
TENDER SPECIFICATION

TENDER NO. BHEL/ NR/SCT/LALITPUR/C&/PACKAGE-A&B/954

FOR

“Erection, testing, commissioning, PG test assistance trial operation and handing over of Control & instrumentation and station C&I of unit 1, 2 &3 of 3x660 MW OF LPGCL, Lalitpur STPP, Distt: Lalitpur (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)
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TENDER NO. BHEL/ NR/SCT/LALITPUR/C&/PACKAGE-A&B/954

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/LALITPUR/C&I/PACKAGE-A&B/954
ii	Broad Scope of job	“Erection, testing, commissioning, PG test assistance trial operation and handing over of Control & instrumentation and station C&I of unit 1, 2 & 3 of 3x660 MW OF LPGCL, Lalitpur STPP, Distt: Lalitpur (U.P.)”
iii	DETAILS OF TENDER DOCUMENT	
a	Volume-IA	<i>Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc</i> Applicable
b	Volume-IB	<i>Special Conditions of Contract (SCC)</i> Applicable
c	Volume-IC	<i>General Conditions of Contract (GCC)</i> Applicable
d	Volume-ID	<i>Forms and Procedures</i> Applicable
e	Volume-II	<i>Price Schedule (Absolute value).</i> Applicable
iv	Issue of Tender Documents	<ol style="list-style-type: none"> <u>Sale from BHEL PS Regional office at :</u> Start : 05/05/14 , Time : 0900 HRS Closes: 26/05/14 , Time :1200 HRS From BHEL website (www.bhel.com) Tender documents will be available for downloading from website till due date of submission Applicable
v	DUE DATE & TIME OF OFFER SUBMISSION	Date : 26/05/ 2014 , Time : 1500 HRS Place : Noida Applicable
vi	OPENING OF TENDER	Date : 26/05/ 2014 <i>(within 2 hours of the latest due date and time of offer submission).</i> Applicable

		Notes: (1) In case the due date of opening of tender becomes a non-working day, then the due date & 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:15/05/2014 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 : <u>Technical</u> 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	<ul style="list-style-type: none"> ○ Envelopes I ○ Envelopes II ○ 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, excepting packages which are on HOLD due to reasons not attributable to Bidder..

- 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 for the 'Period of Assessment':**

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:

- P₁, P₂, P₃, P₄, P₅, 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 = P_T (i.e P_T = P₁+P₂+ P₃+P₄ + .. P_N)
- Number of Months 'T₁' for which 'Monthly Performance Evaluation' as per relevant formats, should have been done in the 'Period of Assessment' for the corresponding similar package P₁. Similarly T₂ for package P₂, T₃ for package P₃, etc for the tendered scope. Now calculate cumulative total months 'T_T' for total similar Packages 'P_T' for all Regions (i.e T_T = T₁+ T₂+ T₃+T₄ + .. T_N)
- Sum 'S₁' of 'Monthly Performance Evaluation' Scores (S₁₋₁, S₁₋₂, S₁₋₃, S₁₋₄, S₁₋₅,.... S_{1-N}) for similar package P₁, for the 'period of assessment' 'T₁' (i.e S₁ = S₁₋₁+ S₁₋₂+ S₁₋₃+ S₁₋₄+ S₁₋₅+...S_{1-N}). Similarly S₂ for package P₂ for period T₂, S₃ for package P₃ for period T₃, etc for the tendered scope for all Regions. Now calculate cumulative sum 'S_T' of 'Monthly Performance Evaluation' Scores for total similar Packages 'P_T' for all Regions (i.e 'S_T' = S₁+ S₂+ S₃+ S₄+ S₅+.... S_N.)
- Overall Performance Rating 'R_{BHEL}' 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

$$= \frac{\text{Aggregate of months for each of the similar package for which performance should have been evaluated in all the Regions}}{S_T}$$

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

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 → (under execution/ executed during period of assessment)	P ₁	P ₂	P ₃	P ₄	P ₅	...	P _N	Total No of similar packages for all Regions = 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) = 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) = S _T

ii) Calculation of Overall ‘Performance Rating’ (R_{BHEL}) in case ‘similar Package/Packages’ for the tendered scope ARE NOT AVAILABLE, during the ‘Period of Assessment’:

This shall be obtained by summing up the ‘Monthly Performance Evaluation’ scores obtained by the bidder in all Regions for ALL the packages, divided by the total number of Package months for which evaluation should have been done. ‘R_{BHEL}’ shall be calculated subject to availability of ‘performance scores’ for at least 6 ‘package months’ in the order of precedence below:

- a) ‘Period of Assessment.
- b) 12 months preceding the cut-off month
- c) 24 months preceding the cut-off month
- d) 36 months preceding the cut-off month

In case, R_{BHEL} cannot be calculated as above, then Bidder shall be treated as ‘NEW VENDOR’. Further eligibility and qualification of this bidder shall be as per definition of ‘NEW VENDOR’ described in ‘Explanatory Notes’

iii) Factor “L” assigned based on Overall Performance Rating (R_{BHEL}) at Power Sector Regions.:

Sl no	Overall Performance Rating (R_{BHEL})	Corresponding value of 'L'
1	=60	NA
2	> 60 and \leq 65	0.4
3	> 65 and \leq 70	0.35
4	> 70 and \leq 75	0.25
5	> 75 and < 80	0.2
6	\geq 80	NA

III. 'Assessment of Capacity of Bidder':

'Assessment of Capacity of Bidder' is based on the Maximum number of packages for which a vendor is eligible, considering the performance scores of similar packages, as below:

Max number of packages $P_{Max} = (R_{BHEL} - 60)$ divided by corresponding value of 'L'
i.e. $(R_{BHEL} - 60)/L$

Note:

- In case the value of P_{Max} results in a fraction, the value of P_{Max} is to be rounded off to next whole number
- For $R_{BHEL} = 60$, $P_{Max} = '1'$
- For $R_{BHEL} \geq 80$, there will be no upper limit on P_{Max}

The Bidder shall be considered 'Qualified' as per 'Assessment of Capacity of Bidder' for the subject Tender if $P \leq P_{Max}$
(where P is calculated as per clause 9.1)

IV. Explanatory note:

- 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
- 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) Bidders who have not been evaluated for at least six package months in the last 36 months in the online BHEL system for contractor performance evaluation in BHEL PS Regions, wef July'2010 shall be considered "NEW VENDOR".

A 'NEW VENDOR' shall be considered qualified subject to satisfying all other tender conditions

A 'NEW VENDOR' if awarded a job (of package/packages identified under this clause) shall be tagged as "FIRST TIMER" on the date of first LOI from BHEL.

The "FIRST TIMER" tag shall remain till execution of work for a period of not less than 09 months, from the commencement of work of first package

A Bidder shall not be eligible for the next job as long as the Bidder is tagged as "FIRST TIMER" excepting for the Tenders which have been opened on or before the date of the bidder being tagged as 'FIRST TIMER'.

After removal of 'FIRST TIMER' tag, the Bidder shall be considered 'QUALIFIED' for the future tenders subject to satisfying all other tender conditions including 'Capacity Evaluation of Bidders'.

- d) 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' or due to non-approval by Customer, 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, starting from the upper band.
- e) 'Under execution' shall mean works in progress as per the following:
- i. up to Boiler Steam Blowing in case of Steam Generator and Auxiliaries
 - ii. upto Synchronisation in case of all other works excepting sl no (i) and (iii)
 - iii. Upto execution of at least 90% of anticipated contract value in case of Civil & Structures (unit wise), Enabling works and upto 90% of material unloading (in tonnage) as per the original contract in case of MM Package.
- 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.
- f) 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 **Not used**
- 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 The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site www.bhel.com.

- 27.0 BHEL reserves the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.

In case BHEL decides to go for Reverse Auction, only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit „online sealed bid“ in the Reverse Auction. Non-submission of „online sealed bid“ by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.”

Information and General Terms and Conditions governing RA shall form part of the RFQ/ Enquiry.

- 28.0 It may please be noted that guidelines/rules in respect of Suspension of Business dealings’, ‘Vendor evaluation format’, ‘Quality, Safety & HSE guidelines’, etc may undergo change from time to time and the latest one shall be followed.

29.0 **Micro and Small Enterprises (MSE)**

Any Bidder falling under MSE category, shall furnish the following details & submit documentary evidence/ Govt. Certificate etc. in support of the same along with their techno-commercial offer

Type under MSE	SC/ST owned	Others
Micro		
Small		

Note: - If the bidder does not furnish the above, offer shall be processed construing that the bidder is not falling under MSE category.

MSE suppliers can avail the intended benefits only if they submit along with the offer, or before price bid opening, attested copies of either EM-II certificate having deemed validity (two years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or EM-II certificate along with CA certificate (format enclosed as Annexure - 3) applicable for the year, certifying quantum of investment in plant and machinery within the permissible limit as per the act for relevant status (Micro or Small) where the deemed validity of EM-II is over. Date to be reckoned for determining the deemed validity will be last date of technical bid submission. Non submission of such documents will lead to consideration of their bids at par with other bidders and MSE status of such suppliers shall be shifted to Non MSE supplier till the supplier submits these documents.

MSEs shall be exempted from payment of earnest money at the time of tender deposit. However, there is no exemption of security deposit submission

No benefits shall be applicable for that particular enquiry if the required documents are not submitted before price bid opening.

30.0 **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: Chartered Accountant certificate for MSMED
04. Annexure-4: GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)
05. Other Tender documents as per this NIT.

ANNEXURE - 1**PRE QUALIFYING REQUIREMENTS**

JOB	"Erection, testing, commissioning, PG test assistance trial operation and handing over of Control & instrumentation and station C&I of unit 1, 2 &3 of 3x660 MW OF LPGCL, Lalitpur STPP, Distt: Lalitpur (U.P.)"
TENDER NO	BHEL/ NR/SCT/LALITPUR/C&I/PACKAGE-A&B/954

SL. NO	PRE QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the PQR Criteria
		Name and Description of qualifying criteria
A	Submission of Integrity Pact duly signed.	Not Applicable
B	Assessment of Capacity of Bidder to execute the work as per sl no. 9 of NIT (if applicable)	Applicable
C	<u>FINANCIAL CRITERIA</u>	
C1	<u>TURNOVER</u> Tenderers should have an average annual turnover of minimum of : 1. For Package 'A': Rs 174 Lakhs (Rs One Hundred Seventy Four Lakhs only) 2. For Package 'B': Rs 225 Lakhs (Rupees Two hundred twenty Five lakhs only) Based on the audited accounts of last three financial years (2010-11, 2011-12 & 2012-13). Bidders shall submit audited annual accounts (balance sheets and profit & loss account) in support of this.	Applicable
C2	<u>NETWORTH</u> Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C1' above should be positive	Applicable
C3	<u>PROFIT</u> Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three years defined in 'C1' above based on latest Audited Accounts.	Applicable
D	Technical	
D1	Bidder who wish to participate should have executed during last seven years as on the date of Technical Bid Opening. D1.1:- C&I works for BTG/GT 'OR' CI works consisting of DCS/DDC/Station C&I in one unit of atleast 400 MW rating.	Applicable Applicable

	'OR'	
	D1.2:- Execution of atleast one contract of C&I works consisting of DCS/DDC/Station C&I in any Industry with its executed value of Rs 280 Lakhs or more.	
E	Approval of Customer Note: Names of bidders who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval. Price bid of only those bidders shall be opened who are approved by customer.	Applicable
F	Consortium criteria	Not Applicable

NOTES:

- (1) If the Qualifying work is executed in the last seven years period, as specified above, even if it has been started earlier, the same will also be considered meeting the qualifying requirements.
- (2) For QR D1 above the word 'Executed' means the bidder should have achieved the criteria specified in the QRs even if the Contract has not been completed or closed.
- (3) In case audited financial statements have not been submitted for all the three years as indicated against C1 above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years.

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 (<input type="checkbox"/>) 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

Certificate by Chartered Accountant on letter head

This is to Certify that M/S ,
(hereinafter referred to as 'company') having its registered office at
..... is registered under MSMED Act 2006, (Entrepreneur
Memorandum No (Part—II) dtd: ,
Category: (Micro/Small)). (Copy enclosed).

Further verified from the Books of Accounts that the investment of the company
as on date..... as per MSMED Act 2006 is as follows:

1. For Manufacturing Enterprises: Investment in plant and machinery (i.e.
original cost excluding land and building and the items specified by the Ministry of Small
Scale Industries vide its notification No. S.0.1722(E) dated October 5, 2006:
Rs Lacs

2. For Service Enterprises: Investment in equipment (original cost excluding land and
building and furniture, fittings and other items not directly related to the service rendered or as
may be notified under the **MSMED** Act, 2006:
Rs Lacs

The above investment of RsLacs is within permissible limit of
Rs..... Lacs for Micro / Small (**Strike off which is not applicable**)
Category under MSMED Act 2006.

Date:

(Signature)

Name -

Membership number -

Seal of Chartered Accountant

ANNEXURE - 4**GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)**

Against this enquiry for the subject item/ system with detailed scope of supply as per enquiry specifications, BHEL may resort to “REVERSE AUCTION PROCEDURE” i.e., ON LINE BIDDING (THROUGH A SERVICE PROVIDER). The philosophy followed for reverse auction shall be English Reverse (No ties).

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit “online sealed bid” in the Reverse Auction. Non submission of “online sealed bid” by the bidder for any of the eligible items for which techno commercially qualified, will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.
3. 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.
4. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.
5. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.
6. Bidders have to fax the Compliance form before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.
7. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at “Total Cost to BHEL” like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.
8. Reverse auction will be conducted on scheduled date & time.
9. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.
10. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, if required, as provided on case-to-case basis to Service provider within two working days of Auction without fail.
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’s standard practice.
12. Bidders shall be required to read the “Terms and Conditions” section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service

provider before reverse auction event. Bidders should acquaint themselves of the „Business Rules of Reverse Auction“, which will be communicated before the Reverse Auction.

13. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action *as per extant BHEL guidelines*, shall be initiated by BHEL and the results of the RA scrapped/ aborted.
14. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.
15. In case BHEL decides to go for reverse auction, the H1(s) bidder (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

ANNEXURE – 5**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)

FOR

**“ERECTION, TESTING, COMMISSIONING & HANDING OVER OF ALL
C&I EQUIPMENTS OF UNIT NO. 1,2 & 3 INCLUDING STATION C&I AT
660 MW LALITPUR STPP, DISTT: LALITPUR (U.P.)”**



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

S.No.	DESCRIPTION	Chapter 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 sharing 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

FOR PACKAGE A AND B- LALITPUR

Name of the Owner	: LALITPUR POWER GEN. CO. LTD
Address	: 3X660MW SUPER CRITICAL TPP at Mirchwara and Buraugaon near Utaririver, Lalitpur, U.P.
New Installation	: 3 x 660 MW
Nearest Railway station	: Lalitpur railway station (37 kms from site) on Jhansi – Bhopal line
Nearest Road	: Approach to site: about 23 km from Bansi on NH 26 connects Jhansi and Sagar
Nearest City	: LALITPUR
Nearest Airport	: GWALIOR AIRPORT (186 km)
Highest Temperature	: 45.1 C ⁰
Lowest Temperature	: 1.9 C ⁰
Relative Humidity	: 87% maximum --22% minimum
Seismic Zone	: III

Chapter - 2: SCOPE OF WORKS

2.0 SCOPE OF WORK

2.0.1 Scope of these specifications cover complete work of handling, identification, 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 electronic earthing and other activities required for erection, testing, commissioning, post commissioning, trial operations ,PG Test assistance & handing over of All C&I and Station C&I equipment of **Unit No. 1 ,2 &3 of 3x660 MW LALITPUR STPP** as indicated in the BOM schedule covered within the scope of these specifications for this tender.

The scope of work under this tender consists of following packages:

Package A: C&I of Unit#1 and station C&I of Unit# 1, 2 &3.

Package B: C&I of Unit#2&3.

Each package will be awarded to two different contractors. Price bid Of successful bidder of Package 'A' will not be considered for Package 'B'. The Scope here under is given for per unit for both the packages for erection, testing, commissioning, PG test assistance, trial operation and handing over of Control & instrumentation and station C&I of unit 1, 2 &3 of 3x660 MW OF LPGCL, Lalitpur STPP, Distt: Lalitpur (U.P.)

2.1 Scope of work for C&I and station C&I of Unit 1, 2 & 3 equipment packages in general

The Scope of C&I and station C&I work covered in the above packages shall be as follows:

1. Erection, Testing and commissioning of Control/DCS panels of SG, TG and station C&I.
2. Erection, Testing and commissioning of LV MCC (~415V) and associated cable and equipments in BHEL scope of work.

3. Erection, Testing and commissioning of GRP,STRP,AVR,Bus transfer System, Link, transducer and AVT cubicles, IPR panels,GCP panel,
4. Erection, Testing and commissioning of All Types of Field Instruments like Temperature, Pressure and Flow instruments (local & remote) and special instruments like EWLI, SWAS System, Flue Gas analyser etc.
5. Erection ,Testing and commissioning Man Machine Interface & Data Acquisition System consists of Operator Workstations (max Station),Engineering station (common for SG/TG/GT),Computers / PLC based Equipment, Laser printers (B/W-A3),Ethernet Switches
6. Erection,Testing and commissioning of all types of Control room mounted instruments like Recorders, Indicators, Microprocessor based panels, DCS system and its accessories like system panels, PC, printers, furniture etc. In CCR and UCR/EER as per drawing.
7. Erection & Testing of all types of control/instrumentation cables etc which are in BHEL PSNR scope of work.
8. Erection of all types of Hardware like impulse pipes, cable trays & tray supports etc. which are in BHEL PSNR scope of work.
9. Fabrication and installation of steel supports, wherever required to route cables through cable trays or panel erection and other Misc activities.
10. Erection Installation of LPBS with canopy for indoor and outdoor pushbutton stations/motors/panels/ instrumentation.
- 11.Commissioning of all Types of Control valves/ Pneumatic operated Valves/Actuators/ Controllers and Relief Valves in BTG area and wherever same is in BHEL PSNR Scope.
- 12.Supply of adequate quantity of touch up paint and paints as required for items covered in scope of works
- 13.Erection and commissioning of UPS, ACDB, Battery, Battery Charger, DCDB, Data Concentrator etc.
- 14.PG test assistance in C&I scope for overall equipments.

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

2.3 The quantity indicated in the BOM/ Rate Schedule is tentative only and based on detail engineering and inputs received from manufacturing units as on date which is liable for variation. If any item or equipment not covered in the specification but requires being 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:-Detailed BOM with specification are given in the CHAPTER-X (For package A) and Chapter XII (For package B) .Contractor shall go through the detailed BOM and specification before filling the Lumsum Price in the rate schedule given in Chapter-XI A and Chapter XIII A .

2.4 GENERAL

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

2.4.1 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.

2.4.2 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.

- 2.4.3 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.
- 2.4.4 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.
- 2.4.5 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 or customer recommendations.
- 2.4.6 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-in-charge feels necessary because of site conditions and also to meet system specification.
- 2.4.7 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. Contractor shall follow all PTW and other procedures required to execute work at site as per BHEL engineer-in-charge instruction.
- 2.4.8 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.

- 2.4.9 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.
- 2.4.10 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.
- 2.4.11 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.
- 2.4.12 Contractor shall retain all T&P/Testing instrument/Material handling equipment 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/Construction Manager and Customer.
- 2.4.13 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.
- 2.4.14 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.
- 2.4.15 The contractor at his cost shall arrange necessary security measures for adequate protection of issued BHEL and its own machinery, equipment, tools, materials etc. BHEL shall not be responsible for any loss or damage to the contractor's custodian 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.

- 2.4.16 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.
- 2.4.17 The Contractor may have to execute work in such a place and condition where other agencies also will be under such circumstances.
- 2.4.18 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.
- 2.4.19 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.
- 2.4.20 Any wrong erection shall be undone and re-erected promptly to comply with the design requirements to the satisfaction of Site Engineer.
- 2.4.21 BHEL will provide vendor's technical support and IMTE's and T&P or any other equipment required for commissioning of various proprietary type special instruments/systems like Analysers, Vibration Monitoring System, Microprocessor based relays, Flame Scanners , DAVR ,GRP, STRP, Battery System, UPS, charger, LV MCC/PMCC etc. The contractor shall carry out the works as per instructions of BHEL/ Vendor Engineer.
- 2.4.22 Assistance in PG test of main equipment along with all auxiliaries, completion of punch points and assistance for handing over of units to customer including additional work of temporary cable laying or equipment fixing or any shall be in the scope of contractor within the quoted rate.

2.5 SITE VISIT

Contractor should visit site and acquire full knowledge & information about site conditions. The bidder must visit site, to acquaint themselves with the conditions prevailing at site and in & around the plant premises, together with all statutory, obligatory, mandatory requirements of various authorities before submission of bid.

2.6 SITE ORGANISATION& ERECTION SCHEDULE

2.6.1 The contractor shall provide adequate staffing in the following areas in addition to the staffing requirements of execution as instructed/informed by BHEL:

1. Overall planning, monitoring & control.
2. Quality control and quality assurance.
3. Materials management.
4. Safety, fire & security.
5. Industrial relations and fulfillment of labour laws and other statutory obligations.

2.6.2 The contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all times for smooth execution of the contract. This organization shall be reinforced from time to time, as required to make up for slippage from the schedule without any commercial implication to BHEL. The site organization shall be headed by a competent construction manager having sufficient authority to take decisions at site.

2.6.3 On award of contract, the contractor shall submit to BHEL site organization chart indicating the various levels of experts to be deployed on the job. BHEL reserves the right to reject or approve the list of personnel proposed by the Contractor. The persons, whose bio-data have been approved by BHEL, will have to be posted at site and deviations in this regard will not generally be permitted.

2.6.4 The contractor should also submit to BHEL for approval a list of construction equipment, erection tools, tackle etc prior to commencement of site activities. These tools & tackles shall not be removed from site without written permission of BHEL.

2.6.5 The organization chart for site should indicate the various levels of experts to be posted for supervision in the various fields in erection, commissioning etc as applicable. For proper supervision of the work, the contractor shall ensure providing one qualified supervisor against deployment of 15 workmen.

ERECTION SCHEDULE

2.6.6 Contractor shall submit within 30 days of LOI date, detailed program (L2 schedule) of construction / erection / commissioning, for approval to Project Manager-Noida/Construction manager Lalitpur site without fail. L2 schedule shall be the working level document demonstrating contractor's ability and methods of completing the work within the key milestones identified in the tender specification These program would be amplified showing start of erection and subsequent activities and shall form the basis for site execution and detailed monitoring, The three monthly rolling program with the first month's program being tentative based on the site conditions would be prepared based on these program. The Contractor shall also be involved along with the Customer/BHEL to tie up detailed resource mobilization plan over the period of time of the contract matching with the performance targets.

2.6.7 The program would be jointly finalised by the site in-charge of the contractor with BHEL/Customer's project coordinator as well as the site planning representative. The erection program will also identify the sequential erectable item.

2.6.8 The scope of work will also include providing free of cost services of experienced and qualified Supervisors by contractor for direct supervision of various works of power plant preferably works other than the scope covered under this tender. The qualification and experience of the supervisors shall be acceptable to the Construction Manager BHEL LALITPUR site.

These qualified supervisors quantity indicated below shall be provided for as per site conditions:

Package-A: - Twenty Two (22) man-months

Package-B: - Eighteen (18) man-months

The supervisors shall possess a minimum qualification of concerned branch of engineering diploma and working experience in power plants. They shall be

deployed in any work area in plant/site at the discretion of BHEL construction manager.

In case contractor fails to provide above-mentioned manpower as desired by BHEL, the latter shall have the right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the man months as per above provision, deduction from final bill at the rate of 25.08% (for statutory payments) at Lalitpur Site for the respective categories stated above plus 10% will be made from the final bill of the contractor.

2.7 Contractor shall ensure following:

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

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

27.3 Contractor has to ensure that adequate First Aid facilities availability at site.

In addition to that 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.

2.7.1 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 labor 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 Discrimination/ Corporal punishment for failure in meeting with relevant requirements.
- e) The Contractor shall abide the requirement of Contract Labor (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 and BOCW act as applicable in state.
- g) The Contractor shall arrange potable drinking water to its employees & workers.

2.7.2 In order to meet the environmental concerns it is expected that the contractor shall plant, protect and maintain at least 150 trees or equivalent in the vicinity of the project as per the available space and as per the advice of Engineers-in –charge.

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

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

2.8.1 CONTROL PANELS(max DNA based/C&I /DCS panel/UCP/MCC/PMCC etc)

- 1.** Panels to be install are microprocessor based max DNA control, ECPetc supplied in suit of either one or more 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 checking of foundation, chipping of floor, fixing of base frame, fixing of anti-vibration pads, levelling, alignment, bolting with base frame/ welding of base frame with floor inserts 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.
- 3.** 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.

4. 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.
5. Checking, testing, mounting/fixing in the panel all loose supplied items modules, relays, switches, lamps, push buttons, meters and all other items.
6. Checking and testing of internal wiring/components and associated relays (including specialised numerical relays).
7. Mounting of microprocessor based amplifier chassis (to be supplied by BHEL-Trichy) in MAXDNA FSSS panel (to be supplied by BHEL-EDN).
8. Interconnection among panels, engineering control, diagnostic, plant monitoring system, control desk and field equipment/instruments.
9. Charging the system, checking and testing functional operation, simulation testing, checking of signal flow.
10. Software/hardware setting of parameters, logic etc.
11. Software programming, erasing, calibration etc.
12. Commissioning of all auto control loops.
13. All the panels and JB's 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 / LPGCL 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 LPGCL
16. Any items like lamps, lens, fuse / relays / instruments missed from 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.
20. The contractor shall calibrate and commission all panel mounted instruments, protection relays, transducers, Recorders, Indicators, energy meters etc.
21. Scope for DAVR-System comprises of DAVR panel which is connected by Input cable from DAVR to main exciter, mounting of local instruments, enclosure winding resistance & IR value of main exciter etc. Checking of healthiness of all diodes, thyristers, earth fault brush checking and dummy load test of exciter, checking of control desk and field related i/ps and o/ps to commission the excitation system fully operational. Contractor shall deploy suitable manpower having knowledge of system for specialized system like DAVR.
22. Scope of work for 415 V PMCC include Testing, Calibration and adjustment of relays setting, electronic cards and instruments, transducers mounted on the panels, CT's, PTs, Breaker and all associated items with the panel/PMCC etc. within the quoted rates.

*Contractor shall deploy specialized manpower for LV system having experience in working in such kind of system.

2.8.2 UPS,BATTERY AND BATTERY CHARGER

The 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. The chargers are thyristor based system and shall comprise of Silicon Controlled Rectifier with transformer, switchgear and automatic regulation. The float and boost chargers will be housed in separate cubicles and mounted side by side.

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

SCOPE OF WORK FOR BATTERY

- Collecting the batteries and all the accessories from stores and assembling on the wooden racks and fixing the all loose items supplied with the battery charger as per drawings and making any minor modifications or changes in wiring, if required, without any extra cost.
- Filling the shells with loose supplied alkali/acid- if applicable.
- Arranging for suitable load for charging and discharging during charging and discharging cycles.
- Arranging manpower in shift during charging and discharging cycles which is to be carried out round the clock as per the code of practice and conducting other routine test as per the IS under the supervision of the BHEL engineer.
- Arranging necessary tools, T&P, Testing & calibration instruments required for erection and commissioning of the above equipment/panel.

2.8.3 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.
2. 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.
3. 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.
4. Cable trays/duct etc may have to be routed underground in cable trench, over head on structure, along the walls, floors etc.
- 5. Installation of tray/duct covers, wherever provided, will be done as a part of tray erection and no extra rates will be payable. Any minor modification in tray work as per site requirement ,stipulated to be done as per drawing shall be done without any cost implications to BHEL**

2.8.4 CABLE LAYING (POWER/CONTROL / INSTRUMENTATION/ COMPENSATING/ FIBRE OPTIC/ ETHERNET SHIELDED/ UNSHIELDED CABLES / PLUG-IN CABLES / Coaxial / UTP / STP /DATA HIGHWAY, ARMoured / UN-ARMoured,SINGLE / MULTI-CORE, PVC / HR PVC / FRLS / TEFLON / XLP INSULATION)

1. Cable laying includes cutting to the required length, laying in overhead Cable racks / underground cable trenches, pipes, flexible conduits, dressing/clamping in tray, drilling of holes in gland plates in panels and junction box, glanding, splicing, dressing of spliced wire inside the panel and JB's, providing printed ferrules (ferrule printing machines to be provided by contractor for printing necessary cross ferruling details) / PVC numerical / alphabetical ferrules (where printed ferrules not possible at all) machine engraved ferrules sleeve/ ferrule,termination by using crimp type copper tinned/aluminium lugs, insulated/un-insulated, crimp and soldered termination, plug-in connections with insert type crimping, providing identification cable tags of PVC/aluminium at both the ends and at appropriate interval (Approximately 30meters) throughout the route length,

continuity checking, insulation resistance checking. Contractor to arrange adequate numbers of his own ferrule printing machines as per requirement of Engineer-in-charge.

2. Entry to the panels, JB's may be at top, side or bottom. All cable are required be supported and clamped near to the panel.
3. **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.**
4. All care should be taken to avoid abrasion, tension, twisting, kinking and stretching of cables during installation. Any damage to cables on account of mishandling, cost of same shall be deducted from contractors RA bill.
5. Cable shielding – all signal cables are supplied with bare shielded copper wire/with braided wire shield. Generally, shield wire is kept isolated at instrument/field device end and continuity is maintained through JB's and earthed at panel end only. While terminating the shield wire in either panel or JB's, PVC sleeves are to be used to avoid two-point earthing.
6. Wherever cables run through ducts, conduits, valves, etc., they shall be sealed using fire/weather proof compound. In addition to this, cable entry in panels, MCCs, instruments, actuators etc., are also required to be sealed. The required material for doing so shall be included by contractor in the cabling
7. 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.

2.8.4.1 CABLE TERMINATION

1. The Cost Of Cable Layingas Per BOQ Cum Rate Schedule Shall Also Include The Cost Of Termination With Suitable Crimping Type Lugs& Ferrules.
2. Only Cable Lugs & Glands Shall Be Issued By BHEL as Free Issue Item. Drilling of holes in gland plates of control panels, JB's etc as per requirement shall also be part of cabling at no extra cost to BHEL.
3. The contractor shall carryout insulation testing, simulation testing etc. as per the instructions of Engineer at site and/or Customer requirement.
4. Screen of signal cables shall run in insulated sleeve (to be arranged by contractor at no extra cost) and shall be terminated as per the instructions of the BHEL Engineer.

2.8.5 SCOPE OF WORK FOR FIELD INSTRUMENTS

1. Various types of instruments to be erected and commissioned shall be as detailed below:
2. All types of transmitters like temperature, pressure, flow, level transmitters etc. Local mounted pressure gauges, DP gauges, thermocouples, RTDs, temperature gauges, temperature switches, pressure switches, DP switches, flow switches and limit switches and flow indicator level switches etc.
3. Air filter regulators, Air lock off valves etc.
4. Panels / Control desk mounted Instruments like indicators, recorder, console and electronic modules etc.
5. I / P converters and local controllers.
6. Pneumatic operated control valves, trip valves, solenoid valves, power cylinders, etc. and electrically operated valves.
7. Special instruments like vibration sensors, electronic water level indicator, Gas analyser, PC based instruments, etc.

8. Prior to installation, all the local & remote Instruments, thermocouples/RTDs, I/P converters, etc. shall be calibrated. Similarly, limit switches, flow switches, level switches, solenoid valves, air filter regulator, purge meters, etc. shall be checked for proper operation.
9. The scope of work for each instrument shall include calibration, installation, loop checking, commissioning and troubleshooting until satisfactory performance as per operational and system requirement and maintenance till the end of contract period or trial operation whichever is earlier.
10. **In case any instrument requires recalibration to achieve the expected performance, the same shall be carried out at no extra cost.** If any re-calibration or replacement of instruments and rechecking of cable termination is found necessary during commissioning, the same shall be done at free of cost.
11. If any instrument is to be relocated for satisfactory performance, the same shall be carried out by the contractor.
12. Fabrication and installation of racks and supports for instruments, wherever required, shall be carried out by the contractor. Steel materials required for fabrication shall be supplied by BHEL.
13. The scope shall also include marking Tag numbers on the instruments or racks, either by paint or a separate tag plate as per BHEL Engineer's directive.
14. For field mounted instruments, pre-fabricated canopies shall be provided by BHEL. Mounting of canopies shall be done by the contractor as part of scope.
15. The scope of work for pressure/differential pressure transmitters, gauges, switches, shall include fixing the instruments on the racks / supports along with manifolds, and associated fittings and clamps.
16. The scope of work for Temperature transmitters, I/P converters, Air filter/Air lock off valves, Purge meters, Rotameters, position transmitter, probes etc shall include fixing the instruments on the racks / supports along with associated fittings and clamps.

17. The scope of work for control room mounted instruments shall cover mounting of instruments on panels / desk wiring, minor grinding on the cut out of panels for proper fixing.
18. The scope of work for erection of Casing temperature thermocouple of turbine/ metal temperature thermocouple (MTM) shall cover laying, dressing and clamping, supply and fixing of tag plates, etc.
19. The scope of work for erection and checking of thermocouple, RTD etc. shall include cleaning of thermo well stubs threads using tap sets, fixing of thermo wells, seal welding of thermo well, wherever required as per BHEL directive of site engineers.
20. The scope of work for temperature switches, gauges shall include providing suitable support for capillary type temperature Gauges/switches besides the works covered above for RTD & T/C.
21. The scope of work for erection and commissioning of float type Level switches includes fixing of switches on float chambers and fixing of float chambers on stand pipe, any minor modification required to match Float chamber with tapping point, providing supports wherever required etc.
22. The scope of work for Electronic type Level switches includes fixing of Electrode standpipe, Electrodes, Electronic unit, any minor modification required to match Float chamber/ Electrode standpipe with tapping point, integration of all loose supplied items etc .
23. The scope of work for special instruments like, Electronic water level indicator, Flue Gas analysers, SWAS Analyser, etc. shall include installation of all loose items which are not explicitly mentioned, but comes as part of the system, integration of total system and commissioning. The quantities of loose supplied items are approximate only. No extra payment will be applicable for any variation in quantity or for any additional items supplied as part of equipment.
24. For Special Instruments like, Analysers, SWAS System, DCS/PLC vendor support shall be provided by BHEL for commissioning. The contractor shall provide necessary assistance for commissioning activities.

25. All instruments are generally covered in the BOM. However, if any instruments not covered, but requires being erected/commissioned, same shall be carried out by the contractor.
26. In case of Instruments that are mounted and supplied along with main equipment, the contractor shall carry out removal, calibration, re-fixing and commissioning of same, as per requirement.

2.8.6 RIGID & FLEXIBLE CONDUITS

1. Cables shall normally be laid on cable trays. However, in case of shorter routes where trays are not possible, suitable GI pipe/flexible conduits shall be used.
2. The scope of works for flexible conduit includes drilling of the holes on the plates, fixing of the end connectors, providing suitable supports and fixing tag marks wherever specified as required by BHEL. The supply of suitable clamps, fasteners and tag plates are in contractor's scope.
3. Fixing end connectors shall be part of scope of flexible conduit laying.

2.8.7 JUNCTION BOXES/CJCBs/PUSH BUTTON BOXES

Different type of Junction boxes/CJCBs/Bush button boxes shall be supplied by BHEL. 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 JB/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.

2.8.8 SCOPE OF WORK FOR IMPULSE PIPES

1. Fabrication and erection of channel / angle / slotted angle supports, cleaning impulse pipe with wire brush and compressed air, edge preparation, cold bending, laying to the required slopes, clamping, welding of isolation / drain valves and fittings by butt / socket welding / swoze lock joints. Servicing of valves, connecting with the process end and to the instruments, NDT, Hydraulic testing the impulse lines, and painting the lines as per requirement of BHEL engineer.
2. The impulse line may have to be cleaned chemically for removing grease / rusting. Proper tagging of valves and impulse lines on both ends shall be done for proper identification. No extra charges will be claimed by contractor for any modification carried out after laying of Impulse / draft pipe lines due to site requirement in general.

2.8.9 SCOPE OF WORK FOR COPPER/ SS TUBES

1. Fabrication and erection of single angle supports / tray supports for single multi run tube. Laying tubes in the angles / trays from the panel to the equipment, instrument to instrument, air supply line to drive / instrument, air line connections, clamping properly as per standard ferruling and termination at both ends. This includes all fittings and needle valves, stop valves etc. also. Proper tagging of valves and pneumatic tubes on both ends shall be done for proper identification. No extra charges will be claimed by contractor for any modification carried out after laying of pneumatic tubes / draft pipe lines due to site requirement in general.

2.8.10 SCOPE OF WORK FOR PRE-FABRICATED/ SEMI-FABRICATED LIR/ LIE/ GAUGE BOARDS

1. If the frame or rack is supplied as a pre-fabricated item like LIR, same shall be erected, grouted and painted as per site requirement.
2. If any frame or support or rack supplied as semi-fabricated item, same shall be assembled at site either by welding or bolting and erected, grouted and painted as per site requirement.
3. Unit rate quoted for such pre-fabricated /semi-fabricated items like LIE/LIR and enclosure shall be on Number basis. Unit rate shall cover installation,

grouting, painting and supply of nuts, bolts, anchor fasteners, grouting materials such as cement, sand etc as required. Unit rate shall also include full painting of impulse line fitted and supplied along with LIR/LIE/LGB.

4. Wherever LIR/LGB/LIE are supplied with instruments mounted on them, the rate quoted for LIR/LGB/LIE shall include calibration of all the instruments mounted on them as detailed in the BOQ. However if the instruments supplied as loose items, the instruments shall be calibrated and mounted on the LIR/LGB/LIE and separate calibration/erection /commissioning charges shall be applicable in line with other instruments erection

2.8.11 SCOPE OF WORK FOR ELECTRIC & PNEUMATIC ACTUATORS

1. Pneumatic actuators shall be calibrated at site
2. For calibration of any Pneumatic Actuator at field, temporary air supply, if required, shall be arranged by the contractor.
3. All calibration instruments required for calibration of actuators shall be arranged by the contractor.
4. For all actuators of the valves, functioning, setting and performance of limit switches/torque switches of various positions shall be checked before and after installation of the actuators. The position transmitters for inching applications shall also be calibrated.
5. For actuators commissioning contractor shall preferably engage specialised party to complete the work on time within the quoted rates

2.8.12 SCOPE OF WORK FOR THE INSTRUMENTS MOUNTED AND SUPPLIED ALONG WITH EQUIPMENT/ SKIDS

1. Scope of work covers removal, re-calibration, re-fixing, re-termination of cables, checking the continuity, replacing any defective parts or replacing the total instrument, if required.
2. The scope also covers collecting the replacement instruments/parts from BHEL/customer stores, stockyard etc.

2.8.13 SCOPE OF EARTHING

1. The scope of earthing covered in this contract is above ground earthing i.e. equipment earthing. Scope of earthing covers earthing of field Instruments, JB's, Branch trays, LIR/LIE, JB, Push Button boxes etc. All DCS and its accessories, PLC/Instrumentation panels/systems etc, shall be earthed to a separate Electronic earth grid.
2. Different type of earthing materials shall be supplied and same shall be erected as per site requirement.
3. The scope of work shall include supply of fasteners, lugs, minor civil works etc.
4. All connections from the equipment to the main earthing conductors shall be made as illustrated in earthing drawings. A copy of earthing drawing shall be provided to the contractor at site.
5. Earth grid shall be provided by M/s LPGCL and contractor has to connect to that grid as per requirement within quoted rates.

2.8.14 STRUCTURAL FABRICATION AND INSTALLATION**INSTRUMENT/ JUNCTION BOX FRAME/ PANEL BASE FRAME / CABLETRAY & 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, levelling, alignment, providing bracings and painting etc. No gas cut holes will be permitted.
3. All the fabricated supports/frames for instruments, trays, pipes, equipments, etc., shall be painted after thoroughly cleaned by wire brush, scrapping or any other method as per requirement of BHEL/LPGCL. 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. If there is requirement of cable routing from one structure to another as per drawing/requirement same shall be done by contractor as per rate schedule.
6. 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.
7. 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.
- 8. Gas cutting of tray/impulse pipe support and holes in frame is not permitted. Only hacksaw cutting/ drilled hole shall be permitted.**

2.8.15 POWER CYLINDER ERECTION

Platforms on which Power Cylinders are to be mounted are usually provided by the Civil Contractor / other agency. However minor structure work required shall form a part of the work within the quoted rate of the respective cylinder. Fabrication / erection of stands for mounting of the cylinders The work also includes minor rectifications/alteration in the tubing , servicing of accessories , setting of limit switches , calibration of actuators and feedback position transmitters.

2.8.16 C&I LAB (To be executed in Package A only)

Scope of work includes the setup & handing over of C&I lab having the following equipment which shall be under free issue by BHEL:

S.No.	Lab Instruments	Qty (in nos.)
1	Electronic Test Bench	1
2	Pneumatic Test Bench	1
3	Dead Weight Tester	1
4	Vacuum Tester	1
5	Hydraulic Pressure Gauge Tester	1
6	Portable Hydraulic Pressure Generator	1
7	Portable Pressure Calibrator	3
8	Test Manometers	2
9	U -Tube Manometer	2
10	Air sets	4
11	Portable Electro-pneumatic Calibrator	2
12	Fluidised Temperature bath	1
13	Thermocouple Test Furnace	1
14	Barometer	1
15	Mercury Thermometers	24
16	Flow meter calibrator	2
17	Portable Tachometer	2
18	Coil winding Machine	1
19	Stop watches	3
20	Precision Instrument Radial Drilling Machine	1
21	Jeweler's Lathe	1
22	Standard tool box	5
23	Wet and Dry Bulb Hygrometer	1
24	Soldering and Desoldering Stations with all accessories	2
25	Vacuum Pump	1
26	Solder sucker	2
27	Digital Multimeter	
a.	Digital Multimeter, 3½ digit hand held	10
b.	Digital Multimeter, 4½ digit hand -held	4
c.	Digital Multimeter, 4½ digit desk top	2
d.	Digital Multimeter, 5½ digit desk top	2
e.	Digital Multimeter, 6½ digit desk top	2

28	Portable Current Calibrator	5
29	Portable milli-volt Calibrator	5
30	Resistance Thermometer Bridge	2
31	Decade Resistance Box	2
32	Variac	1
33	Rheostat/Potentiometer	10
34	Test RTD	2
35	Portable Thermocouple/RTD calibrator/Simulator	1
36	Portable MultiFunction Counter	1
37	Digital Storage Oscilloscope	1
38	Power Pack	3
39	Portable Vibration Meter	1
40	RCL Bridge	1
41	pH Simulator	1
42	MultiChannel Simulation Unit(Analog)	1
43	Digital Channel Simulator	1
44	Function Generator	1
45	Portable Infrared Thermometer	1
46	Clip On AC Power Meter	1
47	Portable Gas Analyser	1
48	Portable Surface pyrometer(infra red)	1
49	Lab PC+ laser printer(A4,B/W)	1
50	Digital megger	2
51	Portable Vibration Analyser/Dynamic balancer	1
52	Portable Universal input type 30-point chartless recorder	1
53	Single battery cell charger	2
54	Test bench for actuator	
55	Visual training aid	
a.	LCD projector	1
b.	Lap top PC	1
c.	Engraving machine	1

2.9 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.

2.10 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.

2.11 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.

2.12 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 Engineer-in charge/ LPGCL.

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.

3. 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.

4. 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.
- 5. In order to have consistency in painting system, it is preferable that all the supplies are sourced from one single manufacturer.**
6. 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
7. The painters have to undergo test on a mock plate of size 1m*1m and only qualified painters will be allowed to work.
8. 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.
9. Touch-up painting of LT MCC \ Control Panels or any other equipment /devices wherever necessary.
10. The primer shall be compatible with the final coat paint schedule.
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.

2.13 TESTING, PRE-COMMISSIONING, AND POST COMMISSIONING

The scope of commissioning work covers commissioning of all instruments/equipment/systems covered in the BOQ including loop checking and establishing the operation of instruments/equipment/systems to meet plant commissioning/operation. BHEL will provide vendor supports for special or proprietary type instruments/systems if necessity is accessed by engineer-in charge BHEL and contractor engineers/supervisors shall associate with the vendors and provide necessary manpower, T&P,IMTE's etc. The contractor shall be responsible for overall commissioning of all the instruments and systems covered in the BOQ.

Scope of commissioning starts with the commissioning of various equipment/ instruments/ systems erected by the contractor and making them available, as required, for the various commissioning activities of the main plants. The commissioning activities of the main plant shall be as below:

- i. Trial run of various equipment. (coupled or de-coupled)
- ii. Light up of boiler.
- iii. Boiler acid cleaning.
- iv. Boiler alkali boils out.
- v. Turbine barring gear.
- vi. Steam blowing of piping
- vii. Turbine rolling.
- viii. Safety valve floating.
- ix. First synchronization of unit.
- x. Full load operation of unit.
- xi. PG Test of all major equipment

The above commissioning activities, tests, trial runs may have to be repeated till satisfactory results are obtained to the satisfaction of customer / consultant / statutory authorities like boiler inspector, inspector etc.

1. The contractor shall co-ordinate with other contractor's during the above main plant commissioning activities to ensure successful commissioning of total plant.
2. The pre commissioning activities of the plant will start with run of various equipment prior to light up of boiler and commissioning operations shall continue till the unit is handed over to customer. The contractor shall simultaneously start commissioning activities for the equipment erected to match with the various milestone activities of commissioning programme of the project.
3. Contractor shall arrange specialized commissioning engineers, supervisors, electricians, and instrument mechanics in each area to be associated with BHEL commissioning staff. Contractor shall earmark separate manpower for various commissioning activities. The manpower shall not be disturbed or diverted. It shall be specifically noted that above employees of the contractor may have to work round the clock along with BHEL commissioning engineers involving considerable payment of overtime, which forms part of Contractors Scope
4. The mobilization of these commissioning groups shall be such that planned activities are taken up in time and also completed as per schedule and the work undertaken round the clock if required. It is the responsibility of contractor to discuss on day to day / weekly / monthly basis the requirement of manpower, consumables, tools and tackles with BHEL engineer and arrange for the same.
5. If at any time the requisite manpower, consumables, T & P are not arranged by the contractor to meet the schedule, BHEL shall make alternate arrangements and recover the cost with overhead from the running bills of the contractor.
6. After erection of various equipment prior to commissioning and after commissioning, protocols have to be made with BHEL's customer. The formats will be given by BHEL and have to be printed by the contractor in adequate numbers.
7. For works, 415 volts and above, the contractor has to bring qualified electricians and the total work has to be certified by license holder.

8. In case any rework/repair/rectification/modification/fabrication etc. is required 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. If during commissioning, any improvement / repair / rework / rectification / fabrication / modification due to design improvement / requirement is involved, the same shall be carried out by the contractor promptly and expeditiously. Claims if any, for such works from the contractor shall be governed by clauses covered elsewhere.
9. During commissioning activities and carrying out various tests, if any of the instruments has to be temporarily erected and commissioned to suit the commissioning activities, the contractor have to carry out the erection of the same. After completion of activities the temporary systems have to be removed and returned to stores and no extra rate shall be paid for this
10. Minimum requirement of Man Power for commissioning works per unit shall be as follows:
- Engineer (C&I) – 4
Supervisor C&I) – 10
Technician (C&I) – 24
- The above commissioning group shall be identified at the Pre-commissioning and commissioning time. The above commissioning group shall have the knowledge of various systems referred in the tender and also should have adequate experience. The above manpower for commissioning is only tentative and for any additional manpower as per site requirement the same shall be arranged by the contractor within the quoted rates.
11. If the contractor fails to deploy the above Engineer/Supervisor/ Technician at appropriate time of commissioning, no payment shall be made against commissioning activities as per terms of payment and BHEL reserves the right to required manpower on risk and cost of Contractor.
12. All the T&P, IMTE's and other Erection & commissioning instruments/tools required for commissioning are to be arranged by the contractor.

Note: It shall be the responsibility of the contractor to arrange and complete all the testing, pre-commissioning and commissioning activities for the particular equipment as per relevant standard, code of practice, manufacturer's instructions and BHEL/LPGCL FQPs/ norms. All the above will be witnessed by the BHEL engineers and a joint report/protocol shall be made and signed by contractor. It shall be responsibility of contractor to get signed all protocols /reports from BHEL and or LPGCL and handing over to BHEL Engineer-in-charge. Contractor shall follow checklist of BHEL and testing & commissioning activities shall be carried out in accordance with the checklist.

Chapter - III: 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		Limited Space (Free of charge) As and where made available by customer M/sLPGCL
B.	Open space for storage	YES		Limited Space (Free of charge) As and where made available by customer M/s LPGCL
1.1.2	FOR LABOUR COLONY			
A	Open space		YES	Contractor has to make own arrangement
1.2.0	ELECTRICITY			
1.2.1.	Electricity for construction purposes (chargeable/free)			Chargeable
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 & execution		YES	Chargeable As per LPGCL/UPPCL standard rates Contractor shall install calibrated energy meter for metering electricity consumption
1.2.2	Electricity for the office, stores, canteen etc of the bidder which include:			
1.2.2.1	Distribution from single point		YES	

	including supply of materials & service			
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 abovelines		YES	Chargeable As per LPGCL/UPPCL standard rates Contractor shall install calibrated energy meter for metering electricity consumption
1.3.0	WATER SUPPLY			
1.3.1	FOR CONSTRUCTION:			
1.3.1.1	Making the water available at single point		YES	Contractor have to arrange on his own of bore well at stipulated places earmarked by LPGCL
1.3.1.2	Further distribution as per the requirement of work including supply of materials & execution		YES	
1.3.2	LABOUR COLONY:			
1.3.2.1	Making the water available at single point		YES	Contractor have to <u>arrange on his own</u>
1.3.2.2	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	do
2.1.10	Preparation of preassembly bay		YES	do

- 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 power and water from the central points to the required place with proper distribution boards observing the safety rules laid down by the 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 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 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 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.
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Chapter - IV: T&Ps and MMEs to be deployed by Contractor

4.0 T&P, IMTEs AND MMD DEPLOYED BY CONTRACTOR

S.NO.	EQUIPMENT	CAPACITY	For Package A	For Package B
1.	Welding Generators & Transformers, Rectifiers & TIG Welding sets		APR	APR
2.	Chain pulley blocks	5/10 T	APR	APR
3.	Trailer with Pulling Unit	10 / 20 MT	1 No.	1 No.
4.	Hydra crane	14/18 MT	1 No.	1 No.
5.	Copper tube bender and cutter sizes 6mm, 8mm, 1/2", 1/4"		2 No. each	2 No. each
6.	Pipe bending machine – 2" size		2 No.	2 No.
7.	Dye sets for threading upto 2" pipe.		2 Set	2 Set
8.	Tap sets for both BSP and NPT threads upto 1" each		2 Set each	2 Set each
9.	Crimping tools up to all size of cables under scope of work		Adequate nos.	Adequate nos.
10.	Hydraulic crimping tool		2 No.	2 No.
11.	Vacuum Cleaner (Industrial)		2 No.	2 No.
12.	Grinding Machine		2 No	2 No
13.	Drilling Machines		APR	APR
14.	Electric Winches		APR	APR
15.	Phase sequence indicator		1 No.	1 No.
16.	Digital Multimeters 3½ digit of reputed make		10 No.	10 No.
17.	Digital,41/2 digit Motwane/HIL/Fluke		8 no.	8 no.
18.	Analog multimeter		6 no.	6 no.
19.	250V/500 V / 1000V rated Hand operated megger Mains/battery operated		2 no. each	2 no. each
20.	Tong Testers AC 5/10,25/60/300 ,Amp Range ,of reputed make		2 No. each	2 No. each
21.	Tong Testers DC 30/60/300 A		2 No.	3 No.
22.	Stop watch		2 No.	2 No.
23.	Tele talk 2 wire system		12 set	16 set

24.	Torque wrench(12-60 Nm,50-225 Nm)		1 No. each	1 No. each
25.	Ferrule printing machine		4 no.	4 no.
26.	Dead Weight Tester rated 400 Kg/cm ² with weights & test gauge facility		2 no.	2 no.
27.	Oil temperature bath suitable to calibrate the instruments range 0-300 deg. C with standard temp. gauges & thermostatic control		4 no.	4 no.
28.	Standard gauges 12" dial size make		APR	APR
29.	A) 0-1 kg/cm ² pressure gauge(vacuum gauge) B) 0 – 5 or 6 kg/cm ² pressure gauge C) 0 – 10 kg/cm ² – do – D) 0 – 25 kg/cm ² – do – E) 0 – 60 kg/cm ² – do – F) 0 – 100 kg/cm ² –do – G) 0 – 250 kg/cm ² – do – H) 0 – 600 kg/cm ² – do – I) 0.2 to 1 kg -- do --		2 no. 2 no. 2 no. 2 no. 2 no. 2 no. 2 no. 2 no.	2 no. 2 no. 2 no. 2 no. 2 no. 2 no. 2 no.
30.	Manometers (+/-) 1000 mm water column With hand bulb for lab and small manometers for field purpose.		4 no.	4 no.
31.	Manometer (+/-) 500mm mercury column with hand bulb for lab and small manometer for field purpose.		2 no.	2 no.
31 a	Inclined manometer (+/-) 300 mm water column		2 no.	2 no.
32.	Portable air compressor with drier and regulator rated for 7 to 10 kg/cm ²		4 no.	4 no.
33.	Vacuum pump		2 no.	2 no.
34.	Standard milliamps / millivolts		4 no.	6 no.

	source of reputed make. Range 0 to 50 ma and 0 to 100 mv			
35.	DC power supply 0-50 VDC, 5 A make "Aplab" or equivalent (variable source)		2 nos.	2 nos.
36.	Single phase variac 250 V, 8 amp		2 no.	2 no.
37.	3 phase variac rating 5 amps		2 no.	4 no.
38.	Glass thermometer 0-120 deg. C, 0-200 deg.c and 0-600 deg.c		2 no. each	2 no. each
39.	Primary current injection kit		1 no.	1 no.
40.	Secondary current injection kit up to 300 amp		1 no.	1 no.
41.	DC shunt 400 amp 75 mv		1 no.	1 no.
42.	Tachometer non-contact type 0 to 4000 rpm		1 no.	1 no.
43.	Decade resistance box		2 sets	2 sets
44.	Relay testing kit		1 no.	1 no.
45.	Equipment and consumables for LPI/MPI test on impulse pipes		1 no.	1 no.
46.	Function generator		1 no.	1 no.
47.	Insulation Tester (upto 5KV)		01 no.	01 no.

***APR-Contractor have to deploy as per the requirement of the BHEL site as decided by BHEL Engineer**

NOTES:

1. The above list specifies only major T&P/MMD (may not be complete) to be deployed by the contractor. All additional/ other tools and plants which are required for satisfactory & timely completion of work shall also be deployed by the contractor within finally accepted rate/ price. Phase wise requirement of T&P's and IMTE's etc shall be decided by Engineer-in-charge at the start of the contract in line with the clause 2.9 of GCC.
2. If works gets delayed due to non-availability of T&P and MMD, BHEL reserves the right to get work done at the risk & cost of contractor without prejudice to right of BHEL as in GCC
3. All testing instruments shall have calibration certificate issued by recognized /accredited agencies.

4. Contractor shall maintain calibration records as per the BHEL format and produce them whenever called for by BHEL Engineers.

5. Wherever frequent calibration is required, contractor shall arrange adequate number of instruments such that the work does not suffer for want of test instruments.

6. Contractor must re-ascertain/ recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration/ deployment.

7. 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 TG Hall	180/20 MT	APR
2.	Available crane	135 MT	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 Time Schedule for Package A: C&I of Unit#1 and station C&I of Unit 1,2 &3**

6.1.1 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 mobilization of manpower and T&Ps by the contractor.

6.1.2 Delivery Period: Entire work as detailed in the tender specifications shall be completed **within 22 months** from the Zero date as per program/milestones indicated by BHEL Engineer-In Charge. Contractor has to mobilize adequate resources to meet BHEL's commitments to their customer as indicated from time to time.

6.1.3 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	07 months
Synchronization	09 months
Full Load	11 months
Trial Operation & Handing Over	12months
PG Test and handing over	13 months

The milestones of unit#3 shall follow with a time lag of 08 months w.r.t Unit#1

Note: 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.

6.2 Time Schedule for Package B: C&I of Unit#1 and 2

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 mobilization of manpower and T&Ps by the contractor.

6.2.1 Delivery Period: Entire work as detailed in the tender specifications shall be completed **within 18 months** from the Zero date as per program/milestones indicated by BHEL Engineer-In Charge. Contractor has to mobilize 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	
	Unit#2	Unit#3
Erection Start	ZERO	ZERO
Boiler Light up	05 months	09 months
Barring gear	07 months	11 months
Synchronization	09 months	13 months
Full Load	11 months	15 months
Trial Operation & Handing Over	12months	16 months
PG Test and handing over	13 months	17 months

The milestones of unit-3 shall follow with a time lag of 04 months w.r.t Unit#2

Note: 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.

6.4 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 **one month from completion of PG test of the unit.**

6.5 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

- 7.1 The 'Engineer In-Charge' 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 authorized 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:

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

2.12.3 PROGRESSIVE PAYMENT ON PRORATA BASIS (For Package A and B both)

I. **85 %** of contract value payable on fulfilment of following conditions:

(A) For Equipment / items such as Panels, ACDB ,UPS, Battery & Charger, Cable Trays, cable, JBs, impulse pipe, tubing 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. (For Package A and B both)

- 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 point's clearance.

(C) STAGE/MILESTONE PAYMENTS (15% of Contract value) (For Package A and B both)

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

Total 15%

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.
2. BHEL Engineer-In charge shall decide which item shall require or not calibration and testing for the purpose of payment.

*Payment of retention amount and final bill shall be as per clause No. 2.22 and 2.23.2 of GCC.

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 charges which 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 break up 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 discharging the 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 Price Bid. 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.

9.2 Modification/deletion in price variation compensation clause no. 2.17 of GCC:

I. Clause no. 2.17.5 of GCC shall be modified as below:

Base date shall be calendar month of the schedule completion date of the contract.

Schedule completion date shall be actual date of start plus delivery period as defined in clause no. 6.0 of TCC.

II. Clause no. 2.17.9 shall be modified as:

PVC shall be applicable only for extended period of contract (if any) after the schedule completion of date. However, total quantum of PV amount payable/recoverable shall be regulated as follows:

- For the portion of backlog attributable to the contractor, no PV shall be paid.
- For the period of Force majeure, the PVC (if applicable) will be limited to the indices applicable at the beginning of the force majeure period.
- For the portion of backlog attributable to BHEL, PVC will be as per the indices applicable for the respective month.
- The total amount of PVC shall not exceed 20% of the cumulatively executed contract value. Executed contract value for this purpose is exclusive of PVC, ORC, Supplementary/Additional item and extra work.

All other terms and conditions of the clause no. 2.17 of GCC shall remain same.

9.3 For reverse auction/ Price Bid opening, only those bidders will be considered who will 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.

THE PROCEDURE FOR SELECTION & FINALIZATION OF CONTRACTORS FOR PACKAGE-A & PACKAGE-B OF THIS TENDER FOR **UNIT NO. 1, 2 & 3 AT 3X660 LALITPUR STPS OF LALITPUR POWER GENERATION CO. LTD., DISTT. LALITPUR, U.P.**

9.3.1 There will be three units of 660 MW each **AT 3X660 MW LALITPUR STPS OF LALITPUR POWER GENERATION CO. LTD., DISTT. LALITPUR.**

9.3.2 **Mode of Award of subject work for three units (3X660MW) at Lalitpur is packaged as follows:**

1) Package A:C&I Unit 1 and Station C&I of Unit 1,2 & 3

2) Package B: Unit #2 and Unit#3

Party who is awarded Package 'A' shall not be eligible for package 'B' and vice-versa.

9.3.3 Scope of work under Package-A & B of this tender is given under clause 2.0. The two packages shall be awarded to two separate contractors i. e. no single bidder shall be awarded more than one package.

9.3.4 Bidders may submit their offer either for both the packages or any one of the packages i.e. Package-A or Package-B given in this tender. However, Bidders shall specifically confirm in their bid that they have quoted for Package-A or Package-B or both of the packages.

9.3.5 Bidders shall submit price bid for each package separately by enclosing each price bid in a separate envelop, clearly indicating on cover of the envelop the respective package number(i.e. Package-A or Package-B) besides furnishing other requisite details.

9.3.6 Reverse Auction/Price bid opening shall be done separately for each package. RA/price bid opening of Package 'B' shall be done after finalisation of Package 'A'.

There will be two separate Contracts for each Package. Both the contracts will be treated individually as a separate contract and Contract Agreement for each package shall be signed separately.

Chapter - X: BILL OF QUANTITY (BOQ) For Package 'A'**BOQ FOR ERECTION, TESTING, COMMISSIONING OF ALL CONTROL & INSTRUMENTATION of UNIT#1 AND STATION C&I OF UNIT 1,2 & 3AT 3x660 MW LALITPUR STPP.**

	ITEM DESCRIPTION	UNIT	Qty/comm on for three Units	Qty/ unit	Total Qty.
	PANELS/RACKS/CONSOLES				
	SG & TG CONTROL PANEL				
01.	suit of one panel (approx. weight 400kg, 900(L) X 900(B) X 2500(H) mm	No.		05	05
02.	TG Siemens Panel (suit of one panel) (approx. weight 300kg, 1200(L) X 800(B) X 2200(H) mm	No		07	07
03.	suit of two panels (approx. weight 800kg, 1800(L) X 1000(B) X 2500(H) mm	No.	01*	07	08
04.	suit of three panels (approx. weight 1200kg, 2700(L) X 1000(B) X 2500(H) mm	No.		03	03
05.	suit of Four panels (approx. weight 1600kg, 3600(L) X 1000(B) X 2500(H) mm	No.		04	04
06.	suit of five panels (approx. weight 2000kg, 4500(L) X 1000(B) X 2500(H) mm	No.		01	01
	STATION C&I CONTROL PANEL				
07.	suit of one panel (approx. weight 400kg, 900(L) X 900(B) X 2500(H) mm	No.		02	06
08.	suit of two panels (approx. weight 800kg, 1800(L) X 1000(B) X 2500(H) mm	No.	01*	03	10
09.	suit of three panels (approx. weight 1200kg, 2700(L) X 1000(B) X 2500(H) mm	No.	03*	20	63
10.	suit of Four panels (approx. weight 1600kg, 3600(L) X 1000(B) X 2500(H) mm	No.		01	03
11.	DAVR panel (approx. 4028x800x2415 mm)	SET		01	01

12.	Grounding Brush Monitor(100 Kg)	SET		01	01
13.	Generator Relay panel/STRP panel with Generator disturbance recorder panel	SET		01	01
14.	Generator Control Panel 750x800x2415 mm	No.		01	01
15.	Electrical Interface System Panel 750x800x2415 mm	No.	02*	01	03
16.	Availability based Tariff System panel	No.		01	01
17.	Steam Leak Detection Panel	No.		01	01
18.	Gas Analyser cabinet 1200x800x2110 mm	No.		02	02
19.	Acoustic Steam leak detection system panel(ASLD) 800x800x2415 Mm	No.		01	01
20.	Vibration Monitoring System 800X800X2415 mm	Set		04	04
21.	Acoustic pyrometer remote cabinet including PC station (approx. 1400 x 2365 x800 mm)	Set		01	01
22.	FTP LOCAL STARTER Box 650x1000x300 mm	No.		02	02
23.	Elevator control Panel	No.		01	01
24.	SCANNER AIR FAN STARTER 900x1120x375 mm	No.		01	01
25.	FOPH PMCC (1000 A)(944 D X 1754 H X 8800W)	Set	01*		01
26.	Sub emergency MCC (2500 A) (944 D X 1754 H X26300W)	Set		01	01
27.	Boiler PMCC)(944 D X 1754 H X 20100W)	Set		01	01
28.	Boiler Valve & Damper MCC)(944 D X 1754 H X 11200W)	Set		01	01
29.	Boiler ACDB)(944 D X 1754 H X 9600W)	Set		01	01
30.	Turbine PMCC)(944 DX 1754 H X 25200W)	Set		01	01
31.	Turbine Valve and Damper MCC) (944 D X 1754 H X13600W)	Set		01	01
32.	Unit Service MCC)(944 D X 1754 H X 9600W)	Set		01	01
33.	Condensate Polishing Unit MCC) (944 D X 1754 H X 7200 W)	Set	01*		01
34.	Mill Reject System MCC)(944 L X 1754 H X 9100W)	Set	01		01
35.	Data Concentrator Panel(800 L X 800H X 2324W) along with PC and communicator system.	No.		06	06
36.	HART Management System for SMART	Set		01	01

	Transmitter Panel dimension 1200X800X2415 mm				
37.	AH Main Control Panel 1830x2186x611 mm	No.		01	01
38.	AH LCS Sector Plate 1&2 Drive Panel 645x673x203 mm	No.		06	06
39.	HWL-1&2 and MEF Control valve Panel 600x600x210 mm	No.		01	01
40.	SOOT BLOWER MCC (23250 L X2250 H X1000 W)	Set.		01	01
41.	Furnace Flame Viewing System –Remote Panel 700x700x2100 mm	No		01	01
42.	Furnace Flame Viewing System –Local Panel 1220x1470x610 mm	No		02	02
43.	GRAVIMETRIC FEEDER REMOTE PANEL 1200 x 2315X600 mm	No.		08	08
44.	Gravimetric Feeder Integral Panel 600x750x350 mm	NO.		08	08
45.	NETWORK PANEL With accessories 800x800x2415 mm	No.	01*	05	06
46.	Power Distribution Panel 2800x800x2415 mm	No.	01*	01	02
47.	Starter cabinet for Emergency Lube Oil Motor, DC seal oil Motor 1000X800X2200 mm	No.		02	02
48.	Max engineer/max Storian/max operator/max link stations/station supervisor/shift in charge terminal/MIS PC/PCAL PC/LVS PC/TFT monitor along with installation of workstation with all connectivity	Nos.	10*	35	45
49.	Printers(A4 & A3 Colour Laser Jet, Inkjet, Dot Matrix) With Printer Table and accessories	No.	03*	07	10
50.	LARGE VIDEO SCREEN(80"/40")	No.	01 (Spare)	04	05
51.	Ethernet switches-16 ports	Set		01	01
52.	Control Desk	Set	01*	01	02
53.	Computer Furniture(for all servers ,pc, printer)	Set	01*	02	03
54.	Simulator Package for Power Plant	Set	01*		01

55.	UPS for Simulator Package (80 KVA)	Set	01*		01
	LIE/LIR/LGB				
56.	Local Instrument racks (LIR) Type A 1650x2150x800	No.		28	28
57.	Local Instrument racks (LIR) Type B 1300x800x2150 mm	No.		32	32
58.	Local Instrument racks (LIR) Type C 800x850x1650 mm	No.		11	11
59.	Local Instrument enclosures (LIE) Type A 1450x2200x950	No.		14	14
60.	Local Instrument enclosures(LIE) Type B 1100x800x2300 mm	No.		12	12
61.	Local Instrument enclosures(LIE) Type C 700x600x2100 mm	No.		2	2
62.	Local Gauge Boards(LGB) Approx. Size 1400x550x1900 mm	No.		08	08
	PRESSURE INSTRUMENTS RACKS (IR1 to IR7) Assembly/welding and onstallation of Instrument Racks with loose supplied prefabricated materials of suitable size, like equal/unequal angles, canopy mounting plates, LHS/RHS stands etc., necessary welding, fixing with fasteners and grouting				
63	Rack of size 2150x700x2150 mm	No.		09	09
64	Rack of size 1250x700x2150 mm	No.		09	09
	24 V DC BATTERY & CHARGER SYSTEM				
65	24 V DC Battery for SG and TG	Set		01	01
66	24 V DC Battery for Station C&I	Set		01	01
67	24 V DC Battery Charger for SG ,TG	Set		01	01
68	DCDB for SG &TG	Set		01	01
69	24 V DC Battery Charger for Station C&I	Set		01	01
70	DCDB for Station C&I	Set		01	01
71	UPS system comprising of the following: UPS Panel, Voltage stabilizer cubicle, Input Iso. Transformer cubicle, Static invertors etc. UPS Panel:1640x900x2000	Set		01	01
72	ACDB Approximate Size and weight: 900x800x2100 mm; 600 kg.	Set		01	01
73	UPS batteries-Ni cd battery	Set		01	01
	INSTALLATION,CALIBRATION& COMMISSIOINGOFLOCAL/FIELD INSTRUMENTATION/EQUIPMENT				
74.	Flow meters/Flow transmitters	No.		186	186
75.	Temperature gauges/Pressure gauges/ Diff.	No.	981*	435	1416

	Pressure gauge				
76.	Temp. Transmitter /Pressure Transmitters / Differential pressure/Position transmitters	No.	627*	235	862
77.	Level Transmitter/Level gauge	No.	153*	37	190
78.	Temp. switches/Pressure switches /DP switches	No.	36*	247	283
79.	Level switch/Level switch(Conductivity type)/ Level switch(Float type) / Level Instruments	No.	18*	41	59
80.	Pneumatic Pressure controller with accessories	Set		1	1
81.	Electronic/Guided Wave Radar /Ultrasonic type level Transmitters	No.		383	383
82.	Limit switches	No.		56	56
83.	Conductivity cell	No.		6	6
84.	ERV Controller	No.		04	04
85.	ASLD sensor assy	No.		24	24
86.	Sonic tube & sensor asy	No.		24	24
87.	Field amplifier Box	Set		24	24
88.	Rotor Stoppage Alarm Box-including sensors for Air pre heaters	No.		2	2
89.	Reverse Rotation Monitoring system	No.		3	3
90.	Flame scanner head assy. Along with fibre optic cable length 130 ",lens barrel assembly with miniature JB's	No.		32	32
91.	Microprocessor based Flame scanner amplifier	No.		8	8
92.	Hand Held HART communicator	Set		01	01
93.	Conductivity/Dissolved oxygen/sodium/pH/silica/analyser	Set	86*		86
94.	Gas Analyser(wt- 400 kg)	Set		02	02
95.	Moisture sensor	Set		01	01
96.	Cathode conductivity	Set	15*		15
97.	Flue gas analysers comprising of SOX/NOX/CO/Co2 analyzer, along with Sensor head, in situ probe,Pressure, temp. transmitter, Display, control & Air drier unit other accessories.	Set		01	01
98.	Steam and water analysis system, SWAS consisting of: Conductivity analyser-13 No. pH analyser-10 No. Dissolved oxygen analyser-5 No. Silica analyser-1 No. Sodium analyser-1 No.	Set		01	01

	Conductivity analyser with drawable type-2 no. SWAS primay rack- 2 set Wet panel-1 set Dry panel- 1 set Chiller-1 set Swas Sample Handling System-01 set				
99.	Oxygen Analyser –Low temperature along with Electronic Unit and other accessories.	Set		10	10
100.	Thermocouples(K/R type)	No.		444	444
101.	RTDs with thermo well	No.	375*	380	755
102.	Cr- Al Thermocouple assy	No.	606*	773	1379
103.	MTM Thermo Couple up to 32 M (duplex)	No.		359	359
104.	Thermo well	No.		40	40
105.	Thermometer(Bimettalic)/Gas filled/MIS	No.		27	27
106.	Co –AXL dial thermometer	No.		7	7
107.	Bearing Elerment	No.		16	16
108.	Burner Tilt shear pin failure indication box	No.		4	4
109.	Heavy Duty Limit switch(Burner tilt)			20	20
110.	Furnace temp. Probe	No.		2	2
111.	HEA exciter box assembly	Set		20	20
112.	Air Filter Regulators	No.		65	65
113.	I/P Converters	No.	36*	26	62
114.	Vibration Transducers/Monitor/ Detectors/Element	No.	186*	108	294
115.	Shaft Axial Detector	No.		2	2
116.	Proximitors	No.		6	6
117.	Rota meters	No.		2	2
118.	Solenoid Valves	No.		148	148
119.	Speed Regulators / Air lock valves in oil gun corner rack	No.		40	40
120.	Speed measuring loop	Set		6	6
121.	Coal bunker level Monitoring system consists of Ultrasonic level sensor-14 no. and transmitter-14 no., Extension cable 320 mtr, Junction box-8 no. and Local panel -02 nos	Set		01	01
122.	Coal Flow Monitor	No.		08	08
123.	Recorder 3/6/24 channel	No.		01	01
124.	Opacity Monitor	No.		01	01
125.	Electronic /Digital Indicators(Bar Graph Indicators, Temperature Indicatorsetc.)	No.		20	40
126.	Pressure/ Temperature Indicators (MovingCoil Type)	No.		5	5
127.	Speed switch / Speed detector	No.		4	4

128.	Pneumatic Temperature controller with accessories	No		02	02
129.	GPS based Master & Slave clock system (Panel dimen. 900*600*2415 mm approx))	Set	01*		1
	CONTROL/SIGNAL/SCREENED/POWER CABLES LAYING,DRESSING,CLAMPING & TERMINATION				
	<u>LT Sheilded /Screened Cable//FRLS/Power cable</u>				
130.	2P X 0.5 SQ MM	Mtr	47333*	65115	112448
131.	2 Triad X 0.5 SQ MM	Mtr		5200	5200
132.	4P X 0.5 SQ MM	Mtr	61000*	121300	182300
133.	8P X 0.5 SQ MM	Mtr	98000*	79950	177950
134.	12P X 0.5 SQ MM	Mtr	10667*	17500	28167
135.	20P X 0.5 SQ MM	Mtr.	8000*		8000
136.	2P X 1.5 SQ MM	Mtr		11600	11600
137.	4P X 1.5 SQ MM	Mtr		5000	5000
138.	2C X 2.5 SQ MM	Mtr		30600	30600
139.	3C X 2.5 SQ MM	Mtr		85200	85200
140.	7C X 2.5 SQ MM	Mtr		23200	23200
141.	10C X 2.5 SQ MM	Mtr		26000	26000

142.	16C X 2.5 SQ MM	Mtr		500	500
143.	19C X 2.5 SQ MM	Mtr		11600	11600
144.	3C X 6 SQ MM	Mtr		2200	2200
145.	2Px16 AWG T/C ext. cable	Mtr		14435	14435
146.	4Px16 AWG T/C extention cable	Mtr		2000	2000
147.	6Px16 AWG T/C extension cable	Mtr		50000	50000
148.	Flame scanner cables	Mtr		8500	8500
149.	UTP E-CAT cable	Mtr		5000	5000
150.	Fibre optic cable	Mtr		3500	3500
151.	Compensating cable	Mtr		5800	5800
152.	Extension Cable	Mtr		960	960
	<u>LT XLPE Power Cables</u>				
153.	1C - 10- AL ARMOURED LT XLPE CABLE	Mtr.		4667	4667
154.	1C - 25- AL ARMOURED LT XLPE CABLE	Mtr.		1000	1000
155.	1C - 50- AL ARMOURED LT XLPE CABLE	Mtr.		500	500

156.	1C - 95- AL ARMoured LT XLPE CABLE	Mtr.		3333	3333
157.	1C - 185- AL ARMoured LT XLPE CABLE	Mtr.		1667	1667
158.	1C - 400- AL ARMoured LT XLPE CABLE	Mtr.		3000	3000
159.	1C - 630- AL ARMoured LT XLPE CABLE	Mtr.		1333	1333
160.	2C - 10- AL ARMoured LT XLPE CABLE	Mtr.		833	833
161.	2C - 25- AL ARMoured LT XLPE CABLE	Mtr.		4500	4500
162.	3C - 10- AL ARMoured LT XLPE CABLE	Mtr.		8500	8500
163.	3C - 25- AL ARMoured LT XLPE CABLE	Mtr.		27333	27333
164.	3C - 50- AL ARMoured LT XLPE CABLE	Mtr.		7833	7833
165.	3C - 95- AL ARMoured LT XLPE CABLE	Mtr.		4167	4167
166.	3C - 150- AL ARMoured LT XLPE CABLE	Mtr.		333	333
167.	3C - 240- AL ARMoured LT XLPE CABLE	Mtr.		4667	4667
168.	3.5C - 25- AL ARMoured LT XLPE CABLE	Mtr.		9000	9000
169.	3.5C - 50- AL ARMoured LT XLPE CABLE	Mtr.		3667	3667
170.	3.5C - 95- AL ARMoured LT XLPE CABLE	Mtr.		5167	5167

171.	3.5C - 300- AL ARMoured LT XLPE CABLE	Mtr.		1167	1167
172.	4C - 10- AL ARMoured LT XLPE CABLE	Mtr.		7333	7333
173.	1C - 2.5- CU ARMoured LT XLPE CABLE	Mtr.		7667	7667
174.	2C - 2.5- CU ARMoured LT XLPE CABLE	Mtr.		15333	15333
175.	3C - 2.5- CU ARMoured LT XLPE CABLE	Mtr.		68333	68333
	<u>LT PVC CONTROL CABLES</u>				
176.	1.1 kV LT PVC-2C-1.5-ARMoured LT PVC Cable	Mtr.		24333	24333
177.	1.1 kV LT PVC-7C-1.5-ARMoured LT PVC Cable	Mtr.		3333	3333
178.	1.1 kV LT PVC-12C-1.5-ARMoured LT PVC Cable	Mtr.		333	333
179.	1.1 kV LT PVC-5C-2.5-ARMoured LT PVC Cable	Mtr.		1000	1000
180.	1.1 kV LT PVC-19C-2.5-ARMoured LT PVC Cable	Mtr.		2000	2000
	EARTHING MATERIAL				
181.	65 x 10 mm GI earthing flat	MTR		2340	2340
182.	50 x 6 mm GI earthing flat	MTR		2820	2820
183.	25x3 mm GI earthing flat	MTR		2260	2260
184.	8SWG Galvanised steel wire	MTR		4660	4660
185.	Earthing Pit	No.		1	1
	CABLE TRAYS COMPLETE WITH COUPLER PLATES, FASTENERS, CLAMPS AND FIXING HARDWARES ETC ERECTION INCLUDING SUPPORT & COVERS FABRICATION				
186.	Ladder/ Perforated type Cable tray, W=50mm	Mtr		4975	9950
187.	Ladder/ Perforated type Cable tray, W=100mm	Mtr		6575	6575
188.	Ladder/ Perforated type Cable tray,	Mtr	1047*		1047

	W=150mm				
189.	Ladder/ Perforated type Cable tray, W=300mm	Mtr	13818*		13818
190.	Ladder/ Perforated type Cable tray, W=450mm	Mtr	357*		357
191.	Ladder/ Perforated type Cable tray, W=600mm	Mtr	13978*		13978
	CABLE TRAY ACCESSORIES				
	Ladder/ Perforated type Horizontal 90 deg bend, Vertical 90 deg bend, , Cross				
192.	300 mm wide	No.		150	150
193.	450 mm wide	No.		25	25
194.	600 mm wide	No.		795	795
	INSTALLATION & FABRICATION OF STRUCTURAL STEEL	Mtr			
195.	ANGLE ,ISMC,PLATES etc	MT		45	45
	IMPULSE PIPES/ TUBES ALONG WITH FITTINGS				
196.	Copper Tube-6mm/8mm/1/4"	Mtr		4520	4520
197.	1' CS PipeSCH 80	Mtr		1025	1025
198.	CS Pipe 21.3 x3.73	Mtr		400	400
199.	CS Pipe 60.3x3.91	Mtr		60	60
200.	1/2" CS Pipe SCH 80	Mtr		6000	6000
201.	1/2" CS Pipe XXS	Mtr		500	500
202.	1/2" CS Pipe SCH 160	Mtr		1600	1600
203.	3/4" CS Pipe SCH 80	Mtr.		3600	3600
204.	1' AS Pipe	Mtr		1000	1000
205.	1/2" AS Pipe SCH 160	Mtr		700	700
206.	1/2" AS Pipe SCH 80	Mtr		650	650
207.	1/2" AS Pipe XXS	Mtr		900	900
208.	1/2" SS PipeSCH 40	Mtr		1500	1500
209.	1/2" SS PipeSCH 80	Mtr		450	450
210.	1/2" SS PipeSCH 160	Mtr		300	300
211.	Cr-Al pipe 21.3x3.73	Mtr		330	330
212.	Seam less CS tube 13.5x2.6	Mtr		423	423
213.	Carbon steel tube 88.9x4	Mtr.		40	40
214.	Carbon steel tube 33.7x3.38	Mtr		2	2
215.	Seam less CS tube 21.3x2.3	Mtr		140	140
216.	Seam less AS tube 21.3x2.77	Mtr		710	710
217.	Seam less AS tube 13.5	Mtr		206	206
218.	SS Tube 12.7x2.1	Mtr		700	700
219.	SS Tube 6x1.5	Mtr		30	30

220.	GI pilica conduit with fittings(up to 1" size)	Mtr		1500	1500
221.	GI pilica conduit with fittings(above 1" size)	Mtr		1500	1500
222.	GI Rigid conduit up to 1"	Mtr		1500	1500
223.	GI pipe ½" NB	Mtr		3600	3600
224.	GI pipe 1" NB	Mtr		150	150
225.	Flexible conduiting /Rubber hoses/pipes	Mtr		1000	1000
	JUNCTION BOXES/INDICATION BOXES/LOCAL CONTROL STATIONS				
226.	JB 12 way	No.		37	37
227.	JB 24 way	No.		143	143
228.	JB 36 way	No.		33	33
229.	JB 48 way	No.		114	114
230.	JB 64 way	No.		5	5
231.	JB 72 way	No.		29	29
232.	JB 96 way	No.		2	2
233.	6 way miniature Junction box	No.		32	32
234.	Shear Pin failure Indication box	No.		4	4
235.	Local oil gun maintenance switch	No.		16	16
236.	Local start stop Push button	No.		11	11
237.	Erection & commissioning of C&I Lab specifications as per C I 2.8.P.	Set	1*		1
	COMMISSIONING/CALIBRATION/TESTING of control valves, on/off valves, /pneumatic valves, actuators, power cylinders etc.				
238.	Commissioning of Pneumatic actuators(Power cylinder) -On/Off type	No.		68	68
239.	Commissioning of Pneumatic actuators(Power cylinder) -Regulating type	No.		123	123
240.	SADC drives	No.		88	88
241.	Over fire air tilt drives	No.		4	4
242.	Pulversier Lube oil skid The scope of work includes removal of instruments calibration, refixing, checking cable connection from JB to instruments etc.approx..instrument per set RTD-04 no., Temp. Gauge-02 no. ,Pressure switch-03 no., Pressure gauge-02 no., level switch-02 no., Level gauge-01 no., Flow switch-02 no.	Set		7	7
243.	Lub oil skids for FD/ ID/ PA Fans The scope of work includes removal of instruments calibration, refixing, checking cable connection from JB to instruments etc. The approximate total quantity of instruments for all the 06 Nos skids put	Set		06	06

	together is given below: DP Gauges - 06 Nos., Pressure Gauges – 18 Nos , Temperature Gauges – 12 Nos, Diff. Pressure Transmitters- 06 Nos, Pressure Transmitters-12 Nos, Pressure Switches – 06 Nos, Level transmitters-06 Nos, Flow indicator with flow switch - 06 Nos				
244.	Gravimetric feeder mounted C&I Equipment like motion ,monitor sensor, micro switches, etc.	Set		7	7
245.	Commissioning of Electric actuators/dampers/valves Open/Close type	No.		55	55
246.	Commissioning of Control Valves	No.		51	51
247.	Commissioning of motorised actuators Open/close type	No.		56	56
248.	Commissioning of Pneumatic Valves/Safety relief valves/NRV	No.		50	50

***- Common for all three units**

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-in charge.

CHAPTER- XI A

RATE SCHEDULE(FOR PACKAGE 'A')

ITEM NUM	DESCRIPTION OF WORK	TOTAL VALUE 'A' IN INR (IN FIGURES AND WORDS)
1.0	TOTAL LUMSUM PRICE FOR PACKAGE 'A' "FOR ERECTION, TESTING, COMMISSIONING & HANDING OVER OF ALL C&I EQUIPMENTS OF UNIT NO. 1 and STATION C&I OF UNIT 1,2 AND 3 OF 660 MW LALITPUR STPP, DISTT: LALITPUR (U.P.)"	/

Notes:

- 1. The rates of individual item for the entire scope of work as define in BOQ Chapter X shall be arrived as per Calulation defined in Chapter XI'B'**
- 2. The derived item rate will remain firm through out the contract period.**

CHAPTER - XI 'B'

FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
1	suit of one panel	No.	18	43.581	
2	suit of two panels	No.	18	73.550	
3	suit of three panels	No.	66	97.626	
4	suit of Four panels	No.	7	245.021	
5	suit of five panels	No.	1	75.195	
6	DAVR panel	Set	1	168.567	
7	Grounding Brush Monitor	Set	1	12.340	
8	Generator Relay panel/STRP panel with Generator disturbance recorder panel	Set	1	149.018	
9	Generator Control Panel	No.	1	64.120	
10	Electrical Interface System Panel	No.	3	20.000	
11	Availability based Tariff System panel	No.	1	20.000	
12	Steam Leak Detection Panel	No.	1	71.170	
13	Gas Analyser cabinet	No.	2	19.621	
14	Acoustic Steam leak detection system panel(ASLD)	No.	1	20.000	
15	Vibration Monitoring System	Set	4	148.282	
16	Acoustic pyrometer remote cabinet including PC station	Set	1	31.236	
17	FTP LOCAL STARTER Box	No.	2	16.404	
18	Elevator control Panel	No.	1	17.341	

CHAPTER - XI 'B'

FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
19	SCANNER AIR FAN STARTER	No.	1	37.527	
20	FOPH PMCC (1000 A)	SET	1	307.347	
21	Sub emergency MCC (2500 A)	SET	1	377.198	
22	Boiler PMCC	SET	1	463.608	
23	Boiler Valve & Damper MCC	SET	1	405.657	
24	Boiler ACDB	SET	1	100.899	
25	Turbine PMCC	SET	1	373.785	
26	Turbine Valve and Damper MCC	SET	1	369.440	
27	Unit Service MCC	SET	1	380.305	
28	Condensate Polishing Unit MCC	SET	1	307.347	
29	Mill Reject System MCC	SET	1	307.347	
30	Data Concentrator Panel	SET	6	52.157	
31	HART Management System for SMART Transmitter Panel dimension	SET	1	61.759	
32	AH Main Control Panel	No.	1	23.745	
33	AH LCS Sector Plate 1&2 Drive Panel	No.	6	13.127	
34	HWL-1&2 and MEF Control valve Panel	No.	1	13.127	
35	SOOT BLOWER MCC	Set	1	315.363	
36	Furnace Flame Viewing System –Remote Panel	No.	1	40.753	

CHAPTER - XI 'B'

FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Qunantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
37	Furnace Flame Viewing System –Local Panel	No.	2	21.873	
38	GRAVIMETRIC FEEDER REMOTE PANEL	No.	8	45.818	
39	Gravimetric Feeder Integral Panel	No.	8	12.500	
40	NETWORK PANEL With accessories	No.	6	21.974	
41	Power Distribution Panel	No.	2	26.086	
42	Starter cabinet for Emergency Lube Oil Motor, DC seal oil Motor	No.	2	20.936	
43	Max engineer/max Storian/max operator/max link stations/station supervisor/shift in charge terminal/MIS PC/PCAL PC/LVS PC/TFT monitor along with installation of workstation with all connectivity	No.	45	7.144	
44	Printers(A4 & A3 Colour Laser Jet, Inkjet, Dot Matrix) With Printer Table	No.	10	2.770	
45	LARGE VIDEO SCREEN(80"/40")	No.	5	32.618	
46	Ethernet switches-16 ports	Set	1	5.189	
47	Control Desk	Set	2	103.556	
48	Computer Furniture(for all servers ,pc, printer) including simulator package	Set	3	50.502	

CHAPTER - XI 'B'

FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
49	Simulator Package for Power Plant including:1.Control logic station-02 nos.,2. 08 work station,Color Printer-02 nos.,ethernet switches-02 nos.,Monitors 24 nos.,with associated connectors and UTP/OFC cable.. LVS 02 nos.,Control desk- 01 nos.,digital projector-01 nos. and associated items to complete system.	Set	1	108.639	
50	UPS for Simulator Package (80 KVA)	Set	1	448.379	
	LIE/LIR/LGB				
51	Local Instrument racks (LIR) Type A 1650x2150x800	No.	28	12.539	
52	Local Instrument racks (LIR) Type B 1300x800x2150 mm	No.	32	13.418	
53	Local Instrument racks (LIR) Type C 800x850x1650 mm	No.	11	12.998	
54	Local Instrument enclosures (LIE) Type A 1450x2200x950	No.	14	17.995	
55	Local Instrument enclosures(LIE) Type B 1100x800x2300 mm	No.	12	17.531	
56	Local Instrument enclosures(LIE) Type C 700x600x2100 mm	No.	2	17.356	
57	Local Gauge Boards(LGB)	No.	8	12.673	
	PRESSURE INSTRUMENTS RACKS (IR1 to IR7)				
58	Rack of size 2150x700x2150 mm	No.	9	15.465	
59	Rack of size 1250x700x2150 mm	No.	9	15.780	

CHAPTER - XI 'B'

FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Qunantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
	24 V DC BATTERY & CHARGER SYSTEM				
60	24 V DC Battery for SG and TG	Set	1	151.038	
61	24 V DC Battery for Station C&I	Set	1	107.012	
62	24 V DC Battery Charger for SG ,TG alongwith DCDB	Set	1	168.704	
63	24 V DC Battery Charger for Station C&I alongwith DCDB	Set	1	122.103	
64	UPS system comprising of the following: UPS Panel, Voltage stabilizer cubicle, Input Iso. Transformer cubicle, Static invertors etc. including ACDB and bateeries	Set	1	412.580	
	INSTALLATION,CALIBRATION& COMMISSIOINGOFLOCAL/FIELD INSTRUMENTATION/EQUIPMENT				
65	Flow meters/Flow transmitters	No.	186	4.627	
66	Temperature gauges/Pressure gauges/ Diff. Pressure gauge	No.	1416	1.023	
67	Temp. Transmitter /Pressure Transmitters / Differential	No.	862	2.109	
68	Level Transmitter/Level gauge	No.	190	4.764	
69	Temp. switches/Pressure switches /DP switches	No.	283	1.501	
70	Level switch/Level switch(Conductivity type)/ Level switch(Float type) / Level Instruments	No.	59	2.873	

CHAPTER - XI 'B'

FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Qunantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
71	Pneumatic Pressure controller with accessories	Set	1	3.679	
72	Electronic/Guided Wave Radar /Ultrasonic type level Transmitters	No.	383	4.005	
73	Limit switches	No.	56	0.829	
74	Conductivity cell	No.	6	4.066	
75	ERV Controller	No.	4	4.053	
76	ASLD sensor assy	No.	24	4.392	
77	Sonic tube & sensor asy	No.	24	36.639	
78	Field amplifier Box	Set	24	4.011	
79	Rotor Stoppage Alarm Box-including sensors for Air pre heaters	No.	2	4.971	
80	Reverse Rotation Monitoring system	No.	3	6.981	
81	Flame scanner head assy. Along with fibre optic cable length 130 ",lens	No.	32	5.864	
82	Microprocessor based Flame scanner amplifier	No.	8	7.389	
83	Hand Held HART communicator	Set	1	4.962	
84	Conductivity/Dissolved oxygen/sodium/pH/silica/analyser	Set	86	12.893	
85	Gas Analyser(wt- 400 kg)	Set	2	11.030	
86	Moisture sensor	Set	1	5.026	
87	Cathode conductivity	Set	15	10.766	

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FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Qunantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
88	Flue gas analysers comprising of SOX/NOX/CO/Co2 analyzer, along with Sensor head, in situ probe,Pressure, temp. transmitter, Display, control & Air drier unit other accessories.	Set	1	124.236	
89	Steam and water analysis system, SWAS consisting of: Conductivity analyser-13 No.,pH analyser-10 No.,Dissolved oxygen analyser-5 No.,Silica analyser-1 No.,Sodium analyser-1 No.,Conductivity analyser with drawable type-2 no.,SWAS primay rack- 2 set,Wet panel-1 set,Dry panel- 1 set,Chiller-1 set,Swas Sample Handling System-01 set,	Set	1	335.870	
90	Oxygen Analyser –Low temperature along with Electronic Unit and other	Set	10	19.279	
91	Thermocouples(K/R type)	No.	444	2.988	
92	RTDs with thermo well	No.	755	1.292	
93	Cr- Al Thermocouple assy	No.	1379	1.400	
94	MTM Thermo Couple up to 32 M (duplex)	No.	359	4.083	
95	Thermo well	No.	40	1.104	
96	Thermometer(Bimettalic)/Gas filled/MIS	No.	27	1.141	
97	Co –AXL dial thermometer	No.	7	1.141	
98	Bearing Elerment	No.	16	2.667	

CHAPTER - XI 'B'

FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
99	Burner Tilt shear pin failure indication box	No.	4	4.131	
100	Heavy Duty Limit switch(Burner tilt)	No.	20	2.371	
101	Furnace temp. Probe	No.	2	6.869	
102	HEA exciter box assembly	Set	20	9.680	
103	Air Filter Regulators	No.	65	1.129	
104	I/P Converters	No.	62	1.216	
105	Vibration Transducers/Monitor/ Detectors/Element	No.	294	2.052	
106	Shaft Axial Detector	No.	2	3.275	
107	Proximitors	No.	6	1.446	
108	Rota meters	No.	2	0.445	
109	Solenoid Valves	No.	148	0.833	
110	Speed Regulators / Air lock valves in oil gun corner rack	No.	40	0.968	
111	Speed measuring loop	Set	6	3.080	
112	Coal bunker level Monitoring system consists of Ultrasonic level sensor-14	Set	1	102.868	
113	Coal Flow Monitor	No.	8	13.878	
114	Recorder 3/6/24 channel	No.	1	3.615	
115	Opacity Monitor	No.	1	99.863	
116	Electronic /Digital Indicators(Bar Graph Indicators, Temperature Indicatorsetc.)	No.	40	1.365	

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FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
117	Pressure/ Temperature Indicators (MovingCoil Type)	No.	5	1.365	
118	Speed switch / Speed detector	No.	4	1.219	
119	Pneumatic Temperature controller with accessories	No.	2	1.820	
120	GPS based Master & Slave clock system (Panel dimen. 900*600*2415 mmapprox))	Set	1	53.859	
	CONTROL/SIGNAL/SCREENED/POWER CABLES LAYING,DRESSING,CLAMPING				
	<u>LT Sheilded /Screened Cable//FRLS/Power cable</u>				
121	2P X 0.5 SQ MM	Mtr	112448	0.021	
122	2 Triad X 0.5 SQ MM	Mtr	5200	0.025	
123	4P X 0.5 SQ MM	Mtr	182300	0.030	
124	8P X 0.5 SQ MM	Mtr	177950	0.035	
125	12P X 0.5 SQ MM	Mtr	28167	0.037	
126	20P X 0.5 SQ MM	Mtr	8000	0.048	
127	2P X 1.5 SQ MM	Mtr	11600	0.021	
128	4P X 1.5 SQ MM	Mtr	5000	0.025	
129	2C X 2.5 SQ MM	Mtr	30600	0.021	
130	3C X 2.5 SQ MM	Mtr	85200	0.021	
131	7C X 2.5 SQ MM	Mtr	23200	0.023	

CHAPTER - XI 'B'

FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
132	10C X 2.5 SQ MM	Mtr	26000	0.023	
133	16C X 2.5 SQ MM	Mtr	500	0.035	
134	19C X 2.5 SQ MM	Mtr	11600	0.037	
135	3C X 6 SQ MM	Mtr	2200	0.025	
136	2Px16 AWG T/C ext. cable	Mtr	14435	0.030	
137	4Px16 AWG T/C extension cable	Mtr	2000	0.030	
138	6Px16 AWG T/C extension cable	Mtr	50000	0.030	
139	Flame scanner cables	Mtr	8500	0.027	
140	UTP E-CAT cable	Mtr	5000	0.037	
141	Fibre optic cable	Mtr	3500	0.097	
142	Compensating cable	Mtr	5800	0.027	
143	Extension Cable	Mtr	960	0.030	
	<u>LT XLPE Power Cables</u>				
144	1C - 10- AL ARMoured LT XLPE CABLE	Mtr	4667	0.018	
145	1C - 25- AL ARMoured LT XLPE CABLE	Mtr	1000	0.028	
146	1C - 50- AL ARMoured LT XLPE CABLE	Mtr	500	0.004	
147	1C - 95- AL ARMoured LT XLPE CABLE	Mtr	3333	0.115	
148	1C - 185- AL ARMoured LT XLPE CABLE	Mtr	1667	0.044	

CHAPTER - XI 'B'

FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
149	1C - 400- AL ARMoured LT XLPE CABLE	Mtr	3000	0.055	
150	1C - 630- AL ARMoured LT XLPE CABLE	Mtr	1333	0.165	
151	2C - 10- AL ARMoured LT XLPE CABLE	Mtr	833	0.027	
152	2C - 25- AL ARMoured LT XLPE CABLE	Mtr	4500	0.032	
153	3C - 10- AL ARMoured LT XLPE CABLE	Mtr	8500	0.034	
154	3C - 25- AL ARMoured LT XLPE CABLE	Mtr	27333	0.037	
155	3C - 50- AL ARMoured LT XLPE CABLE	Mtr	7833	0.041	
156	3C - 95- AL ARMoured LT XLPE CABLE	Mtr	4167	0.048	
157	3C - 150- AL ARMoured LT XLPE CABLE	Mtr	333	0.067	
158	3C - 240- AL ARMoured LT XLPE CABLE	Mtr	4667	0.082	
159	3.5C - 25- AL ARMoured LT XLPE CABLE	Mtr	9000	0.067	
160	3.5C - 50- AL ARMoured LT XLPE CABLE	Mtr	3667	0.041	
161	3.5C - 95- AL ARMoured LT XLPE CABLE	Mtr	5167	0.048	
162	3.5C - 300- AL ARMoured LT XLPE CABLE	Mtr	1167	0.082	
163	4C - 10- AL ARMoured LT XLPE CABLE	Mtr	7333	0.032	
164	1C - 2.5- CU ARMoured LT XLPE CABLE	Mtr	7667	0.018	
165	2C - 2.5- CU ARMoured LT XLPE CABLE	Mtr	15333	0.021	
166	3C - 2.5- CU ARMoured LT XLPE CABLE	Mtr	68333	0.021	

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FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
	<u>LT PVC CONTROL CABLES</u>				
167	1.1 kV LT PVC-2C-1.5-ARMOURED LT PVC Cable	Mtr	24333	0.023	
168	1.1 kV LT PVC-7C-1.5-ARMOURED LT PVC Cable	Mtr	3333	0.034	
169	1.1 kV LT PVC-12C-1.5-ARMOURED LT PVC Cable	Mtr	333	0.028	
170	1.1 kV LT PVC-5C-2.5-ARMOURED LT PVC Cable	Mtr	1000	0.021	
171	1.1 kV LT PVC-19C-2.5-ARMOURED LT PVC Cable	Mtr	2000	0.062	
	<u>EARTHING MATERIAL</u>				
172	65 x 10 mm GI earthing flat	Mtr	2340	0.133	
173	50 x 6 mm GI earthing flat	Mtr	2820	0.122	
174	25x3 mm GI earthing flat	Mtr	2260	0.094	
175	8SWG Galvanised steel wire	Mtr	4660	0.023	
176	Electronic Earthing Pit	No.	1	39.601	
	<u>CABLE TRAYS COMPLETE WITH COUPLER PLATES, FASTENERS, CLAMPS AND FIXING HARDWARES ETC ERECTION INCLUDING SUPPORT & COVERS</u>				
177	Ladder/ Perforated type Cable tray, W=50mm	Mtr	9950	0.163	

CHAPTER - XI 'B'

FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
178	Ladder/ Perforated type Cable tray, W=100mm	Mtr	6575	0.183	
179	Ladder/ Perforated type Cable tray, W=150mm	Mtr	1047	0.218	
180	Ladder/ Perforated type Cable tray, W=300mm	Mtr	13818	0.365	
181	Ladder/ Perforated type Cable tray, W=450mm	Mtr	357	0.165	
182	Ladder/ Perforated type Cable tray, W=600mm	Mtr	13978	0.349	
	CABLE TRAY ACCESSORIES				
	Ladder/ Perforated type Horizontal 90 deg bend, Vertical 90 deg bend, Cross AND REDUCERS				
183	300 mm wide	No.	150	1.001	
184	450 mm wide	No.	25	1.590	
185	600 mm wide		795	1.083	
	INSTALLATION & FABRICATION OF STRUCTURAL STEEL				
186	ANGLE ,ISMC,PLATES etc	MT	45	42.545	
	IMPULSE PIPES/ TUBES ALONG WITH FITTINGS				
187	Copper Tube-6mm/8mm/1/4"	Mtr	4520	0.158	
188	1' CS PipeSCH 80	Mtr	1025	0.399	
189	CS Pipe 21.3 x3.73	Mtr	400	0.429	
190	CS Pipe 60.3x3.91	Mtr	60	0.512	
191	1/2" CS Pipe SCH 80	Mtr	6000	0.351	

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FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
192	1/2" CS Pipe XXS	Mtr	500	0.365	
193	1/2" CS Pipe SCH 160	Mtr	1600	0.317	
194	3/4" CS Pipe SCH 80	Mtr	3600	0.390	
195	1' AS Pipe	Mtr	1000	0.340	
196	1/2" AS Pipe SCH 160	Mtr	700	0.333	
197	1/2" AS Pipe SCH 80	Mtr	650	0.406	
198	1/2" AS Pipe XXS	Mtr	900	0.358	
199	1/2" SS PipeSCH 40	Mtr	1500	0.298	
200	1/2" SS PipeSCH 80	Mtr	450	0.337	
201	1/2" SS PipeSCH 160	Mtr	300	0.276	
202	Cr-Al pipe 21.3x3.73	Mtr	330	0.372	
203	Seam less CS tube 13.5x2.6	Mtr	423	0.250	
204	Carbon steel tube 88.9x4	Mtr	40	0.324	
205	Carbon steel tube 33.7x3.38	Mtr	2	0.358	
206	Seam less CS tube 21.3x2.3	Mtr	140	0.284	
207	Seam less AS tube 21.3x2.77	Mtr	710	0.257	
208	Seam less AS tube 13.5	Mtr	206	0.583	
209	SS Tube 12.7x2.1	Mtr	700	0.261	

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FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
210	SS Tube 6x1.5	Mtr	30	0.223	
211	GI pilica conduit with fittings(up to 1" size)	Mtr	1500	0.261	
212	GI pilica conduit with fittings(above 1" size)	Mtr	1500	0.234	
213	GI Rigid conduit up to 1"	Mtr	1500	0.183	
214	GI pipe ½" NB	Mtr	3600	0.136	
215	GI pipe 1" NB	Mtr	150	0.145	
216	Flexible conduiting /Rubber hoses/pipes	Mtr	1000	0.259	
JUNCTION BOXES/INDICATION BOXES/LOCAL CONTROL STATIONS					
217	JB 12 way	No.	37	1.391	
218	JB 24 way	No.	143	1.423	
219	JB 36 way	No.	33	1.558	
220	JB 48 way	No.	114	1.806	
221	JB 64 way	No.	5	1.870	
222	JB 72 way	No.	29	1.912	
223	JB 96 way	No.	2	1.976	
224	6 way miniature Junction box	No.	32	1.232	
225	Shear Pin failure Indication box	No.	4	2.219	
226	Local oil gun maintenance switch	No.	16	1.462	

CHAPTER - XI 'B'

FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
227	Local start stop Push button	No.	11	1.629	
228	Erection & commissioning of C&I Lab specifications as as per C I 2.8.P.	Set	1	116.765	
	COMMISSIONING/CALIBRATION/TESTING of control valves, on/off valves, /pneumatic valves, actuators, power cylinders etc.				
229	Commissioning of Pneumatic actuators(Power cylinder) -On/Off type	No.	68	3.208	
230	Commissioning of Pneumatic actuators(Power cylinder) -Regulating type	No.	123	3.208	
231	SADC drives	No.	88	11.840	
232	Over fire air tilt drives	No.	4	3.904	
233	Pulversier Lube oil skid The scope of work includes removal of instruments calibration, refixing, checking cable connection from JB to instruments etc.approx..instrument per set RTD-04 no., Temp. Gauge-02 no. ,Pressure switch-03 no., Pressure gauge-02 no., level switch-02 no., Level gauge-01 no., Flow switch-02 no.	Set	7	12.968	

CHAPTER - XI 'B'

FOR PACKAGE- 'A' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XI-A

	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/unit (I)
					Item Rate(I)= (Item factor (F) *Lumsum Price (A))/ 100000
234	Lub oil skids for FD/ ID/ PA Fans The scope of work includes removal of instruments calibration, refixing, checking cable connection from JB to instruments etc. The approximate total quantity of instruments for all the 06 Nos skids put together is given below: DP Gauges - 06 Nos., Pressure Gauges – 18 Nos , Temperature Gauges – 12 Nos, Diff. Pressure Transmitters- 06 Nos, Pressure Transmitters-12 Nos, Pressure Switches – 06 Nos, Level transmitters- 06 Nos, Flow indicator with flow switch - 06 Nos	Set	6	36.126	
235	Gravimetric feeder mounted C&I Equipment like motion ,monitor sensor, micro switches, etc.	Set	7	7.160	
236	Commissioning of Electric actuators/dampers/valves Open/Close type	No.	55	4.062	
237	Commissioning of Control Valves	No.	51	2.926	
238	Commissioning of motorised actuators Open/close type	No.	56	5.085	
239	Commissioning of Pneumatic Valves/Safety relief valves/NRV	No.	50	2.502	

Chapter - XII: BILL OF QUANTITY (BOQ) FOR Package 'B'**BOQ FOR ERECTION, TESTING, COMMISSIONING OF ALL CONTROL & INSTRUMENTATION of UNIT#2 and 3 AT 3x660 MW LALITPUR STPP.**

	ITEM DESCRIPTION	UNIT	Qty/ unit	Total Qty.
	PANELS/RACKS/CONSOLES			
	SG & TG CONTROL PANEL			
01	suit of one panel (approx. weight 400kg, 900(L) X 900(B) X 2500(H) mm	No.	05	10
01.	TG Siemens Panel (suit of one panel) (approx. weight 300kg, 1200(L) X 800(B) X 2200(H) mm	No.	07	14
02.	suit of two panels (approx. weight 800kg, 1800(L) X 1000(B) X 2500(H) mm	No.	07	14
03.	suit of three panels (approx. weight 1200kg, 2700(L) X 1000(B) X 2500(H) mm	No.	03	06
04.	suit of Four panels (approx. weight 1600kg, 3600(L) X 1000(B) X 2500(H) mm	No.	04	08
05.	suit of five panels (approx. weight 2000kg, 4500(L) X 1000(B) X 2500(H) mm	No.	01	02
	STATION C&I CONTROL PANEL			
06.	DAVR panel (approx. 4028x800x2415 mm)	SET	01	02
07.	Grounding Brush Monitor(100 Kg)	SET	01	02
08.	Generator Relay panel/STRP panel with Generator disturbance recorder panel	SET	01	02
09.	Generator Control Panel 750x800x2415 mm	No.	01	02
10.	Electrical Interface System Panel 750x800x2415 mm	No.	01	02
11.	Availability based Tariff System panel	No.	01	02
12.	Steam Leak Detection Panel	No.	01	02
13.	Gas Analyser cabinet 1200x800x2110 mm	No.	02	04

14.	Acoustic Steam leak detection system panel(ASLD) 800x800x2415 Mm	No.	01	02
15.	Vibration Monitoring System 800X800X2415 mm	Set	04	08
16.	Acoustic pyrometer remote cabinet including PC station (approx. 1400 x 2365 x800 mm)	Set	01	02
17.	FTP LOCAL STARTER Box 650x1000x300 mm	No.	02	04
18.	Elevator control Panel	No.	01	02
19.	SCANNER AIR FAN STARTER 900x1120x375 mm	No.	01	02
20.	Sub emergency MCC (2500 A) (944 D X 1754 H X26300W)	Set	01	02
21.	Boiler PMCC)(944 D X 1754 H X 20100W)	Set	01	02
22.	Boiler Valve & Damper MCC)(944 D X 1754 H X 11200W)	Set	01	02
23.	Boiler ACDB)(944 D X 1754 H X 9600W)	Set	01	02
24.	Turbine PMCC)(944 DX 1754 H X 25200W)	Set	01	02
25.	Turbine Valve and Damper MCC) (944 D X 1754 H X13600W)	Set	01	02
26.	Unit Service MCC)(944 D X 1754 H X 9600W)	Set	01	02
27.	Data Concentrator Panel(800 L X 800H X 2324W) along with PC and communicator system.	No.	06	12
28.	HART Management System for SMART Transmitter Panel dimension 1200X800X2415 mm	Set	01	02
29.	AH Main Control Panel 1830x2186x611 mm	No.	01	02
30.	AH LCS Sector Plate 1&2 Drive Panel 645x673x203 mm	No.	06	12
31.	HWL-1&2 and MEF Control valve Panel 600x600x210 mm	No.	01	02
32.	SOOT BLOWER MCC (23250 L X2250 H X1000 W)	Set.	01	02
33.	Furnace Flame Viewing System –Remote Panel 700x700x2100 mm	No	01	02
34.	Furnace Flame Viewing System –Local Panel 1220x1470x610 mm	No	02	04
35.	GRAVIMETRIC FEEDER REMOTE PANEL 1200 x 2315X600 mm	No.	08	16
36.	Gravimetric Feeder Integral Panel 600x750x350 mm	NO.	08	16

37.	NETWORK PANEL With accessories 800x800x2415 mm	No.	05	10
38.	Power Distribution Panel 2800x800x2415 mm	No.	01	02
39.	Starter cabinet for Emergency Lube Oil Motor, DC seal oil Motor 1000X800X2200 mm	No.	02	04
40.	Max engineer/max Storian/max operator/max link stations/station supervisor/shift in charge terminal/MIS PC/PCAL PC/LVS PC/TFT monitor along with installation of workstation with all connectivity	Nos.	35	70
41.	Printers(A4 & A3 Colour Laser Jet, Inkjet, Dot Matrix) With Printer Table and accessories	No.	07	14
42.	LARGE VIDEO SCREEN(80"/40")	No.	04	08
43.	Ethernet switches-16 ports	Set	01	02
44.	Control Desk	Set	01	02
45.	Computer Furniture(for all servers ,pc, printer)	Set	02	04
	LIE/LIR/LGB			
46.	Local Instrument racks (LIR) Type A 1650x2150x800	No.	28	56
47.	Local Instrument racks (LIR) Type B 1300x800x2150 mm	No.	32	64
48.	Local Instrument racks (LIR) Type C 800x850x1650 mm	No.	11	22
49.	Local Instrument enclosures (LIE) Type A 1450x2200x950	No.	14	28
50.	Local Instrument enclosures(LIE) Type B 1100x800x2300 mm	No.	12	24
51.	Local Instrument enclosures(LIE) Type C 700x600x2100 mm	No.	2	04
52.	Local Gauge Boards(LGB) Approx. Size 1400x550x1900 mm	No.	08	16
	Assembly/welding and installation of Instrument Racks with loose supplied prefabricated materials of suitable size, like equal/unequal angles, canopy mounting plates, LHS/RHS stands etc., necessary welding, fixing with fasteners and grouting			
53	Rack of size 2150x700x2150 mm	No.	09	18

54	Rack of size 1250x700x2150 mm	No.	09	18
	24 V DC BATTERY & CHARGER SYSTEM			
55	24 V DC Battery for SG and TG	Set	01	02
56	24 V DC Battery Charger for SG ,TG along with DCDB	Set	01	02
57	UPS system comprising of the following: UPS Panel, Voltage stabilizer cubicle, Input Iso. Transformer cubicle, Static invertors etc UPS Panel:1640x900x200	Set	01	02
58	ACDB Approximate Size and weight: 900x800x2100 mm; 600 kg	Set	01	02
59	UPS batteries-Ni-Cd battery	Set	01	02
	INSTALLATION,CALIBRATION& COMMISSIOINGOFLOCAL/FIELD INSTRUMENTATION/EQUIPMENT			
60	Flow meters/Flow transmitters	No.	186	372
61	Temperature gauges/Pressure gauges/ Diff. Pressure gauge	No.	435	870
62	Temp. Transmitter /Pressure Transmitters / Differential pressure/Position transmitters	No.	235	470
63	Level Transmitter/Level gauge	No.	37	74
64	Temp. switches/Pressure switches /DP switches	No.	247	494
66	Level switch/Level switch(Conductivity type)/ Level switch(Float type) / Level Instruments	No.	41	82
67	Pneumatic Pressure controller with accessories	Set	1	2
68	Electronic/Guided Wave Radar /Ultrasonic type level Transmitters	No.	383	766
69	Limit switches	No.	56	112
71	Conductivity cell	No.	6	12
72	ERV Controller	No.	04	08
73	ASLD sensor assy	No.	24	48
74.	Sonic tube & sensor asy	No.	24	48
75.	Field amplifier Box	Set	24	48
76.	Rotor Stoppage Alarm Box-including sensors for Air pre heaters	No.	2	4
77.	Reverse Rotation Monitoring system	No.	3	6
78.	Flame scanner head assy. Along with fibre optic cable length 130 “,lens barrel assembly with miniature JB’s	No.	32	64
79.	Microprocessor based Flame scanner	No.	8	16

	amplifier			
80.	Hand Held HART communicator	Set	01	02
81.	Gas Analyser(wt- 400 kg)	Set	02	04
82.	Moisture sensor	Set	01	02
83.	Flue gas analysers comprising of SOX/NOX/CO/Co2 analyzer, along with Sensor head, in situ probe, Pressure, temp. Transmitter, Display, control & Air drier unit other accessories.	Set	01	02
84.	Steam and water analysis system, SWAS consisting of: Conductivity analyser-13 No. pH analyser-10 No. Dissolved oxygen analyser-5 No. Silica analyser-1 No. Sodium analyser-1 No. Conductivity analyser with drawable type-2 no. SWAS primay rack- 2 set Wet panel-1 set Dry panel- 1 set Chiller-1 set Swas Sample Handling System-01 set	Set	01	02
85.	Oxygen Analyser –Low temperature along with Electronic Unit and other accessories.	Set	10	20
86.	Thermocouples(K/R type)	No.	444	888
87.	RTDs with thermo well	No.	380	760
88.	Cr- Al Thermocouple assy	No.	773	1546
89.	MTM Thermo Couple up to 32 M (duplex)	No.	359	718
90.	Thermo well	No.	40	80
91.	Thermometer (Bimettalic)/Gas filled/MIS	No.	27	54
92.	Co –AXL dial thermometer	No.	7	14
93.	Bearing Element	No.	16	32
94.	Burner Tilt shear pin failure indication box	No.	4	8
95.	Heavy Duty Limit switch(Burner tilt)		20	40
96.	Furnace temp. Probe	No.	2	4
97.	HEA exciter box assembly	Set	20	40
98.	Air Filter Regulators	No.	65	130
99.	I/P Converters	No.	26	52
100.	Vibration Transducers/Monitor/ Detectors/Element	No.	108	216
101.	Shaft Axial Detector	No.	2	4
102.	Proximitors	No.	6	12
103.	Rota meters	No.	2	4
104.	Solenoid Valves	No.	148	296
105.	Speed Regulators / Air lock valves in oil gun	No.	40	80

	corner rack			
106.	Speed measuring loop	Set	6	12
107.	Coal bunker level Monitoring system consists of Ultrasonic level sensor-14 no. and transmitter-14 no., Extension cable 320 mtr, Junction box-8 no. and Local panel -02 nos	Set	01	02
108.	Coal Flow Monitor	No.	08	16
109.	Recorder 3/6/24 channel	No.	01	02
110.	Opacity Monitor	No.	01	02
111.	Electronic /Digital Indicators(Bar Graph Indicators, Temperature Indicatorsetc.)	No.	20	40
112.	Pressure/ Temperature Indicators (MovingCoil Type)	No.	5	10
113.	Speed switch / Speed detector	No.	4	8
114.	Pneumatic Temperature controller with accessories	No	02	04
	CONTROL/SIGNAL/SCREENED/POWER CABLES LAYING,DRESSING,CLAMPING & TERMINATION			
	<u>LT Sheilded /Screened Cable//FRLS/Power cable</u>			
115.	2P X 0.5 SQ MM	Mtr	65115	130230
116.	2 Triad X 0.5 SQ MM	Mtr	5200	10400
117.	4P X 0.5 SQ MM	Mtr	121300	242600
118.	8P X 0.5 SQ MM	Mtr	79950	159900
119.	12P X 0.5 SQ MM	Mtr	17500	35000
120.	2P X 1.5 SQ MM	Mtr	11600	23200
121.	4P X 1.5 SQ MM	Mtr	5000	10000
122.	2C X 2.5 SQ MM	Mtr	30600	61200

123.	3C X 2.5 SQ MM	Mtr	85200	170400
124.	7C X 2.5 SQ MM	Mtr	23200	46400
125.	10C X 2.5 SQ MM	Mtr	26000	52000
126.	16C X 2.5 SQ MM	Mtr	500	1000
127.	19C X 2.5 SQ MM	Mtr	11600	23200
128.	3C X 6 SQ MM	Mtr	2200	4400
129.	2Px16 AWG T/C ext. cable	Mtr	14435	28870
130.	4Px16 AWG T/C extention cable	Mtr	2000	4000
131.	6Px16 AWG T/C extension cable	Mtr	50000	100000
132.	Flame scanner cables	Mtr	8500	17000
133.	UTP E-CAT cable	Mtr	5000	10000
134.	Fibre optic cable	Mtr	3500	7000
135.	Compensating cable	Mtr	5800	11600
136.	Extension Cable	Mtr	960	11600
	<u>LT XLPE Power Cables</u>			

137.	1C - 10- AL ARMoured LT XLPE CABLE	Mtr.	4667	9334
138.	1C - 25- AL ARMoured LT XLPE CABLE	Mtr.	1000	2000
139.	1C - 50- AL ARMoured LT XLPE CABLE	Mtr.	500	1000
140.	1C - 95- AL ARMoured LT XLPE CABLE	Mtr.	3333	6666
141.	1C - 185- AL ARMoured LT XLPE CABLE	Mtr.	1667	3334
142.	1C - 400- AL ARMoured LT XLPE CABLE	Mtr.	3000	6000
143.	1C - 630- AL ARMoured LT XLPE CABLE	Mtr.	1333	2666
144.	2C - 10- AL ARMoured LT XLPE CABLE	Mtr.	833	1666
145.	2C - 25- AL ARMoured LT XLPE CABLE	Mtr.	4500	9000
146.	3C - 10- AL ARMoured LT XLPE CABLE	Mtr.	8500	17000
147.	3C - 25- AL ARMoured LT XLPE CABLE	Mtr.	27333	54666
148.	3C - 50- AL ARMoured LT XLPE CABLE	Mtr.	7833	15633
149.	3C - 95- AL ARMoured LT XLPE CABLE	Mtr.	4167	8334
150.	3C - 150- AL ARMoured LT XLPE CABLE	Mtr.	333	666
151.	3C - 240- AL ARMoured LT XLPE CABLE	Mtr.	4667	9334

152.	3.5C - 25- AL ARMOURED LT XLPE CABLE	Mtr.	9000	18000
153.	3.5C - 50- AL ARMOURED LT XLPE CABLE	Mtr.	3667	7334
154.	3.5C - 95- AL ARMOURED LT XLPE CABLE	Mtr.	5167	10334
155.	3.5C - 300- AL ARMOURED LT XLPE CABLE	Mtr.	1167	2334
156.	4C - 10- AL ARMOURED LT XLPE CABLE	Mtr.	7333	14666
157.	1C - 2.5- CU ARMOURED LT XLPE CABLE	Mtr.	7667	15334
158.	2C - 2.5- CU ARMOURED LT XLPE CABLE	Mtr.	15333	30666
159.	3C - 2.5- CU ARMOURED LT XLPE CABLE	Mtr.	68333	136666
160.	4C - 2.5- CU ARMOURED LT XLPE CABLE	Mtr.	1167	2334
	<u>LT PVC CONTROL CABLES</u>			
161.	1.1 kV LT PVC-2C-1.5-ARMOURED LT PVC Cable	Mtr.	24333	48666
162.	1.1 kV LT PVC-7C-1.5-ARMOURED LT PVC Cable	Mtr.	3333	6666
163.	1.1 kV LT PVC-12C-1.5-ARMOURED LT PVC Cable	Mtr.	333	666
164.	1.1 kV LT PVC-5C-2.5-ARMOURED LT PVC Cable	Mtr.	1000	2000
165.	1.1 kV LT PVC-19C-2.5-ARMOURED LT PVC Cable	Mtr.	2000	4000
	EARTHING MATERIAL			
166.	65 x 10 mm GI earthing flat	MTR	2340	4680
167.	50 x 6 mm GI earthing flat	MTR	2820	5640
168.	25x3 mm GI earthing flat	MTR	2260	4520

169.	8SWG Galvanised steel wire	MTR	4660	9320
170.	Earthing Pit	No.	1	2
	CABLE TRAYS COMPLETE WITH COUPLER PLATES, FASTENERS, CLAMPS AND FIXING HARDWARES ETC ERECTION INCLUDING SUPPORT & COVERS FABRICATION			
171.	Ladder/ Perforated type Cable tray, W=50mm	Mtr	4975	9950
172.	Ladder/ Perforated type Cable tray, W=100mm	Mtr	6575	13150
	CABLE TRAY ACCESSORIES			
	Ladder/ Perforated type Horizontal 90 deg bend, Vertical 90 deg bend, , Cross			
173.	300 mm wide	No.	150	300
174.	450 mm wide	No.	25	50
175.	600 mm wide	No.	795	1590
	INSTALLATION & FABRICATION OF STRUCTURAL STEEL			
176.	ANGLE , ISMC, PLATES etc	MT	45	90
	IMPULSE PIPES/ TUBES ALONG WITH FITTINGS			
177.	Copper Tube-6mm/8mm/1/4"	Mtr	4520	9040
178.	1' CS Pipe SCH 80	Mtr	1025	2050
179.	CS Pipe 21.3 x3.73	Mtr	400	800
180.	CS Pipe 60.3x3.91	Mtr	60	120
181.	1/2" CS Pipe SCH 80	Mtr	6000	12000
182.	1/2" CS Pipe XXS	Mtr	500	1000
183.	1/2" CS Pipe SCH 160	Mtr	1600	3200
184.	3/4" CS Pipe SCH 80	Mtr.	3600	7200
185.	1' AS Pipe	Mtr	1000	2000
186.	1/2" AS Pipe SCH 160	Mtr	700	1400
187.	1/2" AS Pipe SCH 80	Mtr	650	1300
188.	1/2" AS Pipe XXS	Mtr	900	1800
189.	1/2" SS Pipe SCH 40	Mtr	1500	3000
190.	1/2" SS Pipe SCH 80	Mtr	450	900
191.	1/2" SS Pipe SCH 160	Mtr	300	600
192.	Cr-Al pipe 21.3x3.73	Mtr	330	660
193.	Seam less CS tube 13.5x2.6	Mtr	423	846
194.	Carbon steel tube 88.9x4	Mtr.	40	80
195.	Carbon steel tube 33.7x3.38	Mtr	2	4
196.	Seam less CS tube 21.3x2.3	Mtr	140	280

197.	Seam less AS tube 21.3x2.77	Mtr	710	1420
198.	Seam less AS tube 13.5	Mtr	206	412
199.	SS Tube 12.7x2.1	Mtr	700	1400
200.	SS Tube 6x1.5	Mtr	30	60
201.	GI pilica conduit with fittings(up to 1" size)	Mtr	1500	3000
202.	GI pilica conduit with fittings(above 1" size)	Mtr	1500	3000
203.	GI Rigid conduit up to 1"	Mtr	1500	3000
204.	GI pipe ½" NB	Mtr	3600	7200
205.	GI pipe 1" NB	Mtr	150	300
206.	Flexible conduiting /Rubber hoses/pipes	Mtr	1000	2000
	JUNCTION BOXES/INDICATION BOXES/LOCAL CONTROL STATIONS			
207.	JB 12 way	No.	37	74
208.	JB 24 way	No.	143	286
209.	JB 36 way	No.	33	66
210.	JB 48 way	No.	114	228
211.	JB 64 way	No.	5	10
212.	JB 72 way	No.	29	58
213.	JB 96 way	No.	2	4
214.	6 way miniature Junction box	No.	32	64
215.	Shear Pin failure Indication box	No.	4	8
216.	Local oil gun maintenance switch	No.	16	32
217.	Local start stop Push button	No.	11	22
	COMMISSIONING/CALIBRATION/TESTING of control valves, on/off valves, /pneumatic valves, actuators, power cylinders etc.			
218.	Commissioning of Pneumatic actuators(Power cylinder) -On/Off type	No.	68	136
219.	Commissioning of Pneumatic actuators(Power cylinder) -Regulating type	No.	123	246
220.	SADC drives	No.	88	176
221.	Over fire air tilt drives	No.	4	8
222.	Pulversier Lube oil skid The scope of work includes removal of instruments calibration, refixing, checking cable connection from JB to instruments etc.approx..instrument per set RTD-04 no., Temp. Gauge-02 no. ,Pressure switch-03 no., Pressure gauge-02 no., level switch-02 no., Level gauge-01 no., Flow switch-02 no.	Set	7	14
223.	Lub oil skids for FD/ ID/ PA Fans The scope of work includes removal of instruments calibration, refixing, checking cable connection from JB to instruments etc.	Set	06	12

	The approximate total quantity of instruments for all the 06 Nos skids put together is given below: DP Gauges - 06 Nos., Pressure Gauges – 18 Nos , Temperature Gauges – 12 Nos, Diff. Pressure Transmitters- 06 Nos, Pressure Transmitters-12 Nos, Pressure Switches – 06 Nos, Level transmitters-06 Nos, Flow indicator with flow switch - 06 Nos			
224.	Gravimetric feeder mounted C&I Equipment like motion ,monitor sensor, micro switches, etc.	Set	7	14
225.	Commissioning of Electric actuators/dampers/valves Open/Close type	No.	55	110
226.	Commissioning of Control Valves	No.	51	102
227.	Commissioning of motorised actuators Open/close type	No.	56	112
228.	Commissioning of Pneumatic Valves/Safety relief valves/NRV	No.	50	100

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-in charge.

CHAPTER- XIII A

RATE SCHEDULE (FOR PACKAGE 'B')

ITEM NUM	DESCRIPTION OF WORK	TOTAL VALUE 'B' IN INR (IN FIGURES AND WORDS)
1.0	TOTAL LUMSUM PRICE FOR PACKAGE 'B' "FOR ERECTION, TESTING, COMMISSIONING & HANDING OVER OF ALL C&I EQUIPMENTS OF UNIT NO. 2 and 3 at 660 MW LALITPUR STPP, DISTT: LALITPUR (U.P.)"	

Notes:

1. The rates of individual item for the entire scope of work as define in BOQ Chapter XIII shall be arrived as per Calulation defined in Chapter XIII'B'
2. The derived item rate will remain firm through out the contract period.

Chapter XIII 'B'

FOR PACKAGE 'B' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XIII-A

SI No.	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/Unit(I)
					Item Rate/Unit(I)= (Item Factor(F)*Lumsum Price (B))/100000
1	suit of one panel	No.	24	33.780	
2	suit of two panels	No.	14	57.009	
3	suit of three panels	No.	6	75.670	
4	suit of Four panels	No.	8	189.916	
5	suit of five panels	No.	2	58.284	
6	DAVR panel	Set	2	130.657	
7	Grounding Brush Monitor	Set	2	9.565	
8	Generator Relay panel/STRP panel with Generator disturbance recorder panel	Set	2	115.504	
9	Generator Control Panel	No.	2	49.700	
10	Electrical Interface System Panel	No.	2	15.502	
11	Availability based Tariff System panel	No.	2	15.502	
12	Steam Leak Detection Panel	No.	2	55.164	
13	Gas Analyser cabinet	No.	4	15.208	
14	Acoustic Steam leak detection system panel(ASLD)	No.	2	15.502	
15	Vibration Monitoring System	Set	8	114.934	
16	Acoustic pyrometer remote cabinet including PC station	Set	2	24.211	
17	FTP LOCAL STARTER Box	No.	4	12.715	
18	Elevator control Panel	No.	2	13.441	
19	SCANNER AIR FAN STARTER	No.	2	29.088	
20	Sub emergency MCC (2500 A)	SET	2	292.368	

Chapter XIII 'B'

FOR PACKAGE 'B' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XIII-A

SI No.	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/Unit(I)
					Item Rate/Unit(I)= (Item Factor(F)*Lumsum Price (B))/100000
21	Boiler PMCC	SET	2	359.344	
22	Boiler Valve & Damper MCC	SET	2	314.426	
23	Boiler ACDB	SET	2	78.208	
24	Turbine PMCC	SET	2	289.722	
25	Turbine Valve and Damper MCC	SET	2	286.354	
26	Unit Service MCC	SET	2	294.776	
27	Data Concentrator Panel	SET	12	40.427	
28	HART Management System for SMART Transmitter Panel dimension	SET	2	47.870	
29	AH Main Control Panel	No.	2	18.405	
30	AH LCS Sector Plate 1&2 Drive Panel	No.	12	10.175	
31	HWL-1&2 and MEF Control valve Panel	No.	2	10.175	
32	SOOT BLOWER MCC	Set	2	244.439	
33	Furnace Flame Viewing System –Remote Panel	No.	2	31.588	
34	Furnace Flame Viewing System –Local Panel	No.	4	16.954	
35	GRAVIMETRIC FEEDER REMOTE PANEL	No.	16	35.514	
36	Gravimetric Feeder Integral Panel	No.	16	9.689	
37	NETWORK PANEL With accessories	No.	10	17.032	
38	Power Distribution Panel	No.	2	20.219	
39	Starter cabinet for Emergency Lube Oil Motor, DC seal oil Motor	No.	4	16.227	

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FOR PACKAGE 'B' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XIII-A

SI No.	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/Unit(I)
					Item Rate/Unit(I)= (Item Factor(F)*Lumsum Price (B))/100000
40	Max engineer/max Storian/max operator/max link stations/station supervisor/shift in charge terminal/MIS PC/PCAL PC/LVS PC/TFT monitor along with installation of workstation with all connectivity	No.	70	5.537	
41	Printers(A4 & A3 Colour Laser Jet, Inkjet, Dot Matrix) With Printer Table and	No.	14	2.147	
42	LARGE VIDEO SCREEN(80"/40")	No.	10	25.283	
43	Ethernet switches-16 ports	Set	2	4.022	
44	Control Desk	Set	2	80.267	
45	Computer Furniture(for all servers ,pc, printer) including simulator package	Set	4	39.144	
	LIE/LIR/LGB				
46	Local Instrument racks (LIR) Type A 1650x2150x800	No.	56	9.719	
47	Local Instrument racks (LIR) Type B 1300x800x2150 mm	No.	64	10.400	
48	Local Instrument racks (LIR) Type C 800x850x1650 mm	No.	22	10.075	
49	Local Instrument enclosures (LIE) Type A 1450x2200x950	No.	28	13.948	
50	Local Instrument enclosures(LIE) Type B 1100x800x2300 mm	No.	24	13.588	
51	Local Instrument enclosures(LIE) Type C 700x600x2100 mm	No.	4	13.452	
52	Local Gauge Boards(LGB)	No.	16	9.823	
	PRESSURE INSTRUMENTS RACKS (IR1 to IR7)				
53	Rack of size 2150x700x2150 mm	No.	18	11.987	
54	Rack of size 1250x700x2150 mm	No.	18	12.231	
	24 V DC BATTERY & CHARGER SYSTEM				

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FOR PACKAGE 'B' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XIII-A

SI No.	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/Unit(I)
					Item Rate/Unit(I)= (Item Factor(F)*Lumsum Price (B))/100000
55	24 V DC Battery for SG and TG	Set	2	117.070	
56	24 V DC Battery Charger for SG ,TG alongwith DCDB	Set	2	130.763	
57	UPS system comprising of the following: UPS Panel, Voltage stabilizer cubicle, Input Iso. Transformer cubicle, Static invertors etc. including ACDB and bateeries	Set	2	319.792	
<i>INSTALLATION,CALIBRATION& COMMISSIOINGOFLOCAL/FIELD INSTRUMENTATION/EQUIPMENT</i>					
58	Flow meters/Flow transmitters	No.	372	3.587	
59	Temperature gauges/Pressure gauges/ Diff. Pressure gauge	No.	870	0.793	
60	Temp. Transmitter /Pressure Transmitters / Differential pressure/Position	No.	470	1.635	
61	Level Transmitter/Level gauge	No.	74	3.692	
62	Temp. switches/Pressure switches /DP switches	No.	494	1.164	
63	Level switch/Level switch(Conductivity type)/ Level switch(Float type) / Level Instruments	No.	82	2.227	
64	Pneumatic Pressure controller with accessories	Set	2	2.852	
65	Electronic/Guided Wave Radar /Ultrasonic type level Transmitters	No.	766	3.105	
66	Limit switches	No.	112	0.643	
67	Conductivity cell	No.	12	3.151	
68	ERV Controller	No.	8	3.142	
69	ASLD sensor assy	No.	48	3.404	
70	Sonic tube & sensor asy	No.	48	28.399	
71	Field amplifier Box	Set	48	3.109	

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SI No.	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/Unit(I)
					Item Rate/Unit(I)= (Item Factor(F)*Lumsum Price (B))/100000
72	Rotor Stoppage Alarm Box-including sensors for Air pre heaters	No.	4	3.853	
73	Reverse Rotation Monitoring system	No.	6	5.411	
74	Flame scanner head assy. Along with fibre optic cable length 130 ",lens barrel	No.	64	4.545	
75	Microprocessor based Flame scanner amplifier	No.	16	5.727	
76	Hand Held HART communicator	Set	2	3.846	
77	Gas Analyser(wt- 400 kg)	Set	4	8.550	
78	Moisture sensor	Set	2	3.896	
79	Flue gas analysers comprising of SOX/NOX/CO/Co2 analyzer, along with Sensor head, in situ probe,Pressure, temp. transmitter, Display, control & Air drier unit other accessories.	Set	2	96.296	
80	Steam and water analysis system, SWAS consisting of: Conductivity analyser-13 No.,pH analyser-10 No.,Dissolved oxygen analyser-5 No.,Silica analyser-1 No.,Sodium analyser-1 No.,Conductivity analyser with drawable type-2 no.,SWAS primay rack- 2 set,Wet panel-1 set,Dry panel- 1 set,Chiller-1 set,Swas Sample Handling System-01 set,	Set	2	260.334	
81	Oxygen Analyser –Low temperature along with Electronic Unit and other accessories.	Set	20	14.943	
82	Thermocouples(K/R type)	No.	888	2.316	
83	RTDs with thermo well	No.	760	1.001	
84	Cr- Al Thermocouple assy	No.	1546	1.085	
85	MTM Thermo Couple up to 32 M (duplex)	No.	718	3.165	

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Sl No.	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/Unit(I)
					Item Rate/Unit(I)= (Item Factor(F)*Lumsum Price (B))/100000
86	Thermo well	No.	80	0.856	
87	Thermometer(Bimettalic)/Gas filled/MIS	No.	54	0.885	
88	Co –AXL dial thermometer	No.	14	0.885	
89	Bearing Elerment	No.	32	2.067	
90	Burner Tilt shear pin failure indication box	No.	8	3.202	
91	Heavy Duty Limit switch(Burner tilt)	No.	40	1.838	
92	Furnace temp. Probe	No.	4	5.324	
93	HEA exciter box assembly	Set	40	7.503	
94	Air Filter Regulators	No.	130	0.875	
95	I/P Converters	No.	52	0.942	
96	Vibration Transducers/Monitor/ Detectors/Element	No.	216	1.591	
97	Shaft Axial Detector	No.	4	2.539	
98	Proximitors	No.	12	1.121	
99	Rota meters	No.	4	0.345	
100	Solenoid Valves	No.	296	0.646	
101	Speed Regulators / Air lock valves in oil gun corner rack	No.	80	0.750	
102	Speed measuring loop	Set	12	2.387	
103	Coal bunker level Monitoring system consists of Ultrasonic level sensor-14 no.	Set	2	79.734	
104	Coal Flow Monitor	No.	16	10.757	
105	Recorder 3/6/24 channel	No.	2	2.802	

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SI No.	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/Unit(I)
					Item Rate/Unit(I)= (Item Factor(F)*Lumsum Price (B))/100000
106	Opacity Monitor	No.	2	77.404	
107	Electronic /Digital Indicators(Bar Graph Indicators, Temperature Indicatorsetc.)	No.	80	1.058	
108	Pressure/ Temperature Indicators (MovingCoil Type)	No.	10	1.058	
109	Speed switch / Speed detector	No.	8	0.945	
110	Pneumatic Temperature controller with accessories	No.	4	1.411	
	CONTROL/SIGNAL/SCREENED/POWER CABLES LAYING,DRESSING,CLAMPING & TERMINATION				
	<u>LT Sheilded /Screened Cable//FRLS/Power cable</u>				
111	2P X 0.5 SQ MM	Mtr	130230	0.016	
112	2 Triad X 0.5 SQ MM	Mtr	10400	0.019	
113	4P X 0.5 SQ MM	Mtr	242600	0.023	
114	8P X 0.5 SQ MM	Mtr	159900	0.027	
115	12P X 0.5 SQ MM	Mtr	35000	0.029	
116	2P X 1.5 SQ MM	Mtr	23200	0.016	
117	4P X 1.5 SQ MM	Mtr	10000	0.019	
118	2C X 2.5 SQ MM	Mtr	61200	0.016	
119	3C X 2.5 SQ MM	Mtr	170400	0.016	
120	7C X 2.5 SQ MM	Mtr	46400	0.018	
121	10C X 2.5 SQ MM	Mtr	52000	0.018	
122	16C X 2.5 SQ MM	Mtr	1000	0.027	

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FOR PACKAGE 'B' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XIII-A

SI No.	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/Unit(I)
					Item Rate/Unit(I)= (Item Factor(F)*Lumsum Price (B))/100000
123	19C X 2.5 SQ MM	Mtr	23200	0.029	
124	3C X 6 SQ MM	Mtr	4400	0.019	
125	2Px16 AWG T/C ext. cable	Mtr	28870	0.023	
126	4Px16 AWG T/C extention cable	Mtr	4000	0.023	
127	6Px16 AWG T/C extension cable	Mtr	100000	0.023	
128	Flame scanner cables	Mtr	17000	0.021	
129	UTP E-CAT cable	Mtr	10000	0.029	
130	Fibre optic cable	Mtr	7000	0.076	
131	Compensating cable	Mtr	11600	0.021	
132	Extension Cable	Mtr	1920	0.023	
	<u>LT XLPE Power Cables</u>				
133	1C - 10- AL ARMOURED LT XLPE CABLE	Mtr	9334	0.014	
134	1C - 25- AL ARMOURED LT XLPE CABLE	Mtr	2000	0.022	
135	1C - 50- AL ARMOURED LT XLPE CABLE	Mtr	1000	0.003	
136	1C - 95- AL ARMOURED LT XLPE CABLE	Mtr	6666	0.089	
137	1C - 185- AL ARMOURED LT XLPE CABLE	Mtr	3334	0.034	
138	1C - 400- AL ARMOURED LT XLPE CABLE	Mtr	6000	0.043	
139	1C - 630- AL ARMOURED LT XLPE CABLE	Mtr	2666	0.128	
140	2C - 10- AL ARMOURED LT XLPE CABLE	Mtr	1666	0.021	
141	2C - 25- AL ARMOURED LT XLPE CABLE	Mtr	9000	0.025	

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SI No.	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/Unit(I)
					Item Rate/Unit(I)= (Item Factor(F)*Lumsum Price (B))/100000
142	3C - 10- AL ARMoured LT XLPE CABLE	Mtr	17000	0.026	
143	3C - 25- AL ARMoured LT XLPE CABLE	Mtr	54666	0.029	
144	3C - 50- AL ARMoured LT XLPE CABLE	Mtr	15666	0.032	
145	3C - 95- AL ARMoured LT XLPE CABLE	Mtr	8334	0.037	
146	3C - 150- AL ARMoured LT XLPE CABLE	Mtr	666	0.052	
147	3C - 240- AL ARMoured LT XLPE CABLE	Mtr	9334	0.063	
148	3.5C - 25- AL ARMoured LT XLPE CABLE	Mtr	18000	0.052	
149	3.5C - 50- AL ARMoured LT XLPE CABLE	Mtr	7334	0.032	
150	3.5C - 95- AL ARMoured LT XLPE CABLE	Mtr	10334	0.037	
151	3.5C - 300- AL ARMoured LT XLPE CABLE	Mtr	2334	0.063	
152	4C - 10- AL ARMoured LT XLPE CABLE	Mtr	14666	0.025	
153	1C - 2.5- CU ARMoured LT XLPE CABLE	Mtr	15334	0.014	
154	2C - 2.5- CU ARMoured LT XLPE CABLE	Mtr	30666	0.016	
155	3C - 2.5- CU ARMoured LT XLPE CABLE	Mtr	136666	0.016	
156	4C - 2.5- CU ARMoured LT XLPE CABLE	Mtr	2334	0.016	
	<u>LT PVC CONTROL CABLES</u>				
157	1.1 kV LT PVC-2C-1.5-ARMoured LT PVC Cable	Mtr	48666	0.018	
158	1.1 kV LT PVC-7C-1.5-ARMoured LT PVC Cable	Mtr	6666	0.026	
159	1.1 kV LT PVC-12C-1.5-ARMoured LT PVC Cable	Mtr	666	0.022	
160	1.1 kV LT PVC-5C-2.5-ARMoured LT PVC Cable	Mtr	2000	0.016	

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SI No.	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/Unit(I)
					Item Rate/Unit(I)= (Item Factor(F)*Lumsum Price (B))/100000
161	1.1 kV LT PVC-19C-2.5-ARMOURED LT PVC Cable	Mtr	4000	0.048	
	EARTHING MATERIAL				
162	65 x 10 mm GI earthing flat	Mtr	4680	0.103	
163	50 x 6 mm GI earthing flat	Mtr	5640	0.095	
164	25x3 mm GI earthing flat	Mtr	4520	0.073	
165	8SWG Galvanised steel wire	Mtr	9320	0.018	
166	Electronic Earthing Pit	No.	2	30.695	
	CABLE TRAYS COMPLETE WITH COUPLER PLATES, FASTENERS, CLAMPS AND FIXING HARDWARES ETC ERECTION INCLUDING SUPPORT & COVERS				
167	Ladder/ Perforated type Cable tray, W=50mm	Mtr	9950	0.126	
168	Ladder/ Perforated type Cable tray, W=100mm	Mtr	13150	0.141	
	INSTALLATION & FABRICATION OF STRUCTURAL STEEL				
169	ANGLE , ISMC, PLATES etc	MT	90	32.976	
	IMPULSE PIPES/ TUBES ALONG WITH FITTINGS				
170	Copper Tube-6mm/8mm/1/4"	Mtr	9040	0.122	
171	1' CS Pipe SCH 80	Mtr	2050	0.309	
172	CS Pipe 21.3 x 3.73	Mtr	800	0.332	

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SI No.	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/Unit(I)
					Item Rate/Unit(I)= (Item Factor(F)*Lumsum Price (B))/100000
173	CS Pipe 60.3x3.91	Mtr	120	0.397	
174	1/2" CS Pipe SCH 80	Mtr	12000	0.272	
175	1/2" CS Pipe XXS	Mtr	1000	0.283	
176	1/2" CS Pipe SCH 160	Mtr	3200	0.246	
177	3/4" CS Pipe SCH 80	Mtr	7200	0.302	
178	1' AS Pipe	Mtr	2000	0.264	
179	1/2" AS Pipe SCH 160	Mtr	1400	0.258	
180	1/2" AS Pipe SCH 80	Mtr	1300	0.315	
181	1/2" AS Pipe XXS	Mtr	1800	0.277	
182	1/2" SS PipeSCH 40	Mtr	3000	0.231	
183	1/2" SS PipeSCH 80	Mtr	900	0.261	
184	1/2" SS PipeSCH 160	Mtr	600	0.214	
185	Cr-Al pipe 21.3x3.73	Mtr	660	0.288	
186	Seam less CS tube 13.5x2.6	Mtr	846	0.194	
187	Carbon steel tube 88.9x4	Mtr	80	0.251	
188	Carbon steel tube 33.7x3.38	Mtr	4	0.277	
189	Seam less CS tube 21.3x2.3	Mtr	280	0.220	
190	Seam less AS tube 21.3x2.77	Mtr	1420	0.199	
191	Seam less AS tube 13.5	Mtr	412	0.452	
192	SS Tube 12.7x2.1	Mtr	1400	0.202	

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FOR PACKAGE 'B' CALCULATION RATIO FOR DIFFERENT ITEMS BASED UPON TOTAL QUOTED VALUE AS PER RATE SCHEDULE OF CHAPTER XIII-A

Sl No.	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/Unit(I)
					Item Rate/Unit(I)= (Item Factor(F)*Lumsum Price (B))/100000
193	SS Tube 6x1.5	Mtr	60	0.173	
194	GI pilica conduit with fittings(up to 1" size)	Mtr	3000	0.202	
195	GI pilica conduit with fittings(above 1" size)	Mtr	3000	0.181	
196	GI Rigid conduit up to 1"	Mtr	3000	0.141	
197	GI pipe ½" NB	Mtr	7200	0.106	
198	GI pipe 1" NB	Mtr	300	0.113	
199	Flexible conduiting /Rubber hoses/pipes	Mtr	2000	0.201	
	JUNCTION BOXES/INDICATION BOXES/LOCAL CONTROL STATIONS				
200	JB 12 way	No.	74	1.078	
201	JB 24 way	No.	286	1.103	
202	JB 36 way	No.	66	1.207	
203	JB 48 way	No.	228	1.400	
204	JB 64 way	No.	10	1.449	
205	JB 72 way	No.	58	1.482	
206	JB 96 way	No.	4	1.532	
207	6 way miniature Junction box	No.	64	0.955	
208	Shear Pin failure Indication box	No.	8	1.720	
209	Local oil gun maintenance switch	No.	32	1.133	
210	Local start stop Push button	No.	22	1.262	

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SI No.	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/Unit(I)
					Item Rate/Unit(I)= (Item Factor(F)*Lumsum Price (B))/100000
	COMMISSIONING/CALIBRATION/TESTING of control valves, on/off valves, /pneumatic valves, actuators, power cylinders etc.				
211	Commissioning of Pneumatic actuators(Power cylinder) -On/Off type	No.	136	2.486	
212	Commissioning of Pneumatic actuators(Power cylinder) -Regulating type	No.	246	2.486	
213	SADC drives	No.	176	9.178	
214	Over fire air tilt drives	No.	8	3.026	
215	Pulversier Lube oil skid The scope of work includes removal of instruments calibration, refixing, checking cable connection from JB to instruments etc.approx..instrument per set RTD-04 no., Temp. Gauge-02 no. ,Pressure switch-03 no., Pressure gauge-02 no., level switch-02 no., Level gauge-01 no., Flow switch-02 no.	Set	14	10.051	
216	Lub oil skids for FD/ ID/ PA Fans The scope of work includes removal of instruments calibration, refixing, checking cable connection from JB to instruments etc. The approximate total quantity of instruments for all the 06 Nos skids put together is given below: DP Gauges - 06 Nos., Pressure Gauges – 18 Nos , Temperature Gauges – 12 Nos, Diff. Pressure Transmitters- 06 Nos, Pressure Transmitters-12 Nos, Pressure Switches – 06 Nos, Level transmitters-06 Nos, Flow indicator with flow switch - 06 Nos	Set	12	28.001	

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Sl No.	Description of Item	Unit	Quantity (Q)	Item Factor (F)	Item Rate/Unit(I)
					Item Rate/Unit(I)= (Item Factor(F)*Lumsum Price (B))/100000
217	Gravimetric feeder mounted C&I Equipment like motion ,monitor sensor, micro switches_ etc	Set	14	5.550	
218	Commissioning of Electric actuators/dampers/valves Open/Close type	No.	110	3.148	
219	Commissioning of Control Valves	No.	102	2.268	
220	Commissioning of motorised actuators Open/close type	No.	112	3.941	
221	Commissioning of Pneumatic Valves/Safety relief valves/NRV	No.	100	1.940	