legrand • ABB • Siemens • C & S
18.	GI pipe 'B' class	<ul style="list-style-type: none"> • Prakash Surya • Jindal
19.	Electrical Switchboards / feeder pillar/LT panel/ACDB Panel	<ul style="list-style-type: none"> • Milestone Switchgear Pvt. Ltd • Neptune Systems Pvt. Ltd. • Tricolite Electrical Industries • Modern Switchgears/ ESSAAR/Adlec
20.	Telephone wires/Telephone Cable / jelly filled telephone cables	<ul style="list-style-type: none"> • Finolex • Delton • Havell's • R.R. Kabel
21.	Telephone tag blocks	<ul style="list-style-type: none"> • Krone • Pouyet
22.	Telephone outlet	<ul style="list-style-type: none"> • MK Electric • Legrand (Mosaic) • Crabtree (Piccadilly)
23.	GI raceways	<ul style="list-style-type: none"> • Milestone Engineering • Legrand • MDS • Neptune Systems Pvt. Ltd. • MK
24.	PVC raceways	<ul style="list-style-type: none"> • Legrand • MK
25.	Panel meters	<ul style="list-style-type: none"> • L&T Rishab • AE • Secure • Conzerv • C & S
26.	Current transformer	<ul style="list-style-type: none"> • Gilbert Maxwell • Kappa • AE
27.	Selector switch	<ul style="list-style-type: none"> • L&T • Kaycee • Siemens • C & S
28.	Protective relays	<ul style="list-style-type: none"> • ABB • C & S

29.	Smart Energy Meter	<ul style="list-style-type: none"> • Enercon • Anchor • L&T • HPL • Conzerv • Secure
30.	Changeover switch	<ul style="list-style-type: none"> • L&T • HPL • Havells • C & S
31.	Electronic ballast	<ul style="list-style-type: none"> • Philips • Wipro • Bajaj • Decon • Crompton • Havells
32.	DLP plastic trunking	<ul style="list-style-type: none"> • Legrand • MK
33.	Programmable Logic Controller(PLC)	<ul style="list-style-type: none"> • Siemens • Allen-Bradley • Schneider
34.	Earthing (Chemical Earthing) Plate Earthing	<ul style="list-style-type: none"> • JMV • As per CPWD Norms
35.	Control Relay Panel	<ul style="list-style-type: none"> • CGL • Schneider • ABB
36.	Lightning Arrestor	<ul style="list-style-type: none"> • ABB • Alltec • JMV
37.	HT/LT cable joints (Straight through/outdoor/indoor)	<ul style="list-style-type: none"> • 3M • Denson • GSeal

Note: Any other material not listed shall be approved by Engineer In Charge.

APPENDIX VI

Undertaking from major equipment OEM's (Original Equipment Manufacturer)

The lowest tenderer shall submit alongwith the performance guarantee after the acceptance of tender, an undertaking from OEM's as at Annexure-1 to 2 regarding major equipment's as mentioned below:

ANNEXURE – 1

Original Equipment Manufacturers (OEM) undertaking for providing **3 years of Defect Liability Period of the Solar PV module to the lowest tenderer for 200 kWp Solar PV Plant proposed to be supplied to IIT Kanpur under the above tender No..... by M/s.....**

1. We, OEM for Solar PV module do hereby give undertaking to IIT Kanpur for the 3 years of Defect liability period support through M/s....., lowest tenderer for the work, ***“Supplying, installation, testing and commissioning of online grid 200 kW roof top solar PV plant on the terrace of New core lab building at IIT Kanpur.”***

- 1. We also give undertaking to provide maintenance support and all the spares to IIT Kanpur throughout the useful life of the equipment for the solar PV module.

M/s.....

Authorized signatory with stamp.

ANNEXURE – 2

Original Equipment Manufacturers (OEM) undertaking for providing **5 years of Defect Liability Period of the Grid Tie Inverter (20 Kw) to the lowest tenderer for 200 kWp Solar PV Plant proposed to be supplied to IIT Kanpur under the above tender No..... by M/s.....**

1. We, OEM for 20 kW Grid Tie Inverter do hereby give undertaking to IIT Kanpur for the 5 years of Defect liability period support through M/s....., lowest tenderer for the work, ***“Supplying, installation, testing and commissioning of online grid 200 kW roof top solar PV plant on the terrace of New core lab building at IIT Kanpur.”***

- 1. We also give undertaking to provide maintenance support and all the spares including hardware & software to IIT Kanpur throughout the useful life of the Grid Tie Inverter.

M/s.....

Authorized signatory with stamp.

APPENDIX VII

CONTRACT AGREEMENT FORMAT

AGREEMENT made this day of , between the Indian Institute of Technology, Kanpur incorporated as a body corporate under the Institute of technology Act 1961 (No.59 of 1961) through its Director Kanpur (hereinafter referred to as ‘The Institute’ “M/s.....” (hereinafter referred to as ‘the contractor’) which expression shall include his/their respective heirs, executors, administrators and assigns of the other part.

WHEREAS the Institute is desirous for “.....” at Institute Campus and has caused drawings and specifications describing the work to be done and WHEREAS the said drawings as per list attached, the specifications, the Priced Schedule of Quantities, the conditions of Tender and the conditions of contract have been signed by or on behalf of the parties hereto AND WHEREAS the contractor has agreed to execute upon and subject to the conditions set fourth herein (hereinafter referred to as ‘the said conditions’) the work shown upon ‘the said drawings’ and described in ‘the said specification’ and ‘the said Priced Schedule of Quantities at the respective rates mentioned in the Priced Schedule of Quantities.

AND WHEREAS the contractor has deposited by FDR/BG a sum of **Rs.**/- (Rupees Only) with the Institute for the due performance of this agreement.

NOW IT IS HEREBY AGREED AS FOLLOWS

1. In consideration of the payments to be made to the contractor as hereinafter provided the contractor shall upon and subject to the said conditions execute and complete the works shown upon the said drawings and such further detailed drawings as may be furnished to him by the said Institute and described in the said specification, and the said Priced Schedule of Quantities.
2. The Institute shall pay the contractor such sums as shall become payable hereunder at the times and in the manner specified in the said conditions.
3. Time is the essence of the agreement. In the event of the contractor failing to comply with this conditions he shall be liable to pay compensation as per clause 9 of the conditions of the

contract as decided by the Director of the Institute in writing which shall be final and binding on the contractor.

4. The drawings, specifications and Priced Schedule of Quantities above mentioned shall form the basis of this contract and the decision of the Director or Arbitrator or Umpire as mentioned in the conditions of contract in reference to all matters of dispute as to material, workmanship or account and as to the intended interpretation of the clause of this agreement or any other document attached here to shall be final and binding on both parties and may be made a Rule of Court.
5. The said contract comprises the work above-mentioned and all the subsidiary works connected therewith within the same site all may be ordered to be done from time to time by the said Institute even though such works may not be shown on the drawings or described in the said specifications or the Priced Schedule of Quantities.
6. The Institute reserves the right of altering the drawings and nature of the work and of adding to or omitting any items of work or of having portions of the same carried-out departmentally or otherwise and such alterations or variation's shall not vitiate this contract.
7. The said conditions and Appendix thereto shall be read and construed as forming part of this Agreement and the parties hereto will respectively abide by and submit themselves to the conditions and stipulations and perform the Agreement on their parts respectively in such conditions contained.
8. All other disputes and differences except as excluded by clause 10 shall be referred to Arbitrations as per clause 55 of the said conditions of contract. The provision of the Arbitrations Act 1940 or any statutory modifications or reenactment thereof and of the rules made there under for the time being enforce shall apply to Arbitration proceedings under this clause.
9. All disputes arising out of or in any way connected with this Agreement shall be deemed to have arisen in Kanpur and only courts in Kanpur shall have jurisdiction to determine the same.
10. The several parts of this contract have been read to us and fully understood by us. IN WITNESS WHEREOF the parties hereto have set their respective hands the day and the year herein above written.

In the presence of

1.

DIRECTOR

2.

CONTRACTOR.

APPENDIX-VIII

TECHNICAL DATASHEETS

ANNEXURE- 1

**TECHNICAL DATASHEET OF PV PANEL PROPOSED BY BIDDER FOR
TECHNICAL EVALUATION**

S.No.	TECHNICAL PARTICULARS	REQUIRED (As per NIT)	AS PER TENDERER
1	Minimum. Output (Pmax) as per STC	300 Wp -400 Wp	
2	Voc/Isc	40V/10A or higher	
3	MPP Voltage	33.43 V(Min)	
4	MPP current (imp) A	9.73A	
5	Open circuit voltage (Voc)V	40 V (Min)	
6	Normal operating cell temperature	45± 2 °C	
7	Module dimensions (LXWXH)	Approx.196mmX990mmX40mm	
8	PV Module type	Mono Crystalline (High eff.)	
1 1	Solar module frame material	Aluminum	
1 2	12 Weather resistant junction	IP 65/IP67	
1 3	Glass	Toughened/Tempered	
1 4	Glass iron content	Low Iron	
1 5	Glass transmissivity	High transmissivity	
1 6	Frame	Anodized Aluminum	

1 7	<i>Encapsulation</i>	<i>Ethyl Vinyl Acetate (EVA)</i>	
1 8	<i>Tri laminate back surface</i>	<i>Tedlar / Polyester</i>	
1 9	<i>By-pass diode</i>	<i>To be provided</i>	
2 0	<i>Standard</i>	<i>IEC 61215 / IS 14286 & IEC 61730 Part 1 & Part 2</i>	
2 1	<i>Performance guarantee</i>	<i>10 years of 90% power output 25 years of 80% power output</i>	
2 2	<i>Product Warranty</i>	<i>10 years against manufacturing defects</i>	
2 3	<i>PV Panel certification & sample testing witness by IIT Kanpur</i>	<i>TUV/NISE</i>	

TECHNICAL DATASHEETS

ANNEXURE- 2

**TECHNICAL DATASHEET OF GRID TIED INVERTER PROPOSED BY
BIDDER FOR TECHNICAL EVALUATION**

SPECIFICATIONS:-

<i>Solar Inverter(Grid Connected)</i>			
Sr.No.	TECHNICAL PARTICULARS	REQUIRED (As per NIT)	AS PER TENDERER
1	Type	Grid Connected	
2	Max. DC Array Input Voltage & Power	1000V & Less Than 25000W	
3	DC Voltage Tolerance	-20% to +15% of the DC array input volt. in Sr.1 Above	
4	Type of inverter	Dual MPPT based inverter (4X 5Kw Input String)	
5	Switching Device	MOSFET/IGBT BASED	
6	Continuous Inverter output Rating	20KWp	
7	Output Wave Form	Pure sign Wave Output	
8	Total Harmonic Distortion	<3% With resistive	
9	Nominal Ac Output Voltage & Frequency	Load 415V 3Phase	
10	Output Frequency	50Hz, 50Hz+0.5Hz	
11	Grid Frequency Tolerance	+5%	
12	Grid Frequency Synchronization range	3Hz	
13	No Load Losses	<1%	
14	Power Factor	>0.9 Lagging	

15	<i>Inverter Efficiency</i>	<i>>98% at Nominal Voltage & Power</i>	
16	<i>Noise Level</i>	<i><57db</i>	
17	<i>Certification</i>	<i>IEC 61727, CE, IEC62109-1, IEC62109-2, IEC61683/IS61683, IES60068-2(1,2,14,30)</i>	
18	<i>Ideal Current</i>	<i><4% of Rated capacity</i>	
19	<i>Regulation line and load regulation</i>	<i>-2%</i>	
20	<i>Over Load Features</i>	<i>150% for 1Minute</i>	