TENDER NOTICE NO. 05 /2021-2022

Public Tender No. : NCRA:WF060:PUB419:2021

The National Centre for Radio Astrophysics (NCRA) of the Tata Institute of Fundamental Research (TIFR) , Pune (is a leading Centre for research in a wide range of areas in astronomy and astrophysics) a national Centre of TIFR, Mumbai which is under the aegis of Department of Atomic Energy, Government of India.

1. **NCRA-TIFR**, Pune, India invites sealed bids in two part, Part– I: Techno-commercial Bid & Part – II: Price Bid for the following:

Description of Work	Bid Security Declaration towards EMD
Design, Supply, Installation, Testing, Commissioning, and Maintenance of 120-150 KWp Grid connected SPV based Roof Top Solar Power Plant in synchronism with Mains as well as DG set with net metering facility complying with all the electrical safety requirements as per IE rules & respective ISS, suitable to site requirement of NCRA, at NCRA-TIFR, Savitribai Phule Pune University Campus, Ganeshkhind, Pune 411007, Maharashtra, India as per bid document. Estimated Cost: ~ **Rs. 113.28 Lakhs** (including of GST). Type of Tender : Two Bid	Bid Security Declaration as per our format **(Form K)** to be submitted on company's letter head by all bidders. **Tender Fee : Rs. 1180/- (including of GST).** **(Rupees One Thousand One Hundred Eighty Only by way of Demand Draft in favour of "TIFR" payable at Pune).** Exemption from tender fee will be given only if vendor is an OEM and has valid Udyam Registration as MSE for the item tendered.

Downloading of Tender	**From : 20.09.2021, 09.30 hrs.** **To : 20.10.2021, upto 18.00 hrs.**
Due date for receipt of pre-bid queries	**11.10.2021 upto 18.00 hrs.**
Due Date and Time for Pre-Bid meeting	**12.10.2021, 14.30 hrs. at NCRA-TIFR Pune.**
Due date for Submission of Tender	**29.10.2021 upto 18.00 hrs.**
Date for Opening of Techno Commercial Bid (Part I). (If sufficient bids are received).	**01.11.2021 at 15.00 hrs.**

2. **Eligibility Criteria:** Bidder must meet the eligibility criteria specified below and must submit documents in support of the same in the technical bid.

a) Bidder should be either an OEM or their authorized Distributor, Dealer and Channel Partner Both cannot bid.

b) If the bidder is a dealer / distributor / channel partner they must submit Manufacturer Authorisation Certificates for major items and if bid is not from OEM.

c) Bidder must have been in the business of SITC and maintenance of Solar Plants for a period of five years prior to this advertisement i.e. between 2016-17, 2017-18, 2018-19, 2019-20, 2020-21.

d) Bidder must have an average turnover of **30% of the estimated cost** for past five years.

e) Only firms registered with Ministry of New and Renewable Energy (MNRE), Government of India, as a channel partner for Solar Photovoltaic System Integrator having 5 years of experience in carrying out solar power system installation works for large office buildings/commercial premises and must have executed themselves successfully similar works.

f) Bidder must also have necessary authority / permission / registration from Maharashtra State Government and Agencies under it for the tendered item if required under the rules.

g) Bidder must visit the **NCRA-TIFR, Pune Premises following Covid Regulations** to understand where the work is to be carried out and must submit site visit Certificate as per **Form U.**

h) Bid must quote rates for all items and bid must be valid for a minimum period of **180 (One Hundred Eighty Days)** from the due date for submission of bid.

i) Bidder must submit Solvency Certificate (not prior to **01.01.2021**) for a minimum amount of **40% of the estimated cost** from their bank.

j) Bidder must submit Chartered Accountant's Certificate showing their turnover and & Net worth for the past Financial **5 years** i.e. prior to 31.03.2021 i.e. for 2016-17, 2017-18, 2018-19, 2019-20, 2020-21.

Do not enclose copies of Profit and Loss and Balance Sheets statement and IT returns.

k) No Deviation from General Conditions of tenders viz. Performance Guarantee, Payment terms etc. will be accepted.

l) Successful bidder must be able to submit :-

Indemnity bond and Performance Guarantee of 3% of total order value including all taxes, duties etc. within **Twenty One days** after receipt of our order valid till completion of work.

m) Individuals signing the bid form and other documents must specify the capacity in which they sign and Copy of power of attorney not prior to **01.01.2021** executed on a Rs. 500/- stamp paper duly notarized to be submitted if the person signing the bid is other than the proprietor.

n) Bidders who have not accepted our order awarded to them or who have withdrawn from the tender process OR whose **EMD/ Performance Guarantee** has been forfeited by us in the past one year are not eligible to bid. Original CA certificate, Solvency Certificate and power of attorney will have to be submitted for verification by the purchaser from the successful bidder.

o) Govt. PSU / Govt. Department may contact us for eligibility criteria only.

p) Pre-bid queries shall be sent via detailed email / correspondence to purchase@ncra.tifr.res.in **on or before 11.10.2021.**

3. **Special conditions** :

NCRA operates the Giant Metrewave Radio Telescope (GMRT) at Khodad. The GMRT is very sensitive and requires protection of manmade RF produced from various types machines and equipment. So before buying any new equipment/machine, NCRA prefers to know its RFI levels and the same are obtained by testing these equipment at the GMRT Observatory using various systems.

In order to test and measure the RFI contributed by various equipments/machines which are part of the solar power plant system, NCRA
requires following compliance from the bidder:

a. To provide one sample unit of Inverter, SMU/SMB, monitoring and control unit each, on returnable basis.

b. NCRA will enclose all the sample units in a separate shielded Faraday's cage along with suitable filtered interfacing connectors. This work will be carried out without any modification to their original unit, by NCRA at GMRT Khodad site.

c. To provide physical dimensions details as well as technical specifications of all the units.

d. The tenderer should allow NCRA for incorporating and testing of the units without violating warranty norms.

e. To provide a sufficient / adequate space to work for implementing shielding measures inside the control / inverter room.

f. The cost of providing shielding solution/ testing will be borne by NCRA.

g. The above tests will be conducted by NCRA engineers in presence of the tenderer's representative, if they are willing.

More details will be explained in the Pre-Bid meeting.

While we are expecting the above compliance without any cost, If any bidder has constraints and if it involves any cost from the bidder's side, the same may be communicated separately. NCRA reserves right to consider OR reject such tenders on technical grounds.

4. **General Information about Bidding:**

a. Bidding document can be downloaded from our website http://www.ncra.tifr.res.in/ncra/ncra1/public-tenders-1 by any interested bidder meeting the above eligibility criteria**.**

b. Bidders after downloading the tender document are requested to send an email to purchase@ncra.tifr.res.in giving their Full address and contact details.

c. The **bids Part 1 – Techno-commercial Bid & Part II – Price Bid** with all documents sought in eligibility criteria with charges in a sealed envelopes duly superscribed with tender no. & due date must reach Purchase Officer, NCRA-TIFR, Savitribai Phule Pune University Campus, Ganeshkhind, Pune-411007, India.

I. Envelope 1 -

(i) Company Profile.
(ii) Schedule of Deviation from General Conditions and technical deviation.
(iii) Bid Form.
(iv) Details of GST.
(v) Bid Security Declaration and tender fee, if applicable.

II. Envelope 2 – Other documents relating to technical bid.

III. Envelope 3 – Price bid superscribed with Tender No.

All the above three envelopes Envelope 1, Envelope 2, Envelope 3 are to be put in Envelope 4 and to be submitted superscribing the tender No. and due date.

Due to Covid restrictions bids will not be opened in the presence of bidders'. In the event of the date specified for bid receipt and opening being declared as a closed holiday for NCRA's office, the due date for submission of bids and opening of bids will be the following working day at the same time.

Price bids will be opened at a later date through **google meet or zoom** which will be intimated to only techno-commercially qualified bidders.

d. **RIGHT TO REJECT ANY OR ALL BIDS**: NCRA reserves the right to accept or reject any or all bids without assigning any reasons there for. NCRA also reserves right to reject bids during technical evaluation, based on past performance, experience or any other criteria.

e. NCRA is not responsible for delay or loss of tender document / bids in transit.

f. **Bidders are requested to visit our website** http://www.ncra.tifr.res.in/ncra/ncra1/public-tenders-1 **regularly to check for addendum /updates if any pertaining to this tender.**

g. **The bid** to be submitted within the due date and time in envelope and marked on top the Tender No., due Date in bold letters.

5. Benefits under : Make in India / Micro and Small Enterprises / Startups :

a. As prescribed in "Public Procurement (Preference to Make in India) order 2017 of Govt. of India, Dept. of DPIIT" (OM No. P-45021/2/2017-PP (BE-II) dated 4th June, 2020 vendors must submit local content certificate as per the Specimen attached with this enquiry on their letterhead signed by a competent authority of the vendor supported by valid audit document from DPIIT Govt. of India, stating the percentage of local content. Only Class I vendors are eligible for price preference as per guidelines of Govt. of India. Vendors debarred by any procuring entity for violation of this order shall not be eligible for benefits till the completion of the debarment period.

b. Micro Small and Enterprises (MSE) must be OEM and have valid Udyam registration for the item / services tendered in order to avail the benefits as per MSE Guidelines of Govt. of India.

c. Traders / resellers / distributors / authorized agents will not be considered for availing benefits under the Public Procurement policy 2012 as MSEs as per MSE guidelines issued by Ministry of Micro and Small Enterprises.

d. The MSEs who have applied for registration or renewal of registration with any of the above agencies / bodies, but have **not obtained the valid certificate** as on close date of the tender, are **not eligible for exemption / preference**.

e. <u>Startups:</u>

As per OM No. F/20/2/2014 – PPD dated 20.09.2016 startups are exempted from payment of tender fee and eligible for relaxation regarding prior turnover and prior experience subject to the condition that :

(i) Startups must have been recognized by Department for Promotion of Industry and Internal Trade (DPIIT).

(ii) They meet quality and specifications.

Startups may be MSE's or otherwise.

PURCHASE OFFICER

NCRA • TIFR

NATIONAL CENTRE FOR RADIO ASTROPHYSICS

Tata Institute of Fundamental Research

Pune

Public Tender No.

NCRA:WF060:PUB419:2021

Design, Supply, Installation, Testing, Commissioning, and Maintenance of 120-150 KWp Grid connected SPV based Roof Top Solar Power Plant in synchronism with Mains as well as DG set with net metering facility complying with all the electrical safety requirements as per IE rules & respective ISS, suitable to site requirement of NCRA, at NCRA-TIFR, Savitribai Phule Pune University Campus, Ganeshkhind, Pune 411007, Maharashtra, India as per bid document.

CHECK LIST

To be enclosed with Techno-Commercial Bid (Part-I)

Sr. No.	Particulars	Provide Details	Enclosed
1	Demand Draft towards Tender Fee enclosed	D.D.No. … Dtd…….	**Yes / No**
2	Copies of partnership registration.		**Yes / No**
3	Copies of Shop & establishment registration & or Certificate of incorporation enclosed.		**Yes / No**
4	Company Profile / Organizational Structure – **Form A**		**Yes / No**
5	Eligibility Criteria – **Form B**		**Yes / No**
6	List of technical personnel – **Form C**		**Yes / No**
7	Format of Curriculum Vitae (CV) – **Form D**		**Yes / No**
8	Schedule of experience showing works completed – **Form E-1** Schedule of experience showing works on hand – **Form E-2**		**Yes / No**
9	Details of all works of similar nature of assignment under execution (ongoing projects) – **Form F**		**Yes / No**
10	Performance report of works – **Form G**		**Yes / No**
11	Schedule of Technical Deviations – **Form H**		**Yes / No**
12	Manufacturing Authorization Form – **Form I**		**Yes / No**
13	Bid Form – **Form J**		**Yes / No**
14	Bid Security Declaration - **Form K**		**Yes / No**
15	Format for power of attorney for signing the bid – **Form L**		**Yes / No**
16	Financial Information / CA Certificate - **Form M**		**Yes / No**
17	Format of Amalgamation/Acquisition - **Form N**		**Yes / No**
18	Format of Indemnity Bond* – **Form O**		**Yes / No**
19	Format of Bank Guarantee for Performance Guarantee * – **Form P**		**Yes / No**
20	Solvency Certificate – **Form Q**		**Yes / No**
21	Certificate of Local content - **Form R**		**Yes / No**
22	Certificate of Registration - **Form S**		**Yes / No**
23	Articles of Agreement - **Form T**		**Yes / No**
24	Certificate of Visit to the Site - **Form U**		**Yes / No**
25	Undertaking for Acceptance of terms and conditions – **Form V**		**Yes / No**
26	Details of **GST** - **Form W**		**Yes / No**

Note (a) Format of Indemnity Bond* – **Form O** and (b) Format of Bank Guarantee for Performance Guarantee * – **Form P** – To be used by vendor on whom order will be placed.

27	**Price bid - Part II (Schedule of work with Qty. & rate as per Chapter 7 of tender document) to be submitted in a separate sealed envelope.**	**Yes / No**

Date : Signature of Bidder :

Name & Designation :

Place : Company Name & Address :

Company Seal & Phone No. :

INDEX

CHAPTER 1

INSTRUCTIONS TO BIDDER (ITB)

Table of Contents	
Sl. No.	**Contents**
A.	**INTRODUCTION**
1	Preamble
2	Eligible Bidders
3	Cost of Bidding
4	Contract Rate / Price
B.	**THE BIDDING DOCUMENTS**
1	Content of Bidding Documents
2	Clarification of bidding documents
3	Amendment of Bidding Documents
C.	**PREPARATION OF BIDS**
1	Language of Bid
3	Conditional Discount
4	Bid Currency
5	Period of Validity of Bids
D.	**SUBMISSION AND SEALING OF BIDS**
1	Submission, Sealing and Marking of Bids
2	Deadline for Submission of Bids
3	Late Bids
E.	**OPENING AND EVALUATION OF BIDS**
1	Opening of Bids
2	Confidentiality
3	Clarification of Bids
4	Preliminary Examination
5	Responsiveness of Bids
6	Non-Conformity, Error and Omission
F.	**AWARD OF CONTRACT**
1	Centre's right to vary Quantities at the time of Award
2	Centre's right to accept any Bid and to reject any or all Bids
3	Notification of Award

A – Introduction

1.1 *Preamble*

Tenderers are expected to be totally familiar with the existing site conditions, restrictions of working hours imposed by the Institute.

All rates are supposed to have included the following concerns:

Contractor shall take all measures of safety and security to their staff. The Contractor shall also abide by the security and safety requirements, restrictions on the working hours etc. imposed by the owner, and no extra claims for the same shall be entertained under any circumstances.

Time is the essence of this contract and the contractor shall make every effort to complete the work in time.

1.2 *Eligible Bidders*

1.2.1 Bidders who fulfill the eligibility criteria as specified in our tender will only be considered for technical evaluation.

1.2.2 Issue / downloading of tender document does not mean that a bidder is qualified to submit the bid. Centre's decision in this regard will be final.

1.3 *Cost of Bidding*

1.3.1 The Bidder shall bear all costs associated with the preparation and submission of its bid, and "Centre", will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the bidding process.

1.4 *Contract Rate / price*

1.4.1 Rate / Prices quoted by the bidder for the work / services to be performed under shall be firm.

1.4.2 Bidder must quote the rates for all items and services as per price bid form available in the bid document.

1.5 All entries must be made by hand and written in ink. If any of the documents is missing or unsigned, the bid may be considered invalid by the NCRA in its discretion.

1.6 Rates and amounts should be quoted both in figures and in words, in columns specified. All erasures and alterations made while filling the tender must be attested by the initials of the tenderer. Overwriting of the figures is not permitted.

1.7 Failure to comply with either of these conditions will render the bid void at the purchasers option. No changes whatsoever especially in rates, specifications or

conditions after opening of the bid will be entertained. If there are differences between the rates given by the contractor in the words and figures or in amount worked out by him, the following procedure shall be followed:

a. When there is a difference between the rates in figures and in words, then rate quoted by the contractor in words shall be taken as correct.
b. When the amount of an item is not worked out by the contractor or it does not correspond with the rate written either in figures or in words, then the amount corresponding to the rate quoted by the contractors in the words shall be taken as correct.
c. When the rates quoted by the contractor in figures and in words tallies but the amount is not worked out correctly, the rate quoted by the contractor shall be taken as correct and not the amount.

B - The Bidding Documents

1.8 *Content of Bidding Documents*

1.8.1 The services required, bidding procedures and contract terms are prescribed in the bidding documents which should be read in conjunction.

1.8.2 The Bidder is expected to examine all instructions, forms, terms, and specifications in the bidding documents. Failure to furnish all information required by the bidding documents or submission of a bid not substantially responsive to the bidding documents in every respect will be at the Bidder's risk and may result in rejection of their bid.

1.9 *Clarification of bidding documents*

1.9.1 A prospective Bidder requiring any clarification of the Bidding Documents shall contact Centre in writing at Centre's address specified in the Tender Notice. Centre shall forward copies of its response to all those who have acquired the Bidding Documents directly from it, including the query but without identifying its source. Centre if deemed necessary will amend the Bidding Documents as a result of a clarification, Centre shall do so following the procedure under clause relating to amendment of bidding documents and Clause relating to Deadline for Submission of Bids.

1.10 *Amendment of Bidding Documents*

1.10.1 At any time prior to the deadline for submission of bids, Centre may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the bidding documents by amendment.

1.10.2 All prospective bidders who have purchased / downloaded the tender document will be notified of the amendment in writing or by fax, or by email or by putting information on webpage which will be binding on them.

1.10.3 In order to allow prospective bidders reasonable time to take the amendment into account, in preparing their bids, Centre, at its discretion, may extend the deadline for the submission of bids if required.

C - Preparation of Bids

1.11 *Language of Bid*

1.11.1 The bid prepared by the Bidder, as well as all correspondence and documents relating to the bid exchanged by the Bidder and Centre, shall be written in **English language only**.

1.12 *Conditional Discount*

1.12.1 In case the bidder offer any conditional discount with regard to acceptance of their bid within a specific period or specific payment terms, delivery, quantity etc. the Centre will not take in to consideration such conditional discount while evaluating their bid.

1.13 *Bid Currency*

1.13.1 Prices shall have to be quoted only in Indian Rupees in the price bid format.

1.14 *Period of Validity of Bids*

1.14.1 Bids will have to remain **valid for a minimum of 180 days from the date of techno commercial bid opening**. A bid valid for a shorter period shall be rejected by Centre as non-responsive.

1.14.2 In exceptional circumstances, Centre may solicit the Bidder's consent to an extension of the period of validity. The request and the responses thereto shall be made in writing (by fax or e-mail).

A Bidder may refuse the request, without affecting their status for suspension from bidding. A Bidder accepting the request will not be required nor permitted to modify their bid.

1.14.3 Bid evaluation will be based on the bid prices without taking into consideration the above corrections.

D - Submission and sealing of Bids

1.15 *Submission, Sealing and Marking of Bids*

Each page of the bid document should be signed by the authorized person or persons submitting the tender in token of his/their having acquainted himself /themselves with the general conditions of contract. General specifications, special conditions etc. as laid down. Any tender with any of the documents not so signed will be liable to be rejected.

Submission of bid by a bidder implies that he has studied the tender documents and has made himself aware of the scope and specifications of the work to be done with all its conditions and other factors having a bearing on the execution of the work.

1.15.1 The bidders may submit their duly sealed bids by post/courier. Centre will not be responsible for any misplacement/delay/ loss of tender documents & bids in transit. Bidder can also drop the bid in person in the public tender box kept at the reception counter of Centre after entering the requisite details in the Public Tender Register kept with the Security Supervisor.

1.15.2 Bids complete in all respects to be submitted in a single sealed envelope duly superscribing our Tender no. & due date so as to reach on or before the due date and time to the address given below :-

Purchase Officer,
National Centre for Radio Astrophysics,
Tata Institute of Fundamental Research,
Savitribai Phule Pune University Campus, Ganeshkhind,
Pune - 411 007. Maharashtra, India.

Overwriting, erasures shall be valid only if they are initialed by the person / persons signing the bid.

The bid must be submitted in an organized and structured manner. No brochures/leaflets etc. should be submitted in loose form. Please indicate page nos. on your bids, eg. If the bids are containing 25 Pages, please indicate page nos. as 1/25, 2/25, 3/25 ----------25/25.
Please do not submit bid with comb binding.

1.15.3 If the envelope is not sealed and marked as required above, Centre will assume no responsibility for the bid's misplacement or premature opening and in such cases bid will be rejected.

1.16 *Deadline for Submission of Bid*

1.16.1 Sealed bid must reach Centre at the address specified in Tender Notice not later than the time and date specified herein. In the event of the specified date for the submission of Bids being declared a holiday for Centre, the Bids will be received upto the appointed time on the next working day.

1.16.2 Centre may, at its discretion, extend the deadline for submission of bids by amending the bid documents in accordance with Clause relating to amendment of bidding Documents in which case all rights and obligations of Centre and bidders previously subject to the deadline will thereafter be subject to the deadline as extended.

1.17 *Late Bids*

1.17.1 Any bid received by Centre after the deadline for submission of bids prescribed will be rejected.

1.17.2 Such tenders shall be marked as late and not considered for further evaluation. They shall not be opened at all and will be returned to the bidders in their original envelope without opening.

1.17.3 The BIDDER is expected to examine all the instructions, forms, terms and specifications in the bidding documents. After review of all documents forming part of Sections C, D, E & F of this specification, the bidder shall indicate clause-by-clause compliance with the requirements specified therein. Any deviations to these requirements shall be clearly stated in the respective Schedules of Deviations provided in Section F of this specification. Incomplete / unfilled Schedules of Deviations shall render the bid liable for rejection.

1.17.4 If no deviations are stated, it will be assumed that the Bid conforms in all respects to the specification and the OWNER reserves the right to evaluate the Bid as such without further reference to the BIDDER.

E - Opening and Preliminary Examination of bids

1.18 *Opening of Bids*

1.18.1 Centre will open bid in the presence of Bidder's authorized representatives who choose to attend, as per the schedule given in Tender Notice. The Bidders' representatives who are present shall sign the bids opening sheet evidencing their attendance. In the event of the specified date of bid opening being declared a holiday for Centre, the Bids shall be opened at the appointed time and location on the next working day.

1.18.2 a) Bid that are received late shall not be considered further for evaluation, irrespective of the circumstances.

b) Bidders interested in participating for bid opening, should depute their representatives along with an authority letter to be submitted to the Centre at the time of bid opening.

c) Only one representative of each bidder will be permitted during opening of bids and they must comply with the safety measures for **Covid-19 followed by the Centre.**

1.19 *Confidentiality*

1.19.1 Information relating to the examination, evaluation, comparison, and post qualification of bids, and recommendation of contract award, shall not be disclosed to bidders or any other persons not officially concerned with such process until publication of the Contract Award.

1.19.2 Any effort by a Bidder to influence Centre in the examination, evaluation, comparison, and post qualification of the bids or contract award decisions may result in the rejection of their Bid.

1.20 *Clarification of Bid*

1.20.1 To assist in the examination, evaluation, comparison and post qualification of the bids, Centre may, at its discretion, ask the Bidder for a clarification on their bid. The request for clarification and the response shall be in writing and no change in prices or substance of the bid shall be sought, offered or permitted. However, no negotiation in respect of prices shall be held except with the lowest bidder, (is) the discretion of Centre. Any clarification submitted by a bidder in respect to their bid which is not in response to a request by Centre shall not be considered.

1.21 *Preliminary Examination*

1.21.1 Centre shall examine the bids to confirm that all documents and technical documentation requested have been provided to determine the completeness of each document submitted.

1.21.2 All the bids received will first be scrutinized to see whether the bids meet the basic requirements as incorporated in the bid document. The bids, which do not meet basic requirements, will be treated as unresponsive and ignored. ***The following are some of the important points, for which a bid will be declared as unresponsive and will not be considered for further evaluation:***

(i) The Bid is unsigned.

(ii) The Bidder is not eligible.

(iii) The Bid validity is shorter than the required period.

(iv) Tender Fee and/or Bid declaration not submitted with technical bid.

(v) Bidder has not agreed to give the required Performance Guarantee.

(vi) Against the schedule of Requirement (incorporated in the bid), the bidder has not

quoted for the entire requirement as specified in the price.

(vii) The bidder has not agreed to some essential condition(s) incorporated in the bid.

(viii) **"If a bidder quotes NIL charges / consideration, the bid shall be treated as unresponsive and will not be considered".**

(ix) The bidder had not completed previous contract of NCRA satisfactorily.

1.22 *Responsiveness of Bids*

1.22.1 Prior to the detailed evaluation, Centre will determine the substantial responsiveness of each bid to the bidding documents. For purposes of this clause, a substantive responsive bid is one, which conforms to all terms and condition of the bidding documents without material deviations, reservations or omissions. A material deviation, reservation or omission is one that:

(a) Affects in any substantial way the scope, quality, or performance of Services specified in the Contract; or

(b) Limits in any substantial way, inconsistent with the Bidding Documents, Centre's rights or the Bidder's obligations under the Contract; or

(c) If rectified, would unfairly affect the competitive position of other bidders presenting substantially responsive bids.

1.22.2 Centre's determination of a bid's responsiveness will be based on the contents of the bid itself.

1.22.3 If a bid is not substantially responsive, it will be rejected by Centre and may not subsequently be made responsive by the Bidder by correction of the material deviation, reservation or omission.

1.23 *Non-Conformity, Error and Omission*

1.23.1 Provided that a bid is substantially responsive, Centre may waive any nonconformity or omissions in the bid that do not constitute a material deviation.

1.23.2 Provided that a bid is substantially responsive, Centre may request the bidder to submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformity or omissions in the bid related to documentation requirements. Such omission shall not be related to any aspect of the price of the bid. Failure of the Bidder to comply with the request may result in the rejection of their bid.

F- Award of Contract

1.24 *Centre's right to vary the Quantities at the time of Award*

1.24.1 Centre reserves the right to decrease or increase the quantity originally specified in the Schedule of Requirements in which case Centre may ask for confirmation of rates in a sealed envelope on or before the due date fixed.

1.25 *Centre's right to accept any bid and to reject any or all Bids without assigning any reasons and for any purposes, deemed fit by the centre.*

1.25.1 The Centre Director, NCRA reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to award of Contract, without thereby incurring any liability to the affected bidder or bidders.

1.26 *Notification of Award*

1.26.1 Prior to the expiration of the period of bid validity, Centre may notify the successful bidder in writing by registered letter or fax or e mail that the bid has been accepted and a detailed work order shall follow.

1.26.2 Until a formal order is prepared and sent, the notification of award constitutes a binding contract.

CHAPTER 2

GENERAL CONDITIONS OF CONTRACT (GCC)

2.1 *Amalgamation/Acquisition*

2.1.1 In the event the bidder proposes for amalgamation, acquisition or sale of its business to any firm during the contract period, the Buyer/Successor of the Principal Company are liable for execution of the contract and also fulfillment of contractual obligations.

2.2 *Application*

2.2.1 These General Conditions shall apply to the extent that they are not superseded by provisions in other parts of the Contract.

2.3 *Change Orders and Contract Amendments.*

2.3.1 Centre may at any time, by written order given to the Supplier pursuant to Clause on Notices of the GCC make changes within the general scope of the Contract in any one or more of the following:

(a) Date for commencement and completion of work.

2.3.2 No change in service charges will be admissible on account of the above.

2.3.3 No variation or modification in the terms of the contract shall be made except by written amendment and subject to acceptance.

2.4 *Assignment*

2.4.1 The contractor shall not assign, in whole or in part, its obligations to perform under the Contract to a third party.

2.5 Discrepancies & Order of Preferences:

In case of ambiguities or discrepancies following order of preferences shall hold good :

a. Work Order.
b. Schedule of Quantities
c. Technical Specifications
d. Special Conditions of contract.
e. General Conditions of Contract.

2.6 *Governing Language*

2.6.1 The contract shall be written in English language which shall govern its interpretation. All correspondence and other documents pertaining to the Contract, which are exchanged by the parties, shall be written in the English language only.

2.7 *Applicable Law/Jurisdiction*

2.7.1 The Contract shall be interpreted in accordance with the laws of the Union of India and all disputes shall be subject to place of jurisdiction as specified in SCC i.e. Pune Jurisdiction only.

2.8 *Notices*

2.8.1 Any notice given by one party to the other pursuant to this contract/order shall be sent to the other party in writing or by e-mail or confirmed in writing to the other party's address specified in the SCC.

2.8.2 A notice shall be effective when delivered or on the notice's effective date, whichever is later.

2.9 *Lien in respect of claims in other contract*

2.9.1 Any sum of money due and payable to the Contractor (including the Security deposit / Performance Guarantee returnable to him) under contract may be withheld or retained by way of lien by the Centre against any claim of the Centre or such other person or persons in respect of payment of a sum of money arising out of or under any other contract made by the contractor with the Centre.

2.9.2 It is an agreed term of the contract that the sum of money so withheld or retained under this clause by the Centre will be kept withheld or retained as such by Centre till this claim arising out of in the same contract or any other contract is either mutually settled or determined by the arbitrator, and that the contractor shall have no claim for interest or damages whatsoever on this account or on any other ground in respect of any sum of money with-held or retained under this clause and duly notified as such to the contractor.

2.10 *With-holding and lien in respect of sums claimed*

2.10.1 Whenever any claim or claims for payment of a sum of money arises out of or under the contract against the contractor, Centre shall be entitled to withhold and have a lien to retain to the extent of the such claimed amount, from any sum or sums found payable or which at any time thereafter may become payable to the contractor under the same contract or any other contract with the Centre.

2.10.2 It is an agreed term of the contract that the sum of money or money so withheld or retained under the lien referred to above by the Centre will be kept withheld or retained as such by the Centre till the claim arising out of or under the contract is determined by the Arbitrator and that the contractor will have no claim for interest or damage whatsoever on any contract in respect of such with-holding or retention under the lien referred to and duly notified as such to the contractor.

2.11 *Settlement of Disputes*

2.11.1 Centre and the contractor shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the Contract.

2.11.2 If, after twenty-one (21) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either Centre or the contractor may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given. Any dispute or difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause shall be finally settled by arbitration. Arbitration may be commenced prior to or after delivery of the Goods under the Contract.

2.11.3 The dispute settlement mechanism/arbitration proceedings shall be concluded as under:

(a) In case of Dispute or difference arising between Centre and contractor relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled in accordance with the Indian Arbitration & Conciliation Act, 1996 as amended till date and the rules there under and any statutory modifications or re-enactments thereof shall apply to the arbitration proceedings. The dispute shall be referred to a sole arbitrator mutually acceptable to contractor and owner. The award of the arbitrator so appointed shall be final, conclusive and binding on all parties to this order. Charges of the arbitrator will have to be shared equally by the Contractor and the Centre.

2.11.4 The venue of the arbitration shall be the place at Pune.

2.12 (A) *Deployment of Labour & Machinery* : You shall not employ any person who has not attained the age of 18 years. You shall deploy sufficient equipment's and labour as may be necessary to maintain the progress of schedule. Night work which requires supervision shall not be permitted except when specially allowed by Engineer each time. On your request, you will be provided necessary lighting arrangements etc. for night work as directed by Engineer.

(B) The Contractor should ensure that their workers do not roam in the premises, other than the assigned work place, without permission.
Workers should not spoil the area such as toilets, canteen, corridors, pathways, roads, etc. by spitting, throwing garbage, etc.
Workers should not make noise near the office areas.
Workers should not cut trees, pluck flowers, pick up any material laying in the campus, etc.

2.13 *Work at Night or on Holidays* : No work at night or on legal holidays will be carried without the written consent of the Engineer and if permitted such work to be done in the presence of the Engineer or his representative.

2.14 *Demobilisation / Site Clearance* : On completion of works under this contract, you shall clear up the site and remove from the site all surplus materials, equipment's, debris, centering etc. and shall handover the site to us in a condition satisfactory to the Engineer

2.14.1 If any of the item/items supplied found to be not original, same will have to be replaced with original item/items at no extra cost to Centre. Delay on this will be to the account of the Contractor.

2.15 Storage of tools and materials: You shall make your own arrangement for storage / safety of tools, plants, machinery, materials.
It is the responsibility of successful bidder to ensure that arrangement is made for receiving and safekeeping of all items required for carrying out the work under their custody and supervision.

2.16 Centre if required can only provide an open space where contractor can make arrangement for safekeeping of their goods. No space will be provided for temporary accommodation of workers.

2.17 Items brought for carrying out work at Centre's site cannot be taken out without valid permission.

2.18 Protection of property: You shall be responsible for making good to the damages to the existing property during the work by your men. During the execution of work, it is likely that you may come across telephone cables, electrical cables, water supply lines, Lan cable etc. It will, therefore, be your responsibility to protect them carefully. All such cases should be brought to the notice of the Engineer by you and also to the concerned department. Any damage what-so-ever done to these are be made good by you at your own cost.

2.19 WATER :If water is available with our existing Bore well at site, then it will be allowed to use at free of cost. It is Contractors' own responsibility to make necessary arrangement to carry the same to work spot. Also note that providing water is not binding on us. If water is not available with us, then contractor shall make his own arrangement at his own cost.

2.20 *ELECTRICITY* : Electricity shall be provided by the department at free of cost from the existing nearby available source for the work. Bidder should make proper arrangement for extra length of cable/distribution board etc. to reach their work place with all electrical safety precautions. Also note that providing electricity is not binding to us.

2.21 *Arrangement by Contractor :*

(A) Centre do not take any risk and responsibility for receiving, storage and issue of items brought to site.

(B) Contractor will have to make necessary arrangement for deploying his own person for safe unloading and receiving and storing of the items / tools / machinery etc. at Centres identified place till they are taken out for consumption / use.

2.22 *Transportation of labour and materials*

2.22.1 The transportation of labour and materials is the responsibility of the contractor.

CHAPTER - 3

SPECIAL CONDITIONS OF CONTRACT (SCC)

CHAPTER – 3

SPECIAL CONDITIONS OF CONTRACT

The following Special Conditions of Contract (SCC) shall supplement and / or amend the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

3.1 The tenderer shall not assign the contract and shall not sublet any portion of the contract except with the written consent of the employer. In the case of breach of these conditions, the employer may serve a notice in writing on the tenderer rescinding the contract where upon the security deposit shall stand forfeited to the employer, without prejudice to his other remedies against the tenderer.

3.2 The tenderer shall carry out all the work strictly in accordance with the details and Engineer / Officials. If in the opinion of the NCRA, changes have to be made in the design and with the prior approval in writing they desire the Tenderer to carry out the same, the tenderer shall carry out the same. The NCRA`s engineer/officials decision in such case shall be final.

3.3 A schedule of probable quantities in respect of each work and specifications must accompany the technical bid. The price bid should contain not only the rates but also the value of each item of work entered in a separate column and all amount quoted against various items entered in a separate column and all amounts quoted against various items should be totalled in order to show the aggregate value of entire tender.

3.4 The tenderer must obtain for himself on his own responsibility and at his own expenses all the information which may be necessary for the purpose of making tender and for entering in to a contract and inspect site of the work, acquaint himself with all local conditions, means of access to the work, nature of the work and all matters pertaining thereto.

3.5 The rates quoted in the tender/ offer shall be for the complete item including design, supply, installation, testing and commissioning of plant at site. The rate shall also include all charges for storing, watch and ward, reinstating and making good damaged work if any to its original finish etc. The rates quoted shall be deemed to be finished work to the measured at site. The rate quoted in the tender shall include all charges for packing, transporting, loading, unloading and for delivery at site. The rates shall also be firm during the period of the contract including extended period if any and rates shall not be subject to exchange variation, labour conditions and fluctuations in railway freights, taxes or any conditions whatsoever. Tenderers must not include in their rates, GST or any other tax and duty or other levy as levied by the central government or any state government or local authority, if applicable. No claim in respect of increase in GST or other tax, duty or levy during the duration of the contract shall be entertained by the employer. The same will remain firm during the contract period.

3.6 **Rate should include :**

(a) Charges for removal of debris out of premises, removing stains, cleaning the site thoroughly and restoring it to original condition where work is undertaken,
(b) All Taxes, Duties, Levies, Payment of wages.
(c) Freight & Insurance and,
(d) All overheads & profits etc.

3.7 Quoted rate should be workable and should be firm for the entire contract period. No variation of rates will be allowed.

3.8 The vendor under the contract has to deliver the goods to the site. (The storage/handling etc shall be sole responsibility of the Bidder till the commissioning/ handover of the system). No concessional GST forms will be issued from NCRA.

3.9 The vendor shall use all materials conforming to the relevant BIS/MNRE relevant code and will use the best material of approved manufacture.

3.10 Vendor shall maintain at site responsible, efficient, qualified and well experienced in charge during the whole contract period. Any clarification, explanation, instruction or notices given by the employer to such in charge shall be deemed to be given to the contractor and shall be binding on the contractor.

3.11 *Force Majeure*

3.11.1 Notwithstanding the provisions of GCC Clauses relating to extension of time, penalty and Termination for Default the Supplier shall not be liable for forfeiture of their Performance Guarantee, liquidated damages or termination for default, if and to the extent that, its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

3.11.2 For purposes of this Clause, "Force Majeure" means an event or situation beyond the control of the contractor that is not foreseeable, is unavoidable, and its origin is not due to negligence or lack of care on the part of the contractor. Such events may include, but not be limited to, acts of Centre in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions, earthquakes, storms and freight embargoes.

3.11.3 If a Force Majeure situation arises, the contractor shall promptly notify Centre in writing of such conditions and the cause thereof within **21 days** of its occurrence. Unless otherwise directed by Centre in writing, the contractor shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

3.11.4 If the performance in whole or in part or any obligations under the contract is prevented or delayed by any reason of force majeure for a period exceeding 60 days, either party may at its option terminate the contract without any financial repercussions on either side.

3.11.5 If in the opinion of NCRA engineer/ officials, works be delayed by force majeure such as war/hostilities, riots or civil commotion, earthquakes, fire, tempest, lightening or other natural disasters etc., restriction imposed by the Government which prevent or delay execution of the order or by any other reasons, a suitable extension of time will be given and no extra claim will be paid by the employer whatsoever.

3,12 Barricading with green net about 5-6 feet height around the existing paving block / building to be provided during the work in progress and upto the completion of work.

3.13 Other Conditions :

3.13.1 The Vendor in consultation with concerned official/officials of NCRA will conduct training program for users, focusing on main features, operation and maintenance of the systems.

3.13.2 The Vendor shall continue to provide spare parts after the expiry of warranty period for a period of 10 years if desired by the user. If the Bidder fails to continue to supply spare parts and services to users NCRA shall take appropriate action against the firm.

3.13.3The Vendor shall provide one copy of instruction manual and routine maintenance manual with each system supplied or installed, this shall be in English/Hindi. The following minimum details must be provided with manual for Grid connected Solar PV Power Plant:

a. About the complete photovoltaic system including PV modules, PCU and electronics etc.
b. Do's and Don'ts
c. Clear instructions on regular maintenance and troubleshooting of the system
d. Name & address of the contact person in case of non-functioning of the system.

3.13.4 Vendor, wherever applicable, shall after proper painting, pack and crate all the equipment in such manner as to protect them from deterioration and damage during rail and road transportation to the site and storage at the site till time of installation. Bidder shall be held responsible for all damage due to improper packing.

3.13.5 The Vendor shall inform NCRA of the date of each shipment from his works and the expected date of arrival at the site for the information of the NCRA at least 7 days in advance.

3.13.6 All demurrage, wharfage and other expenses incurred due to delayed clearance of the material or any other reason shall be to the account of the Vendor.

3.13.7 The goods supplied under the contract shall be fully insured against loss or damage incidental to manufacture or acquisition, transportation, natural calamities shall be included in the bid price.

3.13.8 All the equipment and materials including spares, if any, being supplied by the bidder shall be completely insured at his own cost from the time of dispatch till installation & commissioning of the project and taking over by beneficiary/User in accordance with the Bidding Documents.

3.13.9 It will be the responsibility of the Vendor to lodge, pursue and settle all claims with the Insurance Company for all equipment / materials in case of any damage, loss, theft, pilferage or fire during execution of Contract and NCRA shall be kept informed about it. The Vendor shall be responsible for replacement of the lost /damaged materials promptly irrespective of the settlement of the claims by the underwriters and the Bidder shall ensure that the work progress is as per the agreed schedule without cost over-run/time overrun. The losses, if any, for such replacement shall be borne by the contractor.

3.13.10 The Vendor should not employ any person who is prohibited by law from being employed for fulfilling obligations under this contract.

3.13.11 Any act of indiscipline/misconduct/theft/pilferage on the part of any employee engaged by the Vendor resulting in any loss to NCRA in kind or in cash will be viewed seriously and NCRA will have the right to levy damages or fine as appropriate and/or even terminate the contract forthwith.

3.13.12 In case of any default or failure on part of the Vendor to comply with all/any one of the terms/conditions, NCRA reserves to itself the right to take necessary steps to remedy the situation including, inter-alia, the deduction of appropriate amount/s from dues otherwise payable to the Vendor and/or by taking recourse to appropriate recovery proceedings.

3.13.13 Time allowed for carrying out the work shall be strictly be adhered to by the Vendor. The work shall through put the stipulated period of the contract be proceeded with all due diligence.

3.13.14 The Vendor shall not be entitled to any compensation for any loss suffered by him on the account of delays in commencing or executing the work, whatever the cause of delays may be including delays arising out of the modification to the work entrusted to him or in any subcontract connected therewith or delays in awarding contracts for other trades of the project or in commencement to the works or in procuring government controlled or other building materials or in obtaining water and power connections for the construction purpose or for any other reason whatsoever and the employer shall not be liable for any claim in respect thereof. The employer does not accept the liability for any sum besides the tender amount, subject to such variations as are provided for herein.

3.13.15 The successful Vendor is bound to carry out any or all items of work necessary for the completion of the job even though such items are not included in the quantities and rates.

3.13.16 The successful Vendor must cooperate with the other contractor appointed by the employer so that the work shall proceed smoothly with the least possible delay and to the satisfaction of the NCRA.

3.14 The Vendor will be governed by all laws / acts of State and Central Government, which are in force for this work.

3.15 Vendor shall on request of the employer, immediately dismiss from the work any person in the opinion of employer be unsuitable or incompetent or who may be guilty of misconduct.

3.16 The Vendor shall at the instructions of the employer within such time as notified , open up for inspection any work and should the contractor refuse or neglect to comply with such instructions , the employer may employ other workman to open of the same . Such work if it is found not in accordance with approved specifications, or the instructions , expenses of opening up and redoing if required shall be borne by and recoverable from the contractor from any money due or which may due to the contractor.

3.17 **Notices of the employer**, to the contractor may be served personally or by being left at or sent by registered post to the last known place of the business of the party to whom the same is given or in the case of the contractor by being left on the works. Notices may be served at or sent by registered post to the registered office of the contractor. Any notice sent by registered post shall be deemed to be served at the time when in the ordinary course of post, it would be delivered.

3.18 **Termination of the contract by the employer:**

If the Vendor being an individual or a firm, commit any "Act of insolvency "or shall be adjudged an insolvent or being an incorporated company shall have an order for compulsory winding up or applies for voluntary winding up or subject to the supervision of the court and of the official assignee or the liquidator, in such acts of insolvency or winding up, shall be unable within seven days after notice to him requiring him to do so, to show to the reasonable satisfaction of the employer that they are able to carry out and fulfil the contract , and to give security , if required by the employer.

Or

If the Vendor (whether an individual firm or incorporated company) shall suffer execution to be issued , or shall suffer any payment under this contract to be attached by or on behalf of any of the creditors of the contractor , or shall assign or sublet the contract without giving the consent in writing of the employer.

Or

Shall charge or encumber this contract or any payments due or which may become due to the contractor there under.

Or

If the Vendor:

a. Has abandoned the contract, or

b. Has failed to commence the works , or has without any lawful excuse under these conditions suspended the progress of the works for seven days after receiving from the employer written notice to proceed , or

c. Has failed to proceed with the works with such diligence an failed to make such progress as would enable the works to be completed within the time agree upon , or

d. Has failed to remove materials from the site or to pull down an replace work for seven days after receiving from the employer written notice that the said material of work were condemned and rejected by the employer under these conditions , or

e. Has neglected or failed persistently to observe and perform all or any of the acts, matters or things by this contractor to be observed and performed by the contractor for seven days after written notice shall have been given to the contractor requiring the contractor to observe or perform the same , or

f. Has to the detriment of good workmanship or in defiance of the employer instructions to the contrary sublet any part of the contractor then and in event of any of the aforesaid cases, the employer may, notwithstanding any previous waiver , after giving seven days' notice in writing to the contractor , determine the contract but without thereby affecting the powers of the employer or the obligation and liabilities of the contractor, the whole of which shall continue in force as fully as if the contract has not been so determined and as if the works subsequently executed has been executed by or on behalf of the contractor.

And further , the employer may enter upon and take possession of the work and all plants , tools , scaffolding ,sheds , machinery and material lying upon the premises or the adjoin lands or roads and use the same as his own property or may employ the same by means of his own servants and workmen in carrying on and completing the works , and the contractor shall not in any way interrupt or do any act, matter or thing to prevent or hinder such other contractor or other persons employed for completing and finishing or using the materials and plant for the works. When work shall be completed or as soon thereafter as convenient, the employer shall give a notice in writing to the contractor to remove his surplus material and plant, and should the contractor fail to do within period of 14 days after the receipt thereof by him, the employer shall sell the same by public auction, and shall give credit to the contractor for the amount realized on deducting therefrom the costs of removal and sales.

If any sum shall be due or payable to or by the employer for the values of the said plant and materials so taken possession of by the employer and the expenses of loss which employer shall have been put to in requiring the works to be completed, and the amount, if any, owing to the contractor and the amount which shall be so certified shall thereupon be paid by the employer to the contractor or by the contractor to the employer , as the case may be , and the employer`s certificate shall be final and conclusive between parties.

On termination of the contract, the contractor shall forth will remove himself and his workmen from the work site.

3.19 **Termination of the contract by the Vendor:**

If the payment of the amount payable by the employer shall be in arrears and unpaid for 30 (Thirty) days after it has become due as per payment terms and after notice in writing requiring payment of the amount shall have been given by the contractor to the employer

and if the employer unreasonably withholds any such payment then Vendor shall be entitled to give a termination notice and terminate the contract and recover from the employer payment for all works executed for the purpose of the contract.

In arriving at the amount of such payment, the net rates contained in the contractor`s original tender shall be followed.

3.20 Matters to be finally determined by the employer

The employers' decision, opinion, direction with respect to all or any of the matter such as scope of work, contractor to provide everything necessary materials and workmanship to conform the description, assignment of subletting, defects after completion, delay and extension of time, opened up works and schedule of rates as contained in the price bid hereof and as to the exercise by them the right to have any works opened up shall be final and conclusive and binding on the contractor. Employer`s instructions if any, in this regard in case of any urgency, shall also be complied immediately.

3.21 Insurance

a. From the commencement to the completion of the works , the Vendor shall take full care and responsibility for the care of the work and for taking precautions to prevent loss or damage to the works and to minimize the loss or damage to the greatest extent possible and shall be liable for any damages or loss that may happened to the works or any part thereof from any cause whatsoever , inherent defects and failure due to poor workmanship and causes such as fire , lightening , explosion, earthquake , storm , hurricane , floods inundation , subsidence, landslides , rock slides, riots (excluding civil war , rebellion, revolution and insurrection) and shall at his own cost repair and make good the same so that at all times the work shall be in good order and condition and inconformity in every respect within the requirement of the contract.

   Explanation:

   For the purpose of this condition, the expression "form the commencement to completion work" shall mean the time commencing from the issue of the work order to the contractor and ending with the successful commission of the plant.

b. Without limiting the obligation and responsibilities under this condition, the contractor shall insure and keep insured the works from the commencement to completion , as aforesaid , for their full value provided under this contract , increased by 25% against the risk if loss or damage from any cause whatsoever including the causes enumerated in the clause (a) above, in the event of there being a variation in the nature and extent of the work , the contractor shall from time to time increase or decrease the value of the insurance correspondingly. The entire premium shall be borne and paid by the contractor. The said insurance shall also provide for the removal of debris of the lost or damaged works.

c. The Vendor shall at all times indemnify the employer against all losses , claims or damages or compensation under the provision of the payment of wages at 1936, minimum wages act 1948, employer liability act 1961 , Industrial dispute act 1947, employer state insurance act 1948 or any modification thereof or any other law relating thereto and rules made there under from time to time or as a consequence of

any accident or injury to any workman or other persons in or about the work whether in the employment of the employer , or Vendor or not and also against all costs, charges and expenses of any suit , action or proceeding whatsoever out of such accident or injury or combination of any such claims.

d. Before commencing the work, the Vendor shall without limiting his obligation and responsibilities under this condition insure against any loss of life or injury to any personal in the employment of the contractor /sub-contractor /nominated contractor. For this purpose insurance shall be taken by the contractor /sub-contractor /nominated contractor. Such insurance shall be taken to include both employees/workmen covered by workmen's compensation act 1923, as well those employees/workmen not covered by the said act. Separate insurance policies may be taken for employees/workmen covered under workmen's compensation act 1923 and employees/ workmen not covered by the said act. All premiums shall be paid by the contractor.

e. The Vendor shall at all times indemnify and keep indemnified the employer against all loses and claim for injuries or damage to any person or any property whatsoever which may arise out of or in consequence of the construction and maintenance of the work and against all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in respect of or on relation thereto. Before commencing the execution of the works, the contractor shall without in any way limiting his obligation and liabilities under this condition, insure at his cost and expenses against any damage or loss or injury which may be caused to any person or property including the employee or servant of the employer and the consultant and their property by or in the course of execution of works. Such insurance to be known as the third party insurance shall be in a sum equivalent to two percent of the value of the accepted tender subject to the minimum sum of rupees five lakh. The insurance policy to be so obtained by the contractor shall be deposited by the contractor with the employer within the seven days of its issue by the insurer.

f. The Vendor shall ensure that similar insurance policies are taken out by his sub-contractors or nominated contractors, if any, and shall be responsible for any claim or loss resulting from their failure to obtain adequate protection in connection thereof . While taking the insurance policies, contractor should indicate clearly to the insurance companies that the policies issued cover their sub-contractor and nominated contractor also.

g. No work shall be commenced by the Vendor unless and until he has obtained the insurance or insurance required to be obtained by him under or by the foregoing clauses and no work shall be carried out or continued by the contractor unless and until each insurance is current and valid at that time.

h. In the event of any claim for insurance becoming due on the account of any eventuality covered by the respective insurance policy/policies, the contractor shall reinstate the installation, replace the material or equipment's or pay compensating to the affected personnel /employees without waiting for the settlement of the claim from the insurance company.

3.22 Pre dispatch Inspection

Before dispatching the equipment to site, the equipment, will be inspected at the discretion of the NCRA and tested for various parameters by the NCRA's Engineers /Officials at the manufacturer's works and then cleared for shipment. This will however, not in any way absolve the contractor of his responsibility for the continued performance of the system/components after erection & commissioning at the designated site during the period of defects liability.

a. No workmen will be allowed to stay within NCRA premises.

b. Permissions, if any required from the local statutory authorities /bodies shall be obtained by the contractor at his own cost.

c. The contractor shall engage the necessary workers for removal of debris, waste , dust etc. as required by the Engineer – in Charge without the extra cost and also redo the damages caused to the building /works without any extra cost to NCRA and dispose of the debris at the designated place.

d. Work may have to be done during night time to adhere to the time schedule for completion of the work, for which no extra charges will be paid.

e. The Contractor shall notify the NCRA about the Statutory Approvals /Permissions, if any, to be take in respect of installation of the Grid connected Roof Top Solar Power Plant with net metering facility and its subsequent operation and shall take full responsibility in obtaining the same as well as in complying with all statutory requirements.

f. When storage is being provided, the surroundings and premises where such storage is located as well as the work of other agencies shall be protected and not damaged; if any damage is caused, it has to be made good to the satisfaction of the employer at the contractor cost.

g. The Vendor shall cover, secure and protect all the items of works as directed, until the works are taken over by NCRA.

h. All the material used in the work shall conform to the latest edition of BIS/Relevant specification and shall be of tested quality and subject to further tests, if required by NCRA, at no extra cost to NCRA.

i. The PV modules will be warranted for a minimum period of 25 years from the date of installation of the system. (Output wattage should not be less than 90% at the end of 10 years and 80% at the end of 25 years).

3.23 **Factory Acceptance Test**

1. Solar PV Modules: The Solar PV modules shall be tested at the factory in the following manner:

i. **Physical Inspection**: The PV modules shall be inspected for its physical parameters such as dimensions, material and workmanship etc.

ii. **Performance Parameter**: The Solar PV modules shall be tested at the factory on a sun simulator at Standard Temperature Conditions (STC) for the following Parameters:

a. Open Circuit Voltage (Voc)
b. Short Circuit Current (Isc)
c. Max. Power (Pmax.)
d. Voltage at Max. Power (Vmax.)
e. Current at Max. Power (Imax.)
f. Fill Factor
g. Module efficiency

2. **Power Conditioning Unit**: The power conditioning unit shall be inspected for the display of parameters as mentioned in the tender either at factory of OEM/Integrator or at site.

3.24 **<u>Bids will be evaluated by a Tender Evaluation Committee (TEC).</u>**

Bidder on their own should have completed similar type of work i.e. Design, Supply, Installation, Testing, Commissioning, and Maintenance of 120-150 KWp Grid connected SPV based Roof Top Solar Power Plant in synchronism with Mains as well as DG set with net metering facility complying with all the electrical safety requirements as per IE rules & respective ISS, suitable to site requirement. (not on back to back from other agencies) **AND**

Should have satisfactorily completed the works during the last 7 (Seven) years ending previous day of last date of submission of bids. (i.e. 2014-15, 2015-16, 2016-17, 2017-18, 2018-19, 2019-20, 2020-21).

- One single job costing not less than 80% of Estimated cost OR
- Two jobs each costing not less than 60% of Estimated cost OR
- Three jobs each costing not less than 40% of Estimated cost

- The value of executed works shall be brought to current costing level by enhancing the actual value of work at the simple rate of **7% per annum**; calculated from the date of completion to due date for submission of bid.

Copies of work orders and completion certificates duly signed by your clients competent authority to be submitted evidencing the above without fail.

3.25 **Terms of the Tender Evaluation Committee**

3.25.1 On the due date the bids will be opened and bids meeting the eligibility criteria and will be referred to a tender evaluation Committee.

3.25.2 All bids will be evaluated with reference to the tendered specifications, performance of similar works carried out elsewhere by the bidder.

3.25.3 A committee will go through all the aspects of the tender and short list such firms whose bids are found technically acceptable based on marks obtained

3.25.4 Centre representatives will proceed through a detailed evaluation of the bids in order to determine whether they are substantially responsive to the requirements set forth in the tender. In order to reach such a determination, Centre will examine the information supplied by the Bidders, and shall evaluate the same as per the specifications mentioned in this tender.

3.25.5 During the evaluation, the committee can ask for more relevant documents from the bidder necessary for evaluation.

3.25.6 **Evaluation Criteria for shortlisting of bidders**

The applicants qualifying the eligibility criteria will be evaluated for following criteria by giving marks on the basis of details furnished by them.

A. **Organization : ..... 25 Points.**

(i) Organization set up and Office Location **Form A** (5 Points)
(ii) Members related to the Assignment and their Experience **Form C** (10 points)
(iii) Curriculum Vitae of Professionals **Form D** (10 Points)

B. **Experience:**..... **50 Points**

(i) Experience in similar nature of work completed during last five years **Form E** -1 (30 Points)
(ii) Performance Report – **Form G** (15 Points)
(iii) Previous experience with Govt. / PSU / autonomous bodies (5 points)

C. **Financial Capability** ..... **25 Points**

(i) Average annual financial turn over (Gross) **Form M** (20 Points)
(ii) Solvency (5 Points)

Total ..... 100 Points

For qualifying a bidder must secure at least sixty percent in Criteria (A), (B) and (C) above.

D. Even though bidder may satisfy the above requirements, they would be liable for disqualification if they have:

(i) Made misleading or false representation or deliberately suppressed the information in the forms, statements furnished by them.

(ii) Record of poor performance such as abandoning work, not properly completing the Contract within time lines or financial failures / weaknesses etc.

E. Short listing of the consultants shall be subject to thorough verification of their credentials and inspection of similar works carried out / in progress by them, through a committee including Technical Experts to be constituted by the Centre.

F. In case a large number of Architects / Architectural Firms secure the minimum prescribed qualifying marks, the Committee may restrict the number of qualifying Architects / Architectural Firms.

G The Committee will examine all the technical aspects of the bids received. Further, the Committee may seek additional information/feedback from other organizations where the bidder has carried out similar works.

H The recommendation/decisions of the evaluation committee is final and binding on all the bidders.

3.25.7 Committee will visit the sites where bidder has completed their works to understand capacity to execute the contract and type and quality of works carried out. Bidder shall render full co-operation in this regard.

3.257.8 After the technical evaluation is completed and approved, Purchaser shall inform the bidders whose bids have been rejected technically with the reasons for rejection.

3.25.9 **The price bids of the Bidders whose techno commercial bids are found to be technically deficient or do not meet the qualification criteria as specified in this tender will be returned to them without opening.**

3.25.10 The successful bidders will be informed regarding the date, time and method for operations of Price bid.

3.25.11 The recommendation/decisions of the Evaluation Committee is final and binding on all the bidders.

3.26 *PLACING OF ORDER* : Centre reserves the right to place the order for part/full/reduced quantity /increased quantity / reduced period than what is specified in the bid document.

Centre reserves the right to place order on L1 either by considering or not considering the total expenditure including five years post warranty Comprehensive Maintenance Charges.

3.27 **If the charges quoted are same by different bidders then Centre reserves the right to place order on any one lowest bidder.**

3.28 *Order Acceptance*

3.28.1 The successful bidder should submit Order acceptance and Performance Guarantee within **21 days** from the date of issue of order and complete all formalities within the same period.

3.28.2 If the successful bidder fails to submit order acceptance and Performance Guarantee even after repeated reminder Centre reserves the right to cancel the order and in which case bidder will be debarred from participating in any tender for a period of one year.

3.29 *Performance Guarantee*

Performance Guarantee to be furnished by the successful bidder for satisfactory performance of the contract. "Satisfactory performance of the contract here means satisfactory completion of work in respect of works.

3.29.1 Quantum of Performance Guarantee

3% of Tender Value (as shown on tender notice).

Successful bidder, shall deposit an amount equal to **3%** of the value of order value including taxes as Performance Guarantee within **21 days** of receipt of our order and must valid till completion of work plus Two months for proper fulfillment of the Contract.

In case Performance Guarantee is not submitted within **21 days interest @ 12% per annum** will be levied till the date you submit the Performance Guarantee.

If the successful bidder fails to submit the Performance Guarantee / Performance Guarantee with interest or refuses to submit the Performance Guarantee even after reminders, Centre reserves the right to cancel the order without notice and such bidder will be debarred from participating in any tender for a period of **one year**.

3.29.2 Forms in which Performance Guarantee can be submitted

Performance Guarantee should be in the form of Demand Draft of a Scheduled Bank in favour of "TIFR", payable at Pune or Bank Guarantee (BG) from a Scheduled Bank in favour of Centre Director, NCRA-TIFR, Pune as per the prescribed format or Fixed Deposit Receipt (FDR) of a Scheduled Bank pledged in favour of Centre Director NCRA-TIFR, Pune. The Bank Guarantee should be from any one of the nationalized banks or Scheduled Bank and to be executed on non-judicial stamp paper of appropriate value. The Bank Guarantee should be valid upto at least 2 months beyond the contractual date for completion of the order.

3.29.3 *Refund of Performance Guarantee*

Performance Guarantee shall be released / returned to the contractor after the completion of the work/contract period without any interest.

3.29.4 *Forfeiture of Performance Guarantee*

Performance Guarantee is taken for due performance of the Contract and can be forfeited in the event of a breach of contract.

FDR / Bank Guarantee / Demand Draft obtained towards Performance Guarantee will be invoked when there is a specific breach on the part of the Contractor.

3.30 ***Income Tax***

3.30.1 As applicable will be deducted from the contractor's bill and TDS certificate will be issued.

3.31 **GST** : Will be paid Extra.
GST TDS will be deducted as per Govt. rules.

3.32 *Duration for Completion of work/Delivery Period*

3.32.1 Entire work to be completed after issue of order and within **Four Months** from the date of handing over the site. **The period may be extended, if the reasons furnished are acceptable to the Centre.**

3.33 *Liquidated Damages*

If the contractor fails to maintain the required progress to complete the work and clear the site on or before the due date for completion of contract as stated in special conditions of contract or any extended date of completion, he shall, without prejudice to any other right or remedy available under the Law to the Govt. on account of such breach, pay as agreed compensation the amount calculated at the rate stipulated below as the authority (whose decision in writing shall be final and binding) may decide on the amount of tendered value of the work for every completed day/ month (as applicable) that the progress remains or that the work remains incomplete.
This will also apply to items or group of items for which a separate period of completing has been specified: **Compensation for delay of work - @ 1% per month of delay to be computed on per day basis.**
Provided always that the total amount of compensation for delay to be paid under this condition shall not exceed 10% of the tendered value of work or of the tendered value of the item or group of items of work for which a separate period of completion is originally given. The amount of compensation may be adjusted or set-off against any sum payable to the contractor under this or any other contract with the NCRA.

3.34 **DEFECT LIABILITY PERIOD** :- **Five years** from the date of completion of Work of full plant.

The contractor shall maintain the work in such manner that on expiry of the period of maintenance, the work shall be as good and perfect in order and condition as that in which it was at the commencement of the period of maintenance. The contractor shall at his own expenses repair, rectify and make good to the satisfaction of the Engineer, all defects, imperfections or other faults arising from or out of use of material or workmanship not in accordance with the provision of the contract.

<u>During the defect liability period contractor is required to provide preventive maintenance of the full plant at no Extra Cost.</u>

3.35 **Warranty** : The Warranty period shall be Twenty Five Years for the PV modules and five years for complete system from the date of commissioning and handing over of the system. Contractor shall rectify defects developed in the system within Warranty period promptly. In case the defects are not rectified by the contractor within Ten days of the receipt of the complaint, NCRA shall have full liberty to repair / rectify restore the system in working condition. The expenditure so incurred by NCRA shall be deducted from the Bidder pending claims, security deposit or in other law full manner.

3.36 **Payment :-**

Payment will be made as under:-

(I) the payment for the works to be executed under this contract shall be made as follows subject to statuary deductions. No variation in the mode of payment terms will be accepted.

(a)For Sr.No. 1 of price bid.

(i) 70% (Seventy percent) after receipt of items at site and on submission of the following documents:
-Manufacturer's Inspection and Test Certificates
-Contractor's Certificate that all components, parts, subsystem, consumable etc. for successful installation, commissioning and testing of the system including maintenance have been received at site in good condition and if any shortfall is noticed during installation, commissioning, they will be supplied free of cost to NCRA.
-Policies of insurance covering all the risks during transit, storage, installation, commissioning, testing and handing over including third party liabilities and fire as mentioned in tender document.

(ii) 20% (Twenty percent after satisfactory testing and installation and commissioning and training to our Engineer and balance.

(iii) after completion of Sixty Two (62) months or against submission of Bank Guarantee from a Schedule Bank for Equivalent amount valid for 62 months from completion of the work.

(b) For Sr.No. 2 – of price bid

Payment will be made through Three R.A. (Running Account) bills and

one final bill on actual measurement.

(II) Payments will be made within 21 days after bill is certified by our Engineer.

(III) Payment will be made after deduction of

(i) GST TDS if applicable.
(ii) Income tax as applicable and
(iii) any other dues.
Payment will be made from NCRA-TIFR, Pune.

(IV) The contractor shall be entitled to receive payment on the basis of installation and commissioning, approved and certified by NCRA engineer. Officials regarding compliance with the specification and acceptability subject to deductions if any.

(V) *Contractor shall submit all your bills to :*

National Centre for Radio Astrophysics (NCRA),
Tata Institute of Fundamental Research (TIFR),
Pune University Campus, Ganeshkhind,
Pune 411007

3.37 *Indemnity Bond*

As per **Form O** to be submitted by the contractor before commencement of the work.

3.38 The Bidder shall indemnify the NCRA against all third party claims of Infringement of patent, royalties' trademark or industrial design rights arising from use to the goods or any part thereof.

3.39 *Contact Person* :

For co-ordination of work kindly contact
National Centre for Radio Astrophysics (NCRA) /
Tata Institute of Fundamental Research (TIFR),
Savitribai Phule Pune University Campus, Ganeshkhind,
Pune - 411007, Maharashtra, India
Phone : +91 20 2571 9000/9111
Email : swami@ncra.tifr.res.in, solanki@ncra.tifr.res.in

Scope of work / Technical Specification's and conditions / Safety Code

1. Scope of work

The extent of the work shown and specified hereunder is defined to include all labor, materials, equipment, and supervision required for the design, fabrication, supply, installation, testing and commissioning of the complete solar power generation system, installation of net metering its distribution and subsequent upkeep and maintenance as defined under succeeding paragraphs. The plant will be grid connected without any energy storage arrangements. The major components will then be the solar photovoltaic modules, SMU (String Monitoring Units)/SMB (String Monitoring Boxes) and grid tie inverters.

The Solar Rooftop Photo Voltaic (SPV) power plant shall consist of SPV array, Module Mounting Structure, Power Conditioning Unit (PCU) consisting of Maximum Power Point Tracker (MPPT), Inverter, and Controls & Protections, interconnect cables, Junction boxes, Distribution boxes and switches and should be designed with necessary features to supplement the grid power during day time. Components and parts used in the SPV power plants including the PV modules, metallic structures, cables, junction box, switches, PCUs etc., should conform to the BIS or IEC, ISS or international specifications, wherever such specifications are available and applicable.

A) Overall Associated Engineering Works

Generation of 120-150 KWp of Solar Energy based, conversion of the same to AC power in synchronism with mains as well as DG power with a guaranteed annual generation of 180,000 KWH to 225000 KWH per year during the first five years of operation at NCRA's power grid synchronization point including:

a) Design, Manufacturing, engineering Factory Acceptance Test (FAT), supply, installation, testing and commissioning of Solar PV Modules (inclusive of Electrical, Civil and Mechanical features) along with Power Conditioning Units (PCUs), as required and specified as per MNRE standard.

b) Supply and installation of Module mounting structure / super structure on identified locations. The successful tenderer shall design their SPV Panel structure with Hot dipped galvanized steel and cement concrete (CC) foundation suitable for site condition. Design of SPV structure shall be certified /vetted by a recognized Govt. Engineering College viz. IIT / NIT etc. or by a reputed structural consultant and submitted for approval before taking up the structure and foundation works.

c) Supply, installation, testing and commissioning of three phase Power Conditioning Units (PCU), (inverter plus local grid synchronizing system), SMU/SMB, distribution panels, electrical switchgears, metering and connecting the system to the switch gear (MCB/Distribution Board) provided by the NCRA for load and connecting up the system to the electrical grid surge protection units etc. as required. Modification of existing outgoing feeder protection, metering and control circuits of air circuit breaker (ACB) and energy meter to suite for receiving solar power in synchronism with both mains as well as DG power.

d) Supply and laying of all power and control cables on prefabricated GI cable trays including supply of cable trays, their installation, hangers, supports, cable terminations and all fixing accessories.

e) 600x600x3mm copper plates of earthing system to be used with copper strip/cable from earthing station to the entire system including interconnection of solar panels. Earthing stations shall be provided with testing point for every pit **as per relevant IS**, including cutting of roads / paved areas & making good the damages as in original shape.

f) The PV modules shall be installed with the necessary tilt with the most effective orientation so that they can generate maximum power possible.

g) Solar System capacity shall be demonstrated to the NCRA's Engineer/Officials.

h) Onsite training to NCRA Engineer / Officials and workmen for proper operation, maintenance and trouble shooting.

i) Provision for periodic cleaning of the solar panels considering the ambient conditions of the site. Water connection at one point shall be provided by NCRA.

j) Supply of the recommended spare parts along with the main equipment's to avoid downtime during Guaranty/Warranty and defect liability period.

k) Inspection of the complete installation at least once every year during guarantee period by the respective equipment manufacturer's specialist Engineer(s).

l) The metering of electricity shall be carried out as per the regulations stipulated by Maharashtra Electricity Regulatory Commission and/ Maharashtra state electricity distribution company limited.

m) All the components and equipment to be used should be reputed as desired by NCRA.

n) The successful bidder, as one of the channel partners shall prepare the detailed project report and bill of materials as per MNRE format for availing subsidy to NCRA. Excise Duty Exemption Certificate (EDEC) and Concessional Customs Duty Certificates (CCDC) will be issued by NCRA. Purchase Order will be released to the successful bidder after submission of (a) Performance Guarantee (i.e.10% of approved tender amount) (b) proof of submission of subsidy documents to NCRA as per MNRE, Govt.of India format. (c)Project Monitoring schedules & charts –soft copy & hard copy. **(NOTE: - During project execution, subsidy is applicable as per Govt. Policy, same will be taken up by NCRA and required documents preparation is under the scope of successful bidder)**

o) PERT / CPM detailed project monitoring charts & schedules along with critical tasks / activities to be monitored along with dates for easy reviews to be submitted with in 15days from the date of LOI.

B) Data Acquisition, Performance monitoring & Reporting – SCADA:

a) Software should be designed such that all (i.e. AC & DC) electrical parameters (i.e. I, V, cosΦ, three energy parameters – cumulative & instant) should be shown in graphical presentation as desired by NCRA.

b) Provision should be made for thermal energy data from installed sensor system to be recorded in all from i.e. graphical & etc as desired by NCRA.

c) Based on actual thermal data of site, electrical energy yield may be calculated for Mono & Poly crystal PV plants and compare with the actual electrical energy generated from PV solar plants. The software should bring out clearly the differences of actual energy to electrical energy yield.

d) If difference exists, then identification of PV string which is generating less energy should be given as warning signal or alarm to the operator to look into the actual problem for rectifying the same.

e) SCADA programming should meet above criteria as per latest IEEE code / standards.

f) The scope includes total required hard ware (including computer, data logger,1 hrs backup UPS, laser colour printer, back up E Proms for software storing, latest detachable memory devices, furniture (Godrej make) to place SCADA equipment and software including their licenses and the SCADA station should be near to Grid synchronizing system.

g) The plant parameters shall be measured by using SCADA or Equivalent system to monitor, maintain, and control the plan, and also to study the plant performance. The system should meet IEC 61724 standard for this provision. The plant monitoring parameter shall include:

i. PV array energy production: Digital Energy Meters to log the actual AC / DC Voltage, Current & Energy generated by the PV system shall have to be provided.

ii. Solar Irradiance & weather station: An integrated Pyranometer (Class II or better) with weather station relevant to all parameters associated with the solar plant performance shall be provided to monitor & accurate data logging, with the sensors mounted in the plane of the array. Readout shall be integrated with data logging system of IP 65 / 67.

iii. Temperature of modules should be measured for mono crystalline PV and temperature sensor should be flat platinum thermometer type and should able to measure temperature range $0^{o}C$ to $60^{o}C$ accurately.

iv. One temperature sensor to measure ambient temperature and humidity.

v. Wind speed and direction are also to be measured and tabulated.

C) All Inclusive Upkeep & Maintenance during warranty period

All Inclusive Upkeep & Maintenance Contract of the entire system as provided, including all spares and consumables for a period of 10 years after successful completion of work. The rates of the same are to be quoted separately as per Schedule of Quantities (Head-II).

D) Service to be provided by the NCRA:

Unless otherwise agreed by NCRA, only the following services shall be provided in connection with this work:

a) Single point water source for cleaning of SPV panels near to the solar system. Further plumbing for distribution of water to various array locations, if required, to be provided by the contractor.

b) Provision of necessary switchgear in the LT distribution panel for connecting the solar energy-based AC power to NCRA's Power grid. However, the termination of cable to the switchgear shall be in the scope of the successful tenderer.
c) Enclosed indoor space for locating PC, control monitoring, data loggers etc. and PCU/solar inverter (if required).
d) Facility by NCRA: On site, lockable storage space will be given as per availability, the security of which will be the responsibility of the contractor/s. NCRA will not be responsible for receipt / shortage and issue of contractor's materials. The contractor may be required to vacate the storage space as per exigency without any extra cost.

2. MINIMAL TECHNICAL REQUIREMENTS / STANDARDS FOR SPV ITEMS / SYSTEMS

2.1 PV MODULES:

Solar PV modules are designed to last 25 years or more. It is therefore essential that all system components and parts, including the mounting structures, cables, SMU/SMB, distribution boxes, clamps nuts & bolts and other parts also have a life cycle of at least 25 years. Therefore, all works shall be undertaken with the highest levels of quality and workmanship.
During inspection special attention will be given to neatness of work execution and conformity with quality and safety norms. Non-compliant works will have to be redone at the cost of the Installer.
The PV modules must conform to the latest edition of any of the following:

a) IEC/equivalent BIS Standards for PV module design qualification and type approval.
b) Crystalline Silicon Terrestrial PV Modules: IEC 61215 / IS14286 as approved by Ministry of New and Renewable Energy (MNRE).
c)In addition, the modules must conform to IEC 61730 Part 1- requirements for construction & Part 2 - requirements for testing, for safety qualification or Equivalent IS PV modules shall be suitable to be used in a highly corrosive atmosphere (coastal areas, etc.) must qualify Salt Mist Corrosion Testing as per IEC 61701 / IS 61701.
d) The total Solar PV array capacity shall be as specified in price schedule and shall be assembled with minimum 250 Wp (with minimum of 24V) Mono Crystalline MNRE approved solar modules with 60/ 72 cells.

Mechanical Characteristics	
Acceptable optimized peak power of each module is **250 W+5W** so as to restrict minimum module capacity to **250W**.	
Length x Width x Thickness (L x W x T) – mm	As per Product design
Mounting Holes Pitch (Y) – mm	As per Product design
Mounting Holes Pitch (X) – mm	As per Product design
Weight (kg)	As per Product design
Solar Cells per Module (Units) / Arrangement	As per Product design
Solar Cell Type	Mono Silicon
Front Cover (Material / Thickness)	Tempered & Low Iron Glass, 3.2mm

Encapsulate	Ethylene Vinyl Acetate
Frame Material	Anodized Aluminum Alloy
Junction Box (Protection degree / Material)	IP 67 rated / Weatherproof PPO enclosure with 3 bypass diodes
Connector	MC4 compatible or MC4, IP67 rated
Cable	4sqmm cross section
Fire safety class	C
Safety application class	A
Safety class	II
Thermal Characteristics	
Temperature coefficient of Current (I_{sc}), α (% / ^{o}C)	0.0681
Temperature coefficient of Voltage (V_{oc}), β (% / ^{o}C)	-0.2941
Temperature coefficient of Power (P_m), γ (% / ^{o}C)	-0.3845
NOCT (^{o}C)	46 ± 2
Operating temperature range (^{o}C)	-40 to 85

Integration Of SPV Power with Grid:

a) The output power from SPV would be fed to the inverters which converts DC produced by SPV array to AC and feeds it into the main electricity grid after synchronization. In case of grid failure, or low or high voltage, solar PV system shall be out of synchronization and shall be disconnected from the grid. **Once the DG set comes into service, PV system should again be synchronized with DG supply such that DG should feed at least 30% load of its capacity.** i.e, If the load is more than 30 % of DG capacity, then solar power plant should start and load equals to 30 % of DG capacity should be on DG set and rest load should be on Solar power plant.

2.2 RELEVENT STANDARD/BALANCE OF SYSTEM (BOS)/ COMPONENTS/ ITEMS

The system/ components/ items of the SPV (Solar Photo Voltaic) power systems/ systems deployed must conform to the latest edition of IEC/ Equivalent BIS Standards/ MNRE specifications / as specified below:

System/components / items	Applicable BIS /Equivalent IEC Standard Or MNRE Specifications	
	Standard Description	**Standard Number**
Power Conditioners/ Inverters including (Maximum peak power tracking) MPPT and Protections	Efficiency Measurements	IEC 61683 / IS 61683
	Environmental Testing	IEC 60068-2 (1, 2, 14, 30) / Equivalent BIS Std.
	procedure of is landing prevention Measures	IEC 62116
Cables	General Test and Measuring Method PVC insulated cables for working voltage up to and including 1100 V and UV resistant for outdoor Installation	IEC 60227 / IS 694 IEC 60502 / IS 1554 (Pt. I & II)
Switches/Circuit Breakers/Connectors	General Requirements connectors – safety A.C. /D.C.	IEC 60947 part I,II, III / IS 60947 Part I,II,III EN 50521
SMU/SMB /Enclosures for Inverters/Luminaries	General Requirements, shall be dust Proof	IP 65(for outdoor)/ IP 21(for indoor) as per IEC 529

2.3. TESTING LABORATORIES / CENTERS

The PV modules must be tested and approved by one of the IEC authorized test centers. Test certificates can be issued by any of the NABL / BIS Accredited Testing / Calibration Laboratories.

Test certificates for the system/ components/ items from any of the NABL / BIS Accredited Testing Calibration Laboratories / MNRE approved test centers to be submitted to the NCRA.

2.4. IDENTIFICATION AND TRACEABILITY

Each PV module used in the solar power project must use a RF identification tag (RFID), which must contain the following information. The RFID can be inside or outside the module Laminate, but must be able to withstand harsh environmental conditions and should contain following details:

i) Name of the manufacturer of PV Module
ii) Name of the Manufacturer of Solar cells of PV Module
iii) Month and year of the manufacture (separately for solar cells and module).
iv) Country of origin (separately for solar cells and module)
v) I-V curve for the module
vi) Peak Wattage, Im, Vm and fill factor (FF) for the module
vii) Unique Serial No. and Model No. of the module
viii) Date and year of obtaining IEC PV module qualification certificate
ix) Name of the test lab issuing IEC Certificate
x) Other relevant information on traceability of solar cells and module as per ISO 9000 series.

2.5 The contractor shall execute the whole & every part of the work in the most substantial manner and both as regard to materials and otherwise in every respect in strict accordance with the specifications. The contractor shall also conform the execution of work exactly, fully and faithfully to designs, drawings & instructions in writing in respect of the work assigned by the NCRA's Engineer.

2.6 ACTIONS TO BE TAKEN BY THE SUCCESSFUL TENDERER AFTER AWARD OF WORK

2.6.1 considering that time is the essence of the contract, the successful tenderer shall take the following actions immediately –

a) He shall contact the NCRA's Engineer-In-Charge of the work immediately after award of work and submit an agreement on a non-judicial stamp paper of adequate value as per the relevant Stamp Act and sign the same in front of the witnesses.
b) All the required submittals must be completed within **15 days** from the date of issue of detailed work order.
c) A program PERT chart shall be prepared for execution of the work & the same shall be finalized in consultation with the NCRA's Engineer. The work-schedule chart/ bar-chart

indicating the time schedule for commencement of various activities of work like inspection & delivery of materials, commencement of work, completion of work etc. required for the execution & timely completion of work shall be submitted by the tenderer to the NCRA's Engineer for approval within 7 (Seven) days of the date of award of work.

2.6.2 All activities for execution of work shall strictly follow the program chart so finalized unless advised otherwise by the NCRA's Engineer in writing. It shall be the responsibility of the contractor to adhere to this work-schedule and complete the work in the specified time. Any deviation from this schedule, for any reason, shall be brought to the notice of the NCRA's Engineer immediately to enable him to take necessary corrective action(s). Failure to submit the work schedule chart within the specified time or meeting the various committed deadlines shall be treated as delay on the part of the tenderer.

2.6.3 Drawings indicating the design of Solar Power Generation System and distribution proposed along with designs for structures / foundations for SPV array (duly certified / vetted by a recognized Government Engineering College/ reputed structural engineering firm etc. for suitability of the structure to withstand high wind velocity up to 150 Km/h) shall be submitted to the NCRA's Engineer, for approval, within fifteen (15) days of the issue of the detailed order. The drawings shall indicate all relevant details about the component/equipment etc. A three-dimensional pictorial view of the same shall also be depicted in the drawings. The contractor shall submit all equipment information, which should include but not limited to the following and obtain approval:

a) General arrangement and dimensional layout.
b) Schematic drawing showing the requirement of SPV Plant, Power conditioning Unit(s), Circuit breakers, AC and DC Distribution Boards, SMU/SMB, meters etc.
c) Structural drawing along with foundation details for the structure.
d) Itemized bill of material for complete SPV plant covering all the components and associated accessories.

2.6.4. The Contractor shall at all times, during the period of execution of works. Keep in mind the specified completion time and other terms & conditions of contract as specified in the tender document which is, and shall remain the essence of the contract. On completion of the installation, the tenderer shall conduct a system acceptance test. The tenderer shall propose a detailed system acceptance test plan, which shall be jointly reviewed by NCRA and the tenderer.

2.7. TESTING OF EQUIPMENTS

2.7.1 Type test certificates for all the tests specified for the factory built Solar PV modules, and the component parts shall be submitted by the Bidder along with the bid.

2.7.2 Factory Acceptance Test (FAT) of equipment's: Delivery of equipment is to be made to the site in accordance with the program finalized in consultation with NCRA's Engineer.

The equipment shall be delivered only after pre-delivery inspection has been carried out by NCRA's authorized representative. Pre- delivery inspection of equipment's shall be carried at the factory premises of principals. The NCRA shall be informed of such inspection at least 7 days in advance.

2.7.3 TESTING OF INSTALLATION AFTER COMPLETION

a) All units shall on their completion and before being placed in service, be subjected to a performance test followed by an acceptance inspection and tests to determine that all parts of the installation conform to the requirement and that all equipment's function as required and the work has been carried out as specified.

b) The contractor shall submit proposed testing procedure to the NCRA's Engineer not later than 15 days before the date of testing.

c) Tests and inspections shall be made by the contractor in the presence of the NCRA's Engineer. Contractor shall notify the NCRA's Engineer in writing at least 07 days before the date of testing in order to facilitate arrangements for NCRA's Engineer to be present.

d) All test instruments and personnel to carry out the testing and commissioning shall be provided by the contractor. Adequate supervision of the tests shall also be maintained.

e) Corrective measures, if necessary, shall be carried out at no additional cost to the NCRA.

f) Performance Test - After installation of the complete system, its operating capability shall be demonstrated. The contractor shall provide personnel, tools, etc. for testing. The performance test shall be conducted in the presence of NCRA's Engineer or his authorized representative for a minimum of (10) ten hours for ten working days as per the following: -

Performance test parameter

I. Measurement of peak DC & AC power generated shall be taken every day for 10 working days at available load condition.

II. Auto operation of the complete system and Correction of unsatisfactory operation during test period. If any deficiency or variation in the design, fabrication or operation causing unsatisfactory performance is noticed, the same shall be corrected to provide satisfactory performance. Manufacturer/Contractor shall have appropriate service personnel at site during the test period to service or adjust the systems equipment's as required.

g) **Acceptance:** After completion of the system performance tests, a joint acceptance inspection shall be carried out by NCRA's Engineer and the representative of the contractor. The purpose of this inspection shall be to determine that the system has been supplied and installed as specified. If the system is not acceptable for reasons of noncompliance to the drawings and specifications, the contractor shall make immediate corrections within the construction schedule. A final acceptance inspection shall be done to determine all corrections have been made. Even though the equipment shall be inspected and accepted, the acceptance date shall not occur before all contractual obligations are completed including delivery of all "as built" drawings, maintenance, and operation & spare parts manuals etc.

h) **Date of virtual completion**

After successful performance test, the system shall be put into operation. However, the date on which the system is finally accepted as per terms of the contract will be considered as the date of virtual completion of the work, from which the defect liability period shall be commenced.

2.8 TRAINING

The contractor shall include in his tender, cost of training of operators and maintenance staff. Initial training of operating and maintenance personnel shall be provided at site to ensure competence in the operation and maintenance of the system provided. The training program shall include but not limited to the following elements:

A) OPERATING TRAINING

i) System description including electrical, electronic and mechanical sub-system and their functions.
ii) System operating procedures.
iii) System operating characteristics.
iv) System limitations.
v) On-site system operation.

B) MAINTENANCE TRAINING

i) System and component trouble-shooting.
ii) On-site inspection and operation and maintenance.
iii) Schedule of maintenance, safety checks and procedures.

2.9 DESIGN PARAMETERS / REQUIREMENTS AND EQUIPMENT SPECIFICATIONS SPECIFIC TECHNICAL REQUIREMENTS

Solar PV system shall consist of following equipment's:

i) Solar PV strings consisting of required number of PV modules.
ii) Power Conditioning Units with data logger.
iii) Mounting structures.
iv) Cables and hardware.
v) SMU (String Monitoring units)/ SMB (String Monitoring BOXES) and distribution boxes.
vi) Earthing.
vii) Surge arrestors.
viii) Related Civil Works.
ix) Control & monitoring system etc.

Broad Technical Specifications:

2.9.1 Solar PV Modules

PV modules must be warranted for their output peak watt capacity, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years. Also, they must be warranted for workmanship and material for 10 years. The PV modules must be high efficiency mono crystalline silicon solar cells.

a) Capabilities: -

I. Screw less frame for high mechanical strength.
II. Superior reliability with IP 65 protection in all SMU/SMB for 35W and above, modules with a system voltage of 1,000V.

III. Greater than 15-micron anodization layer on aluminum frame to protect rusting of metal due to moisture and improve the insulation of module.
IV. Superior module efficiency as per International Benchmarks.
V. Upto 5% Positive power tolerance.
VI. PID (Potential induced degradation) tested modules with long-term reliability Glass with anti-reflective coating to improve light transmission.
VII. Salt mist, Ammonia, Blowing sand and Hail resistant.
VIII. IP 67 rated MC4 compatible connectors.
IX. Excellent performance in low light.
X. Sustain Heavy Wind & Snow loads (2400 Pa & 5400 Pa).

Should pass following tests as per IEC norms:

I. Thermal cycling test.
II. Damp heat test
III. Wet leakage current test.
IV. Potential induced degradation (PID) test.
V. Solar cells: Cell tester.
VI. EVA: Gel content test and pressure cooker test.
VII. Glass: Fragmentation test.
VIII. Frame: Frame anodizing test.
IX. SMU/SMB: IP 65 test.
X. Ribbon: Elongation test and camber test.
XI. RTV Silicone sealant: Adhesiveness test.
XII. Electroluminescence test to detect micro cracks.
XIII. Ammonia test for anti-corrosion.

b) Certifications:

CE, TUV Inter Cert, MCS, Intertek, Clean Energy Council, CEC Listed & standard:ISO 9001:2008 I ISO 14001:2004 I OHSAS 18001:2007, IEC 61215 I IEC 61730-1&2 I UL 1730 I IEC 61701 I IEC 62716.

c) Acceptance Criteria:

I. Each module is to be tested for electro luminescence test (on site) to detect micro cracks and pass the test as per IEC norms and also record of data on the test for each module will be done by NCRA for future studies. Contractor has to cooperate at site.
II. 1 no. of module from each batch production will be tested for PID (at 1000V, 85% humidity & temperature of 60 deg. Cel. for 96 hours) & LID (Light Induced Degradation) test also need to be carried out by exposing to real sunlight for 3 days. Test results should be submitted to NCRA.
III. The solar photo-voltaic module of ≥250 Wp power output under STC shall be provided with high efficiency (of more than 15%) mono crystalline silicon solar cells.
IV. It should have rugged design to withstand tough environmental conditions and high wind speeds (over 150 km/h). It shall perform satisfactorily in relative humidity up to 95% and temperature between 10 °C and 85 °C.
V. The I-V characteristics of all suitable modules as per specifications, to be used in the systems, are required to be submitted at the time of supply. For modules

to be used in a highly corrosive environment throughout their lifetime they must qualify for IEC 61701.

2.9.2. Module Mounting Structures

a) The module mounting structure shall be designed in such a way that it will occupy minimum space without sacrificing the output from suitable number of solar modules in series.
b) The structure shall be designed to allow easy replacement of any module & shall be in line with the site requirements.
c) The frames and leg assemblies of the mounting structure should be of standard M.S. sections of angle, channel, tubes and any other sections conforming to IS: 2062. These structures should be hot dip galvanized (120-micron thick coating with 7 tank process) for the long life in external weather conditions.
d) Bolts, nuts, fasteners, and panel mounting clamps should be of galvanized steel and quality certified by CE and manufactured in ISO 9001 company.
e) The mounting structure should be of Fixed Type, Tilt angle suitable to site, on PCC Foundation, with SS 304 fastener and clamp fitted to provide rigidity to the structure.
f) Galvanized Steel Structural members must be considered for all type of structural Steel proposed for the power plant.
g) The array structure shall be grounded properly using earthing kit.
h) Design drawings with material selected shall be submitted for prior approval of NCRA.
i) Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, and nuts and bolts. Galvanizing should meet ASTM A-123 hot dipped galvanizing or equivalent which provides at least spraying thickness of 70 microns on steel as per IS5905, if steel frame is used. Aluminium frame structures with adequate strength and in accordance with relevant BIS/international standards can also be used.
j) The structure should be capable of withstanding a wind load of 150 km/hr. after installation.
k) The structures shall be designed for simple mechanical and electrical installation. There shall be no requirement of welding or complex machinery at the installation site.
l) Solar PV modules are designed to last 25 years or more. It is therefore essential that the mounting structure, clamps nuts & bolts and other parts also have a life cycle of at least 25 years. Therefore, all works shall be undertaken with the highest levels of quality and workmanship.
m) The supplier/developer shall specify installation details of the PV modules and the support structures with appropriate diagrams and drawings. Such details shall include, but not limited to, the following:
    I. Array tilt angle to the horizontal;
    II. Details with drawings for fixing the modules;
    III. Structure installation details and drawings;
    IV. Electrical grounding (earthing);
    V. Inter-panel/Inter-row distances with allowed tolerances;
    VI. Safety precautions to be taken**.**
n) Panels shall be installed in North – south orientation with a fixed tilt angle depending on the location co-ordinates of, NCRA Center (Lat: 17.3045 & Long: 78.5065) and Sol-Gel (Lat: 17.3034 & Long: 78.5073) buildings at NCRA, south facing.
o) Anchoring arrangement for mounting structure of PV modules on the RCC- roofs shall be with removable concrete ballast, made of polymer modified concrete (PMC)/(LMC)

or PCC (1:1.5:3)- M20, that holds the anchor bolts. An epoxy bonding layer is to be provided, in case M20 mix is used, between the parent concrete and the ballast after removing the waterproofing layer and thoroughly cleaning to expose a clean concrete surface.

p) The water proofing layer should be repaired / rebuilt to the original composition and texture wherever broken / disturbed during the installation process of the solar panels and their mounting structures. The ballast / pedestal holding the anchor bolts and the joint between it and the water proofing layer has to be covered with a suitable water proofing layer.

q) Civil scope of work should be carried out as per NCRA authorities direction and as per drawing enclosed.

2.9.3 PCU (Power Conditioning Unit)/ MPPT (Maximum Peak Power Tracking) /Inverter

a) PCU / MPPT and 3 phase inverter shall be supplied as integrated unit depending upon the size of the solar power system and as per the site requirements. It should conform to IEC61683 and must additionally conform to the relevant national / international Electrical Safety Standards IEC60068-2. To minimize power losses, the PCU should be microprocessor based having inverter, which converts DC energy produced by the solar array to 3 phase AC energy.

b) The PCU shall be mounted either on a suitable MS stand on the floor or on the wall with proper supports in the control room. All cable entry to and from the PCU shall be fully sheathed to prevent access of rodents or other insects into the PCU from bottom/top of the PCU.

c) PCU shall be communicable on LAN protocol and should be provided with the following minimum Indications (through LEDs & LCD display): -

Inverter ON
Grid ON
Inverter under voltage/over voltage
Inverter over load
Inverter over temperature.

It should also have following protections: -

Over voltage both at input & output
Over current both at input & output
Over/under grid frequency
Over temperature
Short circuit
Grid input undervoltage/overvoltage with auto recovery, DC reverse polarity.
Protection against lightning
Surge voltage induced at output due to external source.
Disconnection by appropriate MCB/MCCB/Circuit breakers at Grid side, PV side, Load side as per site requirement.

d) The solar grid-tie inverter converts the DC power output of the solar PV modules to grid-compatible AC power and the total output power (AC) of the grid-tie inverters shall match the solar PV plant capacity while achieving optimum system efficiency. Operating ambient temperature range shall be considered at - 10 ^{o}C - +60 ^{o}C and relative humidity 0 – 95%.

e) Power Conditioners / Inverters including MPPT (EN 50530) and Protections shall comply Efficiency Measurements as per IEC 61683 / IS 61683 and Environmental Testing as per IEC 60068-2 (1, 2, 14, 30) /Equivalent BIS Std. In case if the Charge controller is in-built in the inverter, no separate IEC 62093 test is required. Additionally, the inverters shall conform to the relevant national / international Electrical Safety Standards wherever applicable as per IEC 62109-1, IEC 62109-2 and anti-islanding protection as per VDE 0126- 1-1, IEC 60255.5 / IEC 60255.27 / IEC 62116

f) The inverter shall be designed for continuous, reliable power supply as per specifications. The inverter shall have high conversion efficiency from 25 percent load to the full rated load. Output shall be true Sine wave with less than 3% THD from no load to full load at 0.8 pf lag or lead. The efficiency of the inverter shall be more than 94% at full load and more than 80% at partial load (50%-75%). The supplier shall specify the conversion efficiency in the offer.

g) The inverter shall have internal protection arrangement against any sustained fault in the feeder. The inverter shall have provision for input & output isolation and it shall include appropriate self-protective and self-diagnostic feature to protect itself and the PV array from damage in the event of inverter component failure or from parameters beyond the inverter's safe operating range due to internal or external causes.

h) Inverter shall be tested for islanding protection performance.

i) The software (Plant Manager & PC for remote monitoring through LAN) and hardware except PC, required for interfacing the plant are to be supplied.

j) The dimension, weight, foundation, makes details etc. of the PCU / Inverter shall be clearly indicated in the detailed technical document. Good quality & reputed / standard makes shall be supplied, having experience of trouble-free successful functioning for minimum two years in similar solar PV system.

k) The PCU/solar inverter shall be capable of complete automatic operation, including wake-up, synchronization & shut down.

l) Built-in data logging facility to remotely monitor plant performance through external PC shall be provided (PC shall be provided by NCRA).

Design: Appropriate/optimized inverter wattage /power should be chosen with following points mind:

a) To meet the total power requirement based on the roof top available area and also area required for maintenance.
b) To get total SCADA information accurately to monitor, control and correction.
c) Maximum decentralization should be achieved, so that at any given time minimum no of strings are down.
d) To deliver maximum power for long duration mentioned in tender document without degradation as per IEC applicable code.
e) Approval should be obtained from NCRA before procurement backed by detailed technical design calculation documents should be submitted to meet the tender document requirements.
f) Optimized wattage should be mentioned in the technical bid along with technical design documents to meet the tender document requirements.

Sr	Items	Range
1.	Nominal Inverter Output Rating	**Minimum 20 KVA**
2.	MPPT Voltage Range	150V to 800V
3.	AC Output with 50Hz frequency	415V Phase to Phase 3 phase
4.	Integrated MPPT Solar Regulator	As per design KVA
5.	Minimum Efficiency above 30% input Power	Above 90%
6.	Accuracy of AC voltage control	+ / - 1%
7.	Accuracy of frequency control	+ / - 0.5%
8.	Grid frequency Synchronization range	+ / - 3 Hz
9.	Maximum Input DC Voltage	Based on inverter make, should follow standard
10.	Ambient temperature considered	50 degree C
11.	Humidity	95% Non-condensing
12.	Protection of Enclosure	IP – 65 (Minimum) for outdoor
13.	Grid Frequency Tolerance range	+ / - 3%
14.	Grid Voltage tolerance	- 20% & + 15%
15.	No-load losses	Less than 1% of rated power
16.	THD	<3%
17.	Type of Loads	all types of loads, resistive, inductive, complex and non-linear
18.	Cooling	Fan Forced
19.	Protections	Output peak overload, short circuit, phase imbalance, over voltage, under voltage of the grid, Surge protections (input and output SPD), Input/output-overvoltage, input/output overcurrent, over/under grid frequency, lightning, islanding, over-temperature.
20.	Control type	Voltage source, microprocessor assisted output regulation
21.	Certifications Required	IEC 600068-1,2,14 and 30 or equivalent – Environment IEC 61000-3-15 EMC IEC 61683-Efficiency requirements as Specified above IEC 62116-Islanding Prevention of Utility interconnected PCUs IEEE 1547-Interconnecting Distributed Sources IEC 61727 UL 1741-Safety of Inverters in Distributed Energy sources EN 50530 for MPPT Certification as per equivalent Standards for above standards are also acceptable
22.	Operation	Completely automatic including wakeup, synchronization (phase locking) and shut down.
23.	Islanding and disconnection	The photovoltaic system in the event of voltage or frequency variations must island/disconnect itself from grid with the time stipulated as per IEEE/IEC /BIS standard as applicable.

24.	Overload and overheat	The inverter should have the facility to automatically switch off in case of overload or overheat and should restart when normal conditions are restored.

- The inverter shall be capable of complete automatic operation including wake-up, to monitor plant performance.
- The inverters should comply with applicable IEC / equivalent BIS standard for efficiency measurements and environmental tests as per standard IEC code.
- The inverters should be tested from the MNRE approved test centers / NABL / BIS accredited testing – calibration laboratories.
- In case of imported power conditioning units, these should be approved by international test houses.

Module Technologies where +ve or –ve grounding required needs to be identified by bidder and according selection of PCU needs to be done by the bidder.

2.9.4 Communication interface

The project envisages a communication interface which shall be able to support:

I. Real time data logging
II. Event logging
III. Supervisory control
IV. Operational modes
V. Set point editing

Communication System shall be an integral part of inverter. All current values, previous values up to 40 days and the average values of major parameters shall be available on the digital bus. The following parameters shall be measured, displayed and recorded/logged. Daily plotting of graphs for various parameters shall also be available on demand.

I. 15 minutes, Daily, monthly & Annual energy generated by the solar system(kWh)
II. Solar system temperature
III. Ambient temperature
IV. AC and DC side voltage and currents
V. Power factor on AC side
VI. Total Current Harmonics distortion in the AC side
VII. Total Voltage Harmonic distortion in AC side
VIII. Efficiency of the inverter
IX. Solar system efficiency
X. Display of I-V curve of the solar system
XI. Any other parameter considered necessary by supplier of the solar PV system based on prudent practice like Running hours & total power generation in KWH, Time Active, Time disabled, Time Idle etc.

Data logger system (Hard ware) and the software for study of effect of various environmental & grid parameters on energy generated by the solar system and various analyses would be required to be provided.

The communication interface shall be suitable to be connected to local computer and also remotely via the Web using either a standard modem or a GSM / WIFI modem.

Acceptance:

Factory tested for routine & type as per IEC norms in the presences of NCRA staff along with warranty & guarantees certificates.

2.9.5 DC DISTRIBUTION BOX

a) A DC distribution box shall be mounted close to the solar grid inverter. The DC distribution box shall be of IP65 DIN-rail mounting type and shall comprise the following components and cable terminations:
   I. Incoming positive and negative DC cables from the DC Combiner Box.
   II. Suitable capacity DC circuit breaker (MCB/MCCB), 2 pole (the cables from the DC Combiner Box will be connected to this circuit breaker on the incoming side).
   III. DC surge protection device (SPD), class 2 as per IEC 60364-5-53.
   IV. Outgoing positive and negative DC cables to the solar grid-tie inverter.

b) As an alternative to the DC circuit breaker a DC isolator may be used inside the DC Distribution Box or in a separate external IP 65 enclosure adjacent to the DC Distribution Box. If a DC isolator is used instead of a DC circuit breaker, a DC fuse of appropriate rating shall be installed inside the DC Distribution Box to protect the DC cable that runs from the DC Distribution box to the solar grid-tie Inverter. The bus bars used if any should be made of copper of desired size and insulated properly.

c) Tenderer should keep in mind that in case DC Distribution is embedded in inverter, all the requirements mentioned above should match.

2.9.6 DC COMBINER BOX/SMU/SMB

a) A DC Combiner Box shall be used to combine the DC cables of the solar module strings/ arrays with DC fuse protection for the outgoing DC cable(s) to the DC Distribution Box.

b) DC disconnection switch should be as per IEC 60947-3, DC fuse rating conform to IEC 60269-1, 2, 6.

c) DC disconnect switch provide safety and protection against over currents in any DC voltage photovoltaic applications and PV solar modular.

d) DC fuse protects against reverse currents in dedicated to PV application.

e) The boxes should be dust, vermin & waterproof & made of FRP/ABS plastic for outdoor use and IP 65 rated (for outdoor) / IP 21 (for indoor) and IEC 62208, for long-term use in PV systems. In addition, the direct connection between the strings and the spring clamp connectors should ensure a durable and safe installation.

f) The boxes shall have suitable cable entry points fitted with cable glands of appropriate sizes for both incoming & outgoing cables. Suitable markings shall be provided on the bus bar for easy identification & cable ferrules shall be fitted at the cable termination points for identification.

g) Each Box shall have High quality Suitable capacity Metal Oxide Varistors (MOVs) / surge arrestors, suitable Reverse Blocking Diodes. The SMU/SMB shall have suitable arrangement monitoring and disconnection for each of the groups. Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification

2.9.7 AC DISTRIBUTION BOX

An AC distribution box shall be mounted close to the solar grid inverter. The AC distribution box shall be of IP65 DIN rail mounting type and shall comprise the following components and cable terminations:

a) Incoming 3-core / 3.5-core cable from the solar grid-tie inverter.

b) AC circuit breaker / isolator, 4-pole.

c) AC surge protection device (SPD), class 2 as per IEC 60364-5-53.

d) Outgoing cable to the grid / DG interconnection.

e) IP 65 construction
f) Design, GA drawing should be submitted for approval prior to fabrication.
g) Rittal make panel of 14 gauge should be used.
h) Incoming & Outgoing cables should be provided with required protection and metering i.e. I, V, CosΦ, KVA, KW, KVAR along with CT's of metering class.
i) Mounted on angle 50x50x6mm GI angle frame with concrete foundation.
j) Well ventilation with canopy construction.
k) Bottom plate should be 3mm and should able to provide space for 10runs of 3.5Cx185sqmm terminations i.e. 5runs in coming & outgoing cables.
l) Two earth pits for body earthing should be provided for two point earthing
m) 3runs of 3.5cX185sqmm from 200kw plant and 2runs of 3.5c X 185sqmm from 120kw plant to Main junction box and 5runs of 3.5cX185sqmm from main junction box to Double bus bar panel in DG Room of aluminum armored cable.

AC Distribution Board (ACDB) shall control the AC power from PCU /inverter, and should have necessary surge arrestors. Interconnection from ACDB to mains at LT Bus bar while in grid tied mode (to evacuate generated power on Saturday, Sunday and holidays to the local grid / state electricity board grid i.e. for Grid Export) All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III or EN 50521 standards.

GENERAL SPECIFICATIONS FOR DC & AC DISTRIBUTION BOXES

a) These specifications cover the requirement of design, supply, installation, testing and commissioning of the DC& AC distribution boxes.
b) The item specified herein, unless otherwise stated shall conform to the relevant and latest revisions of Indian standards and Indian Electricity Rules.
c) The DC & AC distribution boxes shall be designed for operation in high ambient temperature up to 50 degrees centigrade and high humidity of up to 95% and tropical atmospheric conditions. Means shall be provided to facilitate ease of inspection, maintenance and servicing.
d) The DC & AC distribution boxes shall be of metal clad, cubicle, outdoor, weather-proof, free-standing type suitable for mounting on MS frame / concrete platform, with adequate size for mounting the isolator switches/MCBs etc. and ease of cable terminations. Dust and moisture ingress protected; the degree of protection shall be IP-65 as specified in IS-2147.
e) The sheet steel cubicle shall have hinged front access door with easy operating fasteners. All the doors and covers shall be heavily gasketted to make the compartment dust and moisture tight. Door hinges shall be of concealed type.
f) The cubicle shall be of minimum 2 mm thick sheet steel. All sheet steel work forming the exterior shall be smoothly finished, leveled and free from flaws. The corners shall be rounded. The minimum thickness of gland plates shall be 3mm.
g) The bus bars shall be so arranged as to ensure the necessary degree of safety.
h) Apparatus forming part of the DBs shall have the following minimum clearance.
    I. Between phases – 25 mm,
    II. Between phase and neutral – 25 mm,
    III. Between phases and earth – 25 mm,
    IV. Between neutral and earth – 19 mm,

i) All insulating materials used in the construction of the equipment shall be non-hygroscopic, duly treated to withstand the effect of high humidity, high temperature and tropical ambient service conditions.
j) All doors / covers providing access to live parts shall be provided with tool operated fasteners to prevent unauthorized access.
k) Provisions shall be made for permanently earthing the frames and other metal parts by two independent connections.
l) All steel works used in the construction of the DC & AC distribution boxes shall have undergone a suitable rigorous metal treatment process so as to remove oxide scales and rust formation and to facilitate a durable coating of the paint on the metal surfaces and also to prevent the spreading of rust, in the event of the paint film being mechanically damaged.
m) Two coats of anti-corrosive primer followed by a finishing coat of epoxy powder coating of the shade 631 of IS: 5 (i.e. Siemens grey) shall be given. The total thickness of paint shall not be less than 25 microns.
n) The bus bars shall be housed in the cubicle at convenient locations with provision for access to the buses from the front. The bus bar shall be suitably rated for the expected short circuit levels. The neutral as well as the earth bus shall be capable of withstanding the above fault level.
o) Large clearance and creeping distance shall be provided on the bus bar system to minimize the possibility of a fault.
p) High tension bolts, nuts and spring washers shall be provided at all bus bar joints.
q) The continuous rating of the aluminum bus bar shall be 0.7A/sq.mm. Maximum temperature of the bus and the connections shall not exceed 85 degrees centigrade. The bus bars shall be of liberal design. The main phase bus bars shall have continuous current rating and the neutral bus bars shall have continuous rating of at 100% of phase bus bars.
r) All bus bars and tapings shall be provided with color coded heat shrinkable sleeves for phase / polarity identification.
s) The DB boxes shall be installed over the MS frame fixed / grouted on a PCC platform including necessary bolts and nuts. Proper earthing shall be done using two independent GI strip of size 25x3 mm. The MS structure shall be painted with two coats of red oxide primer after cleaning the surfaces thoroughly and two coats of anticorrosive epoxy paint of proper shade as directed by the NCRA representative.
t) The pre-commissioning tests as required shall be done and the DB boxes shall be commissioned.

2.9.8 SURGE PROTECTION

a) Surge protection shall be provided on the DC side and the AC side of the solar system. The DC surge protection devices (SPDs) shall be installed in the DC distribution box adjacent to the solar grid-tie inverter. The AC SPDs shall be installed in the AC distribution box adjacent to the solar grid-tie inverter.
b) The SPDs earthing terminal shall be connected to earth through dedicated earthing system. The SPDs shall be of type 2 as per IEC 60364-5-53 & NFEN 50539-11

2.9.9 Cables

a) The XLPE power cable shall be 1.1kV grade, heavy duty, stranded copper / aluminum conductor, UV resistant (for outdoors) PVC type. An insulated, galvanized steel wire / strip armored, flame retardant low smoke (FRLS) extruded PVC type ST-1 outer

sheathed. The cables shall, in general conform to IS-1554 Part-I, ISS 7098 :1:1988 & other relevant standards.

b) Control & Data Communication Cables: The cable shall be 1.1kV grades, heavy duty, stranded copper conductor, PVC type an insulated, armored galvanized steel wire / strip armored, flame retardant low smoke (FRLS) extruded PVC type ST-1 outer sheathed. The cable shall, in general conform to IS-1554 Part-I & other relevant standards.
c) The permissible voltage drop from the SPV modules to the PCU/inverter shall not be more than 2% of peak power voltage of the SPV modules. In the light of this fact the cross-sectional area of the cable chosen is such that the voltage drop introduced by it shall be within 2% of the system voltage at peak power.
d) All connections should be properly terminated from outdoor and indoor elements. Relevant codes and operating manuals must be followed.
e) The power cable and its fixing accessories shall comply with the latest relevant Indian Standards and National Electrical Code.
f) All relevant factory test reports along with warranty and guarantee should be submitted along with the supply of cables. Cable drums should be stored on a plain vibration-free ground. Drums should be stored and kept in such a way that the bottom of the outer cable coil should not be damaged.
g) Before the commencement of cable laying, it shall be ensured that only the specified cables are used. It shall be the responsibility of the contractor to check the soundness and correctness of the size of the cable. If any defects are noticed during the process of laying, it shall be brought to the notice of the NCRA representative.
h) The material such as bricks, sand, cable route markers of best quality as approved by the NCRA representative only shall be used for cable laying works.
i) Contractor shall provide all the necessary labor, tools and other requisites at his own cost for carrying out pumping of water and removing of water from trenches, if any, where required.
j) Installation shall be carried out in a neat manner by skilled, experienced and competent workmen in accordance with standard practices.
k) Minimum 185 sq. mm 3.5 core armored cable should be used for AC circuit while, 95 sq. mm single core, multistrand armored Copper Cable should be used between DC Combiner box (SMU) to Inverter (PCU),and quantity of cables will be used as per site requirement.
l) While laying the cable, care shall be taken to avoid formation of kinks and also damage to the cable. In the case of cable bends, it shall not have bent radius lesser than 12 times the overall diameter of the cable.
m) A power cable loop of about 5 meters length and as directed by the NCRA representative shall be provided at the following locations.
    a) Near the termination points
    b) Near to the straight through joint
n) The method of cable laying and routing of cables, shall in every case be as directed by the NCRA representative.
o) Cable shall be laid in Class ‘B’ GI pipes at all entry to buildings. Whenever cable passes through GI pipes embedded across the wall in a building, both the ends of the pipe shall be suitably sealed.
p) Identification tags indicating the size of the cable and feeder designation shall be securely attached at both ends of the cable. Such tags shall also be attached to the cable at intervals of 50 Meters. The material of the tags shall be 25x3mm, Al strip. In case of Al strip, the details should be punched. Cable route markers shall be provided at the

intervals of 20M with a minimum of one number route marker. The details of the route markers shall be as per the IS standard. At the locations of straight through joints, necessary joint-markers shall be provided.

q) When cable runs vertically, it shall be clamped on proper GI cable trays or angle iron frames fixed on walls and are spaced at such intervals as to prevent buckling of the cables. All steel work shall be painted with two coats of red oxide primer after thorough cleaning of surfaces and thereafter finished with suitable anti- corrosive paints and provided with appropriate earthing as per IS.

r) MV cables (up to 1.1 KV) shall be laid at a minimum depth of 0.75 M when laid in ground. When cable pass through roads, storm drains etc. they must be protected by either by Hume pipe or GI pipe of suitable dimensions.

s) Excavations of trenches shall be carried out as indicated in the relevant IS standard. The width of the trench at the bottom shall be 0.4 M for one cable. In case the total number of cables laid in trenches is more than one, then the width shall be such that the spacing between the cables is maintained as in the IS standard. Before the cable is laid in the trench the bottom of the trench shall be cleared from stones and other sharp materials and filled with sand layer of 150mm.

t) While removing the cable from the drum, it shall be ensured that the cable drum is supported on suitable jacks and the drum is rotated to unwind the cable from the drum. The cable should never be pulled while unwinding from the drum. It shall be ensured that the cables are pulled over the wooden rollers placed in the trench at intervals not exceeding 2 meters. At no point of time the cable should touch the ground while pulling, it should be always on the Rollers. Contractor should use latest equipment for unrolling and laying the cable.

u) After placing the cables in the trench, it shall be filled in layers. First a 150mm layer of fine sand and a layer of red bricks and then back filling excavated soil ensuring there are no big stones or sharp objects in the backfill and that each layer is well rammed by spraying water and consolidated. The extra earth shall be removed from the place of trench and deposited at a place as directed by the NCRA representative.

Cable terminations and straight through joints

I. All cable joints / termination materials such as straight through joint kits, cable glands, cable lugs, insulation tapes etc. shall be of approved makes. Prior approvals of NCRA representative are to be obtained beforehand.

II. Cable terminations should be done using suitable double compression gland, crimping with copper lugs.

III. Cable glands for armored cables shall include a suitable armor clamp for receiving and securely attaching the armoring of the cable in a manner such that no movement of the armor occurs when the assembly is subjected to tension forces.

IV. The cable gland shall not impose on the armoring; cable bending radius shall not be less than 12 times the diameter of the cable. The clamping ring shall be solid and of adequate strength.

V. Provision shall be made for attachment of an external earthing bond between the metallic covering of the cable and the metallic structure of the apparatus to which the cable is attached.

Testing

I. Once cable is laid, following tests shall be conducted in the presence of NCRA representative, before energizing the cable:
II. Insulation resistance test with 500V as test voltage between the cores and all the cores to earth (Armor) and the results are to be recorded.
III. Sheathing continuity test.
IV. Continuity and conductor resistance test.
V. Tests conducted shall be as per IS and National Electrical Code.

Cables of appropriate size to be used in the system shall have the following characteristics:

a) Should meet IS 694/1554/IEC 60189, ISS:7098:1:1988 standards.
b) Voltage rating 660/1100V.
c) Excellent resistance to heat, cold, water, oil, abrasion, UV radiation and FRLS.
d) Flexible.
e) Sizes of cables between array interconnections, array to SMU/SMB, SMU/SMB to Inverter etc. shall be so selected to keep the voltage drop (power loss) of the entire solar system to the minimum. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use.
f) Cable Routing/ Marking: All cable/wires are to be routed in a GI cable tray and suitably tagged and marked with proper manner by good quality ferule or by other means so that the cables are easily identified.
g) The Cable should be so selected that it should be compatible with the life of the solar PV panels i.e., 25 years.
h) The size of each type of cable selected shall be based on minimum voltage drop, however, the maximum drop shall be limited to 2%.
i) Selected cable should carry a current density of minimum 1.2Amp/Sq.mm.
j) All electrical cables / wires inside the building to be fixed in Rigid Steel Conduit for wiring inside the building.
k) Proper laying of cables has to be ensured in appropriate cable trays, pipes / trenches as per site requirement.
l) For laying / termination of cables, latest BIS / IEC codes / standards be followed.

2.9.10 EARTHING

This specification is intended to cover the requirements of supply, installation, testing and commissioning.

a) The PV module structure components shall be electrically interconnected and shall be grounded. Copper plate electrode shall be constructed and Earthing shall be done in accordance with IS 3043-1986, provided that earthing conductors shall have a minimum size of 6.0 mm2 copper, 10 mm2 aluminum or 70 mm2 hot dip galvanized steel.
b) A minimum of two separate dedicated and interconnected earth electrodes must be used for the earthing of the solar PV system support structure and distribution boxes with a combined total earth resistance not exceeding 5 Ohm. The earth electrodes shall have a precast concrete enclosure with a removable lid for inspection and maintenance. The entire earthing system shall comprise non- corrosive components.
c) The system should be provided with adequate earthing points. This includes earthing for lighting, system grounding, separately for DC and AC active points. The frame of the PV module array should be earthed at multiple points.

d) To prevent the damage due to lighting, one terminal of the lighting protection arrangement by way of proper earthing is to be provided. The provision for lightning & surge protection of the SPV power source is separately earthed.
e) Supply and installation of **Earthing complete with copper earth plate 600 x 600 x 3 mm thick buried in ground vertically to a depth not less than 2.25m below ground level with top edge of the earth plate not less than 1.5m below normal ground level with copper strip/cable from earthing station** to the entire system including interconnection of solar panels. Earthing stations shall be provided with testing point for every pit as per relevant IS, including cutting of roads / paved areas & making good the damages as in original shape.
f) In case the SPV Array/string installed in the field separate earth has to be provided for SPV array/string and System at closer points of the array and the equipment respectively. It shall be ensured that all the earthings are bonded together to prevent the development of potential difference between any two earthing.
g) Automatic ground fault protection circuits to be installed to monitor any unwanted current flow to the ground and should become active to prevent any damage.
h) **Lightening Protection: -** The SPV Power Plant should be provided with lightening and over voltage protection. The principal aim in this protection is to reduce the over voltage to a tolerable value before it reaches the PV or other sub-systems components. The source of over voltage can be lightening or any other atmospheric disturbance. The Lighting Arrestor (LA) is to be made of 1 ¼" diameter (minimum) and 12 feet long GI spike on the basis of the necessary meteorological data of the location of the projects. Necessary foundation for holding the LA is to be arranged keeping in view the wind speed of the site and flexibility in maintenance in future. Latest grounding equipment should be used for this purpose. Each LA shall have to be earthed through suitable size earth bus with earth pits. The earthing pit shall have to be made as per IS 3043.
i) Electrode shall be made of GI pipe having a clean surface and not covered with paint, enamel or poorly conducting material. Galvanized pipe shall not be smaller than 38 mm ID. Earthing with pipe electrode shall be done as per the details indicated in IS : 3043/87 Electrodes shall be embedded below permanent moisture level.
j) The length of pipe electrodes shall not be less than 2.5m. If rock is encountered, pipes shall be driven to a length of not less than 2.5m with suitable inclination. Pipe shall be in one piece and deeply driven.
k) To reduce the depth of burial of an electrode without increasing the resistance, a number of rods or pipes may have to be connected together in parallel. The distance between two electrodes in such case shall not be less than twice the length of the electrode.
l) The earth resistance of each electrode shall be measured by using a reliable and calibrated earth resistance tester and recorded. The values shall be as per IS/IE rules.

2.9.11 Netmeter:

Net metering system is to be provided to the solar consumer. Net meter means the bidirectional energy meter to be installed at the interconnection point of the consumer with the network of distribution licensee Energy meters shall be installed and maintained in accordance with the provisions of The Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 as amended from time to time. The bidirectional energy meter suitable for the installed solar plant shall be supplied and installed by the contractor after testing and sealing from respective authority. Energy Meters must be provided with the necessary data cables if required.

The net energy meter shall be of accuracy as given (0.2s) and CT and PT shall be utilized according to CEA metering regulations 2006 and its amendment.

3 General Technical Specifications: -

The structures shall be designed for simple mechanical on-site installation. There shall be no requirement of welding or complex machinery at the installation site. Minimum distance between roof edge and mounting structure shall be 0.6m. Access for panel cleaning and maintenance should be provided. All solar panels must be accessible from the top for cleaning and from the bottom for access to the module SMU/SMB.

a) **Installation & Commissioning and Safety:** the installation of the PV arrays, Inverters and other components should be as per the IEC 61173, IEC 62548, IEC 61140 and IEC 62109 – 1 & 2 standards.
b) All medium voltage equipment shall be earthed by two separate and distinct connections with the earth. All materials, fittings etc. used in earthing shall conform to Indian standard specifications wherever they exist. In the case of materials for which Indian standard specifications do not exist, such materials shall be approved by the NCRA representative.
c) Copper/GI strip shall be connected to the respective earth electrodes, either by brazing or welding respectively. The overlap shall not be less than 50 mm.
d) Earthing clamps used for supporting earth strips shall be made of such materials so as to avoid bimetallic action between strip and clamps.
e) The installation, commissioning & trials to demonstrate proper functioning of the all the systems will be the responsibility of the supplier.
f) The bidders have to supply the calibration reports for all sensors from the authorized calibration laboratory.
g) Data Logging Provision for plant control and monitoring shall provide time and date stamped system data logs for analysis purposes.
h) Metering and Instrumentation for display of system parameters and status indication shall be provided.
i) **PV array energy production:** Digital Energy Meters to log the actual value of AC/ DC voltage, Current & Energy generated by the PV system shall be provided. Energy meter along with CT/PT should be of 0.2s accuracy class shall be provided.
j) Protective function limits (Viz.-AC Over voltage, AC Under voltage, over frequency, under frequency, ground fault, PV starting voltage, PV stopping voltage, over voltage delay, under voltage delay, Ground fault delay, PV starting delay, PV stopping delay).
k) All connections are to be made through suitable cable/lug/terminals; crimped properly & with use of Cable Glands.
l) Switches / Circuit Breakers / Connectors-safety IS/ IEC 60947 part I, II & III, EN 50521
m) Fuses to be provided to protect against short circuit conditions.
n) Details of solar power system design and layout for all systems shall be submitted along with Technical bid (Part-I)
o) All the components of the systems viz. PV modules, Electronics, etc. should have type approval / test certificates from / internationally accredited labs. / as per MNRE guide lines
p) All components and materials used in the system should be of good quality & conform to the BIS / IEC standards / specifications, wherever available / applicable.

q) Each system should have number plate with name & logo of the manufacturer and the month / year of installation.

r) Danger boards should be provided as and where necessary as per IE Act. /IE rules as amended up to date.

***All the work related to civil will not be in scope of tenderer. It will be done locally via local civil contractor as per the requirement of tenderer.**

****Any additional request/queries if any will be discussed in technical pre-bid meeting.**

*****Before submitting the tender/quote, party/bidder should visit the NCRA campus to understand the site requirements.**

4 DOCUMENTATION

The complete documentation should be as per IEC 62446 and submitted to NCRA

a) One set of operation manuals complete with drawing, parts list (with part codes) circuit diagrams with list ratings of components and list of do's and don'ts for the main equipment as well as the sub-systems should be submitted to NCRA.

b) One set of maintenance manuals with full information on drawings, circuit diagrams, list and suppliers address for bought out parts, troubleshooting charts, programs of built-in controllers etc. for the main equipment as well as for the sub-system.

c) These manuals should be in the form of hard (printed) copy in English Language as well as in electronic storage form (disc pen drive etc.)

d) A certificate for the adequacy of the manuals should be obtained and provided with the manuals. Such certificate must be signed by the QA engineer of the manufacturer

e) The Installer shall supply the following documentation also:

I. System description with working principles.
II. System single line diagram
III. Solar PV array lay-out.
IV. Routing diagram of cables and wires.
V. Data sheets and user manuals of the solar PV panels and the solar grid-tie inverter.
VI. A system operation and maintenance manual.
VII. Name, address, mobile number and email address of the service center to be contacted in case of failure or complaint.
VIII. Warranty cards.
IX. Maintenance Register.

5 TOOLS, TACKLES AND SPARES

The Installer shall keep ready stock of tools, tackles and essential spares that will be needed for the day-to-day maintenance of the solar PV system. This shall include but not be limited to, the following:

I. Screw driver suitable for the junction boxes and combiner boxes.
II. Screw driver and / or Allen key suitable for the connectors, power distribution blocks, Circuit breaker terminals and surge arrestor terminals.
III. Spanners / box spanners suitable for the removal of solar PV modules from the solar PV module support structure.
IV. Solar panel mounting clamps.
V. Cleaning tools for the cleaning of the solar PV modules.
VI. Spare fuses.

6 TEST CERTIFICATES AND REPORTS TO BE FURNISHED

a) Test Certificates / Reports from IECQ / NABL accredited laboratory or MNRE approved test centers for relevant IEC / equivalent BIS standard for quoted components shall be furnished.

b) Type Test Certificates shall be provided for the solar modules and the solar grid inverters to provide evidence of compliance with standards as specified in relevant articles of this Technical Specification.

c) NCRA reserves the right to ask for additional test certificates or (random) tests to establish compliance with the specified standards.

7 DESIGN PARAMETERS

a) Environment

All components and materials are to be designed and selected for long service life under local environment conditions.

b) Maintenance consideration

I. Particular attention shall be given to keep components simple, rugged and easily accessible for routine maintenance and components replacement.

II. Major assemblies and components such as, electrical components/controls shall be interchangeable and easily removable/replaceable without extensive dismantling of other assemblies of components.

III. All wiring shall be of a uniform color coding and marking system throughout indicating wiring terminations to permit rapid effective tracing and trouble shooting. Maintenance manual shall reflect said colour coding/markings.

IV. To facilitate identification, each item of equipment shall have a name plate of corrosion resistant metal attached in a conspicuous location.

8 Safety Code

a) First aid appliance including adequate supply if sterilized dressing and cotton wool shall be maintained in a readily accessible place.

b) An injured person shall be taken to the hospital without loss of time in cases where the injury necessitates hospitalization.

c) Hoisting machines and tackle if used in works, including their attachments, anchorage and supports shall be in the perfect condition.

d) Inflammable and hazardous items shall not be allowed near the working site.

e) Adequate safety measures against fire, theft etc. will be taken by the Contractor.

f) The Bidder shall observe all the safety precautions for the safety of the laborers and the employees of NCRA during execution of works. As a part of the contract, the Bidder must satisfy the under mentioned safety requirements and must ensure at all times that these are followed without any deviations:

g) The Office Campus is a “NO SMOKING ZONE”, hence use of tobacco and smoking is strictly prohibited.

h) Any job where welding, soldering etc. is required and where lighting of flame is involved or using a source of heat or temporary electrical connections, shall not be done without prior permission from NCRA’s Technical Officer. No job involving heat sources are permitted to be carried out after office hours, holidays, Saturday and Sunday without prior permission from NCRA.

i) It is entirely the responsibility of the Bidder to see that the safety appliances such as safety belts, life lines, helmets, rubber gloves etc., depending on the job, are made available to his staff at Contractor's cost. If the Bidder needs any suggestion/help in the matter, he can approach NCRA's Officer-in-Charge. However, any lapse on safety will be viewed seriously.
j) The Bidder shall ensure that the persons posted for the work are well conversant with the operation of fire extinguishers.
k) The Bidder shall take all precautions to avoid accident and causes of accident. He must be careful regarding safety during working of his staff in the premises.

Safety Precautions for portable electrical appliances:

a) Precautions in handling portable electrical appliances are more significant under monsoon conditions. Some likely situations are highlighted here for the contractor's attention and action to ensure that conditions and methods of usage conform to safety of personnel and property.
b) Joints in flexible cables: Usage of portable appliance through cable joints sometimes may lead to severe sparking and fire takes place if combustible or flammable materials are lying at the joint. Perhaps this may not be noticed by operator at all. For this and similar reasons, joints in cables of portable appliances are not permitted at all.
c) Appliance body grounding and system grounding: In absence of or ineffective appliance body grounding, operator may receive severe shock in case of phase to body fault during usage. Further, all earth pin socket must have low impedance and mechanically firm earthing according to Indian Electricity Rules so that safety is assured to operator even under fault conditions.
d) Water leakage: Water reduces efficiency of insulation depending upon exposure. Presence of moisture on ordinary switches may give a shock during operation. Switches in chronic leakage areas should preferably be de-energized until rectification is done and contractors must apprise civil works and properties department.
e) Excavation / Additions / Alterations of Building etc.: During excavations, alternations of buildings etc., every care shall be taken that electric shock or damage to cable, etc. are avoided. De-energisation of circuits must be considered whenever required.

CHAPTER 4

Technical Description of BOQ Items (*Annexure –I –Technical)*

Sl. No	NCRA item code	Technical Item Description	Unit	Quantity	Make, Model no & Technical Specifications of sub items considered to complete the job Note: 1) To be filled by contractor submit along with technical bid 2) For lumsum items sub items estimated quantities also to be specified
1	000000035	**120-150 KWp PV SOLAR MODULES- MONO CRYSTALLINE TYPE** :- Design, Supply, Installation, Testing, Commissioning, and Maintenance of 120-150 KWp Grid connected SPV based Roof Top Solar Power Plant in synchronism with Mains as well as DG set with net metering facility complying with all the electrical safety requirements as per IE rules & as per the technical specifications & conditions of the tender Document **Note: O**ptimum wattage of each module, no of modules considered and technical details should be given in technical bid.	Lumsum	1	
2	000000036	**DC COMBINER BOXES (SMU/SMB) FOR 120-150 KWp** :- Design, Supply, Installation, Testing, Commissioning, and Maintenance of 120-150 KWp Grid connected SPV based Roof Top Solar Power Plant in synchronism with Mains as well as DG set with net metering facility complying with all the electrical safety requirements as per IE rules & respective ISS & as per the technical specifications & conditions of the tender document **Note:** Designed optimum wattage of each box per building, no of boxes per building considered and technical details should be given in technical bid.	Lumsum /(Lot)	1	
3	000000037	**DC DISTRIBUTION BOXES FOR 120-150 KWp** :- Design, Supply, Installation, Testing, Commissioning, and Maintenance of 120-150 KWp Grid connected SPV based Roof Top Solar Power Plant in synchronism with Mains as well as DG set with net metering facility complying with all the electrical safety requirements as per IE rules & respective ISS & as per the technical specifications & conditions of the tender document **Note:** Designed optimum wattage of each box, no of boxes considered and technical details should be given in technical bid	Lumsum /(Lot)	1	

4	000000038	**GRID –TIE STRING INVERTERS FOR 120-150 KWp – Minimum 20KVA output**: - Design, Supply, Installation, Testing, Commissioning, and Maintenance of 120-150 KWp Grid connected SPV based Roof Top Solar Power Plant in synchronism with Mains as well as DG set with net metering facility complying with all the electrical safety requirements as per IE rules & respective ISS & as per the technical specifications & conditions of the tender document **Note:** Optimum wattage of each inverter, no of inverter considered and technical details should be given in technical bid	Lumsum /(Lot)	1	
5	000000039	**AC DISTRIBUTION BOXES FOR 120-150 KWp**:- Design, Supply, Installation, Testing, Commissioning, and Maintenance of 120-150 KWp Grid connected SPV based Roof Top Solar Power Plant in synchronism with Mains as well as DG set with net metering facility complying with all the electrical safety requirements as per IE rules & respective ISS & as per the technical specifications & conditions of the tender document **Note:** Designed optimum wattage of each box, no of boxes considered and technical details should be given in technical bid	Lumsum /(Lot)	1	
6	000000040	**ARMOURED DATA COMMUNICATION AND SYSTEM CONTROL CABLES FOR 120-150 KWp** :- Design, Supply, Installation, Testing, Commissioning, and Maintenance of 120-150 KWp Grid connected SPV based Roof Top Solar Power Plant in synchronism with Mains as well as DG set with net metering facility complying with all the electrical safety requirements as per IE rules & respective ISS & as per the technical specifications & conditions of the tender document **Note:** Designed cable length, type, which/from item to & end item, termination details, no of cables considered and technical details in a tabular form should be given in technical bid	Lumsum /(Lot)	1	

7	000000041	**MAIN AC JUNCTION BOX OF IP65 TO RECEIVE SOLAR POWER TO BE PLACED NEAR Synchronizing panel**:- Design, Supply, Installation, Testing, Commissioning, and Maintenance of 120-150 KWp Grid connected SPV based Roof Top Solar Power Plant in synchronism with Mains as well as DG set with net metering facility complying with all the electrical safety requirements as per IE rules & respective ISS & as per the technical specifications & conditions of the tender document **Note:** Designed technical details should be given in technical bid	No	1	
8	000000042	**ALUMINUM ARMOURED POWER CABLE OF 1.1KV RATING 3.5 CORE 185 SQ. MM**:- Supply, installation, laying, testing, 20nos end terminations as per IE rules & respective ISS & as per the technical specifications & conditions of the tender document Note: Before procurement actual distance should be measured and should take approval for procurement from NCRA.	Mtrs	500	
9	000000043	**CABLE TRENCH 200 X 750** :-Excavation of cable trench of size 200 x 750mm depth in wet, dry & rocky conditions of the soil for cable laying on a fine sand (without sharp edges) bed of 150mm in the excavated trench after cable laying again cover the cable by 150mm sand cover all sides with red bricks and back filling. Stacking of removed earth from all along the trench on either side after back filling and reinstatement. The excavated /removed excess sand should be transported to designated place as per NCRA official.	Sq. Ft	As per the requirement of tenderer	
10	000000044	**ROAD CUTTING 200X 750**:- Cutting the tar road or cement road / cobble stone road along with culverts either side of the road to make cable trench of size 200mm wide x 750mm depth, laying of 100mm dia GI pipes and remaking to original shape both road with tar, pcc & culverts with bricks, plastering as directed by NCRA Officials for the run of Power / Telephone / LAN cables at the road crossings, building entry, underground floor and over the walls.	Sq. Ft	As per the requirement of tenderer	

11	000000026	**CIVIL- PCC (1:2:4) PEDESTALS:-** Plain Cement Concrete (1:2:4) nominal mix using 20mm size graded machine crushed hard granite metal (coarse aggregate – as per IS 383 – 1970 and IS 2386 Part 1 to Part 8) from approved quarry including cost and conveyance of all materials like cement, fine aggregate (river sand), coarse aggregate, water etc. to site, including centering /Shuttering ,Lift charges, curing ,mixing charges, including Surface preparation by chipping of all existing loose concrete, dead mortar and cleaning of the surface from dirt, dust and other contaminations with wire brush including application of Nito bond (EP) to the old concrete to receive the fresh concrete including cost and conveyance of all materials, labour charges, all taxes, complete for finished item of work etc.	Cubic Meter	As per the requirement of tenderer	
12	000000027	**CIVIL- RCC (1:2:4) PEDESTALS:-** Reinforced Cement Concrete (1:2:4) nominal mix using 20mm size graded machine crushed hard granite metal (coarse aggregate – as per IS 383 – 1970 and IS 2386 Part 1 to Part 8) from approved quarry including cost and conveyance of all materials like cement, fine aggregate (river sand), coarse aggregate, water etc. to site, including centering /Shuttering ,Lift charges, curing ,mixing charges, including cost of steel as per drawing & GI binding wire, including Surface preparation by chipping of all existing loose concrete, dead mortar and cleaning of the surface from dirt, dust and other contaminations with wire brush including application of Nito bond (EP) to the old concrete to receive the fresh concrete including cost and conveyance of all materials, labour charges, all taxes, complete for finished item of work etc.	Cubic Meter	As per the requirement of tenderer	
13	000000028	**CIVIL- DRILLING OF HOLES ABOVE TERRACE:-**	Nos	As per the requirement of tenderer	

		Drilling holes of 16mm dia and 100mm deep in RCC beam with pneumatic compressor and placing of 12mm dia Tor steel bars and grouting the holes in HILTY RE 150 including cost of steel and its fabrication charges cost and conveyance of all materials and labour charges , all taxes, leads, lifts etc. complete for finished item of work			
14	000000029	**CIVIL -3MM THICK APP MODIFIED BITUMEN MEMBRANE TREATMENT ABOVE TERRACE:-** Providing and laying of 3mm thick app modified bitumen membrane treatment to the terrace duly [1] removing of existing tar felt. [2] Cleaning of the surface from dirt, dust and other contaminations. [3]application of one coat of Bitumen primer [4]providing and laying of 3mm thick APP Modified Bitumen Membrane with 100 mm overlap fixing with butane torch including cost and conveyance of all materials to site, all taxes, labour charges, lift charges etc., complete for finished item	Sqm	As per the requirement of tenderer	
15	000000030	**CIVIL –STRUCTURAL STEEL (SUPPORT STRUCTURE FOR SOLAR PANELS) WITH 75 X 75 X 5 MM GI COATED SQUARE HOLLOW SECTIONS:-** Providing, fabricating and fixing in position of structural steel (support structure for solar panels) with 75 x 75 x 5 mm GI coated Square Hollow Sections of Jindal/ Tata make for fixing of Solar Panels as show in the detailed approved drawings including cutting, welding, hoisting & including cost and conveyance of all materials, all taxes, labour charges for fabrication erection at site work for all heights etc., complete as directed by the Engineer-in-Charge for finished item of work	KGs	As per the requirement of tenderer	
16	000000031	**CIVIL- GI COATED STRUCTURAL STEEL WORKS:-** Supplying, fabricating, hoisting, erecting in position GI coated structural steel works comprising of trusses, lattice girders, brackets, column, bracing, rafters and other connected works with necessary joints, channels, angles, I-section, plates, bolts and nuts, washers as	KGs	As per the requirement of tenderer	

		show in the detailed approved drawings including cutting, welding, hoisting including cost and conveyance of all materials, all taxes, labour charges for fabrication erection at site work for all heights etc., complete as directed by the Engineer-in-Charge for finished item of work			
17	000000032	**CIVIL- PROVIDING AND ANCHORING IN POSITION 20MM DIA AND 200MM LONG HIGH STRENGTH ANCHOR BOLTS OF HILTY MAKE:-** Providing and anchoring in position 20mm dia and 200mm long high strength anchor bolts of HILTY Make and welding(with bolts) in bottom including drilling, anchoring and grouting with chemical ,necessary equipment including sales & other taxes on all materials, and all operational, incidental charges on materials and including cost of all labour charges etc., complete as per specifications and directed by the Engineer-in-Charge for finished item of work	Nos	As per the requirement of tenderer	
18	000000033	**CIVIL- PLASTERING 12MM THICK SINGLE COAT IN CM(1:5):-** Plastering 12mm thick single coat in CM(1:5) using screened sand including cost and conveyance of all materials like cement, river sand, water etc., to site, including sales & other taxes on all materials, and all operational, incidental charges on materials and including cost of all labour charges for mixing mortar, finishing, curing as directed by Engineer-in-charge etc., complete for finished item of work	Sqm	As per the requirement of tenderer	
19	000000034	**CIVIL-SUPPLY AND INSTALLATION GI PERFORATED CABLE TRAY WITH COVER AND GI JUNCTION BOX :-** Supply and Installation of different sizes of GI perforated cable tray with cover and junction boxes along with required angle supports, with coupler plates, Anchor bolts and nuts including cost and conveyance of all materials etc., complete and the tray should be fitted on the wall / Ceiling/Fencing poles etc.	KGs	As per the requirement of tenderer	

20	000000045	**COPPER ARMOURED POWER CABLES FOR 120-150 KWp**:- Design, Supply, Installation, Testing, Commissioning, and Maintenance of 120-150 KWp Grid connected SPV based Roof Top Solar Power Plant in synchronism with Mains as well as DG set with net metering facility complying with all the electrical safety requirements as per IE rules & respective ISS & as per the technical specifications & conditions of the tender document **Note:** 1)Designed cable length, type, which/from item to & end item, termination details, no of cables considered and technical details in a tabular form should be given in technical bid. **2)** Bidder should mention size of the cable.	Lumsum /(Lot)	1	
21	000000046	**EARTHING AND LIGHTNING PROTECTION for 120-150 KWp:-** Design, Supply, Installation, Testing, Commissioning, and Maintenance of 120-150 KWp Grid connected SPV based Roof Top Solar Power Plant in synchronism with Mains as well as DG set with net metering facility complying with all the electrical safety requirements as per IE rules & respective ISS & as per the technical specifications & conditions of the tender document **Note:** 1) Designed GI strip length & size, type, which/from item to & end item, termination details, no of earth pits considered and technical details in a tabular form should be given in technical bid **2) Construction of earth electrode and providing earthing and lightning protection to the system.**	Lumsum /(Lot)	1	

22	000000047	**SCADA CUM WEATHER SENSOR STATION –DATA ACQUISTION, PERFORMANCE MONITORING & REPORTING: -** Design, Supply, Installation, Testing, Commissioning, and Maintenance of 120-150 KWp Grid connected SPV based Roof Top Solar Power Plant in synchronism with Mains as well as DG set with net metering facility complying with all the electrical safety requirements as per IE rules & respective ISS & as per the technical specifications & conditions of the tender document **Note:** 1)Make, model nos for weather station & SCADA, measured , monitored & accuracy levelsparameters considered, at what level the parameters inputs are taken, software & hard ware details along with quantities consider and all technical details in a tabular form should be given in technical bid.	Lumsum /(Lot)	1	

CHAPTER 4

List of APPROVED MAKES

Technical Description of BOQ Items (*Annexure –II –Technical)*

List of APPROVED MAKES	
1. SOLAR PANELS	BHEL/ CENTRAL ELECTRONICS LIMITED/ REIL (Rajasthan Electronics and Instrumentation Ltd.), BEL and TATA solar
2. GRID-TIE STRING INVERTERS	ABB/ SMA/ FRONIUS /EMERSON/ REFUSOL
3. POWER CABLES	UNISTAR / FINOLEX/ POLYCAB
4. CONTROL CABLES	UNISTAR / LAPP/ FINOLEX/POLYCAB
5. LT SWITCHGEAR	L&T / SIEMENS / SCHNEIDER/LEGRAND
6. STEEL MEMBERS	TATA / VIZA .STEEL/SAIL (GI coating done)
7. EARTHING/ LIGHTNING ARRESTER	ERICO / OBO BETTERMANN INDIA
8. WEATHER MONITORING STATION	KIPP & ZONNEN / EPPLEY / EKO INSTRUMENTS
9 Power Panel	RITTAL/REPUTED

CHAPTER 4

(*Annexure –III –Technical)*

SPV STANDARDS TO BE USED IN DIFFERENT PROGAMS (GENERALISED BASED INCENTIVE, OFF-GRID AND ROOF TOP) OF **MNRE, Govt. of India**

Sl. No.	Item/ Subject	Pertain to component / system	IEC / ISS / IEEE / TUV standard no.
1.	PV Module ➢ Crystalline Silicon terrestrial PV module	• Design Qualification and type approval	IEC 61215 / IS 14286
		• Safety qualification	IEC 61730
		• NH3 (Ammonia) corrosion testing	IEC 62716
		• PV Module Performance Testing and Energy Reliability – Part – 1	IEC 61853-1
		• Slat mist corrosion testing	IEC 61701
		• Dynamic mechanical load testing	IEC 62782
		• System voltage durability test (PID) Crystalline PV Modules	IEC 62804
		• Comparative Testing of PV Modules to different performance in multiple climate and application – Part-1 (over all Test square)	IEC 62892
	➢ Tin Film terrestrial PV modules	• Design qualification and type approval	IEC 61646
		• Safety qualification	IEC 61730
		• NH3 (Ammonia) corrosion testing	IEC 62716
		• Salt mist corrosion testing	IEC 61701
		• Dynamic mechanical load testing	IEC 62782
	➢ Concentrator PV Modules & Assemblies	• Design qualification and type approval	

		• Safety qualification • NH_3 (Ammonia) corrosion testing	IEC 62108 IEC 61730
	➢ PV Module	• Salt mist corrosion testing • Dynamic mechanical load testing • Safety requirements and tests	IEC 62716 IEC 61701 IEC 62782 IEC 62790
2.	PV inverter / PCU ➢ Safety of power converters ➢ Installation & Commissioning ➢ Procedure of measuring efficiency	• GI safety test procedure • General requirements GI/standalone / other) • Particular requirements of inverter • Protection against electrical shock-Common aspects for Installation & Equipment • Parallel operation of inverter • Islanding protection (All except standalone inverter) • Electromagnetic Compatibility, i.e. EMC (applicable to all) • Electrical installations of building (Roof Top only) • Procedure for measuring efficiency (GI / OFF – GRID/ ROOF TOP) • Measuring the efficiency of MPPT algorithm	IEC 61728 IEC 62109-1 IEC 62109-2 IEC 61140 IEC 61727 IEC 62116 IEC 61000-3-15 IEC 60364 IEC 61683 EN 50530

3.	Charge Controller ➢ Charge controller / MPPT units ➢ Power conditioners / Inverters including MPPT and protections	• Environmental testing • Efficiency measurements • Environmental testing	IEC 6006-2 (1, 2, 14, 30) IEC 661683 IS 61683 IEC 60068-2 (1, 2, 14, 30)
4.	Cable	• General Test and Measuring method XLPE /PVC insulated cables for working voltage up to and including 1100V and UV resistant for outdoor installation	IEC 60227 / IS 694 IEC 60502/IS 1552 (Pt. I &II) ISS:7098:1:1988 ISS:1554.1.1988
		• Service life expectation (25 years)	TUV 2PFG 1169 EN 50618
5.	Junction box / Terminal box ➢ Enclosures for Inverters / Charge Controllers / Luminaries	• General requirements	IP60/IP 54 (for , IP outdoor) per 21 (for indoor) as IEC 60529
6.	Data System monitoring	• PV system performance & monitoring, data exchange & analysis	IEC 61724
7.	Switches / Circuit Breakers / connectors	• General requirements • Connectors safety • AC/DC • Connectors in DC-applications in PV systems	IEC 60947 part I, II, III IEC 60947 part I, II, III EN 50521 IEC 62852
8.	Auxiliaries	• Design verification • GI system commissioning & inspection • Building mounting GI system (safety) • Design qualification of solar trackers (for PV systems) • Industrial communication networks (safety)	IEC 62124 IEC 62446 IEC 61723 IEC 62817 IEC 62685 IEC 61784-3
9	Earthing:	• Earth electrode construction	ISS:3043:1987
10	Earthing conductor	• Earth connectivity conductor	ISS:1897:1983, 2008

11	Structural steel, hardware etc	• Hot dip galvanizing	ISS:1367.13.1983
12	Lightning protection	• Lightning protection	ISS:2309.1989
13	Cables	• Laying • Recommended current ratings for cables: PVC insulated light duty cables.	ISS: 1255: 1983 IS 3961 (Part 5): 1968
14	National Electrical codes	• Electrical codes	SP30:2011

Note:

1. In addition to above mentioned tests for PV modules, the modules must conform to IEC 61730 Part 1-requirements for construction & Part 2 – requirements for testing, for safety qualification.

2. PV modules to be used in a highly corrosive atmosphere (coastal areas, etc.) must qualify Salt Mist Corrosion Testing as per IEC 61701 / IS 61701.

3. In case, if the Charge controllers is in-built in the inverter, no separate IEC 62093 test is required and must additionally conform to the relevant national/international Electrical Safety Standards wherever applicable.

4. The solar power system, all its associated parts/materials/structures/necessary works/assembly of parts/installation, cable laying/clamping, testing and commissioning work etc should be done in conformance/compliance with the relevant specification standards with their latest amendments.

Chapter 5

Annexures to be filled in by Bidder

Annexure - I

A) **SCHEDULE OF TECHNICAL INFORMATION** (To be filled by the bidder)

i)	Enclose a write up on the system design proposed for this project specifically indicating how the power generated from the solar energy will be synchronized with the local grid as well as DG set.	
ii)	Enclose a single line diagram (SLD) / schematic layout for the proposal indicating the ratings and quantity of major components viz. SPV Modules, nos. of arrays, AC & DC distributions, PCUs etc.	
iii)	Enclose Bill of Quantities of major equipment's	Please fill up the details as per the format enclosed under **Annexure II**
iv)	Enclose the proposed layout of the SPV module array showing the spacing between arrays, walk way width etc.	
v)	Confirm the minimum guaranteed annualized energy (KWH/year) that will be generated from solar energy source and available for internal use for 25 years.	Please fill up the format enclosed under **Annexure III.**
vi)	Confirm the area required by the bidder for installation of SPV panels along with its structure, maintenance, walk ways to provide a generating capacity of 120-150 KWp as required in the tender.	L _____m W_____m Area_____sqm.
vii)	Enclose drawing showing typical arrangement for mounting of SPV modules along with dimensions and nature of foundation	(plan, elevation and section to be enclosed)
viii)	Confirm the total quantum of AC power to be Available from the installed SPV Modules.	_____ KVA
ix)	Confirm the location of meters to be provided for continuous measurement of AC power generated.	
x)	Please confirm the acceptance test procedures to be adopted during factory Acceptance Test (FAT) for the SPV Modules. Also indicate the standard to be followed.	
xi)	Please confirm the acceptance test procedure to be adopted on completion of the work for the major components and the complete system at site.	

SCHEDULE OF TECHNICAL DATA (To be filled by the bidder)

Sr. No	SPV Module	
i.	**Manufacture's Name & Address**	
ii.	**Type of Modules with cat. Reference**	
iii.	**Design of module at standard test condition**	
a)	Peak power watt	
b)	Peak power voltage	
c)	Peak power current	
d)	Open circuit voltage	
e)	No. of PV Modules proposed to achieve	
f)	minimum 120-150 KWp DC power	
g)	Short circuit current of PV module (Amp.)	
h)	Max. power rating of one PV Module (Wp) (not less than 250Wp)	
i)	Photo electrical conversion efficiency of SPV Module (not less than 15%)	
j)	Fill factor of the SPV module (> 0.70)	
K)	Designated life of the SPV modules	
l)	Overall dimensions (IN mm)	
m)	Weight	
n)	Frame materials	
o)	Reference of Standards / approval, if any	
p)	Life of SPV Module (Years of Operation)	
iv.	**PV ARRAY CAPACITY**	
a)	Number of Module in series in each array	
b)	Peak power rating of one array	
c)	Number of array considered to achieve the specified output	
v.	**MODULE MOUNTING STRUCTURE**	
a)	Type of structure and its materials used in frame and accessories	
b)	Type of mounting structures (Fixed or any other type)	
c)	Overall dimensions	
d)	Type of mounting	
e)	Surface azimuth angle of PV Modules	
f)	Tilt angle (Slope) of PV module	
g)	Confirm structure & module frame shall be	

h)	designed at wind speed 150 km/hr.	
vi.	**Power Conditioning Units (PCU)/Solar Inverter**	
a)	Manufacturer's name & address	
b)	Type of PCU (Centralized or string type)	
c)	Rated capacity of each PCU	
d)	Input DC Voltage range	
e)	Frequency	
f)	Minimum efficiency at full load	
g)	Location (outdoor / indoor)	
h)	Output ware shape	
i)	Dimensions in mm	
j)	IP protection level	
k)	Type of cooling required	
l)	Type of mounting	
m)	Suitability for specified Ambient Temp. range & Humidity at	
n)	Type of Protection provided:-	
	1) Over Load Condition	Yes/No
	2)Short Circuit Protection	Yes/No
	3)Low/High Voltage Protection	Yes/No
	4)Power Electronic Component Protection	Yes/No
	5) Anti-Islanding Protection	Yes/No
o)	Life of PCU	
vii.	METERING	
a)	Nos. of meters proposed to be provided	
b)	Location of meters	
c)	Manufacturer's name & address	
d)	Confirm compliance with laid down specification & technical deviation.	

Date : Signature of Bidder :

Name & Designation :

Place : Company Name & Address :

Company Seal & Phone No. :

ANNEXURE- II

List of Major equipment's which will be provided for 120-150 KWp Solar Power Plant (To be filled by the bidder)

S.No	Item	Quantities
1	SPV Modules	Total Quantities (Nos.)
		No. of Arrays
		Nos. of SPV modules in each array
2	Power Conditioning Units	Type
	(PCUs) (Centralized / string type)	Quantity
3.	DC SMU/SMB	
4.	AC Junction boxes	
5.	Control cables	
6.	Power cables	
7.	Earth electrodes and earth connectivity conductors as per requirement	
8.	Other related items viz. GI hardware, cable trays, surge Diverters etc. for the complete work as required & specified	Lot

Date : Signature of Bidder :

Name & Designation :

Place : Company Name & Address :

Company Seal & Phone No. :

ANNEXURE- III

GUARANTEED ENERGY GENERATION FOR 25 YEARS

Note : Efficiency of solar PV System shall be guaranteed to minimum 90% at the end of 10 years and 80% at the end of 25 years.

Year	Total (KWh) of guaranteed generation
Year 1	
Year 2	
Year 3	
Year 4	
Year 5	
Year 6	
Year 7	
Year 8	
Year 9	
Year 10	
Year 11	
Year 12	
Year 13	
Year 14	
Year 15	
Year 16	
Year 17	
Year 18	
Year 19	
Year 20	
Year 21	
Year 22	
Year 23	
Year 24	
Year 25	

Date :

Place :

Signature of Bidder :

Name & Designation :

Company Name & Address :

Company Seal & Phone No. :

ANNEXURE-IV

Format for undertaking & maintenance support

(To be submitted by the tenderer)

Name of work: Design, Supply, Installation, Testing and Commissioning of 120-150 KWp Grid interactive SPV based solar power system in synchronism with mains as well as DG set for NCRA Pune.

Pursuant to a contract awarded by NCRA for the full scope of work as contained under the tender documents for the above mentioned work of part thereof, we..... (Full name of firm with address), hereby

Undertake the complete responsibility for proving full product support and also maintenance support for entire period of the designed life of the equipment's so supplied and installed by us, promptly and expeditiously.

Further, in case any of the components, materials or parts used in the system to provided goes out of production, then we will make available the blue print, drawings of the spare parts and specifications of materials at no cost to NCRA, as and when required in connection with the equipment to enable the NCRA to fabricate or procure spare from other sources.

Thanking you

Yours faithfully

(Signature of the contractor with company `s seal)

ANNEXURE V

DECLARATION OF COUNTRY OF ORIGIN (To be furnished by the tenderer)

SCOPE OF WORK: Design, Supply, Installation, Testing and Commissioning of 120-150 KWp Grid Interactive SPV Based Solar Power System in synchronism with mains as well as DG set for NCRA Pune.

This is to certify that

(a) The SPV Modules & PCU's offered are new:

(b) The SPV Modules will be manufactured, assembled and offered for inspection before

Dispatch the works/factory of (address in India)

Therefore, Country of Origin of SPV Modules shall be

(c) The Power Conditioning Units (PCUs) will be manufactured, assembled and offered for inspection before dispatch at the works / factory of (address India)

Hence the Country of Origin of PCUs shall be .

Date:

(Name and Signature of bidders and Company Seal)

Note: There could be different country of origin for SPV Modules & PCUs. Specific address shall be provided for carrying out pre-delivery inspection at the works of the manufacturer.

CLIENT's CERTIFICATE REGARDING PERFORMANCE OF CONTRACTOR

(Use separate form for each client)

Name & address of the Client		
Details of Works executed by Shri /M/s.		
1	Name of work with brief particulars	
2	Agreement No. and date	
3	Agreement amount	
4	Date of commencement of work	
5	Stipulated date of completion	
6	Gross amount of the work completed and paid	
7	Name and address of the authority under whom works executed	
8	Whether the contractor employed qualified Engineer/Overseer during execution of work?	
9	i) Quality of work (indicate grading)	Outstanding/Very Good/ Good/Satisfactory/poor
	ii) Amt. of work paid on reduced rates, if any.	
10	i) Did the contractor go for arbitration?	
	ii) If yes, total amount of claim	
	iii) Total amount awarded	
11	Comments on the capabilities of the	
	Contractor	
a)	Technical proficiency	Outstanding/Very Good/ Good/Satisfactory/poor
b)	Financial soundness	Outstanding/Very Good/ Good/Satisfactory/poor
c)	Mobilization of adequate T&P	Outstanding/Very Good/ Good/Satisfactory/poor
d)	Mobilization of manpower	Outstanding/Very Good/ Good/Satisfactory/poor
e)	General behavior	Outstanding/Very Good/ Good/Satisfactory/poor

Note: All columns should be filled in properly countersigned.

Standard forms (To be enclosed by bidders with Part – I, Techno-commercial bid)

	Table of Contents
Sl. No.	**Contents**
1	Company Profile / Organizational Structure – **Form A**
2	Eligibility Criteria – **Form B**
3	List of technical personnel – **Form C**
4	Format of Curriculum Vitae (CV) **– Form D**
5	Schedule of experience showing works completed – **Form E-1** Schedule of experience showing works on hand – **Form E-2**
6	Details of all works of similar nature of assignment under execution (ongoing projects) – **Form F**
7	Performance report of works – **Form G**
8	Schedule of Technical Deviations – **Form H**
9	Manufacturing Authorization Form – **Form I**
10	Bid Form – **Form J**
11	Bid Security Declaration - **Form K**
12	Format for power of attorney for signing the bid – **Form L**
13	Financial Information / CA Certificate - **Form M**
14	Format of Amalgamation/Acquisition - **Form N**
15	Format of Indemnity Bond* – **Form O**
16	Format of Bank Guarantee for Performance Guarantee * – **Form P**
17	Solvency Certificate – **Form Q**
18	Certificate of Local content - **Form R**
19	Certificate of Registration - **Form S**
20	Articles of Agreement - **Form T**
21	Certificate of Visit to the Site - **Form U**
22	Undertaking for Acceptance of terms and conditions – **Form V**
23	Details of **GST** - **Form W**

* ***To be used by vendor on whom order will be placed.***

FORM –A

COMPANY PROFILE / ORGANISATIONAL STRUCTURE

(To be filled in by the Bidder)

Sl.No.	Question	Response
1.1	Company Name	
1.2	Type of firm Proprietary / Partnership / Pvt. Ltd. / Ltd. / Single Person Company / LLP	
1.3	Date of Incorporation / Establishment	
1.4	Company Head Office address	
	* Contact person(s) Name	
	* Phone Number	
	* Fax Number	
	* E-mail Address	
1.5	Address of Pune office	
	* Contact person(s) Name	
	* Phone Number	
	* Fax Number	
	* E-mail Address	
1.6	Number of Employees	
1.7	State pending or past litigation if any within the last 3 years with details and explain reasons. Please also mention any claims/complaints received in the last three years.	
1.8	Name of Designation of the Officer of the Contractor/ Bidder to whom all the reference shall be made for expeditious technical co-ordination	
1.9	Whether Contractor is familiar with and has experience in the type of work specified	
1.10	Indicate the number of similar jobs in hand, giving a brief description of scope of work and personnel employed	
1.11	GST Registration and Date	
1.12	Permanent Account No. (PAN)	
1.13	Details bank solvency certificates issued by bidder's bankers.	
1.13.1	Name of Bank	
1.13.2	Branch	
1.13.3	Amount of Solvency	
1.13.4	Date of Issue	

Signature of the Bidder
Name & Designation
Company Seal
Date:

FORM –B

ELIGIBILITY CRITERIA

Sr.No.	Description	Details to be furnished by the contractor, enclosing relevant documents in the technical bid.
1	Bidder should be either an OEM or their authorized Distributor, Dealer and Channel Partner Both cannot bid.	
2	If the bidder is a dealer / distributor / channel partner they must submit Manufacturer Authorisation Certificates for major items and if bid is not from OEM.	
3	Bidder must have been in the business of SITC and maintenance of Solar Plants for a period of five years prior to this advertisement i.e. between 2016-17, 2017-18, 2018-19, 2019-20, 2020-21.	
4	Bidder must have an average turnover of **30% of the estimated cost** for past five years.	
5	Only firms registered with Ministry of New and Renewable Energy (MNRE), Government of India, as a channel partner for Solar Photovoltaic System Integrator having 5 years of experience in carrying out solar power system installation works for large office buildings/commercial premises and must have executed themselves successfully similar works.	
6	Bidder must also have necessary authority / permission / registration from Maharashtra State Government and Agencies under it for the tendered item if required under the rules.	
7	Bidder must visit the **NCRA-TIFR, Pune Premises following Covid Regulations** to understand where the work is to be carried out and must submit site visit Certificate as per **Form U.**	
8	Bid must quote rates for all items and bid must be valid for a minimum period of **180 (One Hundred Eighty Days)** from the due date for submission of bid.	
9	Bidder must submit Solvency Certificate (not prior to **01.01.2021**) for a minimum amount of **40% of the estimated cost** from their bank.	
10	Bidder must submit Chartered Accountant's Certificate showing their turnover and & Net worth for the past Financial **5 years** i.e. prior to 31.03.2021 i.e. for 2016-17, 2017-18, 2018-19, 2019-20, 2020-21. **Do not enclose copies of Profit and Loss and Balance Sheets statement and IT returns.**	**Period** / **Turnover** / **Net Worth** 2016-17 2017-18 2018-19 2019-20 2020-21
11	No Deviation from General Conditions of tenders viz. Performance Guarantee, Payment terms etc. will be accepted.	
12	Successful bidder must be able to submit :- **Indemnity bond and Performance Guarantee of 3%** of total order value including all taxes, duties etc. within **Twenty One days** after receipt of our order valid till completion of work.	

NOTE : KINDLY FILL UP THE ABOVE DETAILS AND ENCLOSE ALONGWITH YOUR TECHNICAL BID – PART I, OTHERWISE YOUR BID WILL BE REJECTED.

Signature of the Bidder :
Name & Designation :

Company Seal :

Date :

Form C

List of technical personnel, giving the technical qualification, experience, including that in the present organization

Sr. No	Name	Age	Qualifications	Work Experience	Nature of works handles	Name of the projects handled	Date	From which employed in present organization	Indicate special experience, if any
1	2	3	4	5	6	7	8		9

Mention other points, if any, to show technical and managerial competency to indicate any important point in your favour.

Signature of the Bidder

Name & Designation

Company Seal

Date:

FORM – ' D '

Format of Curriculum Vitae (CV) of Key Professionals

(This form to be furnished not only by the Prime Architect/Architectural firm applying for the prequalification, but also furnish separately for each member of consortium / sub consultants who would be associated with this project work)

Name of Firm : _____

Professional : _____

Date of Birth : _____

Years with Firm **:** _____

Nationality : _____

Membership in Professional Societies : _____

Detailed Task Assigned : _____

Key Qualifications :

_____

[Give an outline of staff member's experience and training relevant to responsibility in context of assignment. Describe degree of responsibility held by staff member on relevant previous assignment and give dates and location. Use up to half a page]

Education :

[Summarize college/university and other specialized education of staff member. Use up to a quarter page.]

Employment Record/ Experience in brief :

[Starting with present position, list in reverse order every employment held. List all positions held by staff member since graduation, giving dates, name(s) of employing organization(s), title of positions held and location of assignments. For experience in last ten years, also give type of activities performed and client references, where appropriate. Use up to three quarter of a page.]

FORM – ' D '

Format of Curriculum Vitae (CV) of Key Professionals

Languages:

[Indicate proficiency in speaking, reading and writing languages : excellent, good, fair, or poor.]

Certification :

I, the undersigned, certify that to the best of knowledge and belief, these bio-data correctly describe my qualifications, my experience and myself.

Date :	**Signature of the Bidder :**
Place :	**Name of the Bidder :**
Company Seal:	**Designation :**

FORM –E-1

SCHEDULE OF EXPERIENCE SHOWING WORKS COMPLETED

Customers (full Address)	Order No. and date	Work and location	Value of order (Rs.)	Date for completion of work as per contract	Date of actual completion of work	Remarks indicating reasons for late completion of work	Has the work been completed Satisfactory? (Attach a copy of order and completion certificates from the Centre)	Contact person Along with Telephone No., FAX No. and email address

Annexure: "E-2"

SCHEDULE OF EXPERIENCE SHOWING WORKS ON HAND

Customers (full Address)	Order No. and date	Work and location	Value of order (Rs.)	Date for completion of work as per contract	Date of actual completion of work	Remarks indicating reasons for late completion of work	Has the Work been completed Satisfactory? (Attach a copy of order and completion certificates from the purchaser)	Contact person Along with Telephone No., FAX No. and email address	% of work completed as on 31.05.2014

Signature of the Bidder

Name & Designation

Company Seal

Date:

FORM – ' F '

DETAILS OF ALL WORKS OF SIMILAR NATURE OF ASSIGNMENT UNDER EXECUTION (ONGOING PROJECTS)

SIMILAR NATURE OF ASSIGNMENTS – UNDER EXECUTION				
Sl. No.	**Description**	**1**	**2**	**3**
1	**Name of work/ Project and location**			
2	**Name & Address of Employer / Organization, Telephone no. of officer to whom reference may be made.**			
3	**Cost of work in Rs. Lakhs (Attach copy of Work Order)**			
4	**Date of commencement as per contract**			
5	**Stipulated date of completion**			
6	**Actual date of completion**			
7	**Litigation/ arbitration pending / in progress with details ***			
8 **a.**	**Service rendered** **Inhouse teams**			
b.	**Associated Consultants/Consortia Members.**			
9.	**Names of Project In charge & Key staff & nos. of staff involves.**			
10.	**Any other information**			

*Indicates gross amount claimed and amount awarded by the Arbitrator.

Date : Signature of the Bidder :

Place : Name of the Bidder :

Company Seal: Designation :

FORM – ' G'

PERFORMANCE REPORT OF WORKS

1	Name of work/Project & Location	
2	Agreement No.	
3	Estimated cost	
4	Tendered cost	
5	Date of start	
6	Date of completion	
	i) Stipulated date of completion	
	ii) Actual date of completion	
7	Amount of compensation levied for delayed completion, if any.	
8	Amount of reduced rate items, if any	
9	Performance Report	
	17. Quality of work	Very Good/Good/Fair/Poor
	ii) Financial soundness	Very Good/Good/Fair/Poor
	iii) Technical Proficiency	Very Good/Good/Fair/Poor
	iv) Resourcefulness	Very Good/Good/Fair/Poor
	v) General Approach & Behaviour	Very Good/Good/Fair/Poor

Date : Signature of the Bidder :

Place : Name of the Bidder :

Company Seal: Designation :

ANNEXURE- H

Schedule of Technical Deviations

We confirm that all technical terms and conditions and specifications of the NCRA except for deviations listed below are acceptable to us.

Sr. No.	Section No.	Clause No.	Deviation proposed

Seal & Signature of company

Name

Designation

Date

ANNEXURE- I

Manufacturing Authorization Form

(Undertaking by manufacturer of SPV Modules and PCUs regarding the manufacture's obligation to extend uninterrupted after sales service to NCRA)

SCOPE OF WORK: Design, Supply, Installation, Testing and Commissioning of 120-150 KWp Grid interactive SPV based solar power system in synchronism with mains as well as DG set for NCRA, Pune.

We, the manufacturer of Solar Power System Component(s) undertake to provide continued after sales service including but not restricted to the following services.

i. To guarantee uninterrupted supply of spare parts throughout the designed life of SPV modules and PCU's. The designed life of SPV modules and PCU's shall be as indicated elsewhere in the technical bid.
ii. To assist NCRA in investigation of failure/malfunctioning of any part or system as and when called for by NCRA during and after defects liability period.
iii. We shall propose with cost estimate, any modification / up gradation of safety features, design modification / improvements to be incorporated in the SPV modules and PCU's subsequent to completion of the contract and suggest a time schedule to implement the same to enhance performance, reliability / life of SPV modules and PCU's.
iv. We hereby undertake to provide the above services and respond to NCRA's queries/requests in reasonable time notified by NCRA during the design life of the SPV modules and PCU's.
v. Any breach of above undertaking will entail NCRA to take any or all actions mentioned below as deemed fit by NCRA.

    a. To place on record the performance of firm either in the NCRA Web Site or other publications.
    b. Intimate the Regulatory Authorities / bodies or any other govt. institutes.
    c. Restrict the firm's participation in further tendering in NCRA.

Date: (Name and address of the company with Company Seal)

Note: This undertaking shall be furnished by the manufacturer of SPV Modules and PCUs.

In case the manufacturers of these two items are different, separate undertakings must be furnished by the respective manufactures.

FORM –J

BID FORM

[The Bidder shall fill in this Form in accordance with the instructions indicated No alterations to its format shall be permitted and no substitutions shall be accepted.]

Date:
[insert date (as day, month and year) of Bid Submission]

Tender No.:
[insert number from Tender Notice]
To:
[insert complete name of Owner]

We, the undersigned, declare that:
(a) We have read & understand the bidding document and have no reservations,

(b) We offer to execute the order in conformity with the Bidding Documents and in accordance with the Delivery Schedules specified in the Schedule of Requirements the following Goods and Related Services *[insert a brief description of the Goods and Related Services];*

(c) Our bid shall be valid for a period of **180 days**, from the date of opening techno commercial bid (Part– I), and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(d) If our bid is accepted, we agree to submit **Performance Guarantee** as per mentioned the tender document;

(e) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed.

(f) We have seen the site and have understood the site conditions.

(g) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.

Signed: *[insert signature of person whose name and capacity are shown]* In the capacity of *[insert legal capacity of person signing the Bid Submission Form]*

h) Name: *[insert complete name of person signing the Bid Submission Form]* duly authorized to sign the bid for and on behalf of: *[insert complete name of Bidder]*

i) Dated on _____ day of _____, _____ *[insert date of signing]*

FORM –K

Bid Security Declaration
(to be submitted on Company's letter head)

I/We the undersigned hereby declare that if we withdraw or modify the bids during the period of its validity, or if we are awarded the contract and fail to sign the contract, or to submit a performance security before the deadline defined in the tender document or fail to execute the contract, we will be suspended for a period of one year from being eligible to submit bids for any tenders invited by NCRA-TIFR, Pune and its related entities.

Name and Signature

Of Authorized Signatory

And Company Seal

Form L

FORMAT FOR POWER OF ATTORNEY FOR SIGNING the bid

(On Non-Judicial Stamp Paper of appropriate value)

Know all men by these presents, We.....(Name of the Bidder and address of their registered office) do hereby constitute, appoint and authorize Mr.

/ Ms. ....(Name and residential address of Power of Attorney holder) who is presently employed with us and holding the position of .....as our attorney, to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to our bid for the Design, Supply, Installation, Testing and Commissioning of 120-150 KWp Grid Interactive SPV Based Solar Power System in synchronism with mains as well as DG set for Office building NCRA , NCRA PUNE including signing and submission of all documents and providing information / responses to NCRA, representing us in all matters before NCRA, and generally dealing with NCRA in all matters in connection with our proposal for the said Project.

We hereby agree to ratify all acts, deeds and things lawfully done by our said attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid attorney shall and shall always be deemed to have been done by us.

Note:

Power of Attorney should be properly stamped and

notarized Power of Attorney furnished shall be

irrevocable.

Signature/(s) of the Bidder

Name/(s)

Stamp/Seal of the Bidder

NB: This guarantee will require stamp duty as applicable in the state, where it is executed and shall be signed by the official whose signature and authority shall be verified).

FORM – M

FINANCIAL INFORMATION / CA Certificate

I. Financial Analysis – Details to be furnished duly supported by figures in balance sheet/profit and loss account for the last three years duly certified by the Chartered Accountant, as submitted by the applicant to the Income Tax Department (copies to be attached).

Particulars	**Financial Year**				
	2016-17	**2017-18**	**2018-19**	**2019-20**	**2020-21**
Gross Annual turnover on executed work (In Lakhs)					
Net Worth					
Certified by					

II. Financial arrangements for carrying out the proposed work.

III. The following certificates are enclosed:

(a) Current Income Tax clearance Certificate / Profit & Loss account.

(b) Solvency Certificate from bankers of Applicant.

For _____

Chartered Accountants

Name & Signature :

Company Seal & Phone No. :

Date :

FORM –N

FORMAT OF DECLARATION REGARDING AMALGAMATION / ACQUISITION

No. ---------- Date:----------

1) ***Amalgamation/Acquisition***

In the event of M/s. ----------proposes for amalgamation, acquisition or sale of its business to any other firm during this contract period, M/s.---------- and proposed Buyer/Successor of the Principal Company are liable to execute, fulfill contractual obligations without any deviations. For this purpose M/s. ----------/M/s.---------- and proposed Buyer/Successor of the Principal Company shall indemnify itself to the Centre Director, National Centre for Radio Astrophysics, TIFR, Pune to fulfill the contractual obligations as per the terms of NCRA Tender and bids of M/s. ----------No. ---------- Dated----------and National Centre for Radio Astrophysics P.O. ----------dated ----------. The contractual obligations are **Design, Supply, Installation, Testing, Commissioning, and Maintenance of 120-150 KWp Grid connected SPV based Roof Top Solar Power Plant in synchronism with Mains as well as DG set with net metering facility complying with all the electrical safety requirements as per IE rules & respective ISS, suitable to site requirement of NCRA, at NCRA-TIFR, Savitribai Phule Pune University Campus, Ganeshkhind, Pune 411007, Maharashtra, India as per bid document**, as per the above mentioned Order.

Company Seal & Phone No.:

Name & Signature of Bidder :

Designation :

Date :

FORM –O

Format of Indemnity Bond

(to be executed on **Rs. 500** Non-Judicial Stamp Paper by the successful bidder before commencement of work at site)

Work Order No. _____ Dt. _____

In consideration of National Centre for Radio Astrophysics, Tata Institute of Fundamental Research (NCRA/TIFR) having office at Savitribai Phule Pune University Campus, Ganeshkhind, Pune 411 007, hereinafter referred to as " The Institute", which expression shall unless it be repugnant to the context or meaning thereof, include its successors and assignors having awarded to M/s. _____ having registered office at _____, a firm carrying in such name and style the business of _____ (hereinafter referred to as "The Contractor " which expression shall unless it be repugnant to the context or meaning; thereof, include its partner(s) / proprietor(s) for the time being or its surviving partner(s) or its heirs and executors, administrators and assignees, its successors and assignors) the contract for _____and in compliance with the terms and conditions of the said contract.

We M/s. _____being the contractor shall save harmless and indemnify the Institute in respect of:

a. Any expenses arising from any injury or accident or death of workers hired for this work or damage to property of any third party.
b. Any claim made under any Act of Government or otherwise in respect of injury or damage as aforesaid.
c. Any award of compensation or damages upon any claim as above.
d. Any claim against the Institute by any member of the public or other third party in respect of anything, which may arise in respect of the works or in consequence thereof.
e. Any claim which may be made upon the Institute whether under the Workman's Compensation Act or any other statute in force during the currency of this contract or of common law in respect of any worker of the contractor/or their family member(s) or of his sub-contractor(s).
f. Any costs, charges or expenses arising out of any claim or proceeding and in respect of any award of compensation of damages arising therefrom.

For and on behalf of M/s. _____

Date:
S E A L
Accepted By for and behalf of NCRA (TIFR) Pune

FORM – P

FORMAT OF BANK GUARANTEE FOR PERFORMANCE GUARANTEE

(to be executed on appropriate value of stamp paper)

(To be used by Successful bidder after placement of order)

To,
Centre Director
National Centre for Radio Astrophysics
Tata Institute of Fundamental Research
Post Bag No. 3, University of Pune campus,
Ganeshkhind, Pune 411 007.

In consideration of National Centre for Radio Astrophysics, Tata Institute of Fundamental Research , Post Bag No. 3, University of Pune campus, Ganeshkhind, Pune 411 007 (hereinafter called "Centre") having agreed under the terms and conditions of Contract No. ..... Dated ..... made between them and ..... (hereinafter called : The said Contractor(s)") for ..... (hereinafter called "the said Contract") having agreed to provide an irrevocable bank Guarantee for Rs. ..... (Rupees ..... only), as a Security / Guarantee from the Contractor(s) for compliance of obligations in accordance with the terms and conditions in the said contract, we ..... (indicate the name of the Bank) (hereinafter referred to as "the Bank") hereby undertake to pay to the Centre an amount not exceeding Rs..... (Rupees..... only) on demand by the Centre.

2. We ..... (indicate the name of Bank) do hereby undertake to pay the amount due and payable under this guarantee without any demur, merely on a demand from the centre stating that the amount claimed is required to meet the recoveries due or likely to be due from the said contractor. Any such demand made on the bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. ..... (Rupees ..... only).

3. We, the said bank, further undertake to pay to the centre any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) in any suit or proceeding pending before any Court or Tribunal relating thereto, our liability under this present being absolute and unequivocal.

The payment so made by us under this bond shall be valid discharge of our liability for payment thereunder and the contractor(s) shall have no claim against us for making such payment.

4. We ..... (indicate the name of Bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said contract and that it shall continue to be enforceable till all the dues of the Centre under or by virtue of the said contract have been fully paid and its claim satisfied or discharged or till Engineer on behalf of the Centre certifies that the terms and conditions of the said contract have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee.

FORM – P

5. We ..... (indicate the name of Bank) further agree that the Centre shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Centre or to extend time of performance by the said Contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the Centre against the said Contractor and to forbear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor(s) or for any forbearance, act of omission on the part of the Centre or any indulgence by the Centre to the said Contractor or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or of the Contractor.

7. We ..... (indicate the name of Bank) lastly undertake not to revoke this guarantee except with the previous consent of the Centre in writing.

8. This guarantee shall be valid up to ..... unless extended on demand by Centre. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs..... (Rupees .....only) and unless a claim in writing is lodged with us on or before the date of expiry or the extended date of expiry of this guarantee, all our liabilities under this guarantee shall stand discharged.

Signed and Sealed

Dated the ..... day of ..... for ..... (indicate the name of Bank).

Signature :

Name of the Officer with No. :

Seal :

Email ID :

Phone No. :

Form Q

SOLVENCY CERTIFICATE

FORM OF BANKERS' CERTIFICATE FROM A SCHEDULED BANK

This is to certify that to the best of our knowledge and information that M/s..... Sh.....having marginally noted address, a customer of our bank are/is respectable and can be treated as good for any engagement upto a limit of Rs.....
(Rupees.....)

(Signature) For the Bank

NOTE : (1) Bankers certificates should be on letter head of the Bank, sealed in cover addressed to tendering authority.

(2) In case of partnership firm, certificate should include names of all partners as recorded with the Bank.

FORM –R

Certificate of Local content

(To be submitted on Company's Letter head signed by competent person)

"We (---------- name of manufacturer) hereby confirm in respect of quoted item(s) that Local Content is equal to or more than 50% and come under 'Class-I Local Supplier' Category. As being 'Class-I Local Supplier', we are eligible for Purchase Preference under 'Make in India' Policy vide GOI Order No. P-45021/2/2017-PP (B.E. –II) dated 15.06.2017 (subsequently revised vide orders dated 28.05.2018, 29.05.2019 and 04.06.2020).

OR

*We (---------- name of manufacturer) hereby confirm in respect of quoted items(s) that Local Content is more than 20% but less than 50% and come under 'Class-II Local Supplier' Category and hence not eligible for any purchase preference.

The details of the location (s) at which the local value addition made is / are as under :

1. ----------
2. ----------
3. ----------

We also certify that if the details given above are found to be false then it shall be a breach of the code of integrity under Rules 175 (1)(i)(h) of the General Financial Rules for which I / my company or its successor can be debarred for upto two years as per rules 151 (iii) of the General Financial Rules above with such other actions as may be permissible under law.

*Strike out whichever is not applicable

Date : Seal and signature of the bidder

NOTE :

- Self-certificate that the item offered meets the minimum local content (as above) giving details of the location(s) at which the local value addition is made in case the bidder wishes to avail the benefits under the make in India policy, if applicable.

In cases of procurement for a value is excess of Rs. 10 crores, the local supplier shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content to avail the benefits under the make in India policy, if applicable.

FORM –S

Certificate of Registration

No._____ Date: _____

Centre Director,
National Centre for Radio Astrophysics (NCRA),
Tata Institute of Fundamental Research (TIFR),
Savitribai Phule Pune University Campus,
Ganeshkhihd, Pune 411007.

Dear Sir:

I/We _____who are established and reputed manufacturers/bidders of _____ having factories/works at _____(*address)* do hereby declare that "I/We have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India as per ----------. I/We hereby certify that items to be supplied against our bid **dated ----------** are not from such a country or, if from such a country, has been registered with the Competent Authority. I/We hereby certify that we fulfill all requirements in this regard and is eligible to be considered. [where applicable, evidence of valid registration by the Competent Authority shall be attached]

Yours faithfully,

(Name of manufacturers/ Bidder)

Note: This Certificate/Undertaking should be on the **letterhead of the manufacturer/Bidder** and should be signed by a person competent and having the power of attorney to bind the manufacturer. It should be included by the Bidder in its techno-commercial un priced bid.

FORM –T

ARTICLES OF AGREEMENT

(to be executed on **Rs. 500** Non-Judicial Stamp Paper by the successful bidder before commencement of work at site)

Articles of agreement made on this .....day of .... Between National Centre for radio & Astrophysics (NCRA) having its office in hereinafter referred to as "The Employer" of the one part and Ms/s ----------(hereinafter called "The Tenderer") of the other part .

Whereas the Employer is desirous of getting executed "Design", Supply, installation, testing, commissioning and maintenance of 120-150 KWp Grid connected Roof Top SPV based Solar Power Plant in synchronism with Mains as well as DG set with net metering facility at NCRA PUNE-411007.

AND Whereas the Tenderer has agreed to execute upon and its subject to the conditions set forth in the Price bid and terms & conditions of the contract (all of which are collectively hereinafter referred to as "the said conditions") the work shown upon the said technical specifications , and included in the Price bid at the respective rates therein set forth amounting the sum as therein arrived or such other sum as shall become payable there under (herein after referred as "the said contract amount").

NOW IT IS HEREBY AGREED AS FOLLOWS:-

1. In consideration hereinafter mentioned, the tenderer will look upon and subject to the conditions annexed, carry out and complete the work shown in the contract, described by or referred to the schedule of quantities and in the said conditions.

2. The Employer shall pay the Tenderer the said contract amount or such sum as shall become payable at the times and in the manner specified in the said conditions.

3. The said Conditions and Appendix thereto and the documents attached hereto shall be read and construed as forming part of this agreement and the parties hereto shall be respectively abide by, submit themselves to the said Conditions and the correspondence and perform the agreements on their part respectively in the said conditions and the documents contained herein.

4. This agreement and documents mentioned herein shall form the basis of this contract.

5. This contract is fixed lump – sum contract for the complete work to be paid for according to necessary installation carried out at site, at the rate contained in the Schedule of Rates or as provided in the said conditions.

6. The Tenderer shall afford every reasonable facility for carrying out of all works of other Contractors employed by the Employer and shall make good any damage done to walls , floors etc. after completion of such works.

FORM –T

ARTICLES OF AGREEMENT

7. The Employer reserves to itself the right of altering the nature of work by adding to or omitting any items of works or having portions of the same carried out without prejudice to this contract.

8. Time shall be considered as the essence of this contract, and the tenderer hereby agrees to commence the work/ job within the 10th day of the receipt of the work order as provided for in the said conditions and to complete the entire work within the time period prescribed below reckoned from date of receipt of such work order subject nevertheless to the provision for extension of time.

9. All payments by the Employer under this contract will be made only at PUNE.

10. All dispute arising out of or in any way connected with this agreement shall be deemed to have arisen at Pune and only courts in Pune shall have jurisdiction to determine the same to the exclusion of all other courts.

11. That the several parts of this contract have been read by the tenderer and fully understood by the tenderer.

IN WITNESS WHERE OF the Employer has set its hands to these presents through its duly authorized officials and the Tenderer has caused its common seal to be affixed hereunto and the said two duplicates / has caused these presents and the said two duplicates here of to be executed on its behalf, the day and year first herein above written (if the Tenderer is a company).

Signed and delivered by the within named

National Centre for radio & Astrophysics (NCRA)

By the hand of its authorized official [Name and Designation]

In presence of

[i]_

[ii]_

Signed and Delivered by Shri----------

In presence of

[i]

[ii]

Place:

Date:

FORM –U

CERTIFICATE OF VISIT TO THE SITE

Tender No.: NCRA:WF060:PUB419:2021

To,
Centre Director,
NCRA-TIFR,
Pune 411007, India.

Dear Sir,

With reference to your tender mentioned above, we have visited and have understood the scope of work and conditions of the site

National Centre for Radio Astrophysics
Tata Institute of Fundamental Research
Pune University Campus, Ganeshkhind,
Pune - 411007, Maharashtra, India

where the tendered work is to be carried out.

Name & Signature of Bidder : Name & Signature of Centre's Representative:

Designation : Date:

Company Seal & Phone No . :

Form V

UNDERTAKING

1. We have studied the complete tender document and accept all the terms and conditions except those specified in **Form H.**

2. It is certified that my firm/agency/company has never been black listed by any of the Departments / Autonomous Institutions / Universities / Public Sector Undertakings of the Government of India or Government of Maharashtra or any other State Government or Public Sector Banks or Local Bodies / Municipalities and no criminal case is pending against the said firm / agency as on **date of bidding**.

3. Works carried out by us shown in **Form E and Form F** have been carried out by us directly and not on back to back by third parties.

Date : **Signature of the Bidder :**

Place : **Name of the Bidder :**

Company Seal: **Designation :**

ANNEXURE- W

DETAILS OF GST

(PLEASE PROVIDE FULL INFORMATION WITHOUT WHICH YOUR BID MAY BE LIABLE FOR REJECTION. THIS MUST BE SUBMITTED WITH TECHNICAL BID)

(a) GST payable : _____ % extra

Your GST Tax Registration No. :

Company Seal

Signature of the Bidder:

Name :

Designation :

Date :

Chapter 7

Price Bid (Part II of the tender)

(To be submitted in a separate sealed envelope)
SCHEDULE OF WORK, QUANTITY AND RATE

The contractor shall submit price for bill of items in the following format for Design, Supply, installation, testing, commissioning, and maintenance of 120-150 KWp Grid connected Roof Top SPV based Solar Power Plant with net metering facility as per the technical specifications & conditions of the tender document and finally handing over the plant to NCRA with the following BOQ / items listed at NCRA, Pune University, Savitribai Phule Pune University Campus, Ganeshkhind, Pune 411007.

Sr. No.		Description of work			
1		Design, manufacture and supply of Complete materials for generation of One No. solar photovoltaic (SPV- High efficiency Mono crystalline solar cell) based grid interactive Roof top Solar power plant as per site requirement of NCRA, in synchronism with Mains as well as DG set including supply and installation of net metering facility, complying with all the electrical safety requirements as per IE rules & respective ISS, of minimum 120-150 KWp with a guaranteed annualized AC energy output of 180,000 KWH to 225000 KWH watt hour (KWH) per year during the first five years of operation including required quantities of SPV modules formed into arrays, their mounting arrangement, power conditioning units, required DC & AC distribution panels with surge protection units, cabling from terrace to main distribution board at ground floor with suitable supports/clamping as per site requirement, earthing as per IS and site requirement, data loggers along with PC based arrangement for system performance monitoring through licensed software, Net Metering, safety arrangements, etc. as defined in the scope and in accordance with the laid down functional requirement and specifications to provide a composite operational system including liaison for all statutory approval etc. as details mentioned in **Chapter 4 including onsite comprehensive Warranty of five years.**	**Qty.**	**Amount Rs. in figures.**	**Amount Rs. in words.**
	1.1	**120-150 KWp PV SOLAR MODULES- MONO CRYSTALLINE** Note: 1) Optimum wattage of each module, no. of modules considered, Make and technical details should be given in technical bid. 2) The total Solar PV array capacity shall be as specified in price schedule and shall be assembled with minimum 250 Wp (with minimum of 24V) Mono Crystalline MNRE approved solar modules with 60/ 72 cells.	Lumsum		
	1.2	**DC COMBINER BOXES/SMU/SMB FOR 120-150 KWp** Note: Designed optimum wattage of each box, make, no of boxes considered and technical details should be given in technical bid.	Lumsum		
	1.3	**DC DISTRIBUTION BOXES FOR 120-150 KWp** Note: Designed optimum wattage of each box, make, no of boxes considered and technical details should be given in technical bid.	Lumsum		

Company Seal

Signature of the Bidder:

Name :

Designation :

Date :

Sr. No.		Description of work	Qty.	Amount Rs. in figures.	Amount Rs. in words.
	1.4	**GRID –TIE STRING INVERTERS FOR 120-150 KWp** Note: Optimum wattage of each inverter, make, no of inverter considered and technical details should be given in technical bid.	Lumsum		
	1.5	**AC DISTRIBUTION BOXES FOR 120-150 KWp** Note: Designed optimum wattage of each box, make, no of boxes considered and technical details should be given in technical bid.	Lumsum		
			Qty.	**Unit Rate Rs. in figures.**	**Unit Rate Rs. in words.**
	1.6	**ARMOURED DATA COMMUNICATION AND SYSTEM CONTROL CABLES FOR 120-150 KWp** Bidders to mention quoted cable details (size, no cores/pairs, type, make) here and give rates per mtr basis. Note: Designed cable length, type, which/from item to & end item, termination details, no of cables considered and technical details in a tabular form should be given in technical bid.	Mtrs		
	1.7	**MAIN AC JUNCTION BOX OF IP65 TO RECEIVE SOLAR POWER: -** It Should have appropriately rated, insulated terminal connectors or insulated copper bus bar mounted on appropriately rated and insulators- as per requirement, two distinct safety earth terminals, electrical clearances as per IE rules/ISS etc. Note: Designed technical details should be given in technical bid.	No		
	1.8	**ALUMINUM ARMOURED POWER CABLE OFXLPE 1.1 KV RATING 3.5CORE 185SQMM-** Bidders to mention quoted cable details (size, no cores, type, make) here and give rates per mtr basis. Supply, installation, laying (as per IS 1255-1982 with amendment and clamping on wall with suitable reputed make fasteners/ fastening materials, supports as per site requirement), testing, 20nos end terminations as per the technical specifications & conditions of the tender document.c Note: Before procurement actual distance should be measured and should take approval for procurement from NCRA.	Mtrs		
2		Installation, Testing & Commissioning of the complete system including providing earthing, mounting arrangement for SPV/module /arrays, related civil works, net metering etc.as required and as specified to provide a complete Operational system including operational and maintenance training etc. of the above for a period of **three days** at NCRA-TIFR premises, Pune as follows: -			
	2.1	**CABLE TRENCH 200 X 750** Excavation of cable trench of size 200 x 750mm depth in wet, dry & rocky conditions of the soil for cable laying on a fine sand (without sharp edges) bed of 150mm in the excavated trench after cable laying again cover the cable by 150mm sand cover all sides with red bricks and back filling. Stacking of removed earth from all along the trench on either side after back filling and reinstatement. The excavate / removed excess sand should be transported to designated place as per NCRA official.	Sq. Ft.		
	2.2	**ROAD CUTTING 200X 750** Cutting the tar road or cement road / cobble stone road along with culverts either side of the road to make cable trench of size 200mm wide x 750mm depth, laying of 100mm dia GI pipes and remaking to original shape both road with tar, pcc & culverts with bricks, plastering as directed by NCRA Officials for the run of Power / Telephone / LAN cables at the road crossings, building entry, underground floor and over the walls.	Sq. Ft.		
	2.3	**CIVIL- PCC (1:2:4) PEDESTALAS** Plain Cement Concrete (1:2:4) nominal mix using 20mm size graded machine crushed hard granite metal (coarse aggregate – as per IS 383 – 1970 and IS 2386 Part 1 to Part 8) From approved quarry including cost and conveyance of all materials like cement, fine aggregate (river sand), coarse aggregate, water etc. to site, including centering /Shuttering Lift charges, curing ,mixing charges, including Surface preparation by chipping of all existing loose concrete, dead mortar and cleaning of the surface from dirt, dust and other contaminations with wire	Cubic Meter		

Company Seal

Signature of the Bidder:
Name :
Designation :

Date :

Sr. No.		Description of work	Qty.	Unit Rate in Rs. in figures.	Unit Rate in Rs. in words.
	2.4	**CIVIL- RCC (1:2:4) PEDESTALAS** Reinforced Cement Concrete (1:2:4) nominal mix using 20mm size graded machine crushed hard granite metal (coarse aggregate – as per IS 383 – 1970 and IS 2386 Part 1 to Part 8) from approved quarry including cost and conveyance of all materials like cement, fine aggregate (river sand), coarse aggregate, water etc. to site, including centering /Shuttering ,Lift charges, curing ,mixing charges, including cost of steel as per drawing & GI binding wire, including Surface preparation by chipping of all existing loose concrete, dead mortar and cleaning of the surface from dirt, dust and other contaminations with wire brush including application of Nito bond (EP) to the old concrete to receive the fresh concrete including cost and conveyance of all materials, labour charges, all taxes, complete for finished item of work etc.	Cubic Meter		
	2.5	**CIVIL- DRILLING OF HOLES ABOVE TERRACE** Drilling holes of 16mm dia and 100mm deep in RCC beam with pneumatic compressor and placing of 12mm dia Tor steel bars and grouting the holes in HILTY RE 500 including cost of steel and its fabrication charges , cost and conveyance of all materials and labour charges , all taxes, leads, lifts etc. complete for finished item of work	Nos		
	2.6	**CIVIL -3MM THICK APP MODIFIED BITUMEN MEMBRANE TREATMENT ABOVE TERRACE** Providing and laying of 3mm thick app modified bitumen membrane treatment to the terrace duly [1] removing of existing tar felt. [2] Cleaning of the surface from dirt, dust and other contaminations. [3]application of one coat of Bitumen primer [4]providing and laying of 3mm thick APP Modified Bitumen Membrane with 100 mm overlap fixing with butane torch including cost and conveyance of all materials to site, all taxes, labour charges, lift charges etc., complete for finished item	Sqm		
	2.7	**CIVIL –STRUCTURAL STEEL (SUPPORT STRUCTURE FOR SOLAR PANELS) WITH 75 X 75 X 5 MM GI COATED SQUARE HOLLOW SECTIONS** Providing, fabricating and fixing in position of structural steel (support structure for solar panels) with 75 x 75 x 5 mm GI coated Square Hollow Sections of Jindal/ Tata make for fixing of Solar Panels as show in in the detailed approved drawings including cutting, welding, hoisting, supply & use of anchor fasteners if/as required & including cost and conveyance of all materials, all taxes, labour charges for fabrication erection at site work for all heights etc., complete as directed by the Engineer-in-Charge for finished item of work	KGs		
	2.8	**CIVIL- GI COATED STRUCTURAL STEEL WORKS** Supplying, fabricating, hoisting, erecting in position GI coated structural steel works comprising of trusses, lattice girders, brackets, column, bracing, rafters and other connected works with necessary joints, channels, angles, I-section, plates, Hot dip galvanized Nuts, bolts, spring and plain washers etc as shown in the detailed approved drawings including cutting, welding, hoisting including cost and conveyance of all materials, all taxes, labour charges for fabrication erection at site work for all heights etc., complete as directed by the Engineer-in-Charge for finished item of work	KGs		
	2.9	**CIVIL- PROVIDING AND ANCHORING IN POSITION 20MM DIA AND 200MM LONG HIGH STRENGTH ANCHOR BOLTS OF HILTY MAKE** Providing and anchoring in position 20mm dia and 200mm long high strength anchor bolts of HILTY Make and welding (with bolts) in bottom including drilling, anchoring and grouting with chemical necessary equipment including sales & other taxes on all materials, and all operational, incidental charges on materials and including cost of all labour charges etc., complete as per specifications and directed by the Engineer- in-Charge for finished item of work	Nos		
	2.10	**CIVIL- PLASTERING 12MM THICK SINGLE COAT IN CM (1:5)** Plastering 12mm thick single coat in CM (1:5) using screened sand including cost and conveyance of all materials like cement, river sand, water etc., to site, including sales & other taxes on all materials, and all operational, incidental charges on materials and including cost of all labour charges for mixing mortar, finishing, curing as directed by Engineer-in-charge etc., complete for finished item of work	Sqm		

Company Seal

Signature of the Bidder:
Name :
Designation :
Date :

Sr. No.		Description of work	Qty.	Unit Rate in Rs. in figures.	Unit Rate in Rs. in words.
	2.11	**CIVIL-SUPPLY AND INSTALLATION GI PERFORATED CABLE TRAY WITH COVER AND GI JUNCTION BOX** Supply and Installation of different sizes of GI perforated cable tray with cover and junction boxes along with required angle supports, with coupler plates, Anchor bolts and nuts including cost and conveyance of all materials etc., complete and the tray should be fitted on the wall / Ceiling/Fencing poles etc. complete. Bidders to mention the size of the cable treys quoted for. In case cable treys of different sizes are required- bidders should quote rates separately for each size.	RMT		
	2.12	**COPPER ARMOURED POWER CABLES FOR 120-150 KWp-** Bidders to mention quoted cable details (size, no cores, type, make) here and give rates per mtr basis. Note: 1) Designed cable length, type, which/from item to & end item, termination details, no of cables considered and technical details in a tabular form should be given in technical bid 3) Other than 3.5Core x185sqmm aluminum power cable required for the system	Mtrs		
			Qty.	**Amount Rs. in figures.**	**Amount Rs. in words.**
	2.13	**EARTHING AND LIGHTNING PROTECTION for 120-150 KWp** Note: 1) Designed GI strip length & size, type, which/from item to & end item, termination details as per **IEC 60364-1 and 60364-4-41**, no of earth pits considered and technical details in a tabular form should be given in technical bid.	Lumsum		
			Qty.	**Unit Rate in Rs. in figures.**	**Unit Rate in Rs. in words.**
	2.13(a)	**Construction of copper plate earth electrodes as per ISS: 3043:1987-** including supply, transport and use of all required materials- a complete job. Bidders to mention the required no of earth electrodes. Earthing complete with copper earth plate 600 x 600 x 3 mm thick buried in ground vertically to a depth not less than 2.25m below ground level with top edge of the earth plate not less than 1.5m below normal ground level, Note**:** Institute reserves the right to decide the no of earth electrode qty. Payment will be made on actual used qty.	Nos		
	2.13(b)	**Supply and installation of earth connectivity conductor –** copper strip/PVC insulated cable/ GI wire etc as per site requirement /as applicable as per ISS /IE rules – including supply and use of necessary fasteners/clamps. Bidders to mention the size of earth connectivity conductor quoted for. Note**:** Payment will be made on actual used qty.	RMT		
			Qty.	**Amount Rs. in figures.**	**Amount Rs. in words.**
	2.14	**SCADA CUM WEATHER SENSOR STATION–DATA ACQUISTION, PERFORMANCE MONITORING & REPORTING** Note: 1) Make, model nos for weather station & SCADA, measured, monitored & accuracy levels parameters considered, at what level the parameters inputs are taken, software & hard ware details along with quantities considered and all technical details in a tabular form should be given in technical bid	Lumsum		

Note: - Items which are necessary for the systems satisfactory functioning and performance as per the specifications but not covered in the tender/BOQ may also be quoted for.

Date : Signature of Bidder :

Name & Designation :

Place : Company Name & Address :

Company Seal & Phone No. :