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T E N D E R S P E C I F I C A T I O N

TENDER NO. BHEL/ NR/SCT/ ANPARA D/ELECTRICAL/UNIT NO. 6/906

FOR

"HANDLING AT SITE/STORES, TRANSPORTATION TO SITE OF WORK, PRE ASSY., ERECTION, TESTING, COMMISSIONING & HANDING OVER OF ELECTRICAL PACKAGE OF UNIT NO. 6 AT 2X500 MW ANPARA D TPS, DISTT. SONEBHADRA, U.P."

PART I – TECHNICAL BID

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)

ISO 9001, ISO 14001, OHSAS 18001 & SA 8000 certified company
SubContract and Purchase Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)
Phone: 0091-0120- 2416232 / 2416296
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TENDER NO. BHEL/ NR/SCT/ ANPARA D/ELECTRICAL/UNIT NO. 6/906

IMPORTANT NOTE

PURCHASER OF THIS TENDER DOCUMENT IS ADVISED TO CHECK AND ENSURE COMPLETION OF ALL PAGES OF TENDER DOCUMENT AND REPORT ANY DISCREPANCY TIMELY FOR CORRECTIVE ACTION, IF ANY, TO THE ISSUING AUTHORITY BEFORE THE BIDS ARE SUBMITTED. ORIGINAL COPY OF TENDER DOCUMENT COMPLETE IN ALL RESPECTS MUST BE SUBMITTED BACK AS PART OF THE BID WITHOUT WHICH THE SAME IS LIABLE TO BE REJECTED BY BHEL.

THIS TENDER SPECIFICATION ISSUED TO:

M/S----------

Rev 01
1st Jun
2012

NOTICE INVITING TENDER

(Document No PS:MSX:NIT)

Bharat Heavy Electricals Limited

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NOTICE INVITING TENDER (NIT)

NOTE: BIDDER MAY DOWNLOAD FROM WEB SITES OR PURCHASE TENDERS FROM THIS OFFICE ALSO

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To

Dear Sir/Madam

Sub : NOTICE INVITING TENDER

Sealed offers in two part bid system are invited from reputed & experienced bidders (meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-I) for the subject job by the undersigned on the behalf of BHARAT HEAVY ELECTRICALS LIMITED as per the tender document. Following points relevant to the tender may please be noted and complied with.

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION	
i	TENDER NUMBER	**BHEL/ NR/SCT/ ANPARA D/ELECTRICAL/UNIT NO. 6/906**	
ii	Broad Scope of job	**"HANDLING AT SITE/STORES, TRANSPORTATION TO SITE OF WORK, PRE ASSY., ERECTION, TESTING, COMMISSIONING & HANDING OVER OF ELECTRICAL PACKAGE OF UNIT NO. 6 AT 2X500 MW ANPARA D TPS, DISTT. SONEBHADRA, U.P."**	
iii	DETAILS OF TENDER DOCUMENT		
a	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc*	***Applicable***
b	Volume-IB	*Special Conditions of Contract (SCC)*	***Applicable***
c	Volume-IC	*General Conditions of Contract (GCC)*	***Applicable***
d	Volume-ID	*Forms and Procedures*	
e	Volume-II	*Price Schedule (Absolute value).*	***Applicable***
iv	**Issue of Tender Documents**	***1. Sale from BHEL PS Regional office at :*** ***Start 03.01.2013 , Time :09:00 Hrs*** ***Closes: 10.01.2013 , Time : 12:00 Hrs*** **2. From BHEL website (www.bhel.com)** Tender documents will be available for downloading from website till due date of submission	***Applicable/*** ~~*Not applicable*~~
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date : 10.01.2013 , Time : 15:00 Hrs*** ***Place : BHEL PSNR NOIDA***	***Applicable***
vi	**OPENING OF TENDER**	***Date: 10.01.2013*** *(Within 2 hours of the latest due date and time of offer submission).* *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, then the due date &*	***Applicable***

		time of offer submission and opening of tenders get extended to the next working day. *(2) Bidder may depute representative to witness the opening of tender*	
vii	**EMD AMOUNT**	***Rs 2,00,000***	***Applicable***
viii	**COST OF TENDER**	***Rs 2000/-***	***Applicable***
ix	**LAST DATE FOR SEEKING CLARIFICATION**	*Date:* *Along with soft version also, addressing to undersigned & to others as per contact address given below*	***Applicable***
x	**SCHEDULE OF Pre Bid Discussion (PBD)**		~~*Applicable*~~*/* ***Not Applicable***
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**		~~*Applicable*~~*/* ***Not Applicable***
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) **and not in the newspapers**. Bidders to keep themselves updated with all such information	

2.0 The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, duly signed & stamped on each page, as part of offer. **Rates/Price including discounts/rebates, if any, mentioned anywhere/in any form in the techno-commercial offer other than the Price Bid, shall not be entertained.**

3.0 Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at Noida issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at Noida, Sundays and second/ last Saturdays

4.0 Unless specifically stated otherwise, bidder shall deposit EMD through Demand Draft/Pay Order in favour of Bharat Heavy Electricals Ltd, payable at Noida. For other details and for 'One Time EMD' please refer General Conditions of Contract.

5.0 **Procedure for Submission of Tenders**: The Tenderers must submit their Tenders to Officer inviting Tender, as detailed below:

- PART-I consisting of 'PART-I A (Techno Commercial Bid)' & 'PART-I B (EMD/COST of TENDER)' in two separate sealed and superscribed envelopes (ENVELOPE-I & ENVELOPE-II)
- PART-II (Price Bid) – in sealed and superscribed envelope (ENVELOPE-III)
- One set of tender documents shall be retained by the bidder for their reference

6.0 The contents for ENVELOPES and the superscription for each sealed cover/Envelope are as given below. **(All pages to be signed and stamped)**

Sl no	Description	Remarks

	Part-I A	
	ENVELOPE – I superscribed as : PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**:-	
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	Duly filled-in `No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above. **Note:** a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained. b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding. i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender	
iii.	Supporting documents/ annexure/ schedules/ drawing etc as required in line with Pre-Qualification criteria. It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph no, FAX no, etc.	
iv.	All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	If applicable
vi.	Duly filled-in annexures, formats etc as required under this Tender Specification/NIT	
vii.	Notice inviting Tender (NIT)	
viii.	Volume – I A : Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc	
ix.	Volume – I B : Special Conditions of Contract (SCC)	
x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

	PART-I B	
	ENVELOPE – II superscribed as: PART-I (EMD/COST of TENDER) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**:-	
i.	1. Earnest Money Deposit (EMD) in the form as indicated in this Tender **OR**	

	Documentary evidence for 'One Time EMD' with the Power Sector Region of BHEL floating the Tender 2. Cost of Tender (Demand Draft or copy of Cash Receipt as the case may be)	

	PART-II	
	PRICE BID consisting of the following shall be enclosed	
	ENVELOPE-III superscribed as: PART-II (PRICE BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**	
i	Covering letter/Offer forwarding letter of Tenderer enclosed in Part-I	
ii	Volume II – PRICE BID (Duly Filled in Schedule of Rates – rate/price to be entered in words as well as figures)	

	OUTER COVER	
	ENVELOPE-IV (MAIN ENVELOPE / OUTER ENVELOPE) superscribed as: TECHNO-COMMERCIAL BID, PRICE BID & EMD TENDER NO: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING:**	
i	o Envelopes I o Envelopes II o Envelopes III	

SPECIAL NOTE: All documents/ annexures submitted with the offer shall be properly annexed and placed in respective places of the offer as per enclosure list mentioned in the covering letter. BHEL shall not be responsible for any missing documents.

7.0 Deviation with respect to tender clauses and additional clauses/suggestions in Techno-commercial bid / Price bid shall NOT be considered by BHEL. Bidders are requested to positively comply with the same.

8.0 BHEL reserves the right to accept or reject any or all Offers without assigning any reasons thereof. BHEL also reserves the right to cancel the Tender wholly or partly without assigning any reason thereof. Also BHEL shall not entertain any correspondence from bidders in this matter (except for the refund of EMD).

9.0 Assessment of Capacity of Bidders:

Bidders capacity for executing the job under tender shall be assessed 'LOAD' wise and 'PERFORMANCE' wise as per the following:

I. **LOAD**: Load takes into consideration **ALL** the contracts of the Bidder under execution with BHEL Regions, irrespective of whether they are similar to the tendered scope or not. The 'Load' is the sum of the unit wise identified packages (refer Table-1) for contracts with BHEL Regions. The cut off month for reckoning 'Load'

shall be the month, two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

(Note: For example if latest bid submission is in Aug 2011, then the 'load' shall be calculated upto and inclusive of June 2011)

i). Total number of Packages
Total number of Packages in hand = P
Where
- P is the sum of all unit wise identified packages under execution with BHEL Regions as of the cut off month defined above, including packages yet to be commenced.

ii) Weightage "A" assigned to bidders based on Total number of Packages 'P':
a) If 'P' = 0-9, : "A" will be equal to '4'
b) If 'P' = 10-18, : "A" will be equal to '3'
c) If 'P' = 19-36, : "A" will be equal to '2'
d) If 'P' = 37-60, : "A" will be equal to '1'
e) If 'P' is above 60 : "A" will be equal to '0'

II. **PERFORMANCE**: Here 'Monthly Performance' of the bidder for all the packages (**under execution**/ executed during the 'Period of Assessment' in all the Power Sector Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced shall be taken into consideration. The 'Period of Assessment' shall be 6 months preceding the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the month two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

(**Note**: For example if 'latest date of bid submission' is in Aug 2011, then the 'performance' shall be assessed for a 6 month period upto and inclusive of June 2011, for all the unit wise identified packages (refer Table I)

i). Calculation of Overall 'Performance Rating' for 'similar Package/Packages' for the tendered scope under execution at Power Sector Regions:
This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for all the similar Package/packages', divided by the total number of Package months for which evaluation should have been done, as per procedure below:

a) P_1, P_2, P_3 , P_4 , P_5 , …. P_N etc be the packages (**under execution**/ executed during the 'Period of Assessment' in all Regions) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = $\mathbf{P_T}$ (ie $P_T = P_1 + P_2 + P_3 + P_4 + .. P_N$)

b) Number of Months 'T_1' for which 'Monthly Performance Evaluation' as per relevant formats, should have been done in the 'Period of Assessment' for the corresponding similar package P_1. Similarly T_2 for package P_2, T_3 for package P_3, etc for the tendered scope. Now calculate cumulative total months '$\mathbf{T_T}$' for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e $\mathbf{T_T} = T_1 + T_2 + T_3 + T_4 + .. T_N$)

c) Sum 'S_1 ' of 'Monthly Performance Evaluation' Scores ($S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, $S_{1\text{-}5}$,…. $S_{1\text{-}N}$) for similar package P_1, for the 'period of assessment' 'T_1' (i.e $S_1 = S_{1\text{-}1} + S_{1\text{-}2} + S_{1\text{-}3} + S_{1\text{-}4} + S_{1\text{-}5} + \ldots S_{1\text{-}N}$). Similarly S_2 for package P_2 for period T_2, S_3 for package P_3 for period T_3, etc for the tendered scope for all Regions. Now calculate cumulative sum 'S_T' of 'Monthly Performance Evaluation' Scores for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e 'S_T'$= S_1 + S_2 + S_3 + S_4 + S_5 + \ldots S_N$.)

d) **Overall Performance Rating 'R_{BEHL}' for the similar Package/Packages** (**under execution**/ executed during the 'Period of Assessment') in all the Power Sector Regions of BHEL)**:**

Aggregate of Performance scores for all similar packages in all the Regions
= **----------**

Aggregate of months for each of the similar package for which performance should have been evaluated in all the Regions

$$= \frac{S_T}{T_T}$$

e) Bidders to note that the risk of non evaluation or non availability of the 'Monthly Performance Evaluation' reports as per relevant formats is to be borne by the Bidder

f) Table showing methodology for calculating 'a', 'b' and 'c' above

Sl no	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions →	P_1	P_2	P_3	P_4	P_5	…	P_N	Total No of similar packages for all Regions = $\mathbf{P_T}$ ie Sum (Σ) of columns (iii) to (ix)
2	Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment for corresponding similar Package (as in row 1)	T_1	T_2	T_3	T_4	T_5	…	T_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{T_T}$
3	Monthly performance scores for the corresponding period (as in Row 2)	S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, … S_{1-T1}	S_{2-1}, S_{2-2}, S_{2-3}, S_{2-4}, … S_{2-T2}	S_{3-1}, S_{3-2}, S_{3-3}, S_{3-4}, … S_{3-T3}	S_{4-1}, S_{4-2}, S_{4-3}, S_{4-4}, … S_{4-T4}	S_{5-1}, S_{5-2}, S_{5-3}, S_{5-4}, … S_{5-T5}	.. … … … …	S_{N-1}, S_{N-2}, S_{N-3}, S_{N-4}, … S_{N-TN}	---------
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S_1	S_2	S_3	S_4	S_5	…	S_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{S_T}$

ii) Weightage "B" assigned to bidders based on Overall Performance Rating (R_{BHEL}) at Power Sector Regions, for the respective Package:

a) If $\mathbf{R_{BHEL}}$ is ≥ 80%, "B" will be equal to '6'
b) If $\mathbf{R_{BHEL}}$ is ≥ 75% < 80%, "B" will be equal to '5'
c) If $\mathbf{R_{BHEL}}$ is ≥ 70% < 75%, "B" will be equal to '4'
d) If $\mathbf{R_{BHEL}}$ is ≥ 65% < 70%, "B" will be equal to '3'
e) If $\mathbf{R_{BHEL}}$ is ≥ 60% < 65%, "B" will be equal to '2'
f) If $\mathbf{R_{BHEL}}$ is < 60%, "B" will be equal to '0'

III. 'Assessment of Capacity of Bidder' to be Qualified for the tender:

Shall be based on the sum of the weightages obtained in 'LOAD' (A) and 'PERFORMANCE' (B) as below:

a) **If the sum (A+B) is 6 or above for each of the applicable Package, then the Bidder is considered 'Qualified' for the tender**
b) **If the sum (A+B) is less than 6 for any of the applicable Package, then the Bidder is considered 'NOT Qualified' for the tender**

IV. **Explanatory note**:

a) Similar package means Boiler or ESP or Piping or Turbine or Civil or Structure or Electrical or CI, etc at the individual level irrespective of rating of Plant, and irrespective of whether the subject tender is a single package or as part of combined/composite packages. Normally Boiler, ESP, Piping, Turbine, Electrical, CI, Civil, Structure, etc is considered individual level of package. For example in case the tendered scope is a Boiler Vertical Package comprising of Boiler, ESP and Power Cycle Piping (i.e the 'identified packages as per Table-1 below), the 'PERFORMANCE' part against sl no II above, needs to be evaluated considering all the identified packages (ie Boiler, ESP and Power Cycle Piping) and finally the Bidder's capacity to execute the tendered scope is assessed in line with III above

b) Identified Packages (Unit wise)

Table-1

	Civil	Electrical & CI	Mechanical
	i). Enabling works ii). Pile and Pile Caps iii). Civil Works including foundations iv). Structural Steel Fabrication & Erection v). Chimney vi). Cooling Tower vii). Others (Civil)	i). Electrical ii). CI iii). Others (Elec & CI)	i). Boiler & Aux (All types including CW Piping if applicable) ii). Power Cycle Piping/Critical Piping iii). LP Piping iv). ESP v). Steam Turbine Generator set & Aux vi). Gas Turbine Generator set & Aux vii). Hydro Turbine Generator set & Aux viii). Turbo Blower (including Steam Turbine) ix). Material Handling x). Material Management xi). Material Handling & Material Management xii). Others (Mechanical)

c) Vendors who are first timers to any BHEL Region, may be considered subject to satisfying other tender conditions. Eligibility of the party for the next tender of any package in that Region, shall be subject to the bidder satisfying the 'Assessment of Capacity of Bidder' for a period of first **nine months** after commencement of work or contract duration whatever is lesser.

In case the first timer is executing any other packages in any BHEL Region, then the performance evaluation will be based on the data available for the other packages though not similar, for the 'Period of assessment', for the purpose of 'Assessment of Capacity of Bidder'

d) Vendors who are not first timers and who have not been executing any package or packages similar to the packages under the tender in the 'Period of assessment', shall be considered qualified subject to them satisfying all other tender conditions.

e) In the unlikely event of all bidders shortlisted against Technical and Financial Qualification criteria not meeting the criteria on 'Assessment of Capacity of Bidders' detailed above, OR leads to a single tender response on applying the criteria of 'Assessment of Capacity of Bidders', then BHEL at its discretion, reserves the right to consider the further processing of the Tender based on the **Overall Performance Rating** 'R_{BHEL}**'** only**.**

f) 'Under execution' shall mean works in progress as per the following:

i. upto Boiler Steam Blowing in case of Steam Generator and Auxilliaries

ii. upto Synchronisation in case of all other works excepting sl no (i) and (iii)

iii. upto execution of at least 75% of anticipated contract value (unit wise), in case of Enabling works or Civil & Structures.

Note : BHEL at its discretion can extend (or reduce in exceptional cases in line with Contract conditions) the period defined against (i), (ii) and (iii) above, depending upon the balance scope of work to be completed.

g) Performance evaluation in CL 9 above is applicable to Prime bidder and consortium partner (or Technical tie up partner) for their respective scope of work

10.0 Since the job shall be executed at site**,** bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation, applicable wage structure, wage rules, etc before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions.

11.0 For any clarification on the tender document, the bidder may seek the same in writing or through e-mail, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.

12.0 BHEL may decide holding of pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.

13.0 In the event of any conflict between requirement of any clause of this specification/ documents/drawings/data sheets etc or requirements of different codes/standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise, interpretation by BHEL shall prevail. Any typing error/missing pages/ other clerical errors in the tender documents, noticed must be pointed out before pre-bid meeting/submission of offer, else BHEL's interpretation shall prevail.

14.0 Unless specifically mentioned otherwise, bidder's quoted price shall deemed to be in compliance with tender including PBD.

15.0 Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if applicable**, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at point (1) above.**

16.0 The Bidder has to satisfy the Pre Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of satisfying the Pre Qualification Criteria specified in this NIT as per Annexure-I (as applicable), past performance etc. and date of opening of price bids shall be intimated to only such bidders. BHEL reserves the right not to consider offers of parties under HOLD.

17.0 In case BHEL decides on a `Public Opening', the date & time of opening of the sealed PRICE BID shall be intimated to the qualified bidders and in such a case, bidder may depute one authorised representative to witness the price bid opening. BHEL reserves the right to open 'in-camera' the 'PRICE BID' of any or all Unsuccessful/Disqualified bidders under intimation to the respective bidders.

18.0 Validity of the offer shall be for **six months** from the latest due date of offer submission (including extension, if any) unless specified otherwise.

19.0 BHEL reserves the right to decide the successful bidder on the basis of Reverse Auction process. In such case all qualified bidders will be intimated regarding procedure/ modality for Reverse Auction process prior to Reverse Auction and price will be decided as per the rules for Reverse Auction. .

However, if reverse auction process is unsuccessful as defined in the RA rules/procedures, or for whatsoever reason, then the sealed 'PRICE BIDs' will be opened for deciding the successful bidder. BHEL's decision in this regard will be final and binding on bidder.

20.0 On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.

21.0 In case the bidder is an "Indian Agent of Foreign Principals", 'Agency agreement has to be submitted along with Bid, detailing the role of the agent along with the terms of payment for agency commission in INR, along with supporting documents.

22.0 The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.

23.0 Consortium Bidding (or Technical Tie up) shall be allowed only if specified in Pre Qualifying Requirement (PQR) criteria, and in such a case the following shall be complied with:

23.1 Prime Bidder and Consortium Partner or partners are required to enter into a consortium agreement with a validity period of six months initially. In case the consortium is awarded the contract, then the Consortium Agreement between the Prime Bidder and Consortium Partner or partners shall be extended till contractual completion period including extension periods if any applicable.

23.2 'Stand alone' bidder cannot become a '**Prime Bidder' or a 'Consortium bidder' or 'Technical Tie up bidder' in a consortium (or Technical Tie up) bidding**. Prime bidder shall neither be a consortium partner to other prime bidder nor take any other consortium partners. However, consortium partner may enter into consortium agreement with other prime bidders. In case of non compliance, consortium bids of such Prime bidders will be rejected.

23.3 Number of partners for a consortium Bidding (or Technical Tie up) shall be as specified in the PQR

23.4 Prime Bidder shall be as specified in the Pre Qualification Requirement, else the bidder who has the major share of work

23.5 In order to be qualified for the tender, Prime Bidder and Consortium partner or partners shall satisfy (i) the Technical 'Pre Qualifying Requirements' specified for the respective package, (ii) "Assessment of Capacity of Bidder' as specified in clause 9.0

23.6 Prime Bidder shall comply with additional 'Technical' criteria of PQR as defined in 'Explanatory Notes for the PQR'

23.7 Prime Bidder shall comply with all other Pre Qualifying criteria for the Tender unless otherwise specified

23.8 In case customer approval is required, then Prime Bidder and Consortium Partner or partners shall have to be individually approved by Customer for being considered for the tender.

23.9 Prime Bidder shall be responsible for the overall execution of the contract

23.10 In case of award of job, Performance shall be evaluated for Prime Bidder and Consortium Partner or partners for their respective scope of work(s) as per prescribed formats

23.11 In case the Consortium partner or partners back out, their SDs shall be encashed by BHEL. In such a case, other consortium partner or partners meeting the PQR have to be engaged by the Prime Bidder, and if not, the respective work will be withdrawn and executed on risk and cost basis of the Prime Bidder. The new consortium partner or partners shall submit fresh SDs as applicable.

23.12 In case the prime Bidder withdraws, the whole contract shall be considered cancelled and short closed.

23.13 After execution of work, the work experience shall be assigned to the Prime Bidder and the consortium partner or partners for their respective scope of work. After successful execution of two similar works with the same consortium partner or partners under direct orders of BHEL, the Prime Bidder shall be eligible for becoming a 'stand alone' bidder for similar works, subject to certification from BHEL about the active involvement of the Prime Bidder for satisfactory execution of the works.

23.14 The consortium partner shall submit SD equivalent to 2% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value. In case there are two consortium partners, then each partner shall submit SD equivalent to 1% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value.

23.15 In case of a Technical Tie up, all the clauses applicable for the Consortium partner shall be applicable for the Technical Tie up partner also

24.0 The bidder shall submit documents in support of possession of 'Qualifying Requirements' duly self certified and stamped by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents/proofs, these shall be submitted immediately.

25.0 The bidder may have to produce original document for verification if so decided by BHEL.

26.0 Electrical work of 2x500 MW Anpara D TPS is divided into two packages unit wise i.e. separately for unit no. 6 & 7. Each Package is floated separately. The successful bidder of unit no. 6 work shall not be considered for the unit no. 7 work & vice versa.

27.0 Order of Precedence

In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be in the order below:

a. Amendments/Clarifications/Corrigenda/Errata etc issued in respect of the tender documents by BHEL
b. Notice Inviting Tender (NIT)
c. Price Bid
d. Technical Conditions of Contract (TCC)—Volume-1A
e. Special Conditions of Contract (SCC) —Volume-1B
f. General Conditions of Contract (GCC) —Volume-1C
g. Forms and Procedures —Volume-1D

for BHARAT HEAVY ELECTRICALS LTD

(SCT)

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List.
03 Annexure-3 Reverse Auction Details
04 Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING REQUIREMENTS

JOB	**"HANDLING AT SITE/STORES, TRANSPORTATION TO SITE OF WORK, PRE ASSY., ERECTION, TESTING, COMMISSIONING & HANDING OVER OF ELECTRICAL PACKAGE OF UNIT NO. 6 AT 2X500 MW ANPARA D TPS, DISTT. SONEBHADRA, U.P."**
TENDER NO	**BHEL/ NR/SCT/ ANPARA D/ELECTRICAL/UNIT NO. 6/906**

SL. NO	PRE QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the PQR Criteria Name and Description of qualifying criteria
1.0	**TECHNICAL CRITERIA**	
1.1	The bidder should have executed during last 7 years, the electrical works in Power Plant consisting of: a) Power Transformers of rating 64 MVA or higher b) HT Bus Ducts c) HT Switchgears Note: Above works in one or more contracts shall be qualified	
1.2	Bidder should have executed similar work in the last 7 years of any one of the following:- One (1) work of value not less than Rs.400 Lakhs OR Two (2) works each of value not less than Rs. 250 Lakhs OR Three (3) works each of value not less than Rs. 200 lakhs	
1.3	The bidder should have executed atleast one (1) contract for power plant or industrial installation in which bidder should have installed power and control cables including 11kV unearthed or higher grade cables along with accessories and associated cable trays, which must be in successful operation for a period of atleast two (2) years as on date of bid opening. The total quantum of cabling involved in such contract shall be 400 Kms or more. Relevant document to submit in proof of this.	
2.0	**FINANCIAL CRITERIA**	
2.1	Bidder should have an average annual turnover of minimum of Rs. 150 Lakhs (Rs. One Hundred Fifty lakhs only) based on the audited accounts of last three financial years (2009-10, 2010-11 & 2011-12). Bidders shall submit audited annual accounts (balance sheets and profit & loss account) in support of this.	
2.2	Net worth of the Bidder based on the latest Audited Accounts as furnished for 2.1 above should be positive	
2.3	Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three years defined in 2.1 above based on latest Audited accounts.	
3.0	**Submission of Integrity Pact duly signed.**	**Not Applicable**

4.0	**Assessment of Capacity of Bidder to execute the work as per sl no. 9 of NIT (if applicable)**	**Applicable**
5.0	**Approval of Customer required**	**Applicable**
6.0	**Consortium criteria (if applicable)**	**Not Applicable**

NOTE:

1. Similar work against S.no.1.2 means any Electrical work consists of Transformers or HT/LT bus duct or HT /LT switchgear or Power or control cabling.
2. If the Qualifying work is executed in the 7 years period as specified above, even if it has been started earlier, the same will also be considered meeting the qualifying requirements.
3. Executed against S.no.1.1 & 1.2 means Charging of Transformers, HT/LT Bus ducts, HT/LT switchgear or Power or Control Cabling. Executed against S.no.1.3 means charging of cables.
4. In case work order/PO enclosed by bidders do not have separate break up of prices for E&C for electrical works i.e. having composite order for supply and E&C, if any, then value of E&C shall be considered as 15% of the price of composite order.
5. Net worth shall be calculated based on the latest audited accounts as furnished for 2.1 above.Net worth=Paid up share capital*+Reserves(* share capital or partnership capital or proprietor capital as the case may be)
6. Net Profit (PAT+Non cash expenditure viz depreciation) earned during any one year of last three financial years.

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BIDDER SHALL SUBMIT ABOVE PRE-QUALIFICATION CRITERIA FORMAT, DULY FILLED-IN, SPECIFYING RESPECTIVE ANNEXURE NUMBER AGAINST EACH CRITERIA AND FURNISH RELEVANT DOCUMENT INCLUSIVE OF WORK OREDER AND WORK COMPLETION CERTIFICATE ETC IN THE RESPECTIVE ANNEXURES IN THEIR OFFER.

ANNEXURE - 2

CHECK LIST

NOTE:- Tenderers are required to fill in the following details and no column should be left blank

1	Name and Address of the Tenderer		
2	Details about type of the Firm/Company		
3.a	Details of Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Email ID: Fax No:	
3.b	Details of alternate Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Email ID: Fax No:	
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER	
5	Validity of Offer	TO BE VALID FOR SIX MONTHS FROM DUE DATE	
		APPLICABILITY (BY BHEL)	ENCLOSED BY BIDDER
6	Whether the format for compliance with **PRE QUALIFICATION CRITERIA** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES / NO
7	Audited profit and Loss Account for the last three years	Applicable/~~Not Applicable~~	YES/NO
8	Copy of PAN Card	Applicable/~~Not Applicable~~	YES/NO
9	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable/~~Not Applicable~~	YES/NO
10	Integrity Pact	~~Applicable~~/Not Applicable	YES/NO
11	Declaration by Authorised Signatory	Applicable/~~Not Applicable~~	YES/NO
12	No Deviation Certificate	Applicable/~~Not Applicable~~	YES/NO
13	Declaration confirming knowledge about Site Conditions	Applicable/~~Not Applicable~~	YES/NO
14	Declaration for relation in BHEL	Applicable/~~Not Applicable~~	YES/NO
15	Non Disclosure Certificate	Applicable/~~Not Applicable~~	YES/NO
16	Bank Account Details for E-Payment	Applicable/~~Not Applicable~~	YES/NO
17	Capacity Evaluation of Bidder for current Tender	Applicable/~~Not Applicable~~	YES/NO

18	Tie Ups/Consortium Agreement are submitted as per format	~~Applicable~~/Not Applicable	YES/NO
19	Power of Attorney for Submission of Tender/Signing Contract Agreement	Applicable/~~Not Applicable~~	YES/NO
20	Analysis of Unit rates	Applicable/~~Not Applicable~~	YES/NO

NOTE : STRIKE OFF 'YES' OR 'NO', AS APPLICABLE. TENDER NOT ACCOMPANIED BY THE PRESCRIBED **ABOVE APPLICABLE DOCUMENTS** ARE LIABLE TO BE SUMMARILY REJECTED.

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

ANNEXURE - 3

GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)

Against this enquiry for the subject item / system with detailed scope of supply as per our tender specification, BHEL-PSNR, NOIDA may resort to "REVERSE AUCTION PROCEDURE" i.e. **ONLINE BIDDING on INTERNET.**

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on Internet.
3. In case BHEL decides to conduct reverse auction, BHEL's service provider shall contact the vendor directly and impart them the training.
4. Business rules like event date, time, start price, bid decrement, extensions, etc. also will be communicated through service provider for compliance.
5. Vendors have to fax the compliance form in the prescribed (provided by service provider) before start of Reverse auction. Without this the vendor will not be eligible to participate in the event.
6. **Total Price quoted shall be inclusive of all taxes except service tax in line with the NIT conditions for the subject work in Indian Rupees (INR), which is to be worked out as per the BOQ (Rate Schedule) given in tender enquiry and subsequent changes made, if any. EXCEL Sheet shall be provided, if applicable.**
7. Reverse auction will be conducted on schedule date & time.
8. At the end of reverse auction event, the lowest bidder value will be known on the network.
9. The lowest bidder has to fax the duly signed filled-in prescribed format as provided on case-to-case basis to BHEL through service provider after completion of event on the same day preferably.
10. Any variation between the on-line bid value and signed document will be considered as sabotaging the tender process and will invite disqualification of vender to conduct business with BHEL as per prevailing procedure.
11. In case BHEL decides not to go for Reverse auction procedure for this tender enquiry, the price bids and price impacts, if any already submitted and available with BHEL shall be opened as per BHEL standard practice.

Authorization of representative who will participate in the on line Reverse Auction Process;

1	NAME & DESIGNATION OF OFFICIAL	
2	POSTAL ADDRESS (COMPLETE)	
3	TELEPHONE NOS. (LAND LINE & MOBILE BOTH)	
4	FAX NO.	
5	E-MAIL ADDRESS	
6	NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN THE REVERSE AUCTION	

TECHINICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/ NR/SCT/ ANPARA D/ELECTRICAL/UNIT NO. 6/906

FOR

"HANDLING AT SITE/STORES, TRANSPORTATION TO SITE OF WORK, PRE ASSY., ERECTION, TESTING, COMMISSIONING & HANDING OVER OF ELECTRICAL PACKAGE OF UNIT NO. 6 AT 2X500 MW ANPARA D TPS, DISTT. SONEBHADRA, U.P."

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301 (INDIA)

S.No.	DESCRIPTION	Chapter No.	PAGE NO.
	Part-I: Contract specific details		
1.	Project Information	Chapter-I	
2.	Scope of Works	Chapter-II	
3.	Facilities in the scope of Contractor/BHEL (Scope Matrix)	Chapter-III	
4.	T&Ps and MMEs to be deployed by Contractor	Chapter-IV	
5.	T&Ps and MMEs to be deployed by BHEL on s basis	Chapter-V	
6.	Time Schedule	Chapter-VI	
7.	Terms of Payment	Chapter-VII	
8.	Taxes and other Duties	Chapter-VIII	
9.	Others	Chapter-IX	
10.	Annexures	Chapter-X	
11.	Rate Schedule	Chapter-XI	

Chapter - 1: Project Information

1. PROJECT INFORMATION

Name of the Owner	:	Uttar Pradesh Rajya Vidyut Utpadan Nigam Ltd (UPRVUNL)
Address	:	Anpara-D Thermal Power station District- Sone bhadra Uttarpradesh
Installed capacity	:	New Project
Nearest Railway station:		Singrauli -- 20 km
		Renukoot -- 40 km
		Varanasi -- 200 km
Nearest City	:	Varanasi-200 Km
Nearest Airport	:	Varanasi - 200 km
Maximum Tempreture	:	48 Deg C
Minimum tempreture	:	Approx 2 Deg C

Chapter - 2: SCOPE OF WORKS

2.0 SCOPE OF WORK

2.1 Scope of these specifications cover complete work of handling, transportation of materials from Project storage yard / stores to erection site / place of erection , storage at erection site, preservation, watch and ward, dressing, chipping and leveling of foundations, cleaning , checking, testing, pre-assembly, erection, calibration, alignment, welding, wherever required, preservative/ touch-up painting including supply of paints etc, earthing of equipment, including other activities required for erection, testing, commissioning, post commissioning, trial operations & handing over of all Electrical equipment and items indicated in the rate schedule covered within the scope of these specifications of Unit No.6 at 2 x 500 MW Anpara D TPS,

2.2 SCOPE OF WORK FOR ELECTRICAL PACKAGE IN GENERAL

1. Erection and commissioning of Station Transformers(80 MVA), Unit Transformers(20/25 MVA)
2. Erection and commissioning of Isolated phase bus ducts, SP & VT Cubicle, LA &VT cubicle, NG cubicle, Current transformers etc.
3. Erection and commissioning of Segregated phase bus ducts (11kV, 3.3kV) & LT bus ducts etc.
4. Erection and commissioning of 11kV,3.3kV switchgear panels & 415 V LT switchgear panels
5. Erection and commissioning of Generator, ST,UT Protection panels
6. Erection and commissioning of 220 V DC Battery system & Chargers
7. Erection and commissioning of Digital automatic voltage regulator panel
8. Erection and commissioning of VFD Panel for ID fans
9. Erection and commissioning of DG set(1.5MVA)
10. Erection and commissioning of Earthing & Lightening Protection system
11. Erection & Testing of all types of Power/Control(HT/LT) cables etc
12. Erection of all types of cable trays & tray supports etc.

13. Fabrication and installation of steel supports, wherever required

14. Supply of adequate quantity of touch up paint and paints as required for items covered in scope of works.

15. Supply as well as installation of material for sealing and making vermin/ dust proof unused openings, if any, in panels/ JBs

16. Installation of Danger Board, First aid box

17. Supply of all consumables and hardwares required for installation

18. Functional Electrical Site testing of LT/HT Motors

2.3 The scope of specification covers the installation, testing and commissioning of the all electrical equipment, hardware along with accessories as detailed in Bill of Materials given in Chapter X

2.4 The quantity indicated in the BOQ/ Rate Schedule is tentative only and is liable for variation**.** If any item or equipment not covered in the specification but requires to be erected/commissioned to complete the system, the same shall be carried out by the contractor. Equivalent unit rate for those item or equipment shall be considered wherever possible from the BOQ. Payment will be made as per actual quantum of job executed at the unit rate accepted by BHEL The rates quoted by the contractor shall be uniform as far as possible for similar items appearing in rate schedule.

Note:-

1. **Detailed BOQ with specification are given in the CHAPTER-X. Contractor shall go through the detailed BOQ and specification before filling the rate in the rate schedule given in Chapter-XI.**

2. **Electrical work of 2x500 MW Anpara D TPS is divided into two packages unit wise i.e. separately for unit no. 6 & 7. Each Package is floated separately. The successful bidder of unit no. 6 work shall not be considered for the unit no. 7 work.**

2.5 The scope of the work will comprise of but not limited to the following:

2.5.1 Identification of equipment at storage yard, technical assistance for checking and making the shortage/damage reports, taking delivery from storage yard/ stores and calibration, erection, aligning, fastening, supporting, cleaning, checking, testing, commissioning, troubleshooting and carrying out statutory tests as required, trial operation, up to the time of completion of commissioning activities and commercial operation of the unit and handing over to customer or till completion of contract period whichever is earlier, along with the supply of all consumables, tools and tackles and testing instruments.

2.5.2 It is not the intent to specify herein all details of material. Any item related to this work not covered, but necessary to complete the system will be deemed to have been included in the scope of the work.

2.5.3 All the work shall be carried out as per instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the contractor.

2.5.4 Contractor shall erect all items/materials etc. as per sequence prescribed by BHEL at site. BHEL engineer depending upon the availability of materials/work fronts etc. will decide the sequence of erection/commissioning methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the methods of erection/commissioning adopted in erection/commissioning of similar job or for any reasons whatsoever.

2.5.5 Site testing wherever required shall be carried out for all items/materials installed by the contractor to ensure proper installation and functioning in accordance with drawings, specifications and manufacturer's recommendations.

2.5.6 The contractor shall co-ordinate and provide assistance for satisfactory testing, pre-commissioning, commissioning and trial run of the connected equipment under overall guidance of BHEL and shall locate any cause of malfunction and rectify the same for proper operation. Testing shall also include any additional tests, which the Engineer feels necessary because of site conditions and also to meet system specification.

2.5.7. During the course of erection, testing and commissioning Electrical work certain rework / modification / rectification / repairs / fabrication etc. may be necessary on account of feedback from other power stations or units already commissioned and/ or units under erection and commissioning and also on account of design changes and manufacturing incompatibilities and site operation / maintenance requirements. Contractor shall carryout such rework /modification / rectification / fabrication / repairs etc, promptly and expeditiously and the same shall be deemed to be part of the scope of work.

2.5.8 The work shall be executed under the usual conditions without affecting power plant construction and in conjunction with other operations and contracting agencies at site. The contractor and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

2.5.9 The contractor shall have valid **ELECTRICAL LICENSE** to carry out the electrical works. All necessary certificates and licenses required to carry out this work are to be arranged by the contractor expeditiously at his cost.

2.5.10 The contractor shall take delivery of item, materials, from the storage yard / stores/ sheds of BHEL / customer which are within plant premises. He shall also make arrangements for, safe custody, watch and ward of equipment after it has been handed over to him till they are fully erected, tested and commissioned till the contract period. The contractor shall note that items/materials shall be transported to erection site / assembly yard etc. by the prescribed route without disturbing and causing damage to other works in the most professional manner. All items, Hardware, etc. shall be stored in appropriate manner as per BHEL's instructions.

2.5.11 The contractor shall take delivery of items/materials, and consumables from the stores/ storage area / sheds of BHEL / customer after getting approval of engineer / customer in the prescribed indent forms of BHEL / customer.

2.5.12 After completing all the works, contractor shall hand over all remaining extra materials with proper identification tags in packed condition to BHEL stores. In case of any use over actual design requirements, BHEL reserves the right to recover the cost of material used in excess or misused. Decision of BHEL engineer in this regard will be final and binding on the contractor.

2.5.13 Contractor shall, transport all materials to site and unload at site / working area, or pre-assembly yard for inspection and checking. All material handling equipment required shall be arranged by the contractor.

2.5.14 Contractor shall retain all T&P/Testing instrument/Material handling instrument etc at site as per advice of BHEL engineer and same shall be taken out from site only after getting the clearances from engineer in charge.

2.5.15 Contractor shall remove all scrap materials periodically generated from his working area in and around power station and collect the same at one place earmarked for the same. Load of scraps is to be shifted to a place earmarked by BHEL. Failure to collect the scrap is likely to lead to accidents and as such BHEL reserves the right to collect and remove the scrap at contractor's risk and cost if there is any failure on the part of contractor in this respect. All the package materials, including special

transporting frames, etc. shall be returned to the BHEL stores / customer's stores by the contractor.

2.5.16 If any item or equipment not covered but requires being erected/commissioned, same shall be carried out by the contractor. Equivalent or proportional unit rate shall be considered wherever possible from the BOQ. The rates quoted by the contractor shall be uniform as far as possible for similar items appearing in rate schedule.

2.5.17 The contractor at his cost shall arrange necessary security measures for adequate protection of his machinery, equipment, tools, materials etc. BHEL shall not be responsible for any loss or damage to the contractor's construction equipment and materials. The contractor may consult the Engineer-in-Charge on the arrangements made for general site security for protection of his machinery equipment tools etc.

2.5.18 The contractor shall ensure that his premises are always kept clean and tidy to the extent possible. Any untidiness noted on the part of the contractor shall be brought to the attention of the contractor's site representative who shall take immediate action to clean the surroundings to the satisfaction of the Engineer-in- Charge.

2.5.19 The Contractor may have to execute work in such a place and condition where other agencies also will be under such circumstances.

2.5.20 Scope of work covered under this specification requires quality workmanship, engineering and construction management. The contractor shall ensure timely completion of work. The contractor shall have adequate tools, measuring instruments, calibrating equipment etc. in his possession. He shall also have adequate trained, qualified and experienced engineers, supervisory staff and skilled personnel. The manpower deployed by contractor shall match with above scope of works.

2.5.21 All the surplus, damaged, unused materials, package materials, containers, special transporting frames, etc. shall be returned to the BHEL stores / customer's stores by the contractor.

2.5.22 Any wrong erection shall be removed and re-erected promptly to comply with the design requirements to the satisfaction of Site Engineer.

2.5.23 BHEL will provide vendor's technical support for commissioning of various proprietary type special instruments/systems like Analysers, Vibration Monitoring System, Microprocessor based relays, Flame Scanners etc. The contractor shall carry out the works as per instructions of BHEL/ Vendor Engineer.

2.6 Contractor shall ensure following:

I. Contractor has to maintain contact with local hospital having ambulance facility, scanning & other ultra modern medical facilities required during emergency.

II. Contractor has to ensure pre employment medical check for all staff & workers.

III. Contractor has to ensure that adequate First Aid facilities with trained nurse are available at work site for emergency purpose. This emergency set-up should include, but not limited to, following

- Male nurse (in shifts)
- Oxygen set up
- Breathing apparatus
- Eye wash facility
- Stretcher
- Trauma blanket
- Medicines.

In addition to above, BHEL (through its other contractor) has arranged ambulance at work site for emergency purpose, which can be utilized by the contractor in case of emergency. The charges for the same will be decided mutually at site. In case, under unavoidable circumstances, if the ambulance is not available / being used elsewhere, the contractor will have to arrange for the same as under clause 2.6 (I).

2.7 **The contractor shall comply with following towards Social Accountability;**

a) The contractor shall not employ any employee less than 15 years of age in pursuant to ILO convention. If any child labour were found to have been engaged, the Contractor shall be levied with expenses of bearing his education expenditure which will include stipend to substantiate appropriate education or employ any other member of family enabling to bear the child education expenditure.

b) The contractor shall not engage Forced/ Bonded Labour and shall abide by abolition of Bonded Labour System (Abolition) Act, 1976.

c) The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour (Regulation & Abolition) Act, 1970.

d) The Contractor shall abide by UN convention w.r.t. Human Rights and shall be liable for Discrimation/ Corporal punishment for failure in meeting with relevant requirements.

e) The Contractor shall abide the requirement of Contract Labour (Regulation & Abolition) Act, 1970 for working hours.

f) The Contractor shall abide by the Statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936.

g) The Contractor shall arrange potable drinking water to its employees & workers.

2.8 In order to meet the environmental concerns it is expected that the contractor shall plant, protect and maintain at least 100 trees or equivalent in the vicinity of the project as per the available space and as per the advice of Engineers.

2.9 The contractor's scope of work is further described in the clauses hereafter:

The work will comprise of, but not limited to the following:

2.9.1 TRANSFORMERS(PowerTransformers/Service transformer)

Different types of transformers like oil immersed or dry type shall be supplied as indicated below. Unit Transformer, Station Transformer will be located adjacent to the powerhouse building in the transformer yard. Various Oil filled service transformer, dry type service transformer & VFD transformers will be located adjacent to their respective location/Service building.

STATION TRANSFORMER

400kV/11.5/11.5kV, 80/40/40 MVA, ONAF -01 Nos.

UNIT TRANSFORMER

21/11.5kV, 25/20 MVA, ONAF - 02 Nos.

SERVICE TRANSFORMERS

11/3.5kV,6.3 MVA, ONAN

11kV/433V,2000kVA, ONAN

11kV/433V,2000kVA, Dry type

11kV/433V, 1600kVA,ONAN

11kV/0.433kV, 500kVA,ONAN

11kV/0.433kV, 750kVA,ONAN

The scope of work under this head is defined as below.

1. Transformers shall be transported from storage yard in a suitable trailer, unload at their respective locations/foundations and install as per the installation drawing. The contractor will unload the transformers on rails, turn the wheels/rollers if necessary for changing over at right angles on rails, roll the transformers to their respective locations and put them on the foundation. The necessary sleepers, winches, jacks etc. required for this operation will be

arranged by the contractor at his cost. The other transformers will be shifted with suitable material handling equipment to the respective location.

2. The transformers shall be handled in such a manner so that no jerk is transferred to the core, winding and internals of the transformer.

3. Transformers are generally supplied in partly assembled condition either filled with oil up to the core level / winding level or gas filled. Accessories, like radiators, conservator tank, pipes, fittings, hardware, gaskets, buchholz relay, marshalling box, relief vent, valves, pumps, cooling fans, cables, bushings, radiator headers/fans, rollers, tap changer drive unit, cables of various sizes for interconnection from marshalling control box to field devices, bushing turrets and oil in 205/210 liters, barrels shall be supplied loose.

4. Cable trays (for transformer local cabling, if not supplied along with transformer) shall be issued separately by BHEL site and the installation charges is inclusive in rate schedule for Transformer and no extra charge shall be paid on this account.

5. All the accessories should be thoroughly cleaned prior to installation and same shall be assembled/mounted as per OGA drawings.

6. Placement on plinth, alignment with respect to the foundation and lay out drawings.

7. Internal inspection to verify the intactness of core and winding, tap changer leads, off-load switch/on load tap changer, measurement of core and core bolt insulation.

8. Auxiliary Service transformers shall be bolted to the adopter panel/bus duct on the LT sides and the bus bars shall be connected together. The contractor shall carry out any modification required to match the bus bar or bus duct connection
9. In case transformers are supplied partly oil filled/gas filled, after internal inspection, the transformer shall be kept under vacuum (for a period to be decided by site engineer) and treated oil to be filled up to required level.

10. Each drums of oil to be tested for BDV. After getting BDV/ withstand value, this treated oil to be filled in the transformers and auxiliaries.

11. Contractor shall arrange filtering & storage tank of suitable capacity, internally sand blasted and with one coat of oil resistance paint. Oil from drums to be transferred in storage tank and filtration to be carried out to achieve the required BDV/ withstand value. This treated oil to be filled in the transformers and auxiliaries. However, for low capacity transformer, a separate storage tank for filtration may not be required.

12. Drying out of transformer and filtration of oil in cooling bank, pipeline, diverter tank of tap changer etc. to be done with ultra vacuum filtering machine of

adequate capacity (760 mm HG). Drying out process shall be carried out round-the-clock and contractor shall deploy trained manpower for this purpose

13. During dry out process, contractor has to plot the curve for insulation resistance value/time/oil temperature. Hourly reading to be recorded till completion of the dry out.

14. The criteria for deciding completion of drying out shall be breakdown value of oil, PPM value of contaminants in oil, resistively of oil, insulation resistance value and polarisation index.

15. Filter machine capacity if found to be inadequate, or in case of failure of an existing machine, alternative arrangement is required to be made to meet the required result and time schedule. **It is to be particularly noted that that as per exigencies of site working, contractor will have to arrange more oil filtration machines as per site requirement.**

16. Contractor shall discuss and finalise installation and testing activity procedure with BHEL/UPRVUNL prior to starting the work.

17. Tests are required to be conducted on Current Transformer, Potential Transformer & prior to / after installation. Contractor shall also carryout oil processing / filtration to achieve the desired results before charging and handing over of the entire system.

18. Contractor shall arrange required testing equipment for carrying out electrical test like voltage ratio, turn ratio, vector group, magnetic balance, winding resistance measurements, BDV value of oil, tan delta measurement of bushings & winding, insulation resistance, measurement of oil PPM, Acidity, Resistively and Tan Delta and **DGA** test. The contractor shall arrange oil sample testing for PPM / resistively or any other tests applicable for oil sample at approved testing laboratory/BHEL Bhopal at his own cost including all incidental expenses.

19. Contractor should have valid electrical contractor license to carry out installation of high voltage equipment.

2.9.2 ISOLATED PHASE BUS DUCT,21KV,19000A,CONTINUOUS AIR COOLED

1. Generator isolated bus duct is connected to low voltage side of three phase generator transformer & generator. The bus consists of cylindrical conductor made of Aluminium alloy supported on post insulators. Flexible connections and expansions joints are provided at terminal and intermediate points to alleviate stresses due to expansion and to arrest vibration. All the CTs will be mounted inside the bus ducts.

2. Isolated phase bus duct shall have tap off connection for potential transformer, VT, surge protection SP cubicles, unit transformers. Each phase

of protection equipment and potential transformers shall be housed in metal clad cubicles. Delta formation is carried out externally through Delta busduct.

3. A totally enclosed neutral grounding cubicle is provided to connect the Generator neutral point. The neutral grounding cubicle houses neutral grounding transformer & resistors. All the generator-isolated bus ducts are supplied with one set of Air pressurization equipment unit.

4. Bus duct enclosure /conductor is a continuous welded type. Conductor, enclosure, makeup pieces, shunts pieces etc have to be welded at site.

5. The scope of for Isolated Phase Bus Duct shall include Transportation of material from stores/ storage yard, preparatory work such as erection of supporting structure, placement of sub assemblies / equipments, alignment, edge preparation of conductor / enclosure, welding of conductor / enclosure, welding of shunt pieces & make up pieces, installation of seal of bushing & wall frame assemblies, shorting links, earthing, LA & VT cubicle, VT & SP cubicle, copper flexibles, copper rubber bellows, weldable/ bolted flexibles, installation of air pressurising unit and its associated piping work and cable etc, testing and commissioning.

6. Pre-fabricated G.I. supporting members shall be supplied in loose condition and are to be erected as per lay out drawing. Foundation pockets and embedded plate inserts shall be provided as per lay out drawing (on floor for bottom support and on bottom of concrete slabs).Contractor shall weld the supports on insert plate and shall carry out grouting including supply of grout materials after complete alignment/bolting of structural members. If any modification required in supporting structure due to site conditions, the same shall be carried out without any extra cost. All welded joints shall be applied cold galvanizing zinc paint. Supply of Paints, primers etc are in the scope of the supplier, within the quoted rates.

7. Required aluminium welding of conductor, enclosures, shunt, make up pieces, aluminium flexible etc as detailed in drawings has to be carried out by contactor. MIG/ TIG welding shall be applicable. Contactor shall arrange necessary welding equipment/ accessory in sufficient number, filler wire, argon gas and other required consumables at his cost.

8. During erection of bus duct/enclosure, makeup pieces and shunts, if any modifications needed to match the alignment shall be part of work and no extra payment shall be made.

9. All bolted joints and flanges shall be tightened with torque wrench to the approved torque. Wherever there are bolted joints, the same shall be cleaned and a layer of anti-oxidation paints shall be applied. Necessary paints etc to be arranged by contractor within the quoted rates.

10. Top chamber/adapter box for line and neutral side, hood assembly at UT hood assembly at excitation transformer and at LA & VT cubicle end shall have drilled hole in flange. If there is any mismatch of the hole in above with respect to the counter flange/welded studs provided on UAT, LAVT and excitation cubicle, the contractor shall drill new holes if required.

11. Proper sequence shall be followed during erection to avoid any mismatch and alignment problem.

12. Prior to installation of bus duct assemblies in position, various components like conductor, insulator shall be inspected and cleaned and insulation resistance to be measured and recorded. If any insulator is found damaged, the same shall be replaced.

13. Electrical test on current transformers and potential transformers shall have to be carried out prior to installation & during pre-commissioning. The tests are insulation resistance measurement, winding resistance, magnetisation characteristic, ratio test water ingress and air leak test on assembled bus ducts.

14. Minor civil work such as chipping, levelling of foundation, providing pockets, drilling/enlargement of holes in structure, bus bar etc. Which are incidental to the erection of bus duct shall not be treated as extra.

15. All miscellaneous items such as disconnecting links, flexibles, shorting bars, hardwares, conduit for wiring, marshalling box, CTs and PTs wiring through conduit, earthing materials,bus bar fish plates etc. are part of bus duct installation. Hence separate breakup quantity is not given in BOQ.

16. Round makeup pieces for main and tee off duct shall be supplied in two halves and it involves but circumferential and horizontal welding at parting plain.

17. Air tightness and water tightness test have to be carried out on completion of bus duct installation. In case of any leakages, contractor has to rectify and bring to the required level of air tightness/water tightness without any extra cost.

18. High voltage test of bus duct is to be carried out as per the instruction of BHEL engineer. Contractor shall arrange necessary test equipment / instrument for conducting various electrical tests at his own cost.

19. Contractor has to carry out final painting as per standard colour code recommended by BHEL. Paints and consumables shall be in contractor’s scope.

20. Shunt pieces shall be supplied in two halves and to be welded between two-phase bus duct at transformer end. The shunt pieces to be welded on both the side on matching plain and bus duct circumference and horizontal plain

21. Contractor shall conduct 10 % radiography and 100% NDT test on welded joints.

22. One end of the enclosure to be earthed to the station earth at shunt location where all three-phase enclosure are shorted. Wherever shunts are not provided, each phase should be earthed separately.

23. In case of bolted busducts, phase split covers, rubber bellows, aclamping earth straps to be connected to maintained the electrical continunity and in turn enclosure gets earthed at one point.

24. All other equipment such as VT & SP cubicles, LA & VT cubicles, NG cubicle, air pressurisation, CT chambers, junction boxes, etc to be earthed at two points to the earth grid.

2.9.3 11 KV / 3.3 KV SEGREGATED PHASE & 415 VOLT LT BUS DUCT

1. 11KV / 3.3 KV Segregated phase bus duct and 415 Volt Bus Duct (NSP) shall be supplied in loose shipping section along with hardware & other items. Each section shall be complete with AL alloy enclosure and conductor with epoxy bus support insulators arrangement. However other items such as silica gel breathers, inspection windows, rubber bellows, flexible & solid copper / aluminium connector, bi-metallic strips, GI pre-fabricated supporting structure, wall frame assembly, set of hardware etc shall be supplied loose. Galvanised iron earth bus shall be provided for enclosure continuity.

2. All bolted joints shall have cadmium plated high tensile steel hardware.

3. Each set of SP bus duct is meant for interconnection from low voltage side of Unit and Station Transformer to 11 KV/3.3 KV switchgear board and bridging bus duct between the switchgear boards.

4. Each set of 415 Volt Bus Duct (NSP) is meant for interconnection from low voltage side of LT Auxiliary Transformer (11 OR 6.6 KV / 0.433 KV) to MCC & switchgear board.

5. The bus duct consists of rectangular conductor made of aluminium alloy supported on post insulator and housed in aluminium sheet metal rectangular enclosure. The bus bar / enclosures are having bolted joints.

6. The bus duct shall be supported either from bottom of the concrete slab with embedded insert plate/ TG building supporting structural members and pocket provided on foundations.

7. The bus duct assemblies, supporting structures shall be pre-fabricated and to be assembled as per layout drawing. **The erection and testing requirement shall be similar to the isolated phase bus duct, except the welding of bus bar and enclosures.**

8. Each set of bus duct shall be supported with supporting structure, which shall be fabricated from standard steel section and hot dip galvanised. All structure & bus duct assemble shall be erected as per drawings.

2.9.4 HT SWITCHGEARS-11/3.3 KV & GENERATOR /TRANSFORMER CONTROL /RELAY PANEL AND OTHER CONTROL PANELS INCLUDING VFD PANELS, AVR ETC.

1. Panels to be install are Generator Panel, Switchgear panels, AVR Panels etc supplied in suit of either one/two/three or loose shipping sections with integral base frame or loose base frame. These panels may have to be installed as stand-alone or in-group consisting of number of panels in each row, depending upon the plant layout and foundation arrangement.

2. Installation of panel shall include fixing of base frame, leveling, alignment, fixing of anti-vibration pads, removal of side covers, fixing of cubical interconnection hardware, interconnection of bus bar /bus bar jointing, wiring interconnection, welding and grouting of panels and base frames, mounting of panel canopy wherever supplied as part of panel, drilling of gland plates, sealing of panels/ cable entries. Where the base frame is not supplied as part of panel supply, the contractor shall fabricate the base frame from structural items at site. Payment for such fabrication will be effected on measured quantity at the rate applicable for structural steel fabrication and installation. Proper sealing of all the holes and cable entries (even if the cable has been laid by others) in the panel is in the contractor‟s scope

3. Panels have to be shifted to their locations through floor openings, temporary openings like floor grills, door etc. This shall be a part of work and no claim whatsoever will be entertained with regard to non-availability of opening as per shortest route etc. Panels have to be erected at different locations and elevation in power house building, LT & HT switchgear room, unit control room etc.

4. For the panels to be mounted on the trenches, channel supports have to be provided across the cable trenches over which the base frames of the panels shall be mounted.

5. The contractor shall carry out fabrication and erection of these support structures and separate rate shall be paid on Tonnage basis.

6. Panels will be delivered in different shipping sections. Necessary interconnection of bus bar, inter panel wiring, etc. shall be carried out as part of panel erection

7. The contractor shall set each section of equipment on its foundation or supporting structures. The contractor shall assemble equipment as

required. Skilled craftsmen arranged by the contractor shall install all equipment with parallel, horizontal and vertical alignment.

8. Normally the panels shall be supplied with complete Relays / Instruments and other Components mounted and wired. However, any minor modifications like dismantling of the existing Relays / Instruments / Components and mounting of new Relays /instruments / components and rewiring to suit operating conditions, will be carried out without any extra cost. Similarly if any Relays/ Instruments /component supplied as loose for safety transit, same shall be mounted and wired as per site requirement at free of cost as part of scope of the job.

9. The commissioning of HT Switchgear shall also involve the trial runs and commissioning of all connected equipment like motors and Service Transformer. The contractor will have to keep his people round the clock, if necessary during the trial runs and promptly take action for any repair, checks and rectification etc. required in the equipment erected by him.

10. Contractor has to co-ordinate with other unit electrical contractor to make the interconnecting cables/bus duct connection through.

11. Switch boards incomer bus shall be connected to bus ducts, through adapter box. The contractor shall co-ordinate for proper bus bar connection. Any modification required in the bus conductor for matching bus duct and bus bar, the same shall be carried out without extra cost.

12. All T&P, Material handling equipment including cranes and Relay Testing / HV Testing / Calibration equipment / Instruments shall be arranged by contractor. Three phase current injection kit required for calibration of relays shall be arranged by the contractor. The contractor shall carry out testing and commissioning works using their own testing equipment and Testing Engineers under the supervision of BHEL Engineer

13. All the panels and JBs shall be electrically earthed to the nearest earth grid by means of GI wire/Flats as per the instructions of BHEL engineer

14. The contractor shall prepare all erection/ commissioning log sheets, protocols / test certificates as per field quality plan, get it signed by the concerned BHEL / UPRVUNL Engineer and submit the same to BHEL Engineer as per his instruction.

15. The charged and commissioned equipment shall be maintained by the contractor till the same is taken over by M/s UPRVUNL

16. Any items like lamps, lens, fuse / relays / instruments missed form the custody if the contractor shall be replaced by the contractor at free of cost.

17. The contractor shall close unused opening at the panel bottom plate with suitable material in consultation with Site Engineer at free of cost.

18. If any removal / Re-fixing of contactors / relays becomes necessary for the completion of the system, the same shall be done by the contractor at free of cost.

19. Scope of work shall also cover drilling of bottom gland plates for cable entry as required.

19. The contractor shall calibrate and commission all switchgear / panel mounted instruments, protection relays, transducers, Recorders, Indicators, energy meters etc.

20. Unit rate shall also include Testing, Calibration and adjustment of relays, electronic cards and instruments, transducers mounted on the panels.

21. If panels are supplied with monitor, printers, furniture, controller etc. or any loose items or equipment, the erection of above shall be part of respective panel. No separate rate shall be payable for loose supplied items unless specifically given in the BOM.

22. Contractor shall arrange to paint / stick good quality danger boards where ever required. Required boards shall be arranged by contractor

2.9.5 VARIABLE FREQUENCY DRIVE (VFD) FOR I.D. FANS

1. VFD system for each ID fan consists of of Power Transformers 6.6/2.3 KV, 3000 KVA, ONAN cooled (2 Nos.), Vacuum Circuit Breaker type VM-12(2 Nos.), D.C. Series Reactor(2Nos.), Control panels (1 NO.), Load Converter / Inverter panels (2 Set- each suit of 3 panels.), Adapter Panel (2 Nos.) and associated accessories. For detail work scope refer other relevant clause for panels. VFD reactor enclosures may be supplied loose. Assembly of the same at site is to be carried out within the quoted rates.

2.9.6 DIGITAL AUTOMATIC VOLTAGE REGULATOR

1. System comprises of DAVR Panel which is connected by Input cable from DAVR to PMG, DAVR to Main Exciter, DAVR to axis coil, Mounting of Local Instrument Enclosure, Winding resistance & IR value of PMG, Main Exciter, Q axis coil, Diode wheel, Checking healthiness of diodes / Fuses, Commissioning of stroboscope, Exciter Heater / Blower, Rotor earth fault brush checking / setting, Lighting inside exciter enclosure, Flap actuator commissioning (If provided). Any other work inside exciter enclosure, Mounting of loose components supplied for Brushless exciter system, Dummy load test of DAVR, Checking from Control desk & Field related inputs/ outputs to commission the excitation system fully operational,

No separate item rate is applicable. Rate quoted by contractor shall be inclusive of all above related to Excitation system.

2.9.7 CABLE TRAYS/CABLE DUCTS

1. Various types of sheet metal, galvanized cable tray, i.e. perforated, ladder type, sheet metal duct, solid bottom trays, pre-fabricated structural trays etc., will be supplied in standard lengths along with accessories and hardware viz; coupler plate, tray covers and tray clamps etc.

2. **Erection of cable tray/cable duct shall include cutting, laying, jointing, fixing tee/reducers/ bends/clamps, fixing of tray covers, hardware, fabrication & welding of tray supports as per tray route layout etc.**

3. Fabrication of bends/tee/ reducers from straight length of tray is within the scope of work and rate quoted shall be inclusive in unit rate (in running meter). All site welds of cable trays shall be painted with approved primer and cold galvanizing paint, which shall be arranged by the contractor.

4. **I**n case structural cable trays, bends, tees, reducers etc., are required to be fabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instances.

5. Cable trays/duct etc may have to be routed underground in cable trench, over head on structure, along the walls, floors etc.

6. ***Installation of tray/duct covers, wherever provided, will be done as a part of tray erection and no extra rates will be payable.***

2.9.8 CABLE LAYING - (POWER/CONTROL / INSTRUMENTATION SHIELDED/ UNSHIELDED CABLES / PLUG-IN CABLES / Coaxial / UTP / STP /DATA HIGHWAY, ARMOURED / UN-ARMOURED,SINGLE / MULTI-CORE, PVC / HR PVC / FRLS / TEFLON / XLP INSULATION, Optical fibre)

1. BHEL will supply HT & LT cables (Armoured / Unarmoured, Aluminium /Copper, XLPE/PVC, FRLS insulation) of different sizes. (Power, control and instrumentation cable).

2. The scope of work includes laying & termination of cables, fixing of glands, ferrules, tag plates with necessary numbering and dressing of cable, as per BHEL specification and BHEL engineer's instructions. All the cables shall be identified at both ends, adjacent to the cable glands. In addition, cable shall be identified at all draw / pull pits, manholes, pull boxes, and at major changes of direction in cables tray / trenches and multilayer racking cable routes.

3. Unit rate quoted for cable shall cover laying, drilling of holes on the gland plates of the panels/JB or Enlargement of cable entry holes by tapping or

any modification required fixing of cable glands, fixing of glands, ferrules termination, and providing tag plates and dressing.

4. Aluminium/GI strips, PVC cable ties, PVC ferrules, PVC button and tapes, cable identification tag of PVC/metal as per site requirement, clamping and dressing material such as suitable cable ties/ clamps etc with hardware, PVC sleeves etc. shall be supplied by contractor within the quoted rate for cable laying. **Only Cable Lugs & Glands Shall Be Issued By BHEL As Free Issue Item.**

5. Uniform unit rate shall be quoted for the cables whether laid on cable trays or routed through duct bank, conduits, cable shafts etc.

6. The contractor shall provide Tools/ equipment required for the connections and termination of cable wherever necessary.

7. The contractor shall carry out cable dressing and clamping for all the cables laid by the contractor. However, if any other agency laid cables of lesser quantity for which no separate trays have been allotted, the contractor shall do clamping along with the cables.

8. Wherever cable entry holes have not been provided for equipment installed by another agency, the contractor shall co-operate to get the same done.

9. During testing and commissioning, if the equipment on which the cables are terminated not functioning, it is the responsibility of the contractor to check and establish in coordination with the commissioning agencies that there is no defect in the cabling, The contractor shall promptly depute his supervisor or technicians to assist the commissioning agencies to check the interconnecting cables.

10. Contractor shall carefully plan the cutting schedule for each cable drum in consultation with Engineer such that wastage is minimized and any resultant short lengths can be used where appropriate route lengths are available.

11. Contractor shall carefully plan the cutting schedule of each cable drum in consultation with BHEL site engineer such that wastages are minimized. Recovery will be made in case the wastages are exceeding the wastage allowances fixed in this contract.

CABLE TERMINATION

1. The Cost Of Cable Laying As Per BOQ Cum Rate Schedule Shall Also Include The Cost Of Termination With Suitable Crimping Type Lugs & Ferrules

2. The scope of termination shall also include termination of cables on various equipment installed by others. The contractor shall coordinate with such

agencies and do the termination, including drilling of gland plates for fixing cable glands, if required.

3. Re-termination if required during testing / commissioning shall be carried out without additional cost.

4. Only Cable Lugs & Glands Shall Be Issued By BHEL as Free Issue Item. Drilling of holes in gland plates of control panels, JBs etc as per requirement shall also be part of cabling at no extra cost to BHEL.

5. The contractor shall carryout insulation testing, simulation testing etc. as per the instructions of Engineer at site.

2.9.9 JUNCTION BOXES/MARSHASLLING BOXES/PUSH BUTTON STATION

Different type of Electrical Junction boxes/Bush button boxes shall be supplied. The scope of installation of Junction boxes/Bush button boxes shall be as follows:

1. The unit rate quoted for erection of junction boxes/push button boxes shall include providing necessary supports, drilling of bottom gland plates for cable glands as required, Painting the tag No of JB or fixing a separate tag plate as required on junction boxes/push button boxes, minor chipping, grouting as required for mounting the JBs/PB and supply of all bolts and nuts (Fasteners) including grouting bolts as required for mounting the junction box/push button.

2. Fabrication and fixing of supports shall be on tonnage basis.

3. The contractor shall close all unused holes on the gland plates using suitable material in consultation with Site Engineer at free of cost.

4. All bolts and nuts (Fasteners) required for mounting the junction box shall be arranged by the contractor.

2.9.10 SCOPE OF WORK FOR BATTERY/BATTERY CHARGERS

The charger and batteries are of heavy duty type, capable of providing normal and emergency DC loads. The cells will be mounted on insulators carried on suitable wooden stands. Tentative details are given in the BOQ.

Lump sump rate shall be quoted for Erection and commissioning of Battery & Battery charger. No additional payment shall be made for any variation in the number of cells. The rate quoted for erection of battery will include the following works

1. Collecting the batteries and all the accessories like cable connectors, inter cell connectors, equalizing connectors, rack insulators, fuse box, loop

cables etc. from stores and assembling on the racks and fixing all loose supplied items as per drawings,

2. Filling the individual cells with Acid/alkali – if applicable.

3. Arranging suitable resistive load banks for charging and discharging during charging and discharging cycles.

4. Arranging manpower in shift during battery charging and discharging cycles that may be carried out round the clock as per the code of practice, and conducting other routine tests as per IS under the supervision of BHEL Engineer/UPRVUNL.

5. Modifications or changes if any for the loose supplied items or any minor changes in wiring.

6. Arranging necessary tools, T&P, Testing equipments required for erection and commissioning of the battery.

7. For laying and termination of cables of battery/ battery charger system, separate rate shall be applicable as per rates in Rate Schedule.

2.9.11 DIESEL GENERATING SET

1. Two sets of 1500 KVA, 3 phase, 415 V skid-mounted diesel generator set with Fuel Tank, Fuel piping (approx. 21 Mtrs), Lubricating system, Air Intake System, Exhaust system (approx. 75 Mtrs of 250 mm pipe), Governing System, battery operated starting means etc., engine coupled together to the alternator and mounted on a sturdy, fabricated welded construction, channel iron base frame, Structural column for supporting exhaust pipe, Acoustic Enclosure etc.

   The alternator is supplied loose with alternator phase and neutral side terminal boxes, complete with excitation system with built in AVR panel mounted on alternator.

   The other loose supplied items include
   - AMF Panel Size 1450 x 600 x 2075 mm; wt 800 kg approx.
   - Aux. Distribution Board Size: 4000 x 600 x 2400 mm;. Approximate wt 1000 kg; in suitable shipping sections.
   - 24V Battery Charger of size 600 x 600 x 850 mm.
   - 24 V, 360 AH Battery set along with stand
   - Fuel tank 990 litre size 1000 x 1000 x 1150, wt 140 kg
   - 8 P x 0.5 sq. mm screened cable: 25 Mtrs
   - GI Strip/ Cu cable for earthing: 50 Mtrs

   Overall dimension: 6000 x 2100 x 2600 mm
   Static Weight of DG Set: 13,500 kg
   Weight of Acoustic Enclosure : 10,000 kg

The scope of works covers erection of Diesel Generator and erection of all loose supplied items, as per specifications.

Minor civil works like drilling, chipping and punching holes and opening in concrete floors, slabs, brick-walls, and cleaning of all debris, Grouting, supply of cement, sand, concrete etc. required for installation of DG sets shall be included in the erection cost of equipment. No separate payment is applicable

The DG set shall be maintained by the contractor after its commissioning until full load testing is completed

2.9.12 STRUCTURAL FABRICATION AND INSTALLATION

INSTRUMENT/ JUNCTION BOX FRAME/ PANEL BASE FRAME / CABLE TRAY & MISC STRUCTURES FABRICATION

1. Structural steel material like MS angles, channels, beams, flats, plates etc. shall be supplied in running meter and the same shall be used for misc fabrication if required and the same shall be used for fabrication of panel base frame, cable tray supports, Canopies for instruments/panels/ drives/JB's/Push Buttons etc., Instrument/Junction box frames, Impulse Pipe/Instrument Air Pipe supports and instruments etc.

2. This shall include cutting to size, contouring of ends for connections if required, welding, grinding of excess weld deposits/burrs, drilling of holes for mounting of device/instrument, installation at location, leveling, alignment, providing bracings and painting etc. No gas cut holes will be permitted.

3. All the fabricated supports/frames for instruments, trays, pipes, electrical equipments, etc., shall be painted after thoroughly cleaned by wire brush, scrapping or any other method as per requirement of BHEL/UPRVUNL. Paints and other associated items are in the scope of the contractor.

4. Frame installation at site may involve mounting either on concrete floor by grouting / using anchor fasteners or on steel structure by welding etc. All consumables including anchor fasteners shall be arranged by the contractor. Where required, as part of work, concrete floors may have to be chipped out to reinforcement depth for anchoring the frames. Wherever grouting is required, contractor shall arrange all the required material including cement / grout mix, shuttering etc., necessary labour and meet all other requirements as part of work.

5. In case, structural cable trays, bends, tees, reducers etc., are required to be fabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instances.

6. In certain packages, members of frames/rack for mounting of junction boxes/ instruments may be supplied readymade. These have to be assembled prior to installation. The installation rate as quoted shall include assembly of the frames.

7. **Gas cutting of tray/impulse pipe support and holes in frame is not permitted. Only hacksaw cutting/ drilled hole shall be permitted.**

2.9.13 SCOPE OF ABOVE GROUND EARTHING & LIGHTENING PROTECTION

1. Earthing scope also covers, earthing of all cable trays, metallic frames of all current carrying equipment, supporting structures adjacent to current carrying conductors, Transformer, Busducts, panels, motors, JB, push button boxes etc as required .

2. Drawings of main earth grid to be provided by others would be made available to the contractor to enable them to carry out rest of the earthing system work.

3. Different type of earthing materials shall be supplied by BHEL and the contractor shall lay and connect the earthing materials as per site requirement. Unit rate for earthing material shall be paid on meter if appearing in the BOQ.

4. The connection between earthing pads/ terminal to the earth grid shall be made short and direct and shall be free from kinks and splices.

6. Generator neutral from the NGT/NGR cubicle shall be earthed using two dedicated rod electrodes, which shall in turn be connected to the main plant grid.

7. The scope of works for Lightning Protection system includes installation of vertical air terminations, Horizontal conductors, vertical risers, down conductors, test links, earth electrodes, supply of saddles & clamps, minor civil works etc.

2.9.14 ELECTRICAL LAB

Scope of work includes the setup & handing over of electrical lab having the following equipments:

1. FUNCTION GENERATOR 1Hz-80 Hz -1 no.
2. INSULATION TESTER 250,500 OR 1000V DC -1 no.
3. 3½ DIGIT DISPLAY (HAND HELD) -2 no.
4. 4½ DIGIT DISPLAY (HAND HELD -2 no.
   4½ DIGIT DISPLAY (DESK TOP) -2 no.

	5½ DIGIT DISPLAY (DESK TOP)	-1 no.
	6½ DIGIT DISPLAY (DESK TOP)	-1 no.
5.	MULTIFUNCTION INSTRUMENT CALIBRATOR	-2 no.
6.	RCL BRIDGE	-1 no.
7.	TABLE MOUNTED mV CALIBRATOR	-1 no.
8.	PORTABLE MILLIVOLT CALIBRATOR	-1 no.
9.	TABLE MOUNTED mA CALIBRATOR	-1 no.
10.	PORTABLE MILLICURRENT CALIBRATOR	-1 no.
11.	TOOOL MAKER CLAMP jaw	
	50mm WIDE	-1 no.
	100mm WIDE	-1 no.
12.	HAND OPERATED WIRE WARP TOOL	-1 no.
13.	BENCH VICE	-2 no.
14.	MAGNETIC SCREW DRIVER	-2 no.
15.	SS & COPPER TUBE CUTTER/BENDER	-1 no.
16.	STD. TOOL BOX	-2 no.
17.	COIL WINDING MACHINE	-1 no.
18.	ELECTRICALLY OPERATED WIRE WARP 0.2MM TO 1.0MM	-1 no.
19.	SOLDERING IRON	
	20 WATT	-2 no.
	40 WATT	-1 no.
20.	SOLDER SUCKER	-1 no.
21.	SOLDERING STATION, 160 deg. C TO 480 deg.C	-1 no.
22.	DE-SOLDERING STATION, 160 deg. C TO 480 deg.	-1 no.
23.	DECADE RESISTANCE BOX	-1 no.
24.	STOP WATCHES	-2 no.
25.	POTENTIOMETER /RHEOSTAT	-10 no.
26.	AC POWER METER	-1 no.
27.	LOGIC ANALYZER	-1 no.
28.	AUTO TRANSFORMER	-2 no.
29.	DIGITAL OSCILLOSCOPE	-1 no.
30.	ELECTRONIC TEST BENCH	-1 no.

All the equipments will be supplied by the BHEL PEM.

2.10 SCOPE OF CIVIL WORKS

1. The scope of civil works covers minor civil works like drilling, chipping and punching & opening in concrete floors, slabs, brick walls, grouting of foundation bus duct columns, base frame of panels, Transformer etc. Scope of civil works also covers minor civil works required for installation of push button stations, Junction Boxes.

2. Scope of civil works includes supply of grouting materials like cement, sand, etc., and cleaning of all debris at free of cost.

2.11 WELDING, NON-DESTRUCTIVE TESTING ETC.

1. Installation of equipment involves good quality welding, NDE checks etc.

2. Welder deployed for aluminium welding shall have experienced and approved by BHEL and BHEL's Customer after due qualification process/testing.

3. Welding of all structural steel & aluminium shall be done only by the qualified and approved welders.

4. All the welders shall be tested and approved by BHEL engineer/ Customer's quality engineer before they are actually engaged on work though they may possess IBR/other certificate. BHEL reserves the right to reject any welder without assigning any reason.

5. The welded surface shall be cleaned of slag and painted with primer paint to prevent corrosion. For this paint will be supplied by the contractor.

6. Welding electrodes have to be stored in enclosures having temperature and humidity control arrangement. This enclosure shall meet BHEL specifications.

7. Certain types of coated welding electrodes, prior to their use, call for baking for specified period and will have to be held at specified temperature for specified period. Also, during execution, the coated welding electrodes have to be carried in portable ovens.

2.12 MEASUREMENTS & WASTAGE & CUTTING ALLOWANCES

1. For all payment purposes, measurement shall be made on the basis of the actual execution of work in line with drawings/documents/site requirements. Physical measurements shall be made by the contractor in the presence of the Engineer.

2. The measurement for cable, impulse pipes/tubes, GI pipe, conduits, flexible conduits, trays etc., shall be made on the basis of length actually laid.

3. All the surplus, scrap and serviceable materials, out of the quantity issued to the contractor shall be returned to BHEL in good condition and as directed by the engineer.

4. All materials returned to stores should carry aluminium tag indicating the size and type. Cables more than 15 meters length is termed as serviceable material and shall be returned size wise and category wise to the owner's stores/yard. Cable of serviceable length being returned to the stores in drums shall have their free ends sealed and the balance lengths on the drum(s) shall be noted and certified by the Engineer-in-charge. This shall be applicable only for the purpose of accounting the cables issued for installation.

5. **While carrying out material reconciliation with contractor, all the above points will be taken into account. All serviceable material returned by the contractor shall be deducted from the quantities issued for the respective sizes and categories and the balance quantity (ies) will be taken as the net quantity (ies) issued to the contractor. Material reconciliation shall be done and allowable scrap quantity calculated as per wastage allowance percentage specified above. Any scrap/wastage generated by the contractor in excess of the allowable percentage shall be charged at the rates decided by the Engineer whose decision shall be final and binding on the contractor**.

6. For all site-fabricated steel items such as supports, racks, frame, Canopy etc. physical measurement shall be made and then converted to tonnage. For steel material supplied to the contractor, all scrap shall be returned to BHEL stores with due accounting.

7. Every month the contractor shall submit an account for all the materials issued to him by BHEL in the standard Performa prescribed for this purpose by the site in charge.

8. The erection contractor shall make every effort to minimize wastage during erection work. Cutting and wastage allowance shall be computed on length, weight of material actually used, measured and accepted. In any case, the wastage shall not exceed the following limits;

Sl.No.	Item	% Wastage on issued Qty
01.	Each iron/steel section	2
02.	Each size of control / shielded cable	2
03.	Each size of power cables	1
04.	Impulse pipe/tubes/GI pipes/copper tube	1

9. If the actual wastage is more than the specified figure, then equivalent price of the excess portion will be deducted from the contractor's bill.

10. The cable take off from drums shall be planned strategically such that jointing in the run of cables and wastage are avoided. For this purpose the exact route length between various equipment/panels as per the cable schedule shall be measured and the route length recorded before laying of the cables. Depending upon the route length and the type of cable required for various destinations, the cable drums shall be suitably selected for cable laying. Any jointing shall have to be approved by BHEL engineer. All the cut pieces/bits of cables, which are not used, shall be returned to the purchaser for accounting towards wastage. The cables damaged by the contractor shall have to be replaced by the contractor at his own cost.

2.13 FINAL PAINTING

1. The contractor shall provide all the primer, paint, and other consumables like brush, cleaning agents etc. All T&P, manpower, supervision is in contractor's scope. Painting shall be carried out as per colour scheme approved by BHEL/ UPRVUNL

2. All metal parts of the equipment including supports, structures, etc., as applicable shall be painted after thoroughly cleaning the surface from dust, rust, greases, oils, scales, etc, by wire brush, scrapping etc; as specified in relevant erection documents. The above parts shall then be painted with specified two coats of specified paint over the shop primer/paint. Also, where the shop primer/paint has peeled off, the affected area shall be cleaned thoroughly by the specified method and then primer coat applied. Similarly, certain components may be supplied without any primer/paint coat from shop. The surface of such items shall be cleaned as per specifications, coated with suitable primer and then coated with final paint coats. The dry film thickness after final coat should be as per specification. The color, shade etc. shall be as per specification.

3. Paint and other materials so purchased shall be ISI marked and as per drawing, documents and specifications and painting should be as per colour scheme and quality approved / specified by Engineer. Painting schedule will be furnished at site. Valid Test certificate for the paint so supplied shall be made available before use of the same on work.

   In order to have consistency in painting system, it is preferable that all the supplies are sourced from one single manufacturer.

4. All the fabricated frames, racks, supports, panel base frame etc. wherever applicable shall be painted with two coats of primer and followed by two coats of paint as specified earlier herein. In case of G I Structure, The cold galvanizing paint to be applied as touch up where ever needed. This is to be done as per instruction of BHEL engineer. The Paint required for this purpose is in scope of Contractor

5. The painters have to undergo test on a mock plate of size 1m*1m and only qualified painters will be allowed to work.

6. The contractor shall ensure availability of

   Ford Cup-4 to measure consistency of paint,

   Automatic magnetic gauge to measure the dry film thickness and

   SSPC Visual standards to assess degree of cleanliness of surfaces to be painted.

8. Touch-up painting of LT MCC \ Control Panels or any other equipment /devices wherever necessary.

9. The primer shall be compatible with the final coat paint schedule.

10. Full (Spray) painting of transformers, bus ducts with two coats of paint as per Specification

11. Colour Banding, Legend and Identification Marking, Direction marking etc. shall be in scope of the contractor. Letter writing shall be done in Hindi / English or in both languages. The painters have to undergo test and only qualified painters will be allowed to work.

2.14 TESTING, PRE-COMMISSIONING, AND POST COMMISSIONING

1. Scope of pre-commissioning/commissioning starts with the commissioning of various equipment erected by the contractor and making them available to commission various materials /systems and main power plant. The scope of work of various commissioning activities of the main plants is referred below:

a. Trial run of various equipment.
b. Light up of boiler.
c. Boiler EDTA acid cleaning.
d. Turbine barring gear.
e. Steam blowing of piping.
f. Turbine rolling.
g. Safety valve floating.
h. First synchronisation
i. Coal firing.
j. Trial Operation / Full load.

2. The above activities, tests, trial runs may have to be repeated till satisfactory results are obtained and also to satisfy the requirements of customer / consultant / statutory authorities like boiler inspector, electrical inspector etc.,

3. The contractor shall co-ordinate with BHEL and other contractor's during the main plant commissioning to ensure successful commissioning of total plant.

4. The pre-commissioning activities of the main power plant shall start with energizing of start up power supply systems followed by trial run of various drives prior to light up of boiler.
Commissioning operations shall continue till BHEL hands over the Unit to their Customer. The contractor shall simultaneously start commissioning checks of systems erected by him to match with the various milestone activities /commissioning programme of the project. All these works need specialized testing engineers, supervisors including electricians in each area to co-ordinate with BHEL Engineers and other agencies round the clock to match with commissioning schedule of unit. Contractor shall earmark separate manpower for various commissioning activities. The manpower shall not be disturbed or diverted

5. The mobilization of testing team shall be planned in time and shall be undertaken round the clock. The contractor shall discuss on day to day / weekly / monthly basis the requirement of testing manpower, consumables, tools and tackles with BHEL engineer and arrange for the same. If at any time the requisite manpower, consumables, T & P are not arranged then BHEL shall make alternate arrangements and the cost shall be recovered from contractor.

6. Prior to commissioning and after commissioning, protocols have to be made with BHEL/ customer. The formats shall be given by BHEL and have to be printed by the contractor in adequate numbers. It shall be specifically noted that above personnel of the contractor may have to work round the clock along with BHEL commissioning engineers which may involve over time payment which forms part of Contractors Scope

7. Any rework/rectification/modification is required to be done because of contractor's faulty erection, which is noticed during commissioning at any stage, the same has to be rectified by the contractor at his cost. During commissioning, if any improvement rework / rectification /modification due to design improvement / requirement is involved, the same shall be carried out promptly and expeditiously. Claims if any, for such works from the contractor shall be governed by clauses covered elsewhere.

8. Minimum requirement of Man Power for testing/checking works shall be as follows:

	TRANSFORMER	BUS DUCT	SWITCHGEAR/Panels	CABLING
Engineer	1	1	2	2
Supervisor	2	2	4	4
Technician	4	4	6	6

9. The above testing/checking group shall be identified at the Pre commissioning time. The above commissioning group shall have the knowledge of various systems referred in the tender and possess adequate experience in testing. The above manpower for commissioning is only tentative and if any additional manpower required as per site requirement, the same shall be arranged by the contractor. **If the contractor fails to deploy the above Engineer/Supervisor/Technician at appropriates time of commissioning, no payment shall be made against commissioning activities as per terms of payment**

10. T&P/ instruments required for testing are to be arranged by the Contractor

11. All testing activities shall be carried out as per relevant standard, code of practice, manufacturer's instructions and BHEL norms. The contractor shall follow the checklist of BHEL prior to taking up testing & commissioning activities and the activities shall be carried out in accordance with the

checklist. All the above shall be witnessed by BHEL engineer and the reports signed jointly.

12 It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers along with Supervisors during pre commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&Ps, IMTEs etc., and any other assistance required during this period. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.

Chapter - III: Facilities in the scope of Contractor/BHEL

3.0 FACILITIES IN THE SCOPE OF CONTRACTOR/BHEL

S.No.	Description	Scope /to be taken care by		Remarks
		BHEL	CONTRACTOR	
1.1.0	**ESTABLISHMENT**			
1.1.1	**FOR CONSTRUCTION PURPOSE**			
A.	Open space for office	**YES**		**Free of charge**. As & where made available by M/s UPRVUNL/BHEL
B.	Open space for storage	**YES**		**Free of charge**. As & where made available by M/s UPRVUNL/BHEL
1.1.2	**FOR LABOUR COLONY**			
A	Open space	**YES**		**Free of charge**. As & where made available by M/s UPRVUNL/BHEL
1.2.0	**ELECTRICITY**			
1.2.1.	Electricity for construction purposes (chargeable/free)			**Free of Charge.**
1.2.1.1	Single point source	**YES**		
1.2.1.2	Further distribution for the work to be done which include supply of materials &		**YES**	

	execution			
1.2.2	Electricity for the office, stores, canteen etc of the bidder which include:			
1.2.2.1	Distribution from single point including supply of materials & service		**YES**	
1.2.2.2	Supply, Installation & connection of material of energy meter including operation & maintenance		**YES**	
1.2.2.3	Duties & deposits including statutory clearances for above		**YES**	
1.2.2.4	Demobilization of the facilities after completion of works		**YES**	
1.2.2.5	Electricity for living accommodation of the bidder's Staff, engineers, supervisors etc. on the above lines		**YES**	**Chargeable basis** at the rate as fixed by BHEL's Customer M/s UPRVUNL.
1.3.0	**WATER SUPPLY**			
1.3.1	**FOR CONSTRUCTION & LABOUR COLONY:**			
1.3.1.1	Making the water available at single point		**YES**	**FREE OF CHARGE.**
1.3.1.2	Further distribution as per the requirement of work including supply of materials & execution		**YES**	
1.4.0	**LIGHTING**			
1.4.1	For construction work (supply of all materials) 1. At office storage area 2.At preassembly area 3.At construction site/area		**YES**	

1.4.2	For construction work (execution of lighting work/arrangements) 1. At office storage area 2. At preassembly area 3. At construction site/area		**YES**	
	Providing the necessary consumables like bulbs, Switches, etc during the course of construction		**YES**	
1.5.0	**Communications facilities for site operations of the bidder**			
	Telephone, fax , internet ,intranet, email etc.		**YES**	
1.6.0	**COMPRESSED AIR SUPPLY**			
1.6.1	Supply of compressor and all other equipments required for compressor & compressed air system including pipes, valves,storage system etc.		**YES**	
1.6.2	Installation of the above system and operation & maintenance of the same		**YES**	
1.6.3	Supply of all the consumables for the above system during the contract period.		**YES**	
	ERECTION FACILITIES			
2.1.1	Providing erection drawings for all the Equipments covered under this scope	**YES**		
2.1.2	Drawings for construction method	**YES**	**YES**	In consultation with BHEL
2.1.3	As-built-drawings-where ever deviations Observed & executed and also based on Decisions taken at site		**YES**	**do**
2.1.4	Shipping lists etc for reference & planning the activities	**YES**	**YES**	**do**

2.1.5	Preparation of site erection schedules and other input requirements		**YES**	**do**
2.1.6	Review of performance & revision of site erection schedules in order to achieve the end dates & commitments	**YES**	**YES**	**do**
2.1.7	Weekly erection schedule based on Sl. No.2.1.5		**YES**	**do**
2.1.8	Daily erection/work plan based on Sl. No.2.1.7		**YES**	**do**
2.1.9	Periodic visit of senior official of bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two month		**YES**	
2.1.10	Preparation of preassembly bay		**YES**	

3.1 BHEL will not be responsible for any loss or damage to the contractor's equipment as a result of variation in voltage or frequency or interruptions in power supply.

3.2 The Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport, electricity, water, medical facilities etc. at his own cost as required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him.

3.3 Provision of distribution lines of both electrical power and water from the central points to the required place with proper distribution boards observing the safety rules laid down by the electrical authorities of the state shall be done by the contractor, supplying all the materials like cables, distribution board, switch boards, TPN, CBS, ELCBS/ MCCBS/ Copper / Brass clamps, copper conductor, change over switches pipes etc. at his own cost. If any failure is caused in supply of the power and water, it is the responsibility of the contractor to make alternate arrangements at his cost. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets..

3.4 The contractor while drawing construction power supply from Distribution Board should strictly adhere to following points.

a) All electrical installations should be as per Indian Electricity rules.

b) All distribution Boards installed by the contractor should be constructed with fireproof materials viz. Steel frames, Bakelite sheets etc.

c) Connection for single phase should be taken from phase and neutral. Nowhere the connection should be taken with earth as neutral.

d) All electrical connections should be made through connectors, nuts and bolts, switches, plug and sockets. Loose connections or hooking up of wires shall not be permitted.

e) Contractor have to make their own earthing arrangement for their equipment / DB earthing.

f) All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points.

g) Contractor should use “MCCB” and “ELCB” either on incoming or outgoing connections to the DBs.

h) Contractor should ensure that all the CBs / TPNs/ Fuses/ MCCB / ELCB cables etc. should be of adequate rating/ capacity.

i) For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected/ proposed loads.

3.5 ELCB will be tested once in a week or as directed by BHEL by actually simulating the earth leakage for all installations and the same shall be recorded in the logbook to be maintained by the contractor.

3.6 In case of power cuts / load shedding no compensation for idle labour or extension of time for completion of work will be given to contractor.

3.7 On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and levelled and debris shall be removed, as per instructions of BHEL, by the contractor at his cost. In the event of his failure to do so, the Engineer will get it done and expanses incurred shall be recovered from the contractor along with prevailing overheads. The decision of BHEL Engineer in this regard shall be final.

3.8 Compressor required capacity for construction purposes shall be arranged by Contractor.

3.9 Contractor should install a PC ALONG WITH MODEM to connect with our server (LAN) AT SITE.

Chapter - IV: T&Ps and MMEs to be deployed by Contractor

4.0 T&P AND MMD DEPLOYED BY CONTRACTOR

S.NO.	EQUIPMENT	CAPACITY	ACCURACY	MINMUM QUANTITY
1.	Welding Generators & Transformers, Rectifiers & TIG Welding sets			APR
2.	Chain pulley blocks	5/10 T		APR
3.	Trailer with Pulling Unit	10 / 20 MT		APR
4.	Hydra crane	12/14 MT		1 No.
5.	Hydraulic Jack (Low Height)	25/50/100T		APR
6.	Screw Jacks	5/10/25/50T		APR
7.	Oil Filteration Machine & tank	5 to 6Kl/hr		01 no.
8.	Oil Filteration Machine & tank	1 to1.5Kl/hr		01 no.
9.	Transformer oil testing kit			1 no.
10.	Crimping tools up to all size of cables under scope of work			Adequat e nos.
11.	Hydraulic crimping tool			1 No.
12.	Vacuum Cleaner (Industrial)			1 no
13.	Pipe bending machine			02 Nos
14.	Grinding Machine			02 Nos
15.	Drilling Machines1/4", 1/2", 3/4" & 1"			01 no. each
16.	Electric Winches			APR
17.	Phase sequence indicator			1 No.
18.	Digital Multimeters AC & DC	200mV to 1000V /	+/-1%+1 digit	10 Nos.
19.		200mA to 20 A A(		
20.	Digital,41/2 digit Motwane/HIL/Fluke			4 nos.
21.	Analog multimeter	Voltage 2.5 to 2500V AC &DC	+/-1%	4 nos.
22.		Current 100 mA to 10A AC	+/-2%	
23.		Current 250 micro A to 1A	+/-1.5%	

		DC		
24.		Resistance upto 100 M ohms	+/-3%	
25.				
26.	Hand operated megger 500V/1000V/2500V	Upto 200 M Ohms		1 no. each
27.	Motor operated megger,-0-1000-2000-5000V	Upto 25000 M Ohms		1 no. each
28.	Earth resistance tester	0 to1,10,100 ohms	+ /-5% at Centre Scale range	
29.	HV Test Kit	50 kV AC 70kV DC	+/-10%	1 No. each
30.	Wheatstone bridge	0.05 m ohm - 100 ohm		1 No
31.	Insulation tester mains operated 2500/5000V			2 No.
32.	Tong Testers	0/300/600A AC 0 to 300A DC	+ 3%	1 No. each
33.	Tong Testers DC 30/60/300 A			1 No.
34.	DC Tong tester(mA)	0-500 mA		
35.	Stop watch			2 No.
36.	Tele talk 2 wire system			6 sets
37.	Torque wrench(12-60 Nm,50-225 Nm)			1 No. each
38.	Ferrule printing machine			1 no.
39.	Dial gauges	0 to 10mm	+/- 0.01mm	
40.	Oil temperature bath suitable to calibrate the instruments range 0-300 deg. C with standard temp. gauges & thermostatic control			2 nos.
41.	Portable air compressor with drier and regulator rated for 7 to 10 kg/cm2			1 no.

42.	Standard milliamps / millivolts source of reputed make. Range 0to 50 ma and 0 to 100 mv			2 nos.
43.	Single phase variac	0-15 A		1 no.
44.	3 phase variac rating 5 amps			1 no.
45.	Glass thermometer 0-120 deg. C, 0-200 deg.c and 0-600 deg.c			1 no. each
46.	Primary current injection kit	0-10000A		1no.
47.	Secondary current injection kit	0-5 A	+/- 0.5mA	1 no.
48.	Tacho generator	0 to 4000 rpm	+/- 0.25%	1 no.
49.	Relay testing kit			1 no.
50.	DC Ammeter	0 to 300 A	+/- 10%	
51.	DC Voltmeter	0 to 500 V	+ /-10%	
52.	Voltmeter AC	0-125-250-625V		
53.	Ammeter AC	0-2-10 A		
54.	Phase sequence meter	110V-450V,25 to		
55.	Oil specific gravity and PPM measuring equipment			2 no.
56.	Dew point measurement instrument			1 no.
57.	Oscilloscope			1 no.

NOTES:

1. The contractor shall arrange all the above T&P, equipment and instruments as indicated except testing instruments which are proprietary in nature.

2. Any other tools and plants instruments and equipment required in addition to the above other than propriety type T&P/Instruments for the successful completion of this job shall be arranged by the contractor at his cost.

3. Necessary accessories for the above shall also be provided by the contractor.

4. The above instruments/equipment shall be sent for testing and calibration wherever from time to time and maintained by contractor as required by BHEL. List of such agencies and periodicity of calibration required for different instruments shall be furnished by BHEL at site.

5. Contractors shall arrange experienced/qualified persons for using these calibration instruments at laboratory and also at work spot.
6. Wherever frequent calibration is required, contractor shall arrange adequate number of instruments such that the work does not suffer for want of test instruments.Other terms and conditions regarding above items shall be as per T&P clause in SCC

Chapter - V: T&P AND MMD DEPLOYED BY BHEL ON SHARING BASIS

5.0 T&P AND MMD DEPLOYED BY BHEL ON SHARING BASIS

LIST OF T&P and MMD being provided by BHEL for use of contractor free of hire charges on sharing basis.

S.NO.	EQUIPMENT	CAPACITY	QTY
T&Ps			
1.	EOT Crane (in T.G. hall)	125T / 25T	1 No.
2.	Suitable capacity crane		APR

NOTES:

1. Any other special T&P if supplied by the manufacturer and available with the customer will also be provided to the contractor free of hire charges as and when made available. Special tools and tackles are to be used only for the purpose for which these are meant and to be returned in good condition.
2. Other terms and conditions regarding above items shall be as per T&P clause in SCC

Chapter - VI: TIME SCHEDULE

6.0 TIME SCHEDULE

6.1 The contractor is required to commence the work within 15 days from the date of issue of LOI unless BHEL decides to fix any other later date. However, the actual date of start of work, to fix up the zero date of the contract, will be certified by BHEL Engineer after adequate mobilisation of manpower and T&Ps by the contractor.

6.2 Entire work as detailed in the tender specifications shall be completed **within 12 months from** the Zero date as per programme/ milestones indicated by BHEL Engineer. Contractor has to mobilise adequate resources to meet BHEL's commitments to their customer as indicated from time to time.

6.3 The contractor has to augment his resources in such a manner that following tentative dates of major milestones of erection & commission are achieved on specified schedules:

MILE STONES	MONTHS
Erection Start	ZERO
Boiler Light up	05 months
Barring gear	08 months
Synchronization	09 months
Full Load	10 months
Trial Operation	11 months

6.4 In order to meet above schedule in general, and any other intermediate targets set, to meet customer/ project schedule requirements, contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL**.**

6.5 This project is a fast track project. Customer is making all out efforts to advance the project schedule. In case the project is to be advanced by customer, the erection work in the scope of the contractor is to be advanced to meet the project requirement. No extra payment whatsoever shall be paid on this account.

6.6 The contractor has to ensure that work is completed in all respects leaving no pending points. However the punch list/ pending points, which are possible to be attended at site, shall be fully liquidated within two months from successful trial operation of the unit.

6.7 The work under the scope of this contract is deemed to be complete in all respects, only when the contractor has discharged all the responsibilities laid down in the contract. The decision of BHEL on completion date shall be final and binding on the contractor.

Chapter - VII: TERMS OF PAYMENT

7.0 TERMS OF PAYMENT

7.1 The 'Engineer' will certify regarding the actual work executed in the measurement books and bills, which shall be accepted by the contractor in measurement book.

7.2 Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. The format for billing shall be approved by BHEL before raising invoices.

7.3 Subject to any deduction which BHEL may be authorised to make under the contract, the contractor on the certificate of the Engineer at site be entitled for payment at different stages of erection as explained hereunder:

7.3.1 Interest bearing recoverable advance: Applicable as per Clause No. 2.13 of GCC

7.4

7.4.1. PROGESSIVE PAYMENT ON PRORATA BASIS- 85 % of contract value payable on fulfillment of following conditions:

(A) For Equipment / items such as Panels, Cable Trays, HT/LT cables, JB, MCC, PCC, DG sets, VFD, Dry transformers, Batteries, chargers etc. where no calibration is required

(i) 50% of item rate shall be payable on erection \ installation /cable laying
(ii) 20% of item rate on final alignment, welding, clamping, termination etc.
(iii) 10% of item rate on testing, pre-commissioning, charging etc.
(iv) 5 % of item rate on pending point clearance

(B) For equipment/items where calibration and testing is required.

i) 20% of item rate on calibration and testing
ii) 30% of item rate on erection, installation alignment and termination wherever involved.
iii) 15% of item rate on individual device loop checking/hydro test/ charging of installation and panels.
iv) 15% of item rate on system loop checks, pre-commissioning checks by simulation/ field calibration or with actual system operation.
v) 5% of item rate on pending points clearance.

(C) For equipment/items such as Oil filled Transformers, HT/LT Bus Ducts & its accessories etc.

i) 20% of item rate shall be payable on placements
ii) 40% of item rate shall be payable on erection/installation
iii) 15% of item rate on final alignment, oil centrifuging, welding, clamping, termination etc.
iv) 5% of item rate on testing, pre-commissioing, charging etc.
v) 5% of item rate on pending points clearance.

NOTE:-Further percentage break up for payments against above, if required will be mutually discussed and finalised at site.

7.4.2. STAGE/MILESTONE PAYMENTS (15% of Contract value)

1.	Charging of Station transformer	1%
2.	Charging of Unit transformer	2%
3.	Boiler Light up	1%
4.	Barring Gear (TG)	1%
5.	Rolling and Synchronisation	1%
6.	Full Load	1%
7.	Trial Operation of Unit	2%
8.	Painting (including arrow marking, nomenclature, etc	2%
9.	Area cleaning, temporary structures cutting/removal and return of scrap	1%
10.	Punch List points/pending points liquidation	1%
11.	Material Reconciliation	1%
12.	Completion of Contractual Obligations	1%

Note:

1. **If the commissioning activities could not be carried out due to no fault of contractor, BHEL Site in-charge, at his discretion, after recording reasons for exercising such option, can split and release payment up to 50% of milestone payment on completion of work, to the extent possible, required for carrying out that particular milestone/ commissioning activity.**

Chapter - VIII: TAXES, DUTIES, LEVIES

8.0 TAXES, DUTIES, LEVIES

The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other chargeswhich may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.

However, provisions regarding **Service Tax and Value Added Tax (VAT**) on output services and goods shall be as per following clauses.

8.1 Service Tax & Cess on Service Tax

Service Tax and Cess on Service Tax as applicable on output Services are excluded from contractor's scope; therefore contractor's price/rates shall be exclusive of Service Tax and Cess on Output Services.

Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. The Service Tax Rules permit more than one option or methodology for discharging the liability of tax/levy/duty and BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the

Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor. Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. For the purpose of claiming any Service Tax from BHEL, the following procedure shall be adopted :

Contractor shall submit serially numbered Service Tax and Cess Invoices, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely:

1. The name, address and registration number of the contractor

2. The name and address of the party receiving taxable service (BHEL)

3. Description, classification and value of taxable service provided and

4. The Service Tax payable thereon.

All the four conditions shall be fulfilled in the invoice for payment of Service Tax by BHEL.

Where more than one nature of Service under Service Tax Rules is involved, the invoice mentioned above shall contain the breakup of all values for each nature of Service.

8.2 VAT (Sales Tax /WCT)

The rates quoted by the Contractor shall be inclusive of VAT/Sales Tax and BHEL shall not reimburse any amount on this account due to any reason whatsoever.

The Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill.

Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted.

In case tax is deducted at source as per the provisions of law, this is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made unless specifically agreed to.

Contractor has to make his own arrangement at his cost for completing the formalities, if required, with Sales Tax/VAT Authorities, for bringing all their material, plant and equipment etc at site for the execution of the work, including arrangement of Road Permits if and as applicable under the relevant VAT Act.

8.2.1 Modalities of Tax Incidence on BHEL

Wherever the relevant tax laws permit more than one option or methodology for dischargingthe liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with

regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the contractor.

8.2.2 New Taxes/Levies

In case the Government imposes any new levy/tax on the output service/goods/work after award of the contract, the same shall be reimbursed by BHEL at actual.

In case any new tax/levy/duty etc. becomes applicable after the date of Bidder’s offer, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of PriceBid. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

Chapter - IX: Others

9.0 OTHERS

9.1 For reverse auction/ for Price Bid opening, only those bidders will be considered who will be qualified for the subject job on the basis of pre-qualification evaluation/ Techno-commercial bids. BHEL reserves the right to reject the bidders with unsatisfactory past performance in the execution of a contract. BHEL's decision in this regard shall be final & binding.

Chapter - X: BILL OF QUANTITY (BOQ)
BOQ FOR ERECTION, TESTING, COMMISSIONING OF ELECTRICAL PACKAGE OF UNIT NO.6 AT 2x500 MW ANPARA D TPS.

S. NO	ITEM DESCRIPTION	UNIT	Quantity
	POWER TRANSFORMERS		
1	**Transportation up to foundation, Assembly, testing & commissioning of Three Phase ,** **400kV/11.5/11.5kV, 80/40/40 MVA, ONAF, STATION TRANSFORMER** Core & winding 62 MT Shipping Weight(N_2 filled) 85 MT Total Weight(with oil) 168MT Overall dimensions 16400X6500X9600 mm Oil Qty. 50800 ltr.	NO.	1
2	**Transportation up to foundation, Assembly, testing & commissioning of Three Phase ,21/11.5kV, 25/20 MVA, ONAF, UNIT TRANSFORMER** Core & winding 26 MT Tank & fittings 11 MT Shipping Weight(N_2 filled) 40 MT Total Weight (with oil) 64 MT Overall dimensions 9100x5100x6600 Oil Qty. 23159 ltr.	NO.	2
	Transportation up to foundation, Assembly, testing & commissioning of SERVICE TRANSFORMERS		
3	11/3.5kV,16 MVA,ONAN, Overall dimensions 7100X5300X5200 mm Oil qty. 7900ltr. 45 MT	NO.	02
4	11/3.5kV,6.3 MVA,ONAN Overall dimensions 4550X3300X3500 mm Oil qty. 2820 ltr. Total wt. 13300 KG	NO.	02
5	11kV/433V,2000kVA,Dry type Overall dimensions 3950X2550X2250 mm	NO.	04

S. NO	ITEM DESCRIPTION	UNIT	Quantity
	Total wt. 7000 KG		
6	11kV/433V,2000kVA,ONAN Overall dimensions 3250X2550X2550 mm Oil qty. 1300 ltr. Total wt. 6100 KG	NO.	04
7	11kV/433V, 1600kVA,ONAN Overall dimensions 3370X3300X2500 mm Oil qty. 990 ltr. Total wt. 5000 KG	NO.	16
8	11kV/0.433kV, 500kVA,ONAN 2700X2700X2800 mm 4700KG	NO.	02
9	11kV/0.433kV, 750kVA,ONAN 2700X2700X2800 mm 4700KG	NO.	02
	NGR		
10	11 kV,300 A	No.	4
11	3.3kV,300A	No.	4
	ISOLATED PHASE BUS DUCT		
12	Transportation from stores / storage yard to erection site, assembly, erection, welding, testing & commissioning of Isolated Phase Bus Duct for interconnection of Generator & Generator Transformers, tap-off to unit transformers, SP&VT, LA &VT cubicles, NG cubicles ,air pressurisation equipments, flexible hoses ,CT/PT transformers, supporting structures along with all accessories & auxiliaries	SET.	01
	Delta Run 21kV, 11000A Enclosure Size: Round,OD1000 mm Thk 8 mm Conductor size: Round, OD 450 mm, Thk. 15 mm Phase to phase distance:1150 mm Approx. length per unit 95 Mtr. **Main run 21kV, 19000 A** Enclosure Size: Round,OD1500 mm Thk 8 mm Conductor size: Round, OD 800 mm, Thk. 16 mm Phase to phase distance:1750 mm		

S. NO	ITEM DESCRIPTION	UNIT	Quantity
	Approx. length per unit 160 Mtr. **Tap-off 21kV, 1600A** Enclosure Size: Round ,780x4.78 mm Conductor size: Box formation 2 channel, OD 2x203.2 mm, Thk. 11.8 mm Phase to phase distance:1000mm Approx. length per unit 75 Mtr. **SP and VT Cubicle for both the units consists of** : Epoxy cast dry type VT –6 Nos., Lighting arrestor –03 Nos, Surge Capacitor –03 Nos, etc Weight of Cubicle approx. 3.5 MT, Dimension 2000 x 1800 x 3500 mm **Neutral Grounding Cubicle(NGR-NGT) consist of** **a) Dry type epoxy cast NG transformer** **b) NG Resistor** c) Dimensions 2500x 2500 x2000 mm **Supporting structural steel approx. 80 MT**		
	SEGREGATED PHASE BUS DUCT		
	Transportation from stores / storage yard to erection site, assembly, erection, welding, testing & commissioning of Segregated Phase Bus Duct for interconnection of Unit/Station Transformers to 11kV Switch Boards		
13	**1600A** SPBD from Unit Transformers to 11 kV Unit Switch Board SPBD for interconnection of 11kV Unit Switch board to 11 kV Station Switch Board Enclosure Size: 450x1250 mm, Thk. 3.15 mm Conductor size: Rectangular, 2x101.6 mm, Thk. 6.68 mm Phase to phase distance:450mm	Mtr.	193
14	**2500A** SPBD from Station Transformer to 11 kV Station Switch B SPBD for interconnection of 11kV Unit Switch board to 11KV Station Switch Board Enclosure Size: 450x1250 mm, Thk. 3.15 mm Conductor size: Rectangular,2x127 mm, Thk. 8.05 mm Phase to phase distance:450mm	Mtr.	375

S. NO	ITEM DESCRIPTION	UNIT	Quantity
15	**3000A** SPBD from Unit Transformer to 3.3 kV Switch Board Enclosure Size: 450x1250 mm, Thk. 3.15 mm Conductor size: Rectangular, 2x127 mm, Thk. 8.05 mm Phase to phase distance:450mm	Mtr.	98
	HT SWITCHGEAR-11 kV SWITCHBOARD		
16	11kV, 1600A, Board# 6BA consists of approx. 17 panels. Each panel size 820X2301X2355 mm	Set	01
17	11kV, 1600A, Board# 6BB consists of approx. 16 panels. Each panel size 820X2301X2355 mm	Set	01
18	11kV, 2500A, Board# 0BA consists of approx. 13 panels. Each panel size 820X2301X2355 mm	Set	01
19	11kV, 2500A, Board# 0BB consists of approx. 19 panels. Each panel size 820X2301X2355 mm	Set	01
	3.3 kV SWITCHBOARD		
20	3.3kV, 3000A, Unit Sw.Board # 6CA consists of approx. 38 panels. Each panel size 820X2301X2355 mm	Set	01
21	3.3kV, 1250A, Board# 0CA consists of approx. 37 panels. Each panel size 820X2301X2355 mm	Set	01
	LT BUS DUCT		
22	Non –segregated LT 415 V,3000A/2500A	Mtr.	106
	LOW VOLTAGE SWITCHGEAR		
23	415V, 3000A, UNIT. SERV. SWITCHBOARD-6DA Approximate Dimension: 12250 x 1000 x 2475 mm	No.	1
24	415V,2500A, UNIT EMER. SWITCHBOARD -6DG Approximate Dimension: 12150 x 1200 x 2475 mm	No.	1
25	220V MAIN DCDB -6FA Approximate Dimension: 5600 x 1000 x 2475 mm	No.	1
26	415V ,1000A,BOILER MCC -6HA Approximate Dimension: 16000 x 1000 x 2475 mm	No.	1
27	415V,250A, BOILER V&D MCC -6HB Approximate Dimension: 14000 x 1000 x 2475 mm	No.	1
28	415V,630A, BOILER ACDB -6HC Approximate Dimension: 3750 x 1000 x 2475 mm	No.	1

S. NO	ITEM DESCRIPTION	UNIT	Quantity
29	415V,250A, ESP & ID FAN AREA MCC -6HD Approximate Dimension: 3000 x 1000 x 2475 mm	No.	1
30	415V ,1000A,TURBINE MCC -6KA Approximate Dimension: 12900 x 1000 x 2475 mm	No.	1
31	415V,250A, TURBINE VALVE MCC -6KB Approximate Dimension: 12750 x 1000 x 2475 mm	No.	1
32	415V ,630A,UNIT SERV. ACDB -6QA Approximate Dimension: 6750 x 1000 x 2475 mm	No.	1
33	415V,630A, VENTILATION MCC-6TA Approximate Dimension: 8250 x 1000 x 2475 mm	No.	1
34	415V,400A, ESP A/C & VENT MCC -6TB Approximate Dimension: 7500 x 1000 x 2475 mm	No.	1
35	415V, 3000A,STN. SERV. SWITCHBOARD -0DA Approximate Dimension: 12000 x 1000 x 2475 mm	No.	1
36	415 V SLURRY P/H & COMPRESSOR HOUSE-0DF Approximate Dimension: 10850 x 1200 x 2475 mm	No.	1
37	415 V,1600A, SILO AREA SWBD.-0DI Approximate Dimension: 6750 x 1000x 2475 mm	No.	1
38	415V ,1000A,STN. SERV. MCC -0QA Approximate Dimension: 12000 x 1000 x 2475 mm	No.	1
39	415V,3000A, FUEL OIL P/H PMCC -0DD Approximate Dimension: 7500 x 1200 x 2475 mm	No.	1
40	415V,3000A, FIRE WATER P/H SWBD.-0DE Approximate Dimension: 10850 x 1200 x 2475 mm	No.	1
41	415V ,2500A,CW SERVICE SWBD.-0DC Approximate Dimension: 6000 x 1000 x 2475 mm	No.	1
42	415V,3000A, COOLING TOWER SWITCHBOARD-6DF	No.	1
43	415V,1000A, BOTTOM ASH MCC-0DH	No.	1
44	415V,1000A, AIR WASHER MCC -6SA	No.	1
45	415V ,3000A,ADM. BUILDING SWBD-0DG	No.	1
46	415V,400A, H2 PLANT MCC-0SB	No.	1
47	415V,400A, WORKSHOP MCC-0SC	No.	1
48	415V,1000A, SERVICE BUILDING MCC-0SD	No.	1
49	415V ,1000A,CCR AC MCC-0TA	No.	1

S. NO	ITEM DESCRIPTION	UNIT	Quantity
50	415V AC FUSE DB	No.	10
51	220V DC FUSE DB	No.	4
52	Local motor starters (up to 3.7 KW)	No.	75
53	PUSH BUTTON STATIONS	No.	590
	JUNCTION BOXES		
54	180x100x250 mm	No.	150
55	250x150x400 mm	No.	40
56	450x150x300 mm	No.	90
	BATTERY SYSTEM		
57	220 V, 400A Float-cum-boost Chargers 1000x1350x(2200+100)mm 1300KG	Set	2
58	220 V DC Battery System (Ni-Cd), 990Ah, 170 cells 1.14V,Single tier Double Row type 8550x3060x875 mm 12750KG	Set	2
	HT POWER CABLES LAYING,DRESSING,CLAMPING		
	11/11kV, Unarmoured, Aluminium Conductor XLPE insulated FRLS outer-sheathed cable		
59	1C x 630 SQ. MM	Mtr.	10500
60	3C x 185 SQ. MM	Mtr.	18300
	3.3/3.3kV, Unarmoured, Aluminium Conductor XLPE insulated FRLS outer-sheathed cable		
61	3C x 185 SQ. MM	Mtr.	7500
62	1C x 300 SQ. MM	Mtr.	300
63	1C x 150 SQ. MM	Mtr.	900
	3.3/3.3kV, armoured, Aluminium Conductor XLPE insulated FRLS outer-sheathed cable		
64	3C x 185 SQ. MM	Mtr.	900
	HT CABLE TERMINATION KITS/JOINT KITS		
	11kV Indoor heat shrinkable type XLPE end termination kits		
65	1 C X630 SQ MM	No.	76
66	3C X 185 SQ MM	No.	125
	11 KV, Outdoor, heat shrinkable type Straight through joint kits		

S. NO	ITEM DESCRIPTION	UNIT	Quantity
67	1 C X630 SQ MM	No.	11
68	3C X 185 SQ MM	No.	19
	3.3KV, Indoor heat shrinkable/push on type XLPE End termination kits for		
69	3C x 185 SQ. MM	No.	161
70	1C x 300 SQ. MM	No.	230
71	1C x 150 SQ. MM	No.	22
	LT POWER CABLE LAYING,DRESSING,CLAMPING & TERMINATION		
	1.1 kV, Armoured/Un armoured, Stranded Al/Cu conductor, XLPE/PVC insulation, Inner sheath PVC & PVC outer sheath, FRLS		
72	1 C X630 SQ MM	Mtr	34200
73	1 C X400 SQ MM	Mtr	39000
74	1 C X120 SQ MM	Mtr	16200
75	1 C X35 SQ MM	Mtr	2400
76	2 C X10 SQ MM	Mtr	6000
77	2 C X25 SQ MM	Mtr	9600
78	2 C X70 SQ MM	Mtr	2400
79	2 C X120 SQ MM	Mtr	9600
80	3 C X10 SQ MM	Mtr	22800
81	3 C X25 SQ MM	Mtr	18000
82	3 C X50 SQ MM	Mtr	4800
83	3 C X95 SQ MM	Mtr	3000
84	3C X 150 SQ MM	Mtr	3600
85	3C X 240 SQ MM	Mtr	3600
86	3.5CX240 SQ.MM,	Mtr.	1800
87	3.5CX 150 SQ MM	Mtr	1800
88	3.5 C X25 SQ MM	Mtr	23400
89	3.5 C X50 SQ MM	Mtr	19200
90	3.5 C X95 SQ MM	Mtr	1200
91	4 C X10 SQ MM	Mtr	1800
92	2 C X2.5 SQ MM Cu.	Mtr	75600
93	2 C X6 SQ MM Cu.	Mtr	25200

S. NO	ITEM DESCRIPTION	UNIT	Quantity
94	3 C X2.5 SQ MM Cu.	Mtr	99000
	LT SCREENED CONTROL CABLE		
95	2P,0.5 SQ MM	Mtr	8280
96	4P,0.5 SQ MM	Mtr	50620
97	8P,0.5 SQ MM	Mtr	16300
98	12P,0.5 SQ MM	Mtr	7900
99	16P,0.5 SQ MM	Mtr	480
100	20P,0.5 SQ MM	Mtr	1080
	LT CONTROL CABLE -1.1 kV, Unarmoured, Strand conductor, PVC insulation, Inner sheath PVC & PV sheath, FRLS		
101	2Cx1.5 SQ MM	Mtr.	7000
102	3 C X1.5 SQ MM	Mtr	42000
103	5 C X1.5 SQ MM	Mtr	21000
104	5 C X2.5 SQ MM	Mtr	18000
105	7 C X1.5 SQ MM	Mtr	12000
106	12 C X1.5 SQ MM	Mtr	3000
107	16C X1.5 SQ MM	Mtr.	8200
108	12 C X2.5 SQ MM	Mtr	10200
109	19 C X1.5 SQ MM	Mtr	30000
	CABLE TRAYSCOMPLETE WITH COUPLER PLATES, FASTENERS, CLAMPS AND FIXING HARDWARES ETC ERECTION INCLUDING SUPPORT & COVERS FABRICATION		
110	Galvanised Ladder/Perforated type cable tray, W=600mm	Mtr	31500
111	Galvanised Ladder/ Perforated type cable tray, W=450mm	Mtr	2580
112	Galvanised Ladder/ Perforated type cable tray, W=300mm	Mtr	10620
113	Galvanised Ladder/ Perforated type cable tray, W=150mm	Mtr	4200
114	Galvanised Ladder/ Perforated type cable tray, W=100mm	Mtr	1530
	CABLE TRAY ACCESSORIES		
	Ladder/ Perforated type Horizontal 90 deg bend-600 mm radius, Vertical 90 deg bend-600 mm radius, Tees -600 mm radius, Cross -600 mm radius		
115	600 mm wide	No.	849
116	450 mm wide	No.	165
117	300 mm wide	No.	129

S. NO	ITEM DESCRIPTION	UNIT	Quantity
118	150 mm wide	No.	42
	Ladder/Perforated type reducers(50% LHS/50%RHS)		
119	600-450 mm wide	No.	66
120	450-300 mm wide	No.	24
120	**EQUIPMENT EARTHING**		
121	GS/GI FLAT 65 X 8 mm	Mtr	2500
122	GS/GI FLAT 50 X 6 mm	Mtr	850
123	GS/GI FLAT 30x5/25 X 6 mm	Mtr	7500
124	GS/GI FLAT 25 X3 mm	Mtr	5500
125	12 SWG/8WG GI WIRE	Mtr	10000
126	40 MM DIA. 1000 MM LONG GS ROD	Mtr	108
	Treated Earth pit, including Installation of 3 Mtr long, 40 NB/ 65 mm dia GS/ GI pipe	No.	140
127	**RIGID/FLEXIBLE CONDUITS**		
128	GI pipe(1/2",1")	Mtr	250
	GI pipe(2" ,3")	Mtr	100
129	**FABRICATION/ ERECTION OF STRUCTURAL STEEL**		
	Structural Steel	MT	100
130	**Erection ,commissioning of PANELS**		
131	Generator and UAT, ST transformers control, metering & protection panels along with PCs, Printers & other accessories 1000X1000X2295 mm	Set	01
132	Data Concentrator Panel along with PCs, Printers & other accessories 1800x800x800 mm	Set	01
	Digital Automatic Voltage Regulator	Set	01
133	**VARIABLE FREQUENCY DRIVE SYSTEM FOR ID FANS**		
134	**VFD Transformer** 3000 KVA, 11/2.3 KV 3 Phase, ONAN Outdoor type transformer with HV, LV cable boxes, radiators, conservator tank, marshalling box etc.	No.	4

S. NO	ITEM DESCRIPTION	UNIT	Quantity
	Total Weight: 9145 kg Overall Dimensions: 5000 x 3000 x 3200 mm Shipping Dimensions: 3650 x 2100 x 3000 mm Oil Qty : 1845 litres (approx.)		
135	SF6/Vacuum Circuit Breaker Overall dimensions 2360 x1835 x1650 mm, Weight 1400 KG	No.	4
136	**DC Air core Reactor** Floor/channel mounting type 3.6 KV grade, 10 mH, 800 A rated air cored DC reactor housed in 3mm thick Aluminium cubicle with suitable input/output terminals Dimension: 1700 x 2000 x 2600 mm , Weight: 1800 kg	No.	4
137	**LCI Drive Panel** comprising Control and Excitation Panel, Fan and Filter Panel with air duct for exhausting air and Bridge Panel Size: 3700 x 1450 x 2400 mm; Weight: 3000 kg	No.	4
138	Control Panel for VFD Drives, including PC System for MMI Size: 800 x 1450 x 2400 mm; weight: 400 kg	Set.	02
139	Adaptor Panel for VFD Drives Size: 600 x 1450 x 2400 mm; weight: 200 kg	No.	04
140	O&M Panel	No.	01
	CLC panel	No.	04
141	**Erection & Commissioning of Diesel Generating set**		
	1500 KVA, 3 phase, 415 V skid-mounted diesel generator set Overall dimension: 6000 x 2100 x 2600 mm Static Weight of DG Set: 13,500 kg Weight of Acoustic Enclosure : 10,000 kg	Set	02
142	**ELECTRICAL COMMISSIONING**		
143	Electrical actuators for valves & dampers	No.	250
144	Position transmitter	No.	50
	Erection & commissioning of Electrical Lab specifications as as per C l 2.4.N	Set	01

NOTE:The Dimension & quantity indicated in the BOQ / Price bid is approximate only and is liable for variation. Payment will be as per actual qty erected / commissioned as certified by BHEL Engineer.

Chapter - XI: RATE SCHEDULE OF ERECTION, TESTING, COMMISSIONING OF ELECTRICAL PACKAGE OF UNIT NO.6 AT 2x500 MW ANPARA D TPS.

S. NO	ITEM DESCRIPTION	UNIT	Quantity	Amount (In Rs.)
	POWER TRANSFORMERS			
1	**Transportation up to foundation, Assembly, testing & commissioning of Three Phase ,** **400kV/11.5/11.5kV, 80/40/40 MVA, ONAF, STATION TRANSFORMER** Core & winding 62 MT Shipping Weight(N_2 filled) 85 MT Total Weight(with oil) 168MT Overall dimensions 16400X6500X9600 mm Oil Qty. 50800 ltr.	NO.	1	
2	**Transportation up to foundation, Assembly, testing & commissioning of Three Phase ,21/11.5kV, 25/20 MVA, ONAF, UNIT TRANSFORMER** Core & winding 26 MT Tank & fittings 11 MT Shipping Weight(N_2 filled) 40 MT Total Weight (with oil) 64 MT Overall dimensions 9100x5100x6600 Oil Qty. 23159 ltr.	NO.	2	
	Transportation up to foundation, Assembly, testing & commissioning of SERVICE TRANSFORMERS			
3	11/3.5kV,16 MVA,ONAN, Overall dimensions 7100X5300X5200 mm Oil qty. 7900ltr. 45 MT	NO.	02	
4	11/3.5kV,6.3 MVA,ONAN Overall dimensions 4550X3300X3500 mm Oil qty. 2820 ltr. Total wt. 13300 KG	NO.	02	

S. NO	ITEM DESCRIPTION	UNIT	Quantity	Amount (In Rs.)
5	11kV/433V,2000kVA,Dry type Overall dimensions 3950X2550X2250 mm Total wt. 7000 KG	NO.	04	
6	11kV/433V,2000kVA,ONAN Overall dimensions 3250X2550X2550 mm Oil qty. 1300 ltr. Total wt. 6100 KG	NO.	04	
7	11kV/433V, 1600kVA,ONAN Overall dimensions 3370X3300X2500 mm Oil qty. 990 ltr. Total wt. 5000 KG	NO.	16	
8	11kV/0.433kV, 500kVA,ONAN 2700X2700X2800 mm 4700KG	NO.	02	
9	11kV/0.433kV, 750kVA,ONAN 2700X2700X2800 mm 4700KG	NO.	02	
	NGR			
10	11 kV,300 A	No.	4	
11	3.3kV,300A	No.	4	
	ISOLATED PHASE BUS DUCT			
12	Transportation from stores / storage yard to erection site, assembly, erection, welding, testing & commissioning of Isolated Phase Bus Duct for interconnection of Generator & Generator Transformers, tap-off to unit transformers, SP&VT, LA &VT cubicles, NG cubicles ,air pressurisation equipments, flexible hoses ,CT/PT transformers, supporting structures along with all accessories & auxiliaries	SET.	01	
	Delta Run 21kV, 11000A Enclosure Size: Round,OD1000 mm Thk 8 mm Conductor size: Round, OD 450 mm, Thk. 15 mm Phase to phase distance:1150 mm Approx. length per unit 95 Mtr. **Main run 21kV, 19000 A** Enclosure Size: Round,OD1500 mm Thk 8 mm			

S. NO	ITEM DESCRIPTION	UNIT	Quantity	Amount (In Rs.)
	Conductor size: Round, OD 800 mm, Thk. 16 mm Phase to phase distance:1750 mm Approx. length per unit 160 Mtr. **Tap-off 21kV, 1600A** Enclosure Size: Round ,780x4.78 mm Conductor size: Box formation 2 channel, OD 2x203.2 mm, Thk. 11.8 mm Phase to phase distance:1000mm Approx. length per unit 75 Mtr. **SP and VT Cubicle for both the units consists of** : Epoxy cast dry type VT –6 Nos., Lighting arrestor –03 Nos, Surge Capacitor –03 Nos, etc Weight of Cubicle approx. 3.5 MT, Dimension 2000 x 1800 x 3500 mm **Neutral Grounding Cubicle(NGR-NGT) consist of** **a) Dry type epoxy cast NG transformer** **b) NG Resistor** c) Dimensions 2500x 2500 x2000 mm **Supporting structural steel approx. 80 MT**			
	SEGREGATED PHASE BUS DUCT			
	Transportation from stores / storage yard to erection site, assembly, erection, welding, testing & commissioning of Segregated Phase Bus Duct for interconnection of Unit/Station Transformers to 11kV Switch Boards			
13	**1600A** SPBD from Unit Transformers to 11 kV Unit Switch Board SPBD for interconnection of 11kV Unit Switch board to 11 kV Station Switch Board Enclosure Size: 450x1250 mm, Thk. 3.15 mm Conductor size: Rectangular, 2x101.6 mm, Thk. 6.68 mm Phase to phase distance:450mm	Mtr.	193	
14	**2500A** SPBD from Station Transformer to 11 kV Station Switch Board	Mtr.	375	

S. NO	ITEM DESCRIPTION	UNIT	Quantity	Amount (In Rs.)
	SPBD for interconnection of 11kV Unit Switch board to 11KV Station Switch Board Enclosure Size: 450x1250 mm, Thk. 3.15 mm Conductor size: Rectangular,2x127 mm, Thk. 8.05 mm Phase to phase distance:450mm			
15	**3000A** SPBD from Unit Transformer to 3.3 kV Switch Board Enclosure Size: 450x1250 mm, Thk. 3.15 mm Conductor size: Rectangular, 2x127 mm, Thk. 8.05 mm Phase to phase distance:450mm	Mtr.	98	
	HT SWITCHGEAR-11 kV SWITCHBOARD			
16	11kV, 1600A, Board# 6BA consists of approx. 17 panels. Each panel size 820X2301X2355 mm	Set	01	
17	11kV, 1600A, Board# 6BB consists of approx. 16 panels. Each panel size 820X2301X2355 mm	Set	01	
18	11kV, 2500A, Board# 0BA consists of approx. 13 panels. Each panel size 820X2301X2355 mm	Set	01	
19	11kV, 2500A, Board# 0BB consists of approx. 19 panels. Each panel size 820X2301X2355 mm	Set	01	
	3.3 kV SWITCHBOARD			
20	3.3kV, 3000A, Unit Sw.Board # 6CA consists of approx. 38 panels. Each panel size 820X2301X2355 mm	Set	01	
21	3.3kV, 1250A, Board# 0CA consists of approx. 37 panels. Each panel size 820X2301X2355 mm	Set	01	
	LT BUS DUCT			
22	Non –segregated LT 415 V,3000A/2500A	Mtr.	106	
	LOW VOLTAGE SWITCHGEAR			
23	415V, 3000A, UNIT. SERV. SWITCHBOARD-6DA Approximate Dimension: 12250 x 1000 x 2475 mm	No.	1	
24	415V,2500A, UNIT EMER. SWITCHBOARD -6DG Approximate Dimension: 12150 x 1200 x 2475 mm	No.	1	
25	220V MAIN DCDB -6FA Approximate Dimension: 5600 x 1000 x 2475 mm	No.	1	
26	415V ,1000A,BOILER MCC -6HA	No.	1	

S. NO	ITEM DESCRIPTION	UNIT	Quantity	Amount (In Rs.)
	Approximate Dimension: 16000 x 1000 x 2475 mm			
27	415V,250A, BOILER V&D MCC -6HB Approximate Dimension: 14000 x 1000 x 2475 mm	No.	1	
28	415V,630A, BOILER ACDB -6HC Approximate Dimension: 3750 x 1000 x 2475 mm	No.	1	
29	415V,250A, ESP & ID FAN AREA MCC -6HD Approximate Dimension: 3000 x 1000 x 2475 mm	No.	1	
30	415V ,1000A,TURBINE MCC -6KA Approximate Dimension: 12900 x 1000 x 2475 mm	No.	1	
31	415V,250A, TURBINE VALVE MCC -6KB Approximate Dimension: 12750 x 1000 x 2475 mm	No.	1	
32	415V ,630A,UNIT SERV. ACDB -6QA Approximate Dimension: 6750 x 1000 x 2475 mm	No.	1	
33	415V,630A, VENTILATION MCC-6TA Approximate Dimension: 8250 x 1000 x 2475 mm	No.	1	
34	415V,400A, ESP A/C & VENT MCC -6TB Approximate Dimension: 7500 x 1000 x 2475 mm	No.	1	
35	415V, 3000A,STN. SERV. SWITCHBOARD -0DA Approximate Dimension: 12000 x 1000 x 2475 mm	No.	1	
36	415 V SLURRY P/H & COMPRESSOR HOUSE-0DF Approximate Dimension: 10850 x 1200 x 2475 mm	No.	1	
37	415 V,1600A, SILO AREA SWBD.-0DI Approximate Dimension: 6750 x 1000x 2475 mm	No.	1	
38	415V ,1000A,STN. SERV. MCC -0QA Approximate Dimension: 12000 x 1000 x 2475 mm	No.	1	
39	415V,3000A, FUEL OIL P/H PMCC -0DD Approximate Dimension: 7500 x 1200 x 2475 mm	No.	1	
40	415V,3000A, FIRE WATER P/H SWBD.-0DE Approximate Dimension: 10850 x 1200 x 2475 mm	No.	1	
41	415V ,2500A,CW SERVICE SWBD.-0DC Approximate Dimension: 6000 x 1000 x 2475 mm	No.	1	
42	415V,3000A, COOLING TOWER SWITCHBOARD-6DF	No.	1	
43	415V,1000A, BOTTOM ASH MCC-0DH	No.	1	

S. NO	ITEM DESCRIPTION	UNIT	Quantity	Amount (In Rs.)
44	415V,1000A, AIR WASHER MCC -6SA	No.	1	
45	415V ,3000A,ADM. BUILDING SWBD-0DG	No.	1	
46	415V,400A, H2 PLANT MCC-0SB	No.	1	
47	415V,400A, WORKSHOP MCC-0SC	No.	1	
48	415V,1000A, SERVICE BUILDING MCC-0SD	No.	1	
49	415V ,1000A,CCR AC MCC-0TA	No.	1	
50	415V AC FUSE DB	No.	10	
51	220V DC FUSE DB	No.	4	
52	Local motor starters (up to 3.7 KW)	No.	75	
53	PUSH BUTTON STATIONS	No.	590	
	JUNCTION BOXES			
54	180x100x250 mm	No.	150	
55	250x150x400 mm	No.	40	
56	450x150x300 mm	No.	90	
	BATTERY SYSTEM			
57	220 V, 400A Float-cum-boost Chargers 1000x1350x(2200+100)mm 1300KG	Set	2	
58	220 V DC Battery System (Ni-Cd), 990Ah, 170 cells 1.14V,Single tier Double Row type 8550x3060x875 mm 12750KG	Set	2	
	HT POWER CABLES LAYING,DRESSING,CLAMPING			
	11/11kV, Unarmoured, Aluminium Conductor XLPE insulated FRLS outer-sheathed cable			
59	1C x 630 SQ. MM	Mtr.	10500	
60	3C x 185 SQ. MM	Mtr.	18300	
	3.3/3.3kV, Unarmoured, Aluminium Conductor XLPE insulated FRLS outer-sheathed cable			
61	3C x 185 SQ. MM	Mtr.	7500	
62	1C x 300 SQ. MM	Mtr.	300	
63	1C x 150 SQ. MM	Mtr.	900	
	3.3/3.3kV, armoured, Aluminium Conductor XLPE insulated FRLS outer-sheathed cable			

S. NO	ITEM DESCRIPTION	UNIT	Quantity	Amount (In Rs.)
64	3C x 185 SQ. MM	Mtr.	900	
	HT CABLE TERMINATION KITS/JOINT KITS			
	11kV Indoor heat shrinkable type XLPE end termination kits			
65	1 C X630 SQ MM	No.	76	
66	3C X 185 SQ MM	No.	125	
	11 KV, Outdoor, heat shrinkable type Straight through joint kits			
67	1 C X630 SQ MM	No.	11	
68	3C X 185 SQ MM	No.	19	
	3.3KV, Indoor heat shrinkable/push on type XLPE End termination kits for			
69	3C x 185 SQ. MM	No.	161	
70	1C x 300 SQ. MM	No.	230	
71	1C x 150 SQ. MM	No.	22	
	LT POWER CABLE LAYING,DRESSING,CLAMPING & TERMINATION			
	1.1 kV, Armoured/Un armoured, Stranded Al/Cu conductor, XLPE/PVC insulation, Inner sheath PVC & PVC outer sheath, FRLS			
72	1 C X630 SQ MM	Mtr	34200	
73	1 C X400 SQ MM	Mtr	39000	
74	1 C X120 SQ MM	Mtr	16200	
75	1 C X35 SQ MM	Mtr	2400	
76	2 C X10 SQ MM	Mtr	6000	
77	2 C X25 SQ MM	Mtr	9600	
78	2 C X70 SQ MM	Mtr	2400	
79	2 C X120 SQ MM	Mtr	9600	
80	3 C X10 SQ MM	Mtr	22800	
81	3 C X25 SQ MM	Mtr	18000	
82	3 C X50 SQ MM	Mtr	4800	
83	3 C X95 SQ MM	Mtr	3000	
84	3C X 150 SQ MM	Mtr	3600	
85	3C X 240 SQ MM	Mtr	3600	
86	3.5CX240 SQ.MM,	Mtr.	1800	

S. NO	ITEM DESCRIPTION	UNIT	Quantity	Amount (In Rs.)
87	3.5CX 150 SQ MM	Mtr	1800	
88	3.5 C X25 SQ MM	Mtr	23400	
89	3.5 C X50 SQ MM	Mtr	19200	
90	3.5 C X95 SQ MM	Mtr	1200	
91	4 C X10 SQ MM	Mtr	1800	
92	2 C X2.5 SQ MM Cu.	Mtr	75600	
93	2 C X6 SQ MM Cu.	Mtr	25200	
94	3 C X2.5 SQ MM Cu.	Mtr	99000	
	LT SCREENED CONTROL CABLE			
95	2P,0.5 SQ MM	Mtr	8280	
96	4P,0.5 SQ MM	Mtr	50620	
97	8P,0.5 SQ MM	Mtr	16300	
98	12P,0.5 SQ MM	Mtr	7900	
99	16P,0.5 SQ MM	Mtr	480	
100	20P,0.5 SQ MM	Mtr	1080	
	LT CONTROL CABLE -1.1 kV, Unarmoured, Stranded Cu conductor, PVC insulation, Inner sheath PVC & PVC outer sheath, FRLS			
101	2Cx1.5 SQ MM	Mtr.	7000	
102	3 C X1.5 SQ MM	Mtr	42000	
103	5 C X1.5 SQ MM	Mtr	21000	
104	5 C X2.5 SQ MM	Mtr	18000	
105	7 C X1.5 SQ MM	Mtr	12000	
106	12 C X1.5 SQ MM	Mtr	3000	
107	16C X1.5 SQ MM	Mtr.	8200	
108	12 C X2.5 SQ MM	Mtr	10200	
109	19 C X1.5 SQ MM	Mtr	30000	
	CABLE TRAYSCOMPLETE WITH COUPLER PLATES, FASTENERS, CLAMPS AND FIXING HARDWARES ETC ERECTION INCLUDING SUPPORT & COVERS FABRICATION			
110	Galvanised Ladder/Perforated type cable tray, W=600mm	Mtr	31500	
111	Galvanised Ladder/ Perforated type cable tray, W=450mm	Mtr	2580	
112	Galvanised Ladder/ Perforated type cable tray, W=300mm	Mtr	10620	

S. NO	ITEM DESCRIPTION	UNIT	Quantity	Amount (In Rs.)
113	Galvanised Ladder/ Perforated type cable tray, W=150mm	Mtr	4200	
114	Galvanised Ladder/ Perforated type cable tray, W=100mm	Mtr	1530	
	CABLE TRAY ACCESSORIES			
	Ladder/ Perforated type Horizontal 90 deg bend-600 mm radius, Vertical 90 deg bend-600 mm radius, Tees -600 mm radius, Cross -600 mm radius			
115	600 mm wide	No.	849	
116	450 mm wide	No.	165	
117	300 mm wide	No.	129	
118	150 mm wide	No.	42	
	Ladder/Perforated type reducers(50% LHS/50%RHS)			
119	600-450 mm wide	No.	66	
120	450-300 mm wide	No.	24	
120	**EQUIPMENT EARTHING**			
121	GS/GI FLAT 65 X 8 mm	Mtr	2500	
122	GS/GI FLAT 50 X 6 mm	Mtr	850	
123	GS/GI FLAT 30x5/25 X 6 mm	Mtr	7500	
124	GS/GI FLAT 25 X3 mm	Mtr	5500	
125	12 SWG/8WG GI WIRE	Mtr	10000	
126	40 MM DIA. 1000 MM LONG GS ROD	Mtr	108	
	Treated Earth pit, including Installation of 3 Mtr long, 40 NB/ 65 mm dia GS/ GI pipe	No.	140	
127	**RIGID/FLEXIBLE CONDUITS**			
128	GI pipe(1/2",1")	Mtr	250	
	GI pipe(2" ,3")	Mtr	100	
129	**FABRICATION/ ERECTION OF STRUCTURAL STEEL**			
	Structural Steel	MT	100	
130	**Erection ,commissioning of PANELS**			
131	Generator and UAT, ST transformers control, metering & protection panels along with PCs, Printers & other accessories	Set	01	

S. NO	ITEM DESCRIPTION	UNIT	Quantity	Amount (In Rs.)
	1000X1000X2295 mm			
132	Data Concentrator Panel along with PCs, Printers & other accessories 1800x800x800 mm	Set	01	
	Digital Automatic Voltage Regulator	Set	01	
133	**VARIABLE FREQUENCY DRIVE SYSTEM FOR ID FANS**			
134	**VFD Transformer** 3000 KVA, 11/2.3 KV 3 Phase, ONAN Outdoor type transformer with HV, LV cable boxes, radiators, conservator tank, marshalling box etc. Total Weight: 9145 kg Overall Dimensions: 5000 x 3000 x 3200 mm Shipping Dimensions: 3650 x 2100 x 3000 mm Oil Qty : 1845 litres (approx.)	No.	4	
135	SF6/Vacuum Circuit Breaker Overall dimensions 2360 x1835 x1650 mm, Weight 1400 KG	No.	4	
136	**DC Air core Reactor** Floor/channel mounting type 3.6 KV grade, 10 mH, 800 A rated air cored DC reactor housed in 3mm thick Aluminium cubicle with suitable input/output terminals Dimension: 1700 x 2000 x 2600 mm , Weight: 1800 kg	No.	4	
137	**LCI Drive Panel** comprising Control and Excitation Panel, Fan and Filter Panel with air duct for exhausting air and Bridge Panel Size: 3700 x 1450 x 2400 mm; Weight: 3000 kg	No.	4	
138	Control Panel for VFD Drives, including PC System for MMI Size: 800 x 1450 x 2400 mm; weight: 400 kg	Set.	02	
139	Adaptor Panel for VFD Drives Size: 600 x 1450 x 2400 mm; weight: 200 kg	No.	04	
140	O&M Panel	No.	01	
141	CLC panel	No.	04	

S. NO	ITEM DESCRIPTION	UNIT	Quantity	Amount (In Rs.)
	Erection & Commissioning of Diesel Generating set			
142	1500 KVA, 3 phase, 415 V skid-mounted diesel generator set Overall dimension: 6000 x 2100 x 2600 mm Static Weight of DG Set: 13,500 kg Weight of Acoustic Enclosure : 10,000 kg	Set	02	
	ELECTRICAL COMMISSIONING			
143	Electrical actuators for valves & dampers	No.	250	
144	Position transmitter	No.	50	
145	**Erection & commissioning of Electrical Lab specifications as as per C l 2.4.N**	Set	01	
	TOTAL AMOUNT (IN RS.)			

NOTE:

The Dimension & quantity indicated in the BOQ / Price bid is approximate only and is liable for variation. Payment will be as per actual qty erected / commissioned as certified by BHEL Engineer