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ASSAM POWER GENERATION CORPORATION LIMITED

BIDDING DOCUMENTS

(NATIONAL COMPETITIVE BIDDING)

FOR

ELECTROMECHANICAL WORKS CONTRACT PACKAGE FOR KARBI LANGPI MIDDLE-II HYDRO POWER PROJECT (24 MW)

(ASSAM, INDIA)

Bid No: KLM-II-HPP/PKG-3

VOLUME-IV

BID FORMS

February 2025

1. BID FORMS AND SCHEDULES

1.1. SCHEDULE-1

BID FORM

(To be submitted on letter head of Bidder or letter head of Lead Member of Consortium)

Reference No: ___

Date: ____

To

The Chief General Manager (NRE)

Assam Power Generation Corporation Limited

Bijulee Bhawan, Guwahati-781001

Subject: Design, manufacture, procurement, supply, fabrication, shop assembly, painting, shop testing, transportation & delivery to project site, receipt & storage at site, erection, testing & commissioning including packing & forwarding for shipment and trial operation of Horizontal Francis Turbine driven Generating units, Main Inlet Valves, Drainage & Dewatering system, Cooling Water system, SCADA/Controls of all Electro-Mechanical equipments and other associated & auxiliary equipment for (3x8MW) KARBI LANGPI MIDDLE II HYDRO POWER PROJECT, West Karbi Anglong, Assam as detailed in the tender document. Detailed Scope can be found under Volume-III

Dear Sir,

1. We have read and examined the tender documents relating to the subject cited works (hereinafter referred to as "Works") at '… SHP'" as issued by you:

2. Having examined the Bidding Documents, including Addenda/Corrigendum, we the undersigned, offer to construct such Works and remedy the defects therein in conformity with the Conditions of Contract, EMPLOYER's Requirements, Bid Proposal Sheets for the sum of:

   .....***(Prices to be left blank in Envelope-1 submission)*** ....(Insert amounts in words)
   (.....) (Amount in Figures) or such other sums as may be determined in accordance with the terms andconditions of the Contract.

3. Attached to this letter are copies of original documents defining

   (a) Our legal status,

   (b) The principal place of business, and

   (c) The place of incorporation (for bidders that are corporations), or the place of

registration and the nationality of the EMPLOYERs (for Bidders that are partnerships or individually owned firms).

4. 'EMPLOYER' and its authorized representatives are hereby authorized to conduct any inquiries or investigations to verify the statements, documents, and information submitted in connection with this Bid, and to seek clarifications from our bankers and employers regarding any financial and technical aspects. This Bid shall also serve as authorization to any individual or authorized representative of any institution referred to in the supporting information to provide such information deemed necessary andas requested by you to verify statements and information provided in this bid, such as the resources, experience, and competence of the Bidder.

5. We agree to keep this Bid open for acceptance for 180 days, or such other extended period as may be required by you and agreed by us, from the due date of submission of the Bid, and also agree not to make any modifications in its terms and conditions of our own accord.

6. A sum of Rs ……. (Rs…….. only) is hereby forwarded in the form as Bid security (hereinafter "Bid Security"). We agree if we fail to keep the validity of Bid open, as aforesaid, or we make any modification in the terms and conditions of our Bid of our own accord or after the acceptance of our Bid if we fail to execute an Agreement as prescribed in the Tender Documents or fail to submit the required Performance Security or we are found to indulge in corrupt or fraudulent practices, as provided in the Tender Documents, we shall become liable for forfeiture of the Bid Security. In such an event you shall, without prejudice to any other right or remedy, be at liberty to invoke the said Bid Security.

7. We certify that the Bid submitted by us is strictly in accordance with the terms, conditions, specifications etc. as contained in the Tender Documents, and it is further certified that it does not contain any deviations to the aforesaid documents and that deviations or variations, if any, are duly disclosed by us separately in as envisaged in the Instructions to Bidders.

8. The bid is made with the full understanding that:

   (a) Bids will be subject to verification of all information submitted at the time of bidding.

   (b) EMPLOYER reserves the right to:

      (i) Amend the scope and value of any work under this tender.

      (ii) Reject or accept any bid, cancel the tender process and reject all bidders by giving a written notice.

   (c) EMPLOYER shall not be liable for any actions taken under (b) (i) and (ii) above.

9. We confirm that the bid as well as any resulting agreement, will be signed so as to legally bind all partners, jointly and severally.

10. We undertake, if our bid is accepted, to commence the Works immediately upon issue of Order to Commence date and to complete and deliver the whole of works comprised in the contract within the period stated and in compliance with the tender conditions.

11. We confirm our agreement to treat the Tender Documents, our Bid, drawings and other records connected with the Works as secret and confidential documents and shall not communicate information contained therein to any person other than the person authorized by 'EMPLOYER' or use such information in any manner prejudicial to the safety and integrity of the Works.

    Subject to the terms of the Agreement as may be executed, this Bid, together with your Letter of Award, shall constitute a binding Contract between us, but without prejudice to your right to withdraw such award as governed by the Tender/Contract conditions.

12. We understand that you are not bound to accept the lowest or any bid you may receive.

13. The undersigned declares that the statements made, and the information provided in the Bid and formats are complete, true, and correct in all aspects.

    We have gone through carefully all the Bid conditions and solemnly declare that we will abide by any penal action such as disqualification or blacklisting or termination of contract or any other action deemed fit, taken by the EMPLOYER against us, if it is found that the statements, documents, certificates produced by us are false / fabricated.

Date of Submission: **(Signature of the Bidder) (Seal)**

List of Enclosures:

In case of group of firm/companies bidding in consortium, signature & seal of all the members are required.

Note: Bidders may note that no prescribed proforma has been enclosed for Power of Attorney. Bidders may use their own proforma, incorporating all essential ingredients constituting a valid "Power of Attorney".

1.2. SCHEDULE-2

DECLARATION

(To be executed on a non-judicial stamp paper of appropriate value)

Tender invited by **Assam Power Generation Corporation Limited (APGCL)**

……..…….

……..

Tender for: ……..……

Name of Tenderer :……

Tender No. and date of opening: ……

In Consideration of the EMPLOYER, having treated the Tenderer to be an eligible to bid, the Tenderer hereby agrees to the condition that the proposal in response to the above invitation shall not be withdrawn within six months (or any extension there of agreed to, by us) from the due date of submission of the tender, also to the condition that if thereafter the Tenderer does withdraw his proposal within the said period, the Bid Security by him may be forfeited to the EMPLOYER and at the discretion of the EMPLOYER, the EMPLOYER may debar the tenderer from tendering as the extant Govt. of India policy and guidelines.

Signed this……..……day of…….…….20..

Place…… Signed by ……..……

Witness Tenderer

1. Full Signature……..
2. Name…….……..
3. Designation……..……

1.3. SCHEDULE - 3

PROFORMA FOR JOINT DEED AGREEMENT AMONG THE BIDDING CONSORTIUM MEMBERS

(To be on non-judicial stamp paper of appropriate value as per Stamp Act relevant to placeof execution)

FORM OF JOINT DEED AGREEMENT BETWEEN M/S....., M/S.

M/S..... AND M/S.....

FOR (……..)

Tender Notice NO. (……)

THIS Joint Deed Agreement executed on this..... day of Two thousand..... between M/s. a company incorporated under the laws of .....and having its Registered Office at ..... (hereinafter called the "Partner-I", which expression shall include its successors, executors and permitted assigns) and M/s……..a Company incorporated under the laws of and having its Registered Office at ..... (hereinafter called the "Partner- 2", which expression shall include its successors, executors and permitted assigns), M/s ..... a Company incorporated under the laws of ..... and having its Registered Office at ..... (hereinafter called the "Partner-3", which expression shall include its successors, executors and permitted assigns, (The Bidder Consortiumshould list the details of all the Consortium Members) for the purpose of making a Bid and entering into the Agreement (in case of award) to be hereinafter referred to as the Contracts, against Tender Notice No. (-----) for ( ) of Assam Power Generation Corporation.

Limited (APGCL) (hereinafter called the “EMPLOYER”, which expression shall include its successors, executors and assigns).

NOW THEREFORE, THIS INDENTURE WITNESSTH AS UNDER:

In consideration of the above premises and agreements all the partners in this Consortium do hereby mutually agree as follows:

1. In consideration of the Award of the Contract(s) by the EMPLOYER to the Consortium, we the Members of the Consortium and partners to the Joint Deed Agreement do herebyunequivocally agree that partner (1) (M/s), shall act as the Lead Member for self and agent for and on behalf of Partner-2, and Partner-3 (the names of the partners to be filled in here)..

2. The Lead Member is hereby authorised by the Members of Consortium and Partners to the Joint Deed Agreement to bind the Consortium and receive instructions for and on their behalf. It is further understood that the entire execution of the Contract including payment shall be done exclusively by the Lead Member.

3. Not withstanding anything contrary contained in this Agreement, the Lead Member shall always be liable for the participation obligations of all the Consortium Members i.e., for both its own liability as well as the liability of other

Members

4. The Lead Member shall be liable and responsible for ensuring the individual and collective commitment of each of the Members of the Consortium in discharging all their respective obligations. Each Consortium Member further undertakes to be individually liable for the performance of its part of the obligations without in any way limiting the scope of collective liability envisaged in this Agreement.

5. Subject to the terms of this Agreement, the participation share in terms of tender/contract value of each Member of the Consortium is/shall be in the following proportion:

Name	Percentage
Partner 1	---
Partner 2	----
Total	100%

6. In case of any breach of any of the commitments by any of the Consortium Members,the Lead Member shall be liable for the consequences thereof.
7. Except as specified in the Agreement, it is agreed that sharing of responsibilities as aforesaid and participation obligations thereto shall not in any way be a limitation of liability of the Lead Member under these presents.
8. It is further specifically agreed that the financial liability of participation share of Lead Member shall, not be limited in any way so as to restrict or limit its liabilities.The Lead Member shall be liable irrespective of their scope of work or financial commitments.
9. This Joint Deed Agreement shall be construed and interpreted in accordance with theLaws of India and courts at **[……]** alone shall have the exclusive jurisdiction in all mattersrelating thereto and arising there under.
10. It is hereby agreed that in case of an award of Contract, the partners to this Joint Deed Agreement do hereby agree that they shall furnish the Performance guarantee in favour of EMPLOYER, as stipulated in the bidding documents, jointly on behalf of the Consortium Members, in favour of the EMPLOYER.
11. It is further expressly agreed that the Joint Deed Agreement shall be irrevocable and shall form an integral part of the Contract and shall remain valid till the term of the Contract unless expressly agreed to the contrary by the EMPLOYER.
12. The Lead Member is authorized and shall be fully responsible for the accuracy and veracity of the representations and information submitted by the Consortium Members respectively from time to time for the purposes of the Project.
13. It is hereby expressly understood between the partners to this Agreement that noneof the partners may assign or delegate its rights, duties or obligations under the Contract except with prior written consent of EMPLOYER.

    This Joint Deed Agreement

    (a) has been duly executed and delivered on behalf of each Partner hereto andconstitutes the legal, valid, binding and enforceable obligation of each such Partner,

    (b) sets forth the entire understanding of the Partners hereto with respect to the subjectmatter hereof;

    (c) may not be amended or modified except in writing signed by each of the Partnersand with prior written consent of EMPLOYER:

IN WITNESS WHEREOF, the partners to the joint Deed Agreement have, through their authorised representatives, executed these present and affixed Common Seals of their respective companies on the Day, Month and Year first mentioned above.

For M/s	(Partner 1)
1. Common Seal of M/s..... have been affixed in my/our presence pursuant to Board/Board of Directors Resolution dated …….	(Signature of the authorized representative)
	Name.....
Signature.....	Designation.....
For M/s	(Partner 2)
2. Common Seal of M/s..... have been affixed in my/our presence pursuant to Board/Board of Directors Resolution dated …….	(Signature of the authorized representative)
	Name.....
Signature.....	Designation……....
For M/s	(Partner 3)
3. Common Seal of M/s..... have been affixed in my/our presence pursuant to Board/Board of Directors Resolution dated …….	(Signature of the authorized representative)
	Name.....
Signature.....	Designation.....

1.4. SCHEDULE - 4

WARRANTY FORM

To, APGCL,

……..

……..

Subject: Tenderer's Warranty against tender no……dated …….for EPC execution of ……

Dear Sir,

……. having invited subject tender for the subject works to be executed at …….

We, M/s …… (herein after referred to as the tenderer) having its registered office at …….. being desirous of tendering in subject tender and having carefully studied all the tender documents consisting of Notice inviting Tender, Instructions to Bidders, General Conditions of Contract, Particular Conditions of Contract, EMPLOYER's Requirements, Tender Drawings, Technical Specifications, and local & site conditions.

We M/s ……. hereby submit our tender and undertake to keep our tender valid up to ……

We hereby further undertake that during the said period, we shall not vary / alter or revokeour tender.

1. We are familiar with and undertake to fulfil earnestly Price Schedule (Bill of Quantities) of the tender.
2. We have investigated the site and satisfied ourselves regarding the character of thework and local conditions that may affect the work of its performance.
3. We are satisfied that the work can be performed and completed as required in thetender documents.
4. We accept all risks directly or indirectly connected with the performance of the contract.
5. We have no collusion with other contractors or with any other person to execute thesaid works.
6. We have not been influenced by any statement or promise of the EMPLOYER but only bythe tender documents.
7. We are financially solvent.
8. We have experience and competency to perform the contract to the satisfaction of the EMPLOYER.
9. The statements submitted by us, are true.

10. We are familiar with all general and special laws, Act, Ordinances, Rules and Regulations of the Municipalities, District, State and Central Government that may affect the work, its performance or personnel employed therein.

    Should this tender be accepted, we also agree to abide by and fulfill and comply with all the terms, conditions and provisions of the above-mentioned tender documents.

Yours faithfully,

Place:	Name: …….
Dated:	Address:……..
Witnesses: 1.	2.

1.5. SCHEDULE - 5

FORM OF BANK GUARANTEE FOR BID SECURITY

(On non judicial stamp paper of appropriate value)

To,

……..

……..

……..,

Sir,

WHEREAS, Messers .....a Company incorporated under the Indian Companies Act having its registered office at ..... / a firm registered under the Indian Partnership Act and having its business office at…….....Sri……son of Sri.....……resident of ..... Sri.Son of Sri..... R/o.....Sri.....son of Sri…….. R/o.....and Sri.....son of Sri R/o.....partners carrying on business under the firm's name and style of Messers..... at.....which is registered partnership firm (hereinafter calledthe 'Tenderer') has/have in response to your Tender Notice No..... Dated for Karbi Langpi Middle-II HPP offered to execute the works.

AND WHEREAS the Tenderer is required to furnish to you a Bank Guarantee for the sum of Rs…… (Rs…… only) as Bid Security against the Tenderer's offer as aforesaid.

AND WHEREAS We.....(*Name of the Bank*, hereinafter called the 'Bank'),

at request of the Tenderer, agree to give you this guarantee as hereinafter contained.

NOW THEREFORE, in consideration of the promises we, the undersigned, hereby covenant that the aforesaid tender of the tenderer shall remain open for acceptance by you during the period of validity as mentioned in the tender or any extension thereof as you and the tenderer may subsequently agree and if the tenderer shall, for any reason back out, whether expressly or impliedly, from his said tender during the period of its validity or any extension thereof as aforesaid we hereby guarantee to Assam Power Generation Corporation Limited.

(APGCL) (the "EMPLOYER") the payment of the sum of Rs……. (Rs……. only) on demand without any reservation, protest, demur and recourse not with standing the existence of any dispute between the EMPLOYER and the Tenderer in this regard and we hereby further agree as follows:

a) That you may, without affecting this guarantee grant time or other indulgence to or negotiate further with the tenderer in regard to the conditions contained in the said tender and thereby modify these conditions or add these to any further

conditions as may be mutually agreed upon between you and the tenderer.

b) That the guarantee herein before contained shall not be affected by any change in the constitution of the tenderer.

c) That this guarantee commences from the date thereof and shall remain in force till the tenderer, if his tender is accepted by you, furnishes the security as requiredunder the said conditions and executes a formal agreement as therein provided or till three months after the period of validity or the extended period of validity, as the casemay be, of the tender, whichever is earlier.

d) That the expressions 'The Tenderer' and 'The Bank' and 'EMPLOYER' herein used shall, unless such and interpretation is repugnant to the subject or context include their respective successors and assigns.

e) That any account settled between you and the tenderer shall be conclusive evidence against us of the amount due hereunder and shall not be questioned by us.

Notwithstanding anything contained hereinabove,

i) Our liability under this guarantee shall not exceed……..……..

ii) This guarantee shall be valid up to 180 days from bid opening date ……..

iii) The Claim period shall be valid up to 6(six) months beyond guarantee period……

iv) We are liable to pay the guaranteed amount or any part thereof under this guarantee only and only if the EMPLOYER serves upon the bank a written claim or demand on or before__.

Yours faithfully

Signature of Authored Official of Bank with seal of Bank

1.6. SCHEDULE - 6

PROFORMA FOR BANK GUARANTEE AGAINST PERFORMANCE (PBG)SECURITY

To.

…….

……

THIS DEED OF GUARANTEE MADE ON THE ..... day of .....20..... by the ..... (hereinafter called 'the Guarantor') of the one PART IN FAVOUR OF Assam Power Generation Corporation Limited (APGCL) ……. (hereinafter called the EMPLOYER) of the other part WHEREAS in accordance with the Contract Agreement No…….. dated the .....day of.....20.....(hereinafter called 'the Contract) entered into between the EMPLOYER and Messrs…… a company within the meaning of the companies act and having its registered office at ..... (here in after called 'the Contractor') the Contractor agrees to execute the complete Electromechanical works for the EMPLOYER as provided in the said Contract.

AND WHEREAS, in accordance with the provision of the contract, the Contractor shall furnish to the EMPLOYER a bank guarantee for the sum specified therein as security for compliance with the Contractor's performance obligations in accordance with the Contract.

Now This Deed Witnesses as Follows:

1. In consideration of the promises the Guarantor hereby undertakes that the Contractor shall duly execute the complete Electromechanical works strictly in accordance with the Contract, failing which the Guarantor shall pay to the EMPLOYER on demand such amount or amounts as the Guarantor may be called upon to pay to the maximum aggregate of Rs. ……. being **10%** of the Contract value

   The Guarantor shall pay to the EMPLOYER the sum under clause 1 above unconditionally, irrevocably and on its first demand without any demur, reservations, recourse, contest or protest and without requiring the EMPLOYER to invoke any legal remedy that may be available to it to compel the guarantor to pay the same or to compel suchperformance by the Contractor.

2. This guarantee shall come into force the date hereof and shall remain valid for 12 months beyond the last Final Acceptance Certificate issued under the Contract i.e., up to.....day of .... If, however, the period of the Contract is for any reason extended thereby extending the said date and upon such extension, if the Contractor fails to furnish a fresh or renewed bank guarantee for the extended period, the Guarantor shall pay to the EMPLOYER the said sum of Rs. ..... or such lesser sum as the EMPLOYER may demand. Validity period of PBG shall be 12 months beyond the last Final Acceptance Certificate issued & Claim period is for 1 year beyond guarantee period of 12 months.
3. The guarantee herein contained shall not be affected by any change in constitution ofthe Guarantor or of the Contractor.

4. The Guarantor shall not, during the term of this guarantee or any extension thereof, revoke the same in any manner whatsoever.

5. The neglect or forbearance of the EMPLOYER in enforcement of payment of any moneys the payment whereof is intended to be hereby secured or the giving of time by the EMPLOYER for the payment thereof shall in no way relieve the Guarantor of its liability under this deed.

6. The Guarantor hereby agrees unequivocally and unconditionally to pay within 48 hours on demand made by EMPLOYER in that behalf and discharge the liabilities of the Contractor under the said terms and conditions of Contract in case of any act, commission, negligence, default or breach whatsoever on the part of the Contractor and pay such as may be payable by the Contractor to the EMPLOYER under the said Contract to the extent of the Guarantor's Guarantee namely Rs. ……..(Rupees -) only

7. The EMPLOYER and the Contractor will be at liberty to carry out any modifications in the said Contract during the time of the said contract and any extension thereof, notice ofwhich modifications to the Guarantor is hereby waived.

8. The expressions 'The EMPLOYER' and 'The Guarantor' and 'The Contractor' shall unless there be any thing repugnant to the subject or context include their respectivesuccessors and assigns.

9. These presents shall be governed by and construed in accordance with the IndianLaws***. The Courts at Guwahati shall*** have exclusive jurisdiction in respect of all matters

   arising out of or relating to the obligation undertaken by the Guarantor.

   Notwithstanding anything contained hereinabove,

   i) Our liability under this bank guarantee shall not exceed _____

   ii) This bank guarantee shall be valid up to_____.

   iii) We are liable to pay the guaranteed amount or any part thereof under this bank guarantee only and only if the EMPLOYER serves upon the bank a written claim or demand on or before_……

   iv) Claim period is for 1 year beyond guarantee period of 12 months.

Signed by(For and on behalf of Guarantor)

IN WITNESS WHERE OF

For and on behalf of the Guarantor has signed this deed on the day and year first abovewritten.

Witness:

1.

2.

1.7. SCHEDULE - 7

FORM OF AGREEMENT

This Agreement made this ……. day of ….. between the, (*Address*)…… (hereinafter called the "the EMPLOYER ") of the One Part and M/s ……(hereinafter called "The Contractor ") of the Other Part.

Whereas, the EMPLOYER is desirous that the Contractor should construct …… for the EMPLOYER (hereinafter referred to as the "Works")

AND WHEREAS pursuant to the Bid submitted by the Contractor dated ……. (hereinafter referred to as "the Proposal"), the EMPLOYER has agreed to award the Contract for the execution and completion of the Works and to remedy any defects therein, on terms and conditions in accordance with the conditions of the Tender Documents in addition to the conditions included hereinafter

AND WHEREAS the Contractor has agreed to undertake, execute and complete the Works and has furnished a Performance Guarantee pursuant to Article 30 of the GCC.

NOW THIS AGREEMENT WITNESSES AS FOLLOWS:

1. In this Agreement, words and expressions shall have the same meanings as arerespectively assigned to them in the Tender Documents.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement:

   (i) The Special Conditions of the Contract

   (ii) The General Conditions of the Contract

   (iii) The Technical Specification

   (iv) Bill of Quantities

   (v) Tender Drawings

   (vi) Project Profile

   (vii) Any other document, as mutually agreed.
3. The foregoing documents shall be harmoniously construed as complementary and mutually explanatory to one another. In the event of any ambiguity or discrepancy or
4. inconsistency between the provisions of the documents mentioned above, the order of precedence of these documents shall, subject to the General Conditions of Contract and to the extent of such ambiguity or discrepancy or inconsistency, be as listed above.

5. Scope of Works

   The contractor shall perform everything required to be performed and shall provide and furnish all the labour, materials, tools and equipment required to perform and complete, in a workman like manner, all the work covered by the contract documents,in strict accordance with the EMPLOYER's Requirements and conditions of contract, technical provisions (including annexures and list of corrections and amendments to specifications and drawings, conditions of contract and technical provisions), whichall are a part of this contract documents and shall do everything required by this contract and other documents constituting a part thereof.

6. In consideration of payments to be made by the EMPLOYER to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the EMPLOYER to perform, execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.

7. The EMPLOYER hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein the contract price as specified in the Special Conditions of the Contract as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

8. It is agreed by the Contractor that the entire Works shall be completed by the Contractor within the Time for Completion as defined in the General Conditions of Contract.

IN THE WITNESS WHEREOF THE PARTIES HERETO HAVE CAUSED THIS AGREEMENT TO BE EXECUTED THE DAY AND YEAR FIRST BEFORE WRITTEN.

Signed, Sealed and delivered by:	Signed, Sealed and delivered by
Name:	Owner: ....
For and on behalf of the contractor	For and on behalf of the Owner
1. Name: ..... Address:	1. Name: ..... Address: ....
2. Name: ..... Address:	2. Name: ..... Address: ....

1.8. SCHEDULE-8

BANK GUARANTEE FOR ADVANCE PAYMENT
(To be stamped in accordance with Indian Stamp Act)

Bank Guarantee No.....

Date.....

To,

[EMPLOYER's Name & Address]

Dear Sir,

In consideration of the [EMPLOYER's Name] ..... (Hereinafter referred to as the 'EMPLOYER', which expression shall, unless repugnant to the context or meaning thereof include its successors, administrators, and assigns) having awarded to M/s.....[Contractor's Name] ..... with its Registered/Head Office at. (Hereinafter referred to as the 'Contractor' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns), a Contract bearing No. ..... dated.....for ..... [Name of Contract] (hereinafter called the 'Contract') and the EMPLOYER having agreed to make an Advance payment to the Contractor for performance of the above Contract amounting (in words and figures) as a payment against Bank Guarantee to be furnished by the Contractor.

We..... [Name and address of the Bank] ..... having its Head Office at ..... (hereinafter referred to as the 'Bank', which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns) do hereby guarantee and undertake to pay the EMPLOYER, immediately on demand any or, all monies payable by the Contractor to the extent of .....[Advance payment amount]..... as aforesaid at any time upto .....(@)..... without any demur, reservation, contest, recourse or protest and/ or without any reference to the Contractor. Any such demand made by the EMPLOYER on the Bank shall be conclusive and binding notwithstanding any difference between the EMPLOYER and the Contractor or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. We agree that the guarantee herein contained shall be irrevocable and shall continue to be enforceable till the EMPLOYER discharges this guarantee.

The EMPLOYER shall have the fullest liberty without affecting in any way the liability of the Bank under this guarantee, from time to time to vary the Advance payment or to extend the time for performance of the Contract by the Contractor. The EMPLOYER shall have the fullest liberty without affecting this guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Contractor, and to exercise the same at any time in any manner, and either to enforce or to forbear to enforce any covenants, contained or implied, in the Contract between the EMPLOYER and the Contractor or any other course or remedy or security available to the

EMPLOYER. The Bank shall not be released of its obligations under these presents by any exercise by the EMPLOYER of its liberty with reference to the matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the EMPLOYER or any other indulgence shown by the EMPLOYER or by any other matter or thing whatsoever which under law would but for this provision have the effect of relieving the Bank.

The Bank also agrees that the EMPLOYER at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee that the EMPLOYER may have in relation to the Contractor's liabilities.

Notwithstanding anything contained herein:

1.Our liability under this Bank Guarantee shall not exceed……..

2.This Bank Guarantee shall be valid upto 60 days beyond Final Acceptance …….

3.Claim period is for 1 year beyond guarantee period of ABG ……....

.

We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only and only if EMPLOYER serve upon Bank a written claim or demand on or before (@).

Dated this ..... day of ..... 20.. ..... at ..... .

WITNESS	
.....	……
(Signature)	(Signature)
.....	.....
(Name)	(Name)
.....	.....
(Official Address)	(Designation with Bank Stamp)
	Attorney as per Power of Attorney No..... Dated.....

Notes:

1. (@) This date shall be One (1) year beyond the date of validity of ABG.
2. The stamp papers of appropriate value shall be purchased in the name of the Bankissuing the guarantee, issued after the signing of Contract agreement.
3. Claim period shall be 1year beyond validity of ABG.
4. Amount of guarantee may be progressively reduced by the amount of the advance payment repaid by the Contractor as indicated in copies of interim statement or payment certificate which shall be presented to the Employer.

2. QUALIFICATION FORMS

2.1. FORM-1

SCHEDULE OF GENERAL PARTICULARS GENERAL INFORMATION

1	Name of Bidder/ Consortium Member:			
2	Head office address:		Local office address (if any):	
3	Contact name: Telephone: Mob. No.		Contact name: Telephone: Mob. No.	
4	Fax: E-mail ID:		Fax: E-mail ID:	
5	Place of incorporation/registration:		Year of incorporation/registration:	
6	Main lines of business:			
7	Nationality of owners/stakeholders Name 1 2 3 4 5		Nationality	

Signature with seal of bidder/ Member of Consortium

NOTE:

1. Use a separate sheet for each member of Consortium.

2.2. FORM-2

STRUCTURE AND ORGANIZATION

1. The Bidder is
   a) a proprietary firm
   b) a firm in partnership
   c) a Limited Company or Corporation / Government undertaking
   d) a voluntarily formed consortium by firms/companies (Please give complete information in respect of each member, indicate also the name of lead member)
2. Number of years of experience
   a) as a Main/Lead Contractor (contractor shouldering major responsibility)
      (i) in own Country
      (ii) other Countries (specify Country)
   b) in a voluntarily formed Consortium by firms/companies
      (i) in own Country
      (ii) other Countries (specify Country)
   c) as sub-contractor (specify main Contractor)
      (i) in own Country
      (ii) other Countries (specify Country)
3. For how many years has your organization been in business of similar work under itspresent name?
4. What were your fields when your organization was established?
5. Whether any new fields were added in your organization? And if so, when?
6. Were you ever required to suspend construction for a period of more than six monthscontinuously after you started? If so, give the name of project(s) and reasons thereof.
7. Have you ever left the work awarded to you incomplete? (If so, give name of project and reasons for not completing work.)
8. Attach an Organization Chart showing the structure of the company/association, including the names of the Directors and position of officers.

Signature with seal of bidder/ Member of Consortium

Note: Use a separate sheet for each member of Consortium.

2.3. FORM-3

TURNOVER RECORD IN ALL CLASS OF CONSTRUCTION WORKS ONLY

Name of Bidder or Lead member of a Consortium:

Sl .No.	Year	Turnover (Rs.)	Ref. to Page No. of Bidder'sDocuments
(1)	(2)	(3)	(4)
1			
2			
3			
4			
5			
	Total	-	-

Signature with seal of bidder/ Member of Consortium

Note:

1. All individual bidders and all members of Consortium must complete the information inthis form.
2. Use a separate sheet for each member in a consortium.
3. The information provided shall be certified by Chartered Accountant and supported byAudited Balance Sheets.

2.4. FORM-4

FINANCIAL CAPABILITY

Name of Bidder or Lead Member of a Consortium

Banker	Name of Banker				
	Address of Banker				
	Telephone		Contact Name and Title		
	Fax		Telex E-mail ID		
	Actual: Previous five financial years				
	--	-	--	-	-
1. Total assets					
2. Current assets					
3. Total liabilities					
4. Current liabilities					
5. Profits before taxes					
6. Profits after taxes					
7. Net worth (Paid up share capital + reserves & surplus) as per Vol I (financial criteria)					
8. Average Net worth for lastFive Years					
Working Capital as per Vol I(financial criteria)					

Signature with seal of bidder/ member of Consortium

1. Bidder/ each member of a consortium must fill in the form.
2. Copies of the Audited Financial Statements, including Balance Sheets certified by a Chartered Accountant for the last five years along with certified copy of Income Tax return for last three years submitted in the Income Tax Office (for the Bidder or each member of a consortium) are to be attached. Firms owned by individuals or partners may submit their balance sheets certified by a Chartered Accountant, along with certified copy of income tax return for last three years.
3. The information provided shall be certified by Chartered Accountant and supported by Audited Balance Sheets.
4. Attach certificate from a Chartered Accountant that the bidder or each member of a consortium has not suffered losses for any reasons whatsoever in last three years.

2.5. FORM - 5

SUMMARY FOR CONSORTIUM
(Net Worth and Working Capital)

Names of all member s of a consortium

1. Lead Member
2. Member
3. Member

Net Worth in Rs during the last five years – B/F from Form 4

Member	1st FY	2nd FY	3rd FY	4th FY	5th FY	Average of Five Years	% of Criteria
1. Lead member							
2. Member							
3. Member							
Total		**-**	**-**	**-**	**-**		

Working Capital in Rs during the latest financial year – B/F from Form 4

Member	Latest Financial Year	% of Criteria
1. Lead member		
2. Member		
3. Member		
Total		

Signature with seal of bidder/ Member of Consortium

2.6. FORM-6

SUMMARY FOR CONSORTIUM

(Financial Resources- Profitability)

Names of all members of a consortium
1. Lead Member
2. Member
3. Member

Profitability in Rs during the last five years – B/F from Form 4

Member	1st FY	2nd FY	3rd FY	4th FY	5th FY	Remarks
1. Lead member						
2. Member						
3. Member						

Signature with seal of bidder/ Member of Consortium

2.7. FORM-7

GENERAL EXPERIENCE CRITERIA

Name of Bidder or Lead Member of Consortium:

a) Name of Work: _____

Name of Client: _____

Contract Value: _____

Reference to page no. of Bidders Document: _____

Year	Amount executed (Rs)
Total	

1. This criterion is to be met by a Bidder/Lead Member of a Consortium. Other members need not submit the details.

Signature with seal of bidder/ Lead Member of Consortium

2.8. FORM-8

PROJECT EXECUTION EXPERIENCE OF BIDDER and OTHER MANUFACTURE/CONSORTIUM

(Specific Experience)

PROJECT DATA SHEET (Separate sheets shall be given for each of the projects)

NAME OF THE COMPANY/FIRM :_____

PROJECT NAME :_____

LOCATION (City and Country) :_____

OVERALL CAPACITY (MW) :_____

CAPTIAL COST :_____

S.No.	Criteria	Particulars of claimed experience	Page Reference No. of the claimed experience
1	**Experience:** As per Technical Criteria in volume - III of bidder and other manufacture.		
2	**Time lines:** a) Date of Commencement of work b) Scheduled date of Commissioning of the project c) Actual date of Commissioning of the Project d) Reasons for delay (if any)		
3	**Contract Value**:		
4	Name, Address and Contact Numbers of Client (for reference)		
Please enclose copy of performance certificate/other testimonials as proof of claimed experience			

Signature with seal of bidder/ member of Consortium

Designation ----------

Company Seal

Note: Please use separate sheets for different project experience and different firms.

2.9. FORM - 9

PROJECTS EXECUTED IN LAST TEN YEARS

(Electromechanical)

(FROM___TO_____)

Name of Bidder OR Other Manufacturer / Lead Member or Member of Consortium

S.No.	Name of Work and Name of Client	Contract Value (Rs)	% Share holding if work done in JV/ Consortium	Date of Award	Completion Date/probable completion date	Value of Work done	Copy of Performance Certificate at Page No.
Total				Total			

Signature with seal of bidder/ Member of Consortium

NOTE:

1. Use a separate sheet for each member in a consortium.
2. Provide copies of Completion/ Work Certificates for each project. Payment received in each year, certified by the Project Authority. Work orders/testimonials may be verified if required for last 5 years.

2.10. FORM-10

SUMMARY FOR CONSORTIUM

Names of all members of a consortium
1. Lead Member
2. Member

	Member	**Value of Works (Rs) – B/F from Form-9**
1. Lead Member		
2. Member		
Total		

Signature with seal of bidder/ Member of Consortium

2.11. FORM-11

LITIGATION HISTORY

Name of Bidder or Lead Member / Member of a Consortium:

Year	Award For or Against Bidder	Name of client, cause of litigation, and matter of dispute	Disputed amount (currentvalue in Rs.)	Actual awarded Amount (in Rs.)

Bidders, including each of the members in a consortium, should provide information on any history of litigation or arbitration resulting from contracts executed in the last five years or currently under execution. A separate sheet should be used for each member of a consortium.

Signature with seal of bidder/ member of Consortium

2.12. FORM-12

ATTACHMENT-12

UNDERTAKING FROM PARENT/ HOLDING COMPANY

(On the letter head of Parent/Holding Company)

No: …… Date:……..

Name & address of the Employer:

Sub: ELECTRO-MECHANICAL WORKS PACKAGE.

Dear Sirs,

We, M/s…….. (Name of the Parent/Holding Company) having registered office at ……(Address of the Parent/Holding Company) do hereby undertake that in case work ……..(Name of work) is awarded to M/s…….. (Name of the Bidder) who is participating in your subject Tender as a Sole Bidder /, which is our subsidiary company, we on our strength / strength of (name of group company(ies)) under our control shall provide the full support for technical and financial requirements for the work " " (the scope of work of bidder company) and we shall be responsible for the successful completion of the scope of works of M/s….....(Name of the Bidder subsidiary company) as per contract agreement with the bidder.

In case the Bidder, M/s ……(Name of Subsidiary company) gets qualified and awarded the work, We do hereby undertake

1.To enter into a separate agreement with the Employer as per the Employer's approved format .

2.To furnish an additional performance bank guarantee(PBG) of value equivalent to Three (3%) percent of the Contract Price, , if the subsidiary Company is qualified on the strength of Parent/Holding Company or group Company(ies) under the control of Parent / Holding Company.The said PBG shall be released by APGCL only after issuance of Final Acceptance certificate as per contract agreement with the bidder.

We do hereby also confirm that we are not participating either as a sole Bidder or as a manufacturer against the above Invitation for Bids.

Yours faithfully,

For & on behalf of M/s. ……..

(Name & Address of the Parent/Holding Company)

(Office Seal)

Station:

Date:

Note: This Letter of undertaking should be on the letterhead of the Parent/Holding Company and should be signed by a person competent and having the Power of Attorney to bind the Parent/Holding Company. Power of Attorney in favour of this person to do so together with the authority of its executant be enclosed with this Letter of Undertaking.

LIST OF SCHEDULES

SCHEDULE I
MANUFACTURER'S AUTHORIZATION FORM

To:

WHEREAS (Name of manufacturer)…….. who are established and reputable manufacturer of …….. (name and description of the plant or part of thereof) having factories at ……..(address of the factory/fabrication unit) do hereby authorize……. (name and address of Agent) to submit a bid and subsequently negotiate and sign the contract with you against……..(reference to Invitation to Tender) for the above plants manufactured by us.

We hereby extend our full guarantee and warranty as per Conditions of Contract for the plant offered for supply, transportation, installation and commissioning by the above against this Invitation to Tender.

……..

(Signature for and on behalf of Manufacturer)

***Note**: This letter of authority shall be on the letterhead of the manufacturer and should be signed by a person competent and having power of attorney to bind the manufacturer and the Contractor. Such letter shall be appended to this Schedule I.*

SCHEDULE II

PROPOSED DEPARTURE/DEVIATIONS FROM PARTICULAR SPECIFICATIONS

(List of Deviations)

Clause No. of Particular Specifications	Outline of Departure	Reason for Departure	Increase in Tender Price	Decrease in Tender Price

The specification shall prevail over any information contained in any document forming a part of our Bid, except only to the extent of deviations indicated in the above table.

Signature of the Tenderer: _____
For and on behalf of:_____
Date: _____

***Note**:*

1. In case of award, only specially agreed deviations from this list shall form part of the LOA/ Contract, while the remaining deviations shall be treated as withdrawn/ null and void.

2. Where there is no deviation, this statement shall be returned duly signed with an endorsement indicating "No Deviations".

3. Attach separate sheet if necessary if the original space is insufficient

SCHEDULE III

EXECUTION WORK PROGRAM (TIME SCHEDULE)

Applicant shall establish the Supply, Transportation, Erection and Commissioning time schedule to meet the requirements specified in this Tender using attached sheets. The Execution Work Program shall match with the Execution Schedules (and their milestone) as specified in tender document. The first month shall be the date of issue of the Engineer's Order to Commence.

Work Item	Months						
	1	2	3	..	..		

Signature of the Tenderer:_____

For and on behalf of :_____

Date: _____

***Note**: The Work Program shall contain each individual item/activity in the Schedule of Prices*

SCHEDULE IV

LIST OF SUBCONTRACTORS/(S)

1. We understand that the Contract or any part of thereof or any benefit or interest therein or there under shall not be assigned without the prior written consent of the Employer and the main Works shall not be sub-let except those permitted by written consent of the Employer in accordance with relevant clauses of Conditions of Contract.

2. We also understand that such consent given by the Employer shall not relieve us from any liabilities or obligations under the Contract and that we shall be fully responsible for acts, defaults, or neglects of any subcontractor, his agents, servants or workmen as fully as if they were our own. Upon receipt of written notice from the Employer requiring us to terminate the subcontract for the reasons stated therein, we shall undertake to dismiss the said subcontractor immediately from site and to execute the said part of the works with our own task force.

3. With the above understanding, we undertake to employ the subcontractor(s) listed below for the work item (s) proposed therein and confirm that our prices tendered reflect the same. We understand that the Employer may not grant consent on the subcontractor(s) if their purpose of engagement is declared herein or if the proposed list is altered by us.

Item No.	Particulars	Name of Subcontractor	Address of Subcontractor

Signature of the Tenderer:_____

For and on behalf of : _____

Date: _____

***Note**:*

1. *Address of the sub contractor(s) shall be full business address with phone number and cable address*
2. *Particular shall be given for each manufacturer, material supplier of major items and for those involved in erection*
3. *Full evidence signed by authorized representative of sub-contractor(s) showing that he shall work as sub-contractor shall be attached*
4. *Numbers of registered engineers and technicians shall also be presented*

SCHEDULE V

LIST OF SITE ERECTION FORCE

1. The Tenderer shall fill up the estimated erection forces both local and foreign for each month of the Contract Period
2. A detailed CV of the Project Manager shall be submitted along with this Schedule VI.

	Month								
Type of Labor Force	**1**	**2**	**3**	**4**					
Expatriate									
Resident Manager									
Supervisor									
Skilled Labor									
Others									
Local									
Foreman									
Heavy Equipment Operator									
Mechanics									
Electrician									
Unskilled Labors									
Others									

Signature of the Tenderer: _____

For and on behalf of : _____

Date: _____

SCHEDULE VI

LIST OF TENDERER'S MAJOR EQUIPMENT

The Tenderer's list of major equipment shall be prepared as per this Schedule VII and included in the Bid. No material modification (other than formatting) is allowed.

Item	Description	Qty	Capacity or Output	Country of Origin	Model	Present Location	Manufacture Year	Ownership* Type	Estimated Present Value

Signature of the Tenderer: _____

For and on behalf of : _____

Date: _____

***Note**: (*) Clearly indicate present ownership such "owned", "to be purchased" or "to be hired". Employer or Engineer may inspect the equipment before issuing the Letter of Acceptance Use as many pages as required*

SCHEDULE VII

SUPPLY, TRANSPORTATION, ERECTION AND COMMISSIONING PLAN, METHODS AND SEQUENCE OF WORK

Applicant's Execution Plan attached to his Tender shall also be attached hereto without any modification. Following information shall be contained but not limited to.

(1) Execution Method and Sequence of Works
   i. Work quantities of major structures
   ii. Explanations on design including the material, manufacturing, quality control and testing including destructive and non destructive, transportation including at site (method of lowering of pipe shall in respective location), installation sequence and NDT Testing, and dry and wet Testing & Commissioning of Electro-mechanical works.
   iii. Proposed methods for safety and protection for manpower, equipment and other structures during transportation and installation.
   iv. Labour force by trades for above works.
   v. Detailed Execution time schedule of major works. (Detail breakdown for design, fabrication, transportation, installation, testing and commissioning).

(2) Organization Chart
   i. Diagram of organization divided into such sections as control, administration, Engineering, Construction, etc.
   ii. Name of staff to be assigned and their grades and assignment period of each staff for this project.

(3) Layout of Temporary Storage at site
   i. Plan of temporary storage area including the space required for storing the plant and equipment, penstock pipe shells and their protection from surrounding and construction time schedule.

(4) Layout of Office, Quarter, workshop and Other Necessary Buildings
   i. Plan of temporary buildings including location, names, quantities, floor areas, accommodation, capacity, water supply system, sewerage treatment, Environmental control measures, furniture, etc. and Construction time schedule.

(5) Layout of Electric Power Supply System
   i. Plan of electric power supply system including schematic diagrams. 11 kV branch lines, step-down facilities, supply line beyond the Employer's power delivery points, emergency Diesel generation units, etc.

(6) Layout of Telecommunication System
   i. Plan of telecommunication system

(7) Plan of medical Services

(8) Schedule of Land Arrangement on temporary Works
   i. Location and area of the Temporary works which is or are to be located.
   ii. The target date by when the Applicant desires to arrange his plan and layout of the temporary works.

(9) Layouts of Other Temporary Facilities

Descriptions, drawing, specification, conditions, schedule or other items necessary to clarify the other temporary facilities proposed shall be covered.

Signature of the Tenderer: _____
For and on behalf of : _____
Date: _____

SCHEDULE VIII

STATEMENT OF AGENT OR REPRESENTATIVE IN INDIA

1. Name of Local agent: .....
2. Address & Telephone/Fax Number of the Local agent:.....
   .....
   .....
   .....
3. Amount of commission: .....
   .....
4. Currency of payment: .....
   .....
5. Method of payment:.....
   .....
6. Other condition of the Agreement (If any) .....
   .....
   .....
   .....

Signature of the Tenderer: .....
For and on behalf of .....
Date: .....

***Note**: Last fiscal year's tax declaration certificate shall be attached herewith:*

SCHEDULE IX

EXPERIENCE OF PERSONNEL

We undertake to provide and employ for the duration of the contract a project manager, an assistant project manager (if any) and _____ (number of persons) senior site staff whose professional experience is as stated. In addition to such senior staff we also undertaken to provide and employ _____ (number of persons) Mechanical, Electrical and _____ (number of persons) engineer(s) qualified for the other engineering field as required by the construction Time Schedule. Professional records of our site staff engaged in the works are as per attached.

_____(name of project manager) has a broad experience in the field of project similar to or larger than this project and is capable of managing the Works in all respects to meet the requirements of the contract. He will stay at site full time throughout the period of the Contract, being supported by at least Mr. _____ Mr._____ Mr._____ Mr. _____ and Mr. _____ (name of senior site staff).

PROFESSIONAL RECORDS OF FIELD PERSONAL

1. Name: ..... _____
2. Date of birth: .... _____
3. Nationality: .... _____
4. Education and degrees: ..... _____
5. Speciality: .... _____
6. Registration: .... _____
7. Length of service with:
   Applicant: Years from _____ to _____
   Years from _____ to _____
8. Years of experience: _____
9. If he has worked in other firms than the Applicant give names and length of service with pervious employers:
   Name of Employer Length of Services
   _____ _____ years from _____ to _____
   _____ _____ years from _____ to _____
10. Construction experience:
    (This should cover the past 15 year experience. Use as many pages as necessary)
    (1) Name of Project _____
    (2) Name and address of owner _____
    (3) Name and address of the _____
    Engineer (consultant)
    For supervision:
    (4) Indicate the features of _____
    Project (size of structures,

work volumes and any
other particular interest
connected with the project):

(5) Contract Amount ----------
(equivalent in Indian
Rupee) _____
Position _____
Works for which the
(personnel was
responsible) _____

(6) Assignment period: From _____ month _____ year
From _____ month _____
year

Signature of the Tenderer:_____
For and on behalf of : _____
Date: _____

SCHEDULE X

FOREIGN CURRENCY REQUIREMENT

Part of Work	Percentage of Amount of Foreign Currency with Respect to Total Tender Price	Applicable Exchange Rate

Signature of the Tenderer:_____

For and on behalf of: _____

Date: _____

SCHEDULE XI

FINANCIAL CAPABILITY

Name of the Tenderer or partner of a Joint Venture offering Tender:

Tenderer including each partner of a joint venture shall provide financial information to demonstrate requirement, either alone or as a joint venture of the Employer as set forth in Vol I "Instruction to Tenderers".

Banker information shall be furnished as follows:

Tenderer or Joint Venture Partner	**Name of the Bank**	
	Address of the Bank	
	Telephone	Contact Name
	Fax	Email

Actual assets and liabilities shall be summarized at the corresponding year for the previous five calendar years. Based on the known commitments, summarize projected assets and liabilities for the next two calendar years.

Financial Information	**Previous Five Years**					**Projected Next Two Years**	
	5	**4**	**3**	**2**	**1**	**1**	**2**
1. Total Assets							
2. Current Assets							
3. Total Liabilities							
4.Current Liabilities							
5. Profit Before Taxes							
6. Profit After Taxes							

Signature of the Tenderer:_____

For and on behalf of: _____

Date: _____

***Note**: Use additional sheets if necessary. Each Joint Venture to submit the information in the format prescribed above.*

A copy of audited balance sheet shall be submitted by all Tenderers (or Joint Venture Partner).

SCHEDULE XII

JOINT VENTURE DETAILS

Information on partners in a joint venture, who shall be individually and severally liable, shall be presented as below:

Joint Venture Summary

Position	Name of partner in Joint Venture	Percentage Stake of Partner
1. Partner In Charge		
2. Partner		
3. Partner		
4.		

Summary of Main Activities of Each Partner of Joint Venture Under the Contract

Partner	Fabrication	Transportation	Erection	Commissioning
1. Partner In Charge				
2.Partner				
3. Partner				

Signature of the Tenderer:_____

For and on behalf of : _____

Date: _____

***Note**: Use additional Sheets if necessary*

SCHEDULE XIII

WORK EXPERIENCE

Name of Tenderer or Other manufacturer as per qualification Criteria / Joint Venture Partner.

Project Name	Owner's Name and Address	Nature and Kind of Works	Contract Value		Contract Period	Reference Attached
			Total	Tenderer's Share		

Signature of the Tenderer: _____

For and on behalf of : _____

Date: _____

***Note**:*

1. *Each JV partner to fill this form separately. Use additional sheets where required.*
2. *References to support the information must be attached*

GUARANTEED TECHNICAL PARTICULARS (TURBINE)			
Sl. No.	**Description**	**Units**	**To be filled by the Tenderer**
1	TYPE OF TURBINE/SHAFT ORIENTATION		
2	NAME OF THE MANUFACTURER		
3	GUARANTEED OUTPUT AT GENERATOR TERMINAL FOR THE FOLLOWING HEADS:		
(a)	Guaranteed max. Output at rated head	kW	
(b)	Guaranteed rated Output at rated head	kW	
(c)	Guaranteed max. Output at max. head	kW	
(d)	Guaranteed max. Output at min. head	kW	
(e)	Guaranteed max. Output at 75% of rated head	kW	
(f)	Guaranteed max. Output at 50%of rated head	kW	
4	GUARANTEED TURBINE OUTPUT FOR THE FOLLOWING HEADS:		
(a)	Guaranteed max. Output at rated head	kW	
(b)	Guaranteed rated Output at rated head	kW	
(c)	Guaranteed max. Output at max. head	kW	
(d)	Guaranteed max. Output at min. head	kW	
(e)	Guaranteed max. Output at 75% of rated head	kW	
(f)	Guaranteed max. Output at 50%of rated head	kW	
5	TURBINE EFFICIENCY		
	Guaranteed efficiency of **Turbine** at rated head for the following outputs:		
(a)	1.1	%	
(b)	1	%	
(c)	0.75	%	
(d)	0.5	%	
(e)	Weighted average eff. of Turbine	%	
6	WEIGHTED AVERAGE EFF. OF TG	%	
7	DISCHARGES		
	Turbine discharge for the following outputs indicated In Sl no.4 above:		
(a)	Max. Output at rated head	m^3/s	
(b)	Rated Output at rated head	m^3/s	
(c)	Max. Output at max. head	m^3/s	
(d)	Max. Output at min. head	m^3/s	
(e)	Max. Output at 75% of rated head	m^3/s	
(f)	Max. Output at 50%of rated head	m^3/s	
8	SPEED		
(a)	Specific speed in M.K.S. units		
(b)	Rated speed	rpm	
(c)	Maximum runaway speed	rpm	
(d)	Critical Speed for combined Turbine & Generator	rpm	
(e)	Direction of rotation when viewed from generator end		
9	Momentary rise in speed on suddenly reducing load to zero fro	% of rated speed	
(b)	Time of Guide Vane closing for regulation of above.	sec	
10	Momentary drops in speed in increasing load from zero to full l	% of rated speed	
(b)	Time of guide vane opening for regulation at (a) above	sec	
11	FLYWHEEL EFFECT OF:		
(a)	The Generating unit for regulation stated above		
(b)	Mass of Turbine rotating parts	kgs	
(c)	GD^2 of Turbine rotating parts	kg-m^2	
(d)	Mass of Generator rotating parts	kgs	
(e)	GD^2 of Generator rotating parts	kg-m^2	
(f)	Pressure Rise for full load throw off (above max. static pressure	%	
(g)	Speed Rise (above rated speed) for full load throw off	%	
(h)	Mass GD^2 of additional Fly wheel, if required	kg-m^2	
12	FACTOR OF SAFETY		
(a)	Guaranteed minimum factor of safety under Worst conditions based on yield point of the material.		
(b)	Name and location of the part having the factor of safety in (a) above.		
13	MAX. WATER HAMMER PRESSURE	% of rated head	
14	RUNNER		
(a)	Type of Runner blank (Cast/Forge)		
(b)	Material and composition		

GUARANTEED TECHNICAL PARTICULARS (TURBINE)			
Sl. No.	**Description**	**Units**	**To be filled by the Tenderer**
(c)	Runner coating material/process		
15	GUIDE VANE APPARATUS	N/A	
(a)	Material of Guide Vane		
(b)	No. of Guide Vanes		
(c)	(i) Leakage through fully closed Guide Vanes		
	(ii) Torque on runner due to leakage		
(d)	Description of the method of lubrication		
(e)	Material of Link and Lever/Operating ring		
(f)	Guide Vane bearing type & Material		
(g)	Guide vane opening (%) for maximum output at rated head	≤90%	
16	GUIDE VANE SERVOMOTOR		
(a)	No. of Servomotors,		
(b)	Material of Servomotor body and piston		
(c)	Rating / Capacity	kg m	
(d)	Range of oil pressure for satisfactory operation	bar	
17	INLET CASING AND STAY RING		
(a)	Inlet diameter of Casing	m	
(b)	Dimensions of Casing	m	
(c)	Maximum / design / working pressure	bar	
(d)	Test pressure	bar	
(e)	Material of Casing		
(f)	No. of sections of Casing		
(g)	Material and construction of speed / stay ring		
(h)	No. of Vanes in speed /stay ring		
(i)	Thickness of Casing & Stay ring		
(j)	Weight	kg	
18 (a)	Elevation of Centre Line of Runner	m	
(b)	Turbine Setting (w.r.t Min. TWL)	m	
19 (a	Critical sigma value		
(b)	Cavitations guarantee in kg/1000 hours of operation		
20	RECOMMENDED PLANT SIGMA		
21	DRAFT TUBE		
(a)	Type		
(b)	Material		
(c)	Thickness	mm	
(d)	Elevation of lowest point in Draft Tube	m	
(e)	Total length of Draft Tube Steel Liner from Runner axis	mm	
(f)	Velocity under full load at Draft Tube Steel Liner exit	m/s	
(g)	Velocity under full load at Draft Tube exit	m/s	
22	GOVERNING SYSTEM		
(a)	Make		
(b)	Type of Governor		
(c)	Rating		
(d)	"Guaranteed sensitivity (minimum speed range to which governor will respond)"		
(e)	Range of adjustment of permanent speed droop	%	
(f)	Range of adjustment in speed setting	%	
(g)	Governing opening and closing times	sec	
(h)	Description and method of operation		
(i)	Adjustment range in governor opening and closing time	sec	
23	ACCUMULATOR / PRESSURE OIL RECIEVER		
(a)	No. of Accumulators per unit		
(b)	Capacity of Accumulator	LPM	
(c)	Normal volume of oil in each	m^3	
(d)	Normal working pressure	bar	
(e)	"No. of complete operation of Guide Vanes & MIV Servomotor	Yes/No	
24	OIL PRESSURE UNIT (OPU)		
(a)	No. of oil pump per unit		
(b)	Type / Make of pump		
(c)	Capacity of each pump	LPM	
(d)	Working pressure	kg/cm^2	

GUARANTEED TECHNICAL PARTICULARS (TURBINE)			
Sl. No.	**Description**	**Units**	**To be filled by the Tenderer**
(e)	Type and grade of oil used		
(f)	Class of Insulation		
(g)	Size & type of Distributing Valve		
25	HEAVIEST PACKAGE OF SHIPMENT		
(a)	Name		
(b)	Weight	ton	
(c)	Dimensions (L x W x H)	m x m x m	
26	LARGEST PACKAGE FOR SHIPMENT		
(a)	Name		
(b)	Weight	ton	
(c)	Dimensions (Lx W x H)	m x m x m	
27	HEAVIEST ASSEMBLY TO BE LIFTED BY POWERHOUSE CRANE		
(a)	Name		
(b)	Weight	ton	
(c)	Dimensions (L x W x H)	m x m x m	

II - TECHNICAL DATA SHEET				
SL.No.	**Description**	**Units**	**To be filled by the Tenderer**	**Remarks (if any)**
1	**TURBINE AND AUXILIARIES**			
1.1	**GENERAL**			
a	Make			
b	Type			
1.2	**DESIGN DATA**			
a	**NET HEAD considered**			
i)	Max. Net Head	m		
ii)	Min. Net Head	m		
iii)	Rated Net Head	m		
b	**DISCHARGE**			
i)	Max. Discharge at max. head	m^3/s		
ii)	Min. Discharge at min. head	m^3/s		
c	**EFFICIENCY**			
i)	Efficiency at max. head & max. discharge	%		
ii)	Efficiency at min, head & min. discharge	%		
1.3	**COMPONENTS/SYSTEM DETAILS**			
a	**RUNNER**			
i)	Material			
ii)	Entrance Diameter of Runner (D1)	mm		
iii)	Min Opening Diameter of Runner (D2)	mm		
iv)	Discharge Diameter of Runner (D3)	mm		
v)	No. of Runner blades			
vi)	Source of Runner casting/forging			
vii)	Weight of Runner	ton		
viii)	Peripheral Velocity	m/s		
ix)	Velocity of water at Runner exit	m/s		
x)	Direction of rotation when viewed from Generator end			
b	**TURBINE SHAFT**			
i)	Material Grade			
ii)	Diameter and length	mm		
iii)	Diameter of Bore	mm		
iv)	Weight	kg		
c	**GUIDE VANE APPARATUS**			
c	Clearance between fully closed Guide Vanes	mm		
ii)	Clearance of top of Guide Vanes	mm		
iii)	Clearance of bottom of Guide Vanes	mm		
iv)	Guide vane pitch circle diameter	mm		
v)	Guide Vane height	mm		
vi)	Weight of each Guide Vane	kg		
vii)	Method of coupling Guide Vane to operating ring / Levers			
viii)	No. of section of operating ring	nos.		
ix)	Diameter of operating ring	mm		
x)	Type and material of bearings supporting operating ring	mm		
d	**GUIDE VANE SERVOMOTORS**			
i)	Piston diameterxstroke	mmxmm		
ii)	Weight of Servomotors	kg		
iii)	Range of adjustment of opening/closing time	sec		
iv)	Range of oil pressure for satisfactory operation	kg/cm^2		
e	**SHAFT SEAL**			
i)	Type			
ii)	Number of rings & material			
iii)	Cooling flushing water requirements/ Filteration Quality	LPM / Micron		
iv)	Pressure of cooling water required	kg/cm^2		
v)	Micro Water Strainer included	Yes/No		
f	**TURBINE GUIDE BEARING**			
i)	Type of bearing			

II - TECHNICAL DATA SHEET				
SL.No.	**Description**	**Units**	**To be filled by the Tenderer**	**Remarks (if any)**
ii)	Diameter and length	mm		
iii)	Working temperature of bearing surface	^{0}C		
iv)	Medium of Lubrication			
v)	Cooling water flow and pressure, if required	LPM kg/cm^2		
vi)	Recommended grade and make of lubricated oil			
vii)	Quantity of lubricating oil	Litres		
g	**WATER VELOCITIES (AT RATED HEAD AND DISCHARGE)**			
i)	At inlet to Inlet Casing	m/s		
ii)	At Runner discharge	m/s		
h	**ELEVATIONS**			
i)	Bottom of Draft Tube exit	m		
ii)	Top of Draft Tube exit	m		
iii)	Highest elevation of Crane Hook	m		
i	**TURBINE INSTRUMENTATION**			
i)	Instrumentation included as per Tender Specific	Yes/No		
ii)	If Not, Furnish the List			
j	**TURBINE FLOW MEASUREMENT APPARATUS**			
i)	Make / Model			
ii)	Quantity	sets		
iii)	Flow Range	m3/h		
iv)	Designed to operate utilising the pressure differential obtained from Winter-Kennedy tappings	Yes/No		
k	**SURGE SHAFT LEVEL SENSOR**			
i)	Make / Model			
ii)	Quantity			
iii)	Measurement Range	m		
l	**TWL LEVEL SENSOR**			
i)	Make / Model			
ii)	Quantity			
iii)	Measurement Range	m		
m	**GENERAL**			
i)	Size & weight of heaviest part for erection purpo	m, kg		
ii)	Size & weight of largest part for erection purpos	m, kg		
iii)	Recommended Powerhouse Dimensions	m		
iv)	Recommended Crane capacity	ton		
v)	Recommended opening size in Trash Rack	mm		
2	**GOVERNOR SYSTEM**			
2.1	**GOVERNOR HEAD**			
a	Sensitivity of the governor			
b	Dead band (electronic control and hydraulic amplifier)	Hz		
c	Governor output current range	mA		
d	Range of adjustment of permanent speed droop	%		
e	Range of adjustment of temporary speed droop	%		
f	Main power supply required	Volt AC/DC		
g	Emergency power supply required	Volt AC/DC		
h	Ambient conditions			
i	Maximum & minimum temperature	^{0}C		
j	Relative humidity	%		
k	Whether built in test instruments are providing for testing purpose	Yes/No		
2.2	**OIL PRESSURE UNIT (OPU)**			
a.	**OIL PUMPS**			
i)	Make of pumps			
b	**SUMP TANK**			

II - TECHNICAL DATA SHEET				
SL.No.	**Description**	**Units**	**To be filled by the Tenderer**	**Remarks (if any)**
i)	Volume of oil in the entire system	Litres		
ii)	Volume of oil Sump Tank	Litres		
iii)	Weight of Sump Tank empty	kg		
iv)	Dimension of Sump Tank	m x m x m		
c	**ACCUMULATOR / PRESSURE OIL RECEIVERS**			
i)	Diameter and height of Accumulator	mm x mm		
ii)	All accessories like relief valve, level switches, pressure switches, Level Indicators etc. included.	Yes/No		
2.3	**TESTS & INSPECTION**			
i)	Whether Governor testing as per IEC offered	Yes/No		
ii)	Whether operation test of the complete system will be offered at shop	Yes/No		
3	**SAFETY DEVICES (ALARM /SHUTDOWN) FOR TURBINE**			
i)	Governor oil pressure low	Pressure S/W		
ii)	Oil level low in Sump Tank	Float S/W		
iii)	Mechanical Over Speed device	Centrifugal Switch		
iv)	Controlled action shut down	Trip Relay		
v)	Emergency shutdown	Trip Relay		
vi)	Cooling water flow low	Flow S/W		
vii)	Gear box bearing temperature	RTD DTT		
viii)	Turbine Bearing temperature high	RTD DTT		
4	**COOLING WATER SYSTEM**			
A	**For TG Units**			
4.1	**Cooling Water Requirement**			
a)	Generator Air Coolers	m^3/hr		
b)	Generator Upper Guide Bearing	m^3/hr		
c)	Generator Thrust and Lower Guide Bearing	m^3/hr		
d)	Turbine Guide Bearing	m^3/hr		
e)	Oil Pressure Unit	m^3/hr		
f)	Turbine Shaft Seal	m^3/hr		
g)	Generator Transformers			
h)	Any other (Specify)	m^3/hr		
i)	Total for each TG unit	m^3/hr		
4.2	**Cyclone Separators**			
a)	Make			
b)	Type/Model			
c)	Quantity (Working / Standby)	nos.		
d)	Rated Flow	m3/hr		
e)	Design Pressure	bar		
f)	Flanges (Size & Class)			
g)	Body Material			
h)	Body Material Hardness	(BHN)		
i)	Internal Coating (if any)			
j)	Pressure drop across Cyclone Separator	bar		

II - TECHNICAL DATA SHEET				
SL.No.	**Description**	**Units**	**To be filled by the Tenderer**	**Remarks (if any)**
k)	Filteration efficiency down to particle size with Specific gravity	%/ Micron / Sp. Gravity		
l)	Flushing Water quantity	l/sec		
m)	Purging Valve	(type & size)		
n)	Purging Valve Material (Body/Trims)			
k)	Purging Valve Motor			
	- Protection	IP		
	- Voltage	AC/DC V		
	- Rating	kW/P		
4.3	**Motorized Automatic Online Self Cleaning Filters**			
a)	Make			
b)	Type/Model			
c)	Quantity (Working / Standby)	nos.		
d)	Rated Flow	m3/hr		
e)	Design Pressure	bar		
f)	Material of Strainer element (SS Wedge type)			
g)	Material of Filter Housing			
h)	No. of tubes	nos.		
i)	Dia. of tubes	mm		
j)	Pressure drop across Filter - clean / dirty	bar		
k)	Filteration efficiency down to particle size	%/ Micron		
l)	Minimum Operating Pressure at inlet to Filter	bar		
m)	Rating of Geared Motor & Purging Motor	kW/P		
4.4	**Valves**			
a)	Make			
b)	Pressure Rating/Class	bar		
c)	Material (body/trim)			
4.5	**Piping**			
a)	Pressure Rating/Class	bar		
b)	Pipe material			
c)	Lagging material			
d)	Cladding material			
e)	Type/Material of Fittings			
B	**For HVAC**			
4.6	**Cooling Water Requirement**			
a)	Air Handling Units (AHU)			
	AHU -1	m^3/hr		
	AHU -2	m^3/hr		
4.7	**Motorized Automatic Online Self Cleaning Strainer**			
a)	Make			
b)	Type/Model			
c)	Quantity (Working / Standby)	nos.		
d)	Rated Flow	m3/hr		
e)	Design Pressure	bar		
f)	Material of Strainer element (SS Wedge type)			
g)	Material of Filter Housing			
h)	No. of tubes	nos.		
i)	Dia. of tubes	mm		
j)	Pressure drop across Filter - clean / dirty	bar		

II - TECHNICAL DATA SHEET				
SL.No.	**Description**	**Units**	**To be filled by the Tenderer**	**Remarks (if any)**
k)	Filteration efficiency down to particle size	%/ Micron		
l)	Minimum Operating Pressure at inlet to Filter	bar		
m)	Rating of Geared Motor & Purging Motor	kW/P		
4.8	**Valves**			
a)	Make			
b)	Pressure Rating/Class	bar		
c)	Material (body/trim)			
4.9	**Piping**			
a)	Pressure Rating/Class	bar		
b)	Pipe material			
c)	Lagging material			
d)	Cladding material			
e)	Type/Material of Fittings			
C	**For Fire Water Storage Tank**			
4.1	**Cooling Water Requirement**			
a)	For Fire Water Storage Tank			
4.11	**Motorized Automatic Online Self Cleaning Strainer**			
a)	Make			
b)	Type/Model			
c)	Quantity (Working / Standby)	nos.		
d)	Rated Flow	m3/hr		
e)	Design Pressure	bar		
f)	Material of Strainer element (SS Wedge type)			
g)	Material of Filter Housing			
h)	No. of tubes	nos.		
i)	Dia. of tubes	mm		
j)	Pressure drop across Filter - clean / dirty	bar		
k)	Filteration efficiency down to particle size	%/ Micron		
l)	Minimum Operating Pressure at inlet to Filter	bar		
m)	Rating of Geared Motor & Purging Motor	kW/P		
4.12	**Pumps (if required)**			
a)	Make			
b)	Type / Model			
c)	Quantity (Working / Standby)	nos.		
d)	Flow Rate	m^3/hr		
e)	Total Discharge Head (TDH) at Pump outlet	m		
f)	Material of Casing/Impeller/Shaft			
g)	Power Requirement	BkW		
h)	Motor Rating	kW/P		
4.13	**Valves**			
a)	Make			
b)	Pressure Rating/Class	bar		
c)	Material (body/trim)			
4.14	**Piping**			
a)	Pressure Rating/Class	bar		
b)	Pipe material			
c)	Lagging material			
d)	Cladding material			
e)	Type/Material of Fittings			
5	**SERVICE & POTABLE WATER SYSTEM**			

II - TECHNICAL DATA SHEET				
SL.No.	**Description**	**Units**	**To be filled by the Tenderer**	**Remarks (if any)**
5.1	**Water Storage Tank**			
a)	Capacity / Quantity	Litres		
b)	Material			
5.2	**Hydro-Pneumatic Tank**			
a)	Make / Model			
b)	Quantity			
c)	Capacity	Litres		
d)	Pressure Rating	bar		
e)	Pump			
i)	Make			
ii)	Type/Model			
iii)	Flow rate	m3/hr		
iv)	Head	kg/cm2		
5.3	**High Pressure Rubber Hose with Gun**			
a)	Make			
b)	Quantity	nos.		
c)	Dia / Length / Pressure Rating			
5.4	**Water Purification Unit for Drinking Water**			
a)	Type / Make			
b)	Quantity / Capacity	nos. / LPH		
c)	Type of Filters included (Sediment Filter, Carbon Filter & UV Filter)	Yes/No		
5.5	**Valves**			
a)	Make			
b)	Pressure rating / Class	bar		
c)	Material (body / trim)			
5.6	**Piping**			
a)	Pressure rating / Class			
b)	Pipe Material			
5	**HP & LP COMPRESSED AIR SYSTEMS**			
5.1	**Compressors**			
a)	HP Compressors (Working / Standby)	nos.		
b)	Make			
c)	Model			
d)	Capacity of each Compressor	m^3/hr		
e)	Discharge Pressure	bar		
f)	Type of drive	Direct/ V Belt		
g)	No. of stages	nos.		
h)	Speed	rpm		
i)	kW at Compressor shaft	kW		
j)	Motor rating	kW/P		
k)	Type of Motor			
l)	Degree of Protection	IP		
m)	Insulation Class/Temp. Rise	F/B		
n)	Type of Cooling			
o)	Cooling water requirement (if water Cooled)	m^3/min		
p)	Temperature rise of Cooling water (if applicable)	^oC		
5.2	**H.P. Air Dryer**			
a)	Make			
b)	Type	Regerative /Refrigerant		
c)	Design Pressure	bar		
d)	% of Purge air	%		
e)	Dew point temperature	^oC		
5.3	**H.P. Air Receiver**			

II - TECHNICAL DATA SHEET				
SL.No.	**Description**	**Units**	**To be filled by the Tenderer**	**Remarks (if any)**
a)	Applicable standards			
b)	Volume of Receiver	m^3		
c)	Overall Dimensions (dia. x height)	mm		
d)	Design Pressure	bar		
e)	Working Pressure	bar		
f)	Test Pressure	bar		
g)	Type of Safety Device			
h)	Safety Valve Setting	bar		
i)	Material			
5.4	**L.P. Air Receiver**			
a)	Applicable Standards			
b)	Volume of Receiver	m^3		
c)	Overall Dimensions (dia. x height)	mm		
d)	Design Pressure	bar		
e)	Working Pressure	bar		
f)	Test Pressure	bar		
g)	Type of Safety Device			
h)	Safety Valve Setting	bar		
i)	Material			
5.5	**Pressure Reducer**			
a)	Make			
b)	Type			
c)	Pressure on both sides of Reducers	bar		
5.6	**Piping**			
a)	Material			
b)	Pressure rating / class	bar		
c)	Pipe / Fittings - Galvanization thickness	mm		
7	**DRAINAGE SYSTEM**			
(a)	**Powerhouse Drainage Sump size**	(L x B x H) m		
(b)	**Pumps**			
i)	Manufacturer			
ii)	Type			
iii)	Model			
iv)	Duty - continuous			
v)	Applicable Standards			
vi)	Quantity (Working/Standby)	nos.		
vii)	Rated flow of each pump	m^3/hr.		
viii)	Total discharge head	m		
ix)	Material of Casing/Impeller/Shaft			
x)	Motor rating	kW/P		
xi)	Supply Voltage /Frequency	V/Hz		
xii)	Degree of Protection	IP		
xiii)	Insulation class / Temp. rise	F/B		
xiv)	Weight of complete pump (with motor)	kg		
(c)	**Provision of std accessories**			
i)	Dismantling joint/Automatic Detachable Pedestal Coupling/Guide pipe/ Lifting chain etc.	Yes/No		
(d)	**Level Switches**			
i)	Make/ Type			
ii)	Quantity	nos.		
(e)	**Valves**			
i)	Make			
ii)	Pressure Rating/Class			
iii)	Material (body/trim)			
(f)	**Piping**			
i)	Nominal pressure			
ii)	Pipe material			
iii)	Lagging material			

II - TECHNICAL DATA SHEET				
SL.No.	**Description**	**Units**	**To be filled by the Tenderer**	**Remarks (if any)**
iv)	Cladding material			
(g)	**Portable Submersible Pump for Valve Pit**			
i)	Make			
ii)	Type / Model			
iii)	Capacity (5 L/s)	L/s		
iv)	Total Discharge Head	m		
v)	Motor Rating	kW / P		
8	**DEWATERING SYSTEM**			
(a)	**Powerhouse Dewatering Sump size**	(L x B x H) m		
(b)	**Pumps**			
i)	Manufacturer			
ii)	Type			
iii)	Model			
iv)	Duty - continuous			
v)	Applicable Standards			
vi)	Quantity (Working/Standby)	nos.		
vii)	Rated flow of each pump	m^3/hr.		
viii)	Total discharge head	m		
ix)	Material of Casing/Impeller/Shaft			
x)	Motor rating	kW/P		
xi)	Supply Voltage /Frequency	V/Hz		
xii)	Degree of Protection	IP		
xiii)	Insulation class / Temp. rise	F/B		
xiv)	Weight of complete pump (with motor)	kg		
(c)	**Provision of std accessories**			
i)	Dismantling joint/Automatic Detachable Pedestal Coupling/Guide pipe/ Lifting chain etc.	Yes/No		
(d)	**Level Switches**			
i)	Make/ Type			
ii)	Quantity	nos.		
(e)	**Valves**			
i)	Make			
ii)	Pressure Rating/Class			
iii)	Material (body/trim)			
(f)	**Piping**			
i)	Nominal pressure			
ii)	Pipe material			
iii)	Lagging material			
iv)	Cladding material			
(g)	Total time for dewatering one unit	hrs.		
(h)	**Provision of Compressed Air Injection connections for each Dewatering Line (Refer Flow Diagram)**	Yes/No		
9	**LUBRICATION OIL PURIFICATION SYSTEM**			
a)	Make			
b)	Type/ Model			
c)	Quantity	nos.		
d)	Performance Parameters			
i)	Free water (100% reduction)			
ii)	Moisture content (<50 PPM)			
iii)	Filtration (<1 Micron)			
e)	Capacity	LPH		
f)	Centrifuge (Make)			
g)	Rating - Heater bank	kW		
h)	Inlet Pumps			
i)	Quantity	nos.		
ii)	Type/ Model			
iii)	Flow	m^3/hr		
iv)	Motor Rating	kW/P		

II - TECHNICAL DATA SHEET				
SL.No.	**Description**	**Units**	**To be filled by the Tenderer**	**Remarks (if any)**
i)	Discharge Pumps			
i)	Quantity	nos.		
ii)	Type/ Model			
iii)	Flow	m^3/hr		
iv)	Motor Rating	kW/P		
j)	Vacuum Pump			
i)	Quantity	nos.		
ii)	Type/ Model			
iii)	Flow	m^3/hr		
iv)	Motor Rating	kW/P		
k)	Hoses			
i)	Make			
ii)	Type/ Model			
iii)	Quantity	nos.		
iv)	Size (Dia. x Length)	mm		
v)	Pressure Rating	bar		
10	**MAIN INLET VALVE (MIV)**			
10.1	**Dimensional Data & Weight**			
a)	Size of Valve (minimum inlet diameter of water passage)	mm		
b)	Main Valve body flange to flange dimension	mm		
c)	Flange to Flange dimension of Valve including dismantling joint & follower flange	mm		
d)	Overall dimension of Valve (including upstream & downstream pipes)	mm		
e)	Weight of Bare Valve (without counter weight)	t		
f)	Weight of Valve including Counter Weight & Servomotors	t		
g)	Weight of Complete Valve Assembly including U/P & D/S pipes	t		
h)	Heaviest component to be lifted during erection - Name/Weight	name/ t		
i)	Largest Part to be Shipped			
i)	Name			
ii)	Shipping Dimensions (L x B x H)	m		
iii)	Shipping Weight	t		
10.2	**Design Data**			
a)	Applicable Code/Standard			
b)	Design Pressure	bar		
c)	Design Flow	m^3/sec		
d)	Maximum Flow	m^3/sec		
e)	Nominal Diameter of Valve	mm		
f)	Corrosion Allowance	mm		
g)	Test Pressure			
i)	Test Pressure for Valve Body	bar		
ii)	Test Pressure for Disc Strength Test	bar		
iii)	Test Pressure for Seal Test	bar		
h)	Valve Operation Period			
i)	Valve **Closure** Time (Max./Min.)	sec		
ii)	Valve **Opening** Time with maximum friction coefficient (Max./Min.)	sec		
10.3	**Pressure Drop across Valve**			
a)	at maximum flow	m		
b)	at normal flow	m		
10.4	**Operating Mechanism**			
a)	Mode of Operation			
b)	Number of Servomotors	nos.		
c)	Servomotor design Pressure	bar		

II - TECHNICAL DATA SHEET				
SL.No.	**Description**	**Units**	**To be filled by the Tenderer**	**Remarks (if any)**
d)	Servomotor bore	mm		
e)	Servomotor stroke	mm		
f)	Weight of counter weights	t		
g)	Maximum counterweight torque	N.m		
h)	Operating torque required	N.m		
i)	Mode of tripping			
j)	Tripping Velocity	m/s		
10.5	**Seals**			
a)	Downstream Seal - Main valve			
i)	Seal fixing method			
ii)	Leakage rate	lpm		
b)	Upstream/Maintenance Seal			
i)	Seal fixing method			
ii)	Method of inflation by oil	Yes/No		
10.6	**By Pass Assembly**			
a)	Pipe diameter	mm		
b)	Pipe material/type			
c)	Type of By Pass valve-hydraulically operated (Needle Type)	Yes/No		
d)	Provision of additional Gate Valve (Manual)	Yes/No		
e)	Material of Needle & Gate Valves			
i)	Body (Cast Steel)	Yes/No		
ii)	Trim/Needle (SS)	Yes/No		
f)	Provision of Dismantling joint	Yes/No		
g)	Provision of DP Gauge Panel	Yes/No		
10.7	**Material of Construction**			
a)	Valve Body			
b)	Rotor/Disc			
c)	Trunion/Shaft			
d)	Main Trunnion Sleeve			
e)	Self-lubricating bushing for Trunion			
f)	Self-lubricating bushing for other mechanisms			
g)	Companion Flanges of Main Valve			
h)	Nuts & Bolts of Main Valve			
i)	Downstream Seal - Main Valve	Material/ Shore hardness		
j)	Upstream/Maintenance Seal	Material/ Shore hardness		
k)	Flange Seal Rings - Upstream/Downstream	Material/ Shore hardness		
l)	Seal Ring - dismantling joint	Material/ Shore		
m)	Upstream & Downstream Pipes			
n)	Dismantling cum expansion joint - Main Valve - By pass Assembly			
o)	Levers			
p)	Counter Weight			
q)	Servomotor			
i)	Servomotor body			
ii)	Servomotor rod			
10.8	**Accessories**			
a)	Air Release Valve	Yes/No		
i)	Make / Model			
ii)	Size			
iii)	Pressure Rating			
b)	Anti-Vacuum Valve	Yes/No		
i)	Make / Model			

II - TECHNICAL DATA SHEET				
SL.No.	**Description**	**Units**	**To be filled by the Tenderer**	**Remarks (if any)**
ii)	Size			
iii)	Pressure Rating			
c)	Air Release Valve and Anti-Vacuum Valve are Common / Separate?	Common / Separate		

Guaranteed Technical Particulars				
S.No.	**Description**	Units	**To be filled by the Tenderer**	**Remarks (if any)**
1	**HVAC SYSTEM**			
A)	**Ventilation System**			
1.1	**Air Handling Units (AHU)**			
a)	Manufacturer			
b)	Place of manufacturer			
c)	Applicable Standards			
d)	Nos. Supplied	nos.		
e)	Sheet thickness of exterior Panels-painted	min. 20G		
f)	Sheet thickness of interior Panels-GI 275 gm/m2	min. 20G		
g)	PUF thickness in double skin panels	min. 25 mm		
h)	Type of Fan Inlet	DIDW		
i)	Type of Fan Blades	Backward curved		
j)	Fan Impeller Dia	mm		
k)	Supply Air Fan Flow Rate	m^3/hr		
l)	Fan Total Pressure	Pa		
m)	Rated Speed of Fan	rpm		
n)	Shaft Power of Fan (BkW)	kW		
o)	Fan Efficiency	%		
p)	Belting Efficiency	%		
q)	Maximum Noise Level at 1.5 m from AHU	dB(A)		
r)	Motorised Air Damper at Fresh Air Inlet			
	· Size (LxW)	mm		
	· Type			
	· Material of Frame/Blades			
	· Motor kW of Actuator			
s)	Motorised Air Damper at Return Air Inlet			
	· Size (LxW)	mm		
	· Type			
	· Material of Frame/Blades			
	· Motor kW of Actuator			
t)	Bag Air Filters			
	· Size (LxWxD)	mm		
	· Material of Filter			
	· Cleaning efficiency/EU Rating	%		
	· Maximum pressure drop at max flow rate	Pa		
u)	Cooling Coils			
	· Type of Cooler			
	· Material of Coils/Fins			
	· No. of Rows	nos.		
	· Cooling Water requirement - Quantity / Pressure	m3/hr. at bar		
1.2	**Motors**			
a)	Make			
b)	Motor Rating	kW/P		
c)	Degree of Protection of Motor	IP 55		
d)	Class of Insulation of Motor & Temp.rise	F/B		
e)	Provision of accessories such as Base Frame, Vibration mounts etc.	Yes/No		
1.3	**Dampers**			
a)	Manufacture's name			
b)	Type of control (manual/ automatic)			
c)	Pressure drop	Pa		
1.4	**Metal Air Ducts**			
a)	Manufacturer's name			
b)	Maximum velocity of air in ducts	m/sec		
c)	Material of construction			
d)	Thickness of sheet adopted for max. dimensions	mm		
e)	Galvanizing coating thickness	gm/m2		
f)	Type of construction for joints			
g)	Thickness of insulation for supply air ducts	mm		
h)	Thermal conductivity and density of material of insulation			
i)	Supporting frame details attached	Yes/No		
j)	Whether details of fixing ducts to walls/ceiling attached	Yes/No		
1.5	**Grilles/ Diffusers**			
a)	Name of manufacturer			
b)	Frame Material			
c)	Blades Material			
d)	Terminal velocity	m/min.		

Guaranteed Technical Particulars											
S.No.	**Description**	Units	**To be filled by the Tenderer**								**Remarks (if any)**
e)	Whether opposed blade volume control damper provided behind each supply air grille	Yes/No									
1.6	**Propellar / Tube Axial Fans**										
1.6.1			**Machine Hall**	**Battery Room**	**Cable Spreader**	**Mechanical Workshop**	**Electrical Workshop**	**Lift M/c Room,**		**Toilets**	
a)	Make										
b)	Type										
c)	Quantity										
d)	Flow rate	m^3/hr									
e)	Total Pressure of Fan	Pa									
f)	Diameter of Fan	mm									
g)	Rated Speed of Fan	rpm									
h)	Noise Level	dB(A)									
i)	Motor Rating	kW/P									
j)	Degree of Protection of Motor	IP 55									
k)	Class of Insulation of Motor & Temp.rise	F/B									
l)	Provision of accessories such as Vibration mounts, Rain Cowl, Bird screen etc.	Yes/No									
B)	**Air Conditioning**										
1.7	**Air Conditioning Units / System**										
1.7.1											
I	**Indoor Units (IDU)**										
a)	Cooling Load of each Room	kcal/hr.									
b)	Make / Model										
c)	Capacity of IDU	kcal/hr.									
d)	Quantity	nos.									
e)	Fan Air Flow	m3/hr.									
f)	Fan Motor rating	kW/P									
g)	Noise Level	dB(A)									
h)	Type of Filter Material										
i)	Type of Mounting - Wall Type	Yes/No									
j)	Controller										
	• Make / Model										
	• Type - Fixed / Remote										
k)	Humidifier - Make/Type										
l)	Humidifier - Capacity										
1.7.2											
II	**Common Outdoor Unit (ODU)**										
a)	Quantity / Make										
b)	Cooling capacity of each ODU	kcal/hr.									
c)	Type of Compressor	Scroll / Screw									
d)	No. of Compressor in each ODU	nos.									
e)	Power requirement of each Compressor	kWh									
f)	Total Power Requirement of each ODU	kWh									
g)	Unit Dimensions (LxWxH)	mm									
h)	Noise Level	dB(A)									
i)	Controller										
	• Make / Model										
	• Type - Fixed / Remote										
III	Refrigerant Used	R 22									
IV	Dia. / Material of Refrigerant Piping										

Guaranteed Technical Particulars					
S. No.	**Item**	**Units**	**To be filled by the Tenderer**		**Remarks (if any)**
1	**FIRE PROTECTION SYSTEM**				
1.1	**Fire Tank Filling/Booster Pumps:**				
a)	Type of Pump offered				
b)	Design Code				
c)	Quantity	nos.			
d)	Make/Model				
e)	Capacity	m3/sec			
f)	Total Discharge Head- TDH (Bidder to Select)	mWC			
g)	Speed	rpm			
h)	No. Impeller/Stage	nos.			
i)	Efficiency at Operating Point	%			
j)	Type of Bearing				
k)	Material of Impeller				
l)	Material of Casing				
m)	Material of Shaft				
n)	Drive Motor type				
o)	Drive Motor Rating	kW/P			
p)	Drive Motor Enclosure/Insulation				
q)	List Safety Devices				
r)	Type of Strainers				
s)	Quantity of Strainers	nos.			
t)	Filtering Efficiency of Strainers	%/particle size			
1.2	**Hydrant System:**				
a)	Design Code	NFPA			
b)	Design Pressure	kg/m2			
c)	No. of Hydrants	nos.			
d)	Diameter of Main Pipe	mm			
e)	Material/Thickness of Pipe	mm			
f)	Design Code of Pipe				
g)	Size of Hose Cabinet	mmxmm			
h)	Material of Hose Cabinet				
i)	Diameter/Length of Fire Hose	mm/m			
j)	Design Code of Fire Hose	NFPA			
k)	Test Pressure of Fire Hose				
l)	Material of Fire Hose				
m)	No. of Fire Hose per Hose Cabinet	nos.			
n)	Diameter/Length of Fire Hose Reel	mm/m			
o)	Material of Fire Hose Reel				
p)	Nozzle size of Fire Hose Reel				
q)	Design Code of Fire Hose Reel	NFPA			
r)	Test Pressure of Fire Hose Reel				
s)	No. of Fire Hose Reels	nos.			
t)	Type/Thickness of Painting of Hydrant Piping	DFT			
u)	Type of wraping/coating for underground hydrant pipes	mm			
1.3	**Typical Water Spray System:**		**HVW for Transformers**	**MVW for OPU**	
a)	Design Code	NFPA			
b)	Design Pressure at Deluge Valve (DV) inlet	kg/m2			
c)	Water Discharge Density	L/min/m2			
d)	Total water flow requirement considered for each system	m3/hr.			
e)	Size/nos. of Deluge Valve	mm/nos.			
f)	Operating Mechanism of Deluge Valve	Hydraulic/ Electric			
g)	No. of Rings & dia. Of ring pipe				
h)	Dia/Nos. of Spray Nozzles				
i)	Make/Type of Fire Detectors				

Guaranteed Technical Particulars							
S. No.	**Item**	**Units**	**To be filled by the Tenderer**				**Remarks (if any)**
j)	Design Code of Detectors						
k)	No. of Fire Detectors						
l)	Minimum pressure at most remote sprinkler						
1.4	**Hydrant & Deluge Valves:**		**Hydrant Valve**		**Deluge Valve**		
i	Make						
ii	Type						
iii	Design Code						
iv	Design/ Pressure Rating	kg/m2					
v	Material of Construction						
a)	Body						
b)	Trim						
c)	Washer, Gasket etc.						
d)	Quick Coupling Connection						
e)	Spring						
f)	Cap & Chain						
g)	Strainer Type & Efficiency						
h)	Pressure Gauge Type & Make						
i)	Actuation Device						
j)	Main & Automatic Drain Valve						
k)	Control Valve Type						
1.5	**Valves:**		**Globe Valve**	**Butterfly Valve**	**Gate Valve**	**Check Valve**	
i	Make						
ii	Design/ Pressure Rating	kg/m2					
iii	Design Code						
iv	Material of Construction						
a)	Body						
b)	Trims						
c)	Disc						
d)	Seats rings						
e)	Seals						
f)	Shaft/Spindle						
g)	Gland Packing						
h)	Bonnet Stud/Nut						
i)	Yoke Nut						
1.6	**Fire Detection Equipment:**						
a)	Design Standard of Multi Sensors						
b)	Location of Multi-Sensors						
c)	Design Standard of Photoelectric Sensors						
d)	Location of Photoelectric Sensors						
e)	Design Standard of Heat Sensors						
f)	Location of Heat Sensors						
g)	Type & Nos. of Manual Call Points (MCP)						
h)	Rating/Specification of Hooters						
i)	Provision of Public Address System	Yes/No					
	-No. of Microphones/Speakers	nos.					
j)	Provision of Exit Signs	Yes/No					
k)	Provision of Portable Extinguishers Location Signs	Yes/No					
l)	Provision of Fire Safety Equipment; Furnish List	Yes/No					
1.7	**Portable Fire Extinguishers:**						
a)	Pressurised Water Type (9lit Cap.)						
b)	Design Standard / nos.	NFPA /nos.					

Guaranteed Technical Particulars				
S. No.	**Item**	**Units**	**To be filled by the Tenderer**	**Remarks (if any)**
c)	CO_2 type (4.5 kg Cap.)			
d)	Design Standard / nos.	NFPA /nos.		
e)	CO_2 type-trolley mounted (22.5 kg Cap.)			
f)	Design Standard / nos.	NFPA /nos.		
g)	DCP type (5 kg Cap.)			
h)	Design Standard / nos.	NFPA /nos.		
i)	Foam type (9 lit Cap.)			
j)	Design Standard / nos.	NFPA /nos.		
k)	Wet Chemical Type (6 lit Cap.)	For Kitchen		
l)	Design Standard / nos.	NFPA /nos.		
m)	Any Other type, specify			

Guaranteed Technical Particulars									
Sl. No.	**Description**	**Units**	**To be filled by the Tenderer**						**Remarks (if any)**
	Electrically Operated Overhead Traveling (EOT) Crane		**Powerhouse**						
A)	**General details:**								
1	**Crane to be Installed at**								
2	**No. of Cranes**								
3	**Capacity of the Crane-Safe working load**		Main Hoist		Aux. Hoist		Monorail Hoist		
4	**Type of Cranes**								
5	**Span** (Centre to Centre of Rails)	m							
6	**Longitudinal Travel**	m							
7	**Altitude of the Place**								
8	**Class of Crane**								
9	**Class of AH, CT & LT**								
10	**Standards to which Crane conforms**								
11	**Operational Speeds (loaded)**		MH	AH	CT	LT	Monorail Hoist		
							Hoist	Travel	
a)	Main Motion	m/min.							
b)	Micro Motion	m/min.							
12	**Acceleration values**	cm/sec^2							
13	**Lift of Crane**		MH		AH		Monorail Hoist		
a)	Maximum lift of hook above Service bay/Floor level	m							
b)	Maximum drop of hook below Service bay/Floor level	m							
c)	Total Lift	m							
14	**Terminal position (CT)**		Upstream		Downstream				
a)	of Main hook from center of rails	mm							
b)	of the Auxiliary hook from the center of rails	mm							
15	**Maximum Travel (LT)**		Service Bay		Other End				
a)	of the Main hook from the inner edge of walls	mm							
b)	of the Auxiliary hook from the inner edge of walls	mm							
16	**Minimum working clearances required**		Upstream		Downstream				
a)	Between center of rail and the nearest side obstruction	mm							
b)	Between the top of Crane beam and the lowest overhead obstruction	mm							
c)	Height of the End-buffers above the top of the LT crane Rail	mm							
17 a)	**Height of LT Rails**	mm							
b)	**Distance between centre line of MH hook to top of LT Rails**	mm							
18	**Controls**								
a)	Cabin operated		Yes / No						
b)	Radio Control operated / Range		Yes / No						

Guaranteed Technical Particulars								
Sl. No.	**Description**	**Units**	**To be filled by the Tenderer**					**Remarks (if any)**
c)	Type of remote control							
d)	Warning device provided		Yes / No					
19	**Tolerance to be confirmed**							
a)	Minimum possible travel, with all Brakes adjusted and Hook carrying rated load shall be :	mm	MH	AH	CT	LT	Monorail Hoist	
b)	The motor speed not to exceed 105% of synchronous speed while lowering a rated load		Yes / No					
c)	The vertical deflection of the crane girders caused by the rated load plus all dead loads not to exceed 1/1000 of the crane span		Yes / No					
d)	Camber provided	mm						
B)	**Mechanical Details:**							
1	**Crane Bridge**							
a)	Type / Construction details							
2	**Platform details (as applicable)**							
a)	Number, Type & Position of access points							
b)	Length and Width of each Platform	m						
c)	Type of access Platform to cabin							
3	Provision of clamping while in motion during Earthquake		Yes / No					
4	Provision of “Holding Clamps” when crane is not in operation		Yes / No					
5	**End Truck**							
a)	Number							
b)	Number of Wheels per Truck							
c)	LT Wheel Base diagram - attached		Yes/No					
6	**Trolley**							
a)	CT Wheel Base diagram - attached		Yes/No					
7	**Wheels**		Bridge / Truck		Trolley/ Crab			
a)	Number							
b)	Wheel Base	mm						
c)	Spacing details	mm						
d)	Diameter	mm						
e)	Width of Wheel tread	mm						
f)	Material / Chemical composition							
g)	Hardness of Wheels							
h)	Depth of Hardness	mm						
i)	Method and type lubrication for bearing							
j)	Position of Wheels with respect to end buffers	mm	Oneside		Otherside			
8	**Rails**		For Bridge		For Trolley			
a)	Section/designation (Furnish Cross Sectional diagram of the rail in the bid)							
b)	Weight per meter run	kg/m						
c)	Name of the manufacturer							
9	**Rail End Stops**							

Guaranteed Technical Particulars								
Sl. No.	**Description**	**Units**	**To be filled by the Tenderer**					**Remarks (if any)**
a)	Type							
i)	Number Provided							
ii)	Material							
b)	**Buffers (Type)**							
i)	Numbers provided							
ii)	Material							
10	**Winding Drum**							
a)	Material							
b)	Diameter and Length	mm						
c)	Depth of Groove	mm						
d)	Pitch of Groove	m						
e)	Hardness of Drum	BHN						
11	**Sheaves**		MH		AH		Monorail Hoist	
a)	Material							
b)	Diameter of Sheaves (Main/Equaliser)							
c)	Groove diameter	mm						
d)	Lead angle							
e)	Type of Sheave Guards provided							
12	**Hoisting Rope**		MH		AH		Monorail Hoist	
a)	Construction							
b)	Diameter of rope	mm						
c)	Material							
d)	Number of falls							
e)	Minimum factor of safety							
f)	Minimum Breaking load	ton						
13	**Crane Hook**		MH		AH		Monorail Hoist	
a)	Type							
b)	Lifting Capacity	ton						
c)	Material							
d)	Whether Swiveling?	Yes/No						
14	**Gears Box Details**		MH	AH	CT	LT	Monorail Hoist	
a)	Type							
b)	Total No. of reduction							
c)	Reduction ratio							
d)	Method of Lubrication							
e)	Hardness (Gear/Pinion)							
f)	Materials (Gears/Pinion)							
15	**Loads**							
a)	Load of Crane without Trolley / Crab	ton						
b)	Independent Trolley / Crab load	ton						
c)	Max. Load per Wheel & Total Load on each Crane Rail:							
i)	When Main Hook is at the center position of two LT rails	ton						
ii)	When Main Hook is at the nearest position to center line of LT rails	ton						
d)	Traction forces and impact allowance	ton	Traverse direction		Longitudenal direction			

Guaranteed Technical Particulars								
Sl. No.	**Description**	**Units**	**To be filled by the Tenderer**					**Remarks (if any)**
16	**Crane surges in transverse and longitudinal directions**	ton	CT		LT			
17	**Crane Testing load**		125% SWL					
C)	**Electrical Details:**							
1	**Motor particulars**		MH	AH	CT	LT	Monorail Hoist	
a)	Number of Motors							
b)	Type							
c)	Relative Duty factor		40%					
d)	Voltage/No. of Phase/Frequency							
e)	Speed	rpm						
f)	Rating	kW						
g)	Degree of Protection							
h)	limit	°C						
i)	Rating in minutes of continuous operation							
j)	Starting Torque	N-m						
k)	Breakdown Torque	N-m						
l)	Locked rotor current	Amp						
m)	Name of the manufacturer							
2	**Brake particulars**		MH	AH	CT	LT		
a)	Type of Brake used							
b)	Name of the manufacturer							
c)	Total number of Brakes used							
d)	Braking Torque	N-m						
i)	EHT							
ii)	DCEM							
e)	Brake Drum diameter : EHT/DCEM	mm						
f)	Brake Shoe width	mm						
g)	Material of Brake lining							
3	**Limit switch**		MH	AH	CT	LT		
a)	Number							
b)	Type							
c)	Manufacturer							
d)	Current Rating							
4	**Controllers (for each motion)**		MH	AH	CT	LT		
a)	Type of Controller							
b)	Number of Steps							
c)	Manufacturer							
5	**Type of Long Travel Collectors (DSL)**							
a)	AC or DC Voltage							
b)	Type/ Material							
c)	Type of Earthing provided							
6	**Type/ Material of Transverse Current Collection System**							
7	**Lighting & Other Accessories**							

Guaranteed Technical Particulars						
Sl. No.	**Description**	**Units**	**To be filled by the Tenderer**			**Remarks (if any)**
a)	Bridge Lighting (type, rating & numbers)					
b)	Underbridge (type, rating & numbers)					
c)	Cabin (type, rating & numbers)					
d)	Warning Lights & Alarm System					
8	**Other Electrical Details**					
a)	Rating of Incoming Feeder					
b)	Cable size					
c)	Rating of Incoming MCCB					
d)	Normal rating, Fault level and numbers of O/G Feeders for					
i)	Main Hoist Feeders					
ii)	Aux. Hoist Feeders					
iii)	CT Feeders					
iv)	LT Feeders					
v)	Lighting Feeders					
vi)	Misc Feeders					
vii)	Any other Feeder, describe					
e)	Rating of Contactors					
i)	Main Hoist Feeders					
ii)	Aux. Hoist Feeders					
iii)	CT Feeders					
iv)	LT Feeders					
v)	Lighting Feeders					
vi)	Misc Feeders					
vii)	Any other Feeder, describe					
f)	time of starting with Voltage & Frequency being at the lowest					
D)	**Other Details**					
1	**Type of Operator's Cabin**					
a)	Fixed/Moving and Open/Glazed					
b)	Location on Bridge					
c)	Type of Fire Extinguisher provided					
d)	Seating arrangement					
2	**Slenderness Ratio**					
a)	Main Compression member					
b)	Bracing and Secondary member					
c)	Ratio of unsupported length of the horizontal projection of any riveted member of Gyration					
3	**Minimum Factor of Safety**					
a)	For most strained structural Crane part					
b)	For Wire Rope					
4	**Maximum Vertical deflection of Bridge Girder**					
a)	At Rated Load + Dead load	mm				
b)	At Test load	mm				
5	**List Safety devices**					
6	**Load Limiting Device (Load Cell)**		MH	AH		

Guaranteed Technical Particulars						
Sl. No.	**Description**	**Units**	**To be filled by the Tenderer**			**Remarks (if any)**
a)	Digital Display unit		Yes/No	N/A		
b)	Overload Switch		Yes/No	Yes/No		
c)	Compression/Tension Type					
d)	Make/Model					
7	**Weight of Major Components**					
a)	Weight of Girder (Single)	ton				
b)	Weight of End Carriage with Wheels	ton				
c)	Weight of Cabin	ton				
d)	Weight of Trolley (complete assembly)	ton				
e)	Weight of Crane (without trolley)	ton				
f)	Total Weight of Crane	ton				
8	**List of Tools & accessories supplied**		Attach separate list			
9	**Heaviest package of shipment**					
a)	Name					
b)	Weight	ton				
c)	Dimension (L x B x H)	m				
10	**Largest Package for Shipment**					
a)	Name					
b)	Weight	kg				
c)	Dimension (L x B x H)	m				
11	**Painting on Equipment**					
a)	Type & Quality					
b)	Extent (no. of coats Primer/Finishing)					
c)	Total dry film thickness (DFT)	microns				

Guaranteed Technical Particulars				
Sl. No.	**Description**	**Units**	**To be filled by the Tenderer**	**Remarks (if any)**
	MECHANICAL WORKSHOP			
1	**Universal Milling Machine**			
a	Manufacturer/Model			
b	Type			
c	Table – Length x width	mm		
	Table swivel	deg		
d	No. of Spindle Speed	nos.		
e	Speed range	rpm		
f	Traverses (Longitudinal x Transversal x V	mm		
g	No. of Feeds			
2	**Lathe Machine**			
a	Manufacturer/Model			
b	Type			
c	Max. & Min dia. and height which can be	mm		
d	Admit between Centres	mm		
e	Bed (length x width)	mm		
	Swing over Bed	deg		
f	Number of Spindle speeds	nos.		
g	Feed Range			
h	Threads Range	Inch		
		mm		
3	**Radial Drilling Machine**			
a	Manufacturer/Model			
b	Type			
c	Capacity (drilling in Steel and Cast Iron)	Dia. (mm)		
d	No. of spindle speeds			
e	Range of Spindle speeds	rpm		
f	No. of Power Feeds			
g	Range of Power Feeds	mm/rev		
h	Drilling Radius (Max /Min)	mm		
i	Quill Traverse	mm		
j	Base plate to Spindle (Max/ Min)	mm		
k	Drilling Head Traverse	mm		
l	Arm Traverse	mm		
4	**Power Hacksaw**			
a	Manufacturer/Model			
b	Type			
c	Cutting capacity dia/square	mm		
d	Stroke per minute			
e	Weight			
5	**Double Ended Pedestal Grinding Machine**			
a	Manufacturer/Model			

Guaranteed Technical Particulars				
Sl. No.	**Description**	**Units**	**To be filled by the Tenderer**	**Remarks (if any)**
b	Type			
c	Wheel Size	mm		
d	Wheel Center distance	mm		
e	Weight	kg		
6	**Thyristorised Welding Rectifier**			
a	Manufacturer/Model			
b	Type			
c	Size	mm		
d	Current Range	Amp		
e	Welding Current Control type			
f	Class of Insulation			
g	Type of cooling			
h	Weight	kg		
7	**Bench Drill**			
a	Manufacturer/Model			
b	Type			
c	Size	mm		
8	**Oxygen Acetylene Set with accessories**			
a	Manufacturer/Model			
b	Type			
c	Size	mm		
9	**Portable Tools**			
I	Portable Electrical Drilling Machines with magnetic base			
a	Manufacturer			
b	Type/Model			
c	Quantity	nos.		
d	Size/ Capacity	mm		
II	Portable Straight Grinder			
a	Manufacturer			
b	Type/Model			
c	Quantity	nos.		
d	Size/ Capacity	mm		
III	Portable Angle Grinder			
a	Manufacturer			
b	Type/Model			
c	Quantity	nos.		
d	Size/ Capacity	mm		
IV	Portable type of Electric Oven for welding rod preheating			
a	Manufacturer			
b	Type/Model			
c	Quantity	nos.		
d	Size/ Capacity	mm		

Guaranteed Technical Particulars				
Sl. No.	**Description**	**Units**	**To be filled by the Tenderer**	**Remarks (if any)**
13	**Portable Electric Blower**			
a	Manufacturer/Model			
b	Type			
c	Capacity	m3/min		
d	Pressure	bar		
14	**Portable Flexible Shaft Grinder**			
a	Manufacturer/Model			
b	Type			
c	Collet size	mm		
V	Portable Electric Blower			
a	Manufacturer			
b	Type/Model			
c	Capacity	m3/min		
VI	Portable Flexible Shaft Grinder			
a	Manufacturer			
b	Type/Model			
c	Quantity	nos.		
d	Size/ Capacity	mm		
VII	Portable Sander / Polisher			
a	Manufacturer			
b	Capacity			
VIII	Multiple Socket with default Circuit Breaker and Cable Reel			
a	Manufacturer			
b	Type			
10	**Vacuum Cleaner (Wet & Dry)**			
a	Manufacturer			
b	Capacity			
11	**Manual Trolley (4 Wheeled)**			
a	Manufacturer			
b	Capacity	Ton		
c	Platform Size	mm		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
1)	GENERATOR & EXCITATION SYSTEM		
1	Name and Address of Manufacturer		
2	Type / Shaft Orientation		
3	Rated Speed and Direction of Rotation*		
4(a)	Normal voltage between Phases*		
b)	Voltage Variation*		
5(a)	Frequency*		
b)	Frequency Variation*		
6	Guaranteed Rated Output at rated conditions with generator temperature rise limited upto Class - B insulation temp. rise limit*		
7	Rated Power Factor*		
8	Guaranteed maximum temp. rise for rated and max. outputs guarnteed in item 6 in degreeC		
a)	Stator winding by RTD's		
b)	Rotor winding by RTD's		
c)	Bearing RTD		
d)	Other parts by thermometer		
9	Guaranteed max. output at any specified conditions (except for temperature rise limit) with generator temp. rise allowed upto class F insulation temp. rise limit. *		
10	Guaranteed max. temperature rise for the output guaranteed in item 9 above in degreeC		
a)	Stator winding by RTD's		
b)	Rotor winding by RTD's		
c)	Bearing RTD		
d)	Other parts by thermometer		
11	Guaranteed overall eff. of generator at rated voltage, p.f frequency and winding temp limit as per specification and in accordance with IS -4889 subject to tolerance in IS: 4722 *		
a	120% rated output		
b	100% rated output		
c	90% rated output		
d	80% rated output		
e	75% rated output		
f	60% rated output		
g	50% rated output		
11.1	Weighted average eff. Of generator *		
11.2	Weighted average eff. Of TG *		
12	Inherent regulation (increase in terminal voltage at constant speed and excitation on taking off(what is taking off))		
a	110% load		
b	100% load		
c	70% load		
d	60% load		
13	Generator Reactances		
a	Synchronous reactance (saturated)		
I)	Direct Axis		
ii)	Quadrature Axis		
b	Transient reactance		
I)	Direct Axis		
ii)	Quadrature Axis		
c	Subtransient reactance		
I)	Direct Axis		
ii)	Quadrature Axis		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
d	Negative phase sequence reactance		
e	Zero phase sequence reactance		
14	Resistance of armature winding per phase		
15	Resistance of field winding		
16	Stator Current at 100% rated output		
17	Reactive KVAR possible at		
a	110% rated output		
b	100% rated output		
c	90% rated output		
d	80% rated output		
e	70% rated output		
f	60% rated output		
g	50% rated output		
18	Momentary speed rise the generator can take		
19	Generator Time constants		
a	Open Circuit		
b	Short Circuit		
20	Synchronizing Power at kV full load, 50 Hz, p.f (lagging)		
21	Short Circuit ratio		
22	Flywheel effect of the		
a	Rotating parts of the generator		
b	Flywheel (if any)		
23	Duration for which all parts are guaranteed to withstand safely max. runaway speed		
24	Guaranteed mim. Factor of safety based on yield point stress of material under runaway short ciruit conditions and name and location of parts having the min, factor of safety		
25	Inertia Constant		
26	Max. runaway speed of all parts guaranteed to withstand for 15 min. of duration(without cooling water)		
27	Embedded temp. detectors		
a	Number / Type		
28	Stator		
a	Material of stator core		
b	Insulation of laminations		
c	insulation of Winding		
d	Max. temp. which the wdg. can withstand		
29	Rotor		
a	Construction of field poles		
b	Method of attaching field poles		
c	Rotor Material		
d	Rotor Construction		
e	Field winding construction		
f	Insulation of field winding		
g	Air Gap		
h	Dia of assembled rotor		
I	Factor of safety at max. runaway speed based on yield point stress of material		
j	Maximum temperature rise of field winding when operating at rated condition.		
30	Bearing		
a	Type/ No of bearings		
b	Bearing oil specifications		
c	Quantity required for first filling		
31	Generators Brakes		
a	Speed at which brakes are applied		
b	Air pressure for satisfactory operation		
c	Brake shoe material		
32	Main Shaft		
a	Material		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
b	Detail of Coupling (if applicable)		
33	Neutral Grounding equipment		
a	Distribution Transformer and Secondary Load Resistor		
b	Type		
c	Voltage Ratio		
d	Continuous Rating		
e	One minute Rating		
f	Resistor / Secondary load resistor		
g	Current rating of resistor		
h	Duty cycle of resistor & Cooling medium		
I	Overall dimensions and weight		
34	Neutral Isolating Switch		
a	Type		
b	Voltage rating frequency		
c	Normal Current		
d	Short time rating		
e	Impulse level (1.2 / 5.0 micro second wave)		
f	Power frequency dry withstand voltage (one min.)		
g	Dimensions		
h	Weight		
35	Lightning Arrestors		
a	Type		
b	Standards to which it confirms		
c	No. of units		
d	Rated voltage		
e	Nominal discharge Current		
f	Power frequency withstand voltage (one min.)		
g	Max. residual voltage at 10 KA		
h	Overall weight		
I	Mounting details		
36	Potential Transformer		
a	Type		
b	Standards to which it confirms		
c	Rated primary voltage		
d	Rated Secondary Voltage		
e	Rated burden		
f	Accuracy class		
g	Temperature rise 1.1 times rated voltage with rated burden & frequency		
h	Power frequency withstand voltage (one min.)		
I	Dimensions		
37	Current Transformer		
a	Type		
b	Standards to which it confirms		
c	Rated primary current		
d	Rated Secondary current		
e	Ratio		
f	No of cores		
g	Purpose of core		
h	Rated burden		
I	Accuracy class		
j	Temperature rise 1.1 times rated voltage with rated burden & frequency		
k	Power frequency withstand voltage (one min.)		
l	Dimensions		
38	Weight of generator rotating parts		
a	Weight of complete generator		
b	Heaviest Package for shipment		
c	Name		
d	Weight		
e	Dimensions		
39	Largest packages for shipment		
a	Name		
b	Weight		
c	Dimensions		
40	Heaviest assembly to be lifited by power house Crane		
a	Name		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
b	Weight		
c	Dimensions		
41	Excitation System		
a	Type/designation		
b	Rating of Excitation system at rated generator output and rated power factor		
c	Rated field voltage		
d	Rated field current		
e	No load excitation voltage		
f	No load field current		
g	Field forcing ceiling current and duration		
h	Maximum field current limit		
i	Minimum excitation limit		
j	Type of voltage regulator		
k	Accuracy of voltage regulation		
l	Range of voltage regulation		
m	No of independent channels		
n	No. of limiters in voltage regulator		
o	Number of Thyrister bridges		
p	Rated current of each thyristor bridge		
2)	GENERATOR TRANSFORMER & OTHER AUXILIARY TRANSFORMERS (To be indicated for each type of transformer)		
1	Name of the manufacturer		
2-a)	Continuous ratings under conditions specified in IS:2026 (Part-I)		
b)	Capability of overload		
3-a)	Rated Voltage (kV)		
b)	Highest System Voltage (kV)		
4-a)	Rated frequency Hz		
b)	Frequency Variation		
5	Number of phases		
6	Current at rated no load voltage and on principal tap (A)		
7	Type of cooling		
8	Maximum flux density in iron at normal voltage, frequency and ratio (T)		
a)	Core		
b)	Yoke		
9-a)	Winding Connections		
b)	Connection Symbol (Vector Group)		
10	Temperature rise		
a)	Temperature rise of top oil above reference peak ambient temperature of 50 deg C (by thermometer) at rated load and rated water flow.		
b)	Temperature rise of winding above reference peak ambient temperature of 50 Deg.C (by resistance method) at rated load and rated water flow.		
c)	Limit of hot spot temperature for which the transformer is designed (Deg. C)		
11	No load loss at rated frequency at		
a)	Rated voltage and frequency at principal tap (kW)		
b)	The voltage corresponding to the highest tap (kW)		
12	a) Load loss at rated output, rated frequency and corrected for 75°C winding temperature at		
a)	Principal tap (Kw)		
b)	Highest tap (Kw)		
c)	Lowest tap (kW)		
13	Tolerance, if any on the above value		
14	Total losses at normal ratio inclusive of auxiliary equipment losses (kW)		
15	Positive sequence impedance HV-LV on rated MVA base at rated current and frequency at 75 deg C winding temperature expressed as a percentage at		
a)	Principal Tap		
b)	Highest Tap		
c)	Lowest		
16	Zero sequence impedance at reference temperature of 75°C at principal tap %		
17	Reactance at rated MVA base at rated current and frequency %		
18	Regulation at full load and 75 deg C winding temperature expressed as a percentage of normal voltage		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
a)	At Unity Power Factor percent		
b)	At 0.9 Power Factor (Lagging)%		
19	Efficiency at 75 deg.C Winding Temperature as derived from guaranteed loss figures at :-		
a)	At full load %		
b)	At ¾ load %		
c)	At 1/2 load %		
20-a)	Maximum efficiency %		
b)	Load at which maximum efficiency occur (percent of full load) %		
21	Time in minutes for which the transformer can be run at full load without exceeding the maximum permissible temperature at reference ambient temperature		
22	Permissible Over load capacity (MVA)		
23-a)	Weight of core and winding		
b)	Weight of complete transformer with oil and fittings		
24	Terminal Arrangement :		
a)	High Voltage (HV) attach drawing		
b)	Low Voltage (LV) attach drawing		
c)	Neutral attach drawing		
25	Insulating and cooling medium		
26	Class of Insulation		
27	Test Voltage		
a)	Lightning impulse withstand test voltage (kV peak)		
b)	Power frequency with stand test voltage (dry) (for 1 minute) (kV rms.)		
c)	Switching impulse withstand test voltage (kV peak)		
28	Partial discharge levels at 1.5 Un/□3 kV rms. (PC)		
29	Noise level when energised at normal voltage and frequency without load (db)		
30	External short circuit withstand capacity (MVA) and duration (Seconds)External short circuit withstand capacity (MVA) and duration (Seconds)		
31	Over flux withstand capability of the transformer (Tesla)		
32	Short Circuit voltage (volts)		
3)	MEDIUM VOLTAGE SWITCHGEAR		
(a)	Make/Type/Manufacturer		
(b)	Rated Voltage HV side		
(c)	Rated Frequency		
(d)	Rated Current		
(e)	Lightning Impulse withstand voltage		
(f)	Power Frequency withstand voltage 1 min		
(g)	Rated short circuit withstand current		
(h)	Conductor material		
(i)	Material of Enclosure		
(j)	Protection class of enclosure		
(k)	Weight of complete switchgear		
(l)	Dimension of switchgear (LxWxH)		
1	Vacuum Circuit breaker (Indicate separately for each rating of Circuit Breaker)		
(a)	Type/designation		
(b)	Rated voltage		
(c)	Rated Current		
(d)	Operating sequence		
(e)	Rated Insulation level		
(f)	Power frequency withstand voltage		
(g)	Lightning impulse withstand voltage		
(h)	Rated short time withstand current for 1 second		
2	Instrument Transformer (Indicate separately for each rating of CT & PT)		
(a)	Current Transformer		
(b)	Make/manufacturer		
(c)	Standards applicable		
(d)	Rated current Primary/Secondary side		
(e)	Number of measuring/protection cores		
(f)	Accuracy class		
(g)	Burden		
(h)	Power frequency withstands voltage (1 min.)		
	Primary Winding		
	Secondary Winding		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
(i)	Lightning impulse withstand voltage		
	Primary Winding		
	Secondary Winding		
3	Potential Transformer		
(a)	Standards applicable		
(b)	Make/manufacturer		
(c)	Rated voltage Primary/Secondary side		
(d)	Number of measuring/protection windings		
(e)	Secondary winding output (VA Burden)		
(f)	Accuracy class		
(g)	Power frequency withstands voltage (1 min.)		
	Primary Winding		
	Secondary Winding		
(h)	Lightning impulse withstand voltage		
	Primary Winding		
	Secondary Winding		
4	Protection Relay (Particulars may be attached separately for each type of relay)		
(a)	Make of protection relay		
(b)	Continuous current/voltage ratings		
(c)	Type of relay		
5	Measuring Instruments		
(a)	Type/designation		
(b)	Accuracy		
6	Auxiliary Relays		
(a)	Type		
(b)	Rated current/voltage and permissible variation		
(c)	Rated Burden		
(d)	No. of NO/NC Contacts available		
7	Indicating Lamps		
(a)	Make		
(b)	Type		
(c)	Rated Voltage		
(d)	Rated power consumption		
8	Indicating meters		
(a)	Make		
(b)	Type		
(c)	Size		
(d)	Scale size		
(e)	Accuracy range offered		
(f)	Burden		
(g)	Applicable Standards		
9	Lightning Arresters		
(a)	Type		
(b)	Rated arrester Voltage		
(c)	Insulation Voltage		
(d)	Nominal discharge Current at 8/20 micro sec wave		
(e)	Dry Power frequency spark over voltage		
(f)	Wet Power frequency spark over voltage		
(g)	Standard Lightning impulse spark over voltage		
(h)	Earthing Device (If provided)		
4)	415V LOW VOLTAGE SWITCHGEAR		
1	Complete Equipment		
a	Power frequency test		
b	Rated continuous current		
c	Short time current		
d	Mechanical (momentary 1 second) withstand rating (asymmetrical)		
e	Temperature rise at rated continuous current above ambient temp. of 50 deg C		
2	Circuit Breaker		
a	Name of manufacturer		
b	Type, model and designation		
c	Applicable standard		
d	number of poles		
e	Continuous current rating		
f	Frequency		
g	Operating time		
h	Closing time		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
l	Contact parting, cycles		
j	Rated interrupting time, cycles		
k	Method of closing		
l	Type of main contacts		
m	I) Closing coil voltage range, %		
	ii) Current		
n	I) Tripping Coil voltage range, %		
	ii) Current		
o	Spring charging motor		
I	Voltge		
ii	Range of operation, %		
p	Power required at rated voltage (220V, dc) for		
I	Closing coil		
ii	Tripping Coil		
q	Number of auxiliary contacts (NO + NC)		
r	Rated short time breaking current, KA (rms), one sec.		
s	Weight of each circuit breaker		
t	Are breaker physically interchangeable		
3	415 V Switchboards (Unit Auxiliary Boards / Station Service Board)		
a	Name of manufacturer		
b	type,model and designation		
c	applicable standard		
d	method of ventilation		
e	overall dimension of each Switchboard/panel		
f	thickness of sheet steel used in front side and rear panel wall, mm		
g	dimension of block outs at the top/bottom for receiving power and control		
h	details of painting inside and outside		
4	Bus Bars		
a	Applicable standard		
b	material and cross section of each bus bar		
c	number of bus bar per phase and their arrangement		
d	Voltage rating		
e	Continuous current rating (A)		
f	short time rating, one sec., kA (rms)		
g	Clearance between phase		
h	Clearance between phase and ground		
I	Support insulator type		
j	Support insulator material		
5	Current Transformers (For Each CT)		
a	Name of manufacturer		
b	Type, model and designation		
c	transformation ratio		
d	One second thermal current, kA (rms)		
e	Rated dynamic current, kA (asymmetrical)		
f	Accuracy class		
g	VA burden		
h	Instrument security factor		
I	frequency		
j	Applicable standard		
6	Potential Transformers (For eact PT)		
a	Name of manufacturer		
b	type,model and designation		
c	Applicable standard		
d	transformation ratio		
e	VA burden		
f	Accuracy class		
g	rated voltage factor		
h	Winding connection		
7	HRC fuses		
a	Name of manufacturer		
b	type,model and designation		
c	Applicable standard		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
d	rated voltage		
e	rated current		
f	rupturing current at rated voltage		
8	Instruments and meters		
a	Name of manufacturer		
b	type,model and designation		
c	Applicable standard		
d	Size		
e	VA burden		
f	power consumption		
g	temperature at which calibrated		
h	maximum scale length		
I	Accuracy		
9	Control and Selector Switch		
a	Name of manufacturer		
b	type,model and designation		
c	Applicable standard		
d	Number of positions		
e	number of contacts (NO + NC) available in each position		
10	Relays (Protective and auxiliary)		
a	Name of manufacturer		
b	type,model and designation		
c	Applicable standard		
d	drawout type/ non draw out type		
e	VA Burden		
f	Type of mounting, flush or projecting		
g	Operating voltage		
h	Power consumption		
I	Contact drop out time, ms		
j	number of NO+NC contact		
k	interrupting capacity		
11	Timers		
a	Name of manufacturer		
b	Applicable standard		
c	Type and model		
d	Range		
12	Terminal block		
a	for current transformer		
I	manufacturer		
ii	Type		
b	for control wiring		
I	manufacturer		
ii	type		
b	for potential transformer		
I	manufacturer		
ii	type		
iii	Applicable standard		
13	Indicating lights		
a	manufacturer		
b	Type		
c	Applicable standard		
5)	CONTROL & PROTECTION SYSTEM (To be indicated for each type of relay)		
1	INSTRUMENTS AND METERS AND RECORDERS		
	(Ammeter, Voltmeter, kWh meter, KVARH, meter, frequency meter etc.)		
a	Makers Name		
b	Type and size		
c	Type of movement		
d	Type of mounting		
e	Whether magnetically shielded or not		
f	Limits of error in the effective range		
g	Maximum scale length		
h	Whether tropicalized		
I	Short time Overload Capacity		
j	CT ratio		
k	PT ratio		
l	VA burden & accuracy class		
i	Current Coil		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
ii	Potential Coil		
m	Details of shunt if any		
n	Rated current		
o	Rated voltage		
p	Thermal rating		
I	Current coil		
ii	Voltage coil		
iii	Time in second		
iv	Power Consumption		
v	Temperature at which the instruments are calibrated		
vi	Description leaflets reference number submitted		
vii	Type of selector switch		
viii	Overall dimension		
ix	Rated current and voltage		
x	Standards adopted		
2	PROTECTIVE RELAYS		
a	Overcurrent & Earth Fault (Should preferably be directional)		
I	Makers name		
ii	Type		
iii	Reference standards		
iv	Type of case		
v	Type of mounting		
vi	No. of contacts		
vii	Normally open		
viii	Normally closed		
ix	Contact rating		
x	Make and carry continuously		
xi	Make and carry for 0.5 sec		
xii	Break		
xiii	Maximum torque angle		
xiv	Earth fault unit		
xv	Inverse time		
xvi	High set inst. Unit		
xvii	Polarization		
xviii	Current		
xix	Potential		
xx	Current Coil Rating		
xxi	Potential Coil Rating		
xxii	Peak up setting		
xxiii	Reset value		
xxiv	Accuracy value		
xxv	Tap Range		
xxvi	VA Burden		
xxvii	Highest tap		
xxviii	Lowest Tap		
xxix	Power Consumption		
xxx	DC current carrying capacity of tripping contacts		
xxxi	Whether the relay is hand / self reset reset type		
xxxii	Whether extra contacts provided for the actuating alarm bell in the relay itself		
xxxiii	Whether test links are incorporated in relay or not		
xxxiv	Insulation Test Voltage		
xxxv	Whether seal in contacts provided		
xxxvi	Description leaflet ref. submitted		
b	Differential Relays (Generator and Transformer differential relay)		
I	Make		
ii	Type		
iii	Nominal Voltage		
iv	Permissible variation in voltage		
v	Nominal current		
vi	Permissible variation in current		
vii	Contacts,Hand reset/self reset		
viii	No. of pairs of contacts		
ix	Make contact		
x	Break contact		
xi	Speed of operation of relay		
xii	Pick up/drop of ratio		
xiii	Resetting time		
xiv	Maximum VA burden		
xv	Operating coil		
xvi	Restraining coil		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
xvii	Power consumption		
xviii	Operating coil		
xix	Restraining coil		
xx	Harmonic restraint provided or not		
xxi	Tap range		
xxii	Whether seal in contact provided or not		
xxiii	Contact rating		
xxiv	Make and carry continuously		
xxv	Make and carry for 0.5 sec.		
xxvi	Break		
xxvii	Type ofcasing and available number of terminals		
xxviii	Type of mounting		
c.	Over Voltage Relay		
I	Maker's name		
ii	Type		
iii	Whether any over voltage coil provided		
iv	Operation time		
v	VA Burden		
vi	Trip circuit current		
vii	Voltage rating and setting		
viii	time setting		
ix	Overall max. dimension		
d.	Negative Phase Sequence Relay		
I	Maker's name		
ii	Type		
iii	Current coil rating		
iv	Voltage coil rating		
v	Operating time		
vi	VA Burden		
vii	Operating time setting		
viii	Overall max. dimaension		
e.	Reverse Power Relay		
I	Maker's name		
ii	Type		
iii	Current coil rating		
iv	Voltage coil rating		
v	Operating time		
vi	VA Burden		
vii	Operating time setting		
viii	Overall max. dimaension		
f.	Stator Earth fault Relay		
I	Maker's name		
ii	Type		
iii	Rated Voltage		
iv	Rated Frequency		
v	Voltage settings		
vi	Resetting Voltage		
vii	Accuracy value		
viii	Resetting time		
ix	Continuous thermal rating		
x	Short time thermal rating		
xi	Operating time		
xii	VA Burden		
xiii	Contact arrangement		
xiv	Power rating		
xv	Power frequency withstand voltage		
xvi	Overall max. dimaension		
g.	Loss of Field Relay		
I	Maker's name		
ii	Type of Relay		
iii	Operating Characteristics		
iv	operating Resetting time		
v	Contact Capacity		
vi	Burden at max. reach setting with off set		
vii	Overall dimension		
h.	Restricted earth Fault Relay		
I	Make		
ii	Type		
iii	Reference standards		
iv	Contact rating		
v	Make and carry continuously		
vi	Make and carry for 0.5 sec		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
vii	Break		
viii	Operating time		
ix	Setting range		
l	Fuse Failure Relay		
i	Make		
ii	Type		
iii	Reference standards		
iv	Rated voltage		
v	Rated DC voltage		
vi	Operating principle		
vii	Thermal rating		
viii	Number of contacts		
ix	Normally open		
x	Normally closed		
xi	Contact self reset/hand reset		
xii	Burden		
xiii	Operation indicator provided		
xiv	Contact rating		
xv	Make and carry continuously		
xvi	make and carry for 0.5 sec.		
xvii	Break		
xviii	Operating time		
xix	Whether monitor all three phases		
xx	Whether operative on earth fault		
j.	Check Synchronizing Relay		
i	Maker's name		
ii	Type		
iii	Reference standards		
iv	Rated Current and Voltage		
v	Rated DC voltage		
vi	Operating principle		
vii	Thermal rating		
viii	No. of contacts		
ix	Normally open		
x	normally closed		
xi	Contacts,Hand reset/self reset		
xii	Burden		
xiii	Operation indicator provided		
xiv	Contact rating		
xv	Make and carry continuously		
xvi	Make and carry for 0.5 sec.		
xvii	Break		
xviii	Phase angle tolerance		
xix	Voltage difference setting		
xx	Response time with timer disconnected		
k.	High speed Trip Relay		
i	Maker's name		
ii	Type		
iii	Reference standards		
iv	Rated Current and Voltage		
v	Rated DC voltage		
vi	Operating principle		
vii	Thermal rating		
viii	No. of contacts		
ix	Normally open		
x	normally closed		
xi	Contacts,Hand reset/self reset		
xii	Burden		
xiii	Operation indicator provided		
xiv	Contact rating		
xv	Make and carry continuously		
xvi	Make and carry for 0.5 sec.		
xvii	Break		
xviii	Setting time		
xix	Operating time at rated voltage		
xx	No. of contact available		
xxi	Whether supervisory relays included		
3	ANNUNCIATORS		
a	Type of annunciators		
i	Make of annunciators		
ii	Type of particulars of window		
iii	Rated		
iv	Power consumption		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
v	Instantaneous making capacity of the contact		
vi	Breaking capacity		
b	Control Switch(Circuit Breaker)		
i	Make		
ii	Type		
iii	Type of Handle provided		
iv	No. of positions		
v	No. of contacts		
	-- Normally closed		
	-- Normally open		
vi	Making Capacity		
	-- 220/30 volts for both induction & non induction current		
	-- At 240 volts,50 cycles AC for both induction & non induction current		
vii	Breaking Capacity		
	-- 220/30 volts for both induction & non induction current		
	-- At 240 volts,50 cycles AC for both induction & non induction current		
viii	Whether spring return type to neutral or neutral put.		
ix	Type of lock provided		
4	SEMAPHORE INDICATORS		
	For Circuit Breaker & For Isolator with E / S		
i	Make		
ii	Type		
iii	Diameter of the disc		
iv	Operating voltage		
v	Burden		
vi	Whether latch in mechanism provided		
5	Restricted Earth Fault Relay		
i	Type & Make		
ii	Max. VA Burden		
iii	Operating Time		
iv	Minimum		
v	Maximum		
6	CONTROL PANELS		
i	Make		
ii	Type of construction		
iii	Finish of the Panel		
iv	Width of the colored strips of mimic diagram		
v	Full details of terminal blocks,wiring earth bar,test links & fuses for potential & DC circuits		
vi	Auxiliary supply voltage for ON/OFF discrepancy auto trip, non-trip, trip circuit healthy and spring charged lamp etc.		
vii	Dimension of the panel		
viii	Net weight of each panel.		
6)	CONTROL AND MONITORING SYSTEM (AUTOMATION, SCADA)		
1	Type /make		
2	Applicable standards		
3	No of system levels		
4	System response time		
5	Command response time		
6	Alarm response time		
7	Event response time		
8	No. of controllers		
9	No. of Engineering stations		
10	No. of operator work stations/SCADA servers		
11	No. of Communication gateways		
12	No of Printers		
13	No of Maintenance laptops		
14	Type of connections provided at local control boards for connection with mobile engineering stations		
15	Programmable processor		
16	Processor type/make		
17	Processor speed		
18	Power requirement		
19	Input supply voltage		
20	Number and type of communication ports		
21	Type and make of RTU at Markichowk SS		
22	Make and type of protocol converter		
23	Make and type of Diagnostic and monitoring station		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
24	Local area network		
(a)	Type		
(b)	Data transfer rate		
25	Data Storage		
(a)	Type of data storage media for permanent backup		
(b)	Type of data storage media for archival purpose		
26	Type and make of GPS system		
27	Manufacturer of		
(a)	Dot matrix printer		
(b)	Grey scale (Inkjet) printer		
(c)	Colour Laser printer		
(d)	Operator workstation display unit		
(e)	Engineering workstation display unit		
(f)	Laptop computer		
(g)	Optical fibre cable		
(h)	Energy meters		
(i)	Interposing relays		
(j)	GPS receiver and antenna		
28	Large screen display		
(a)	Type		
(b)	No. of tiles for each large screen display		
(c)	Diagonal length of large screen display		
(d)	Screen resolution of LSD		
29	Details of display controller		
(a)	Type		
(b)	Display		
(c)	Applicable standard		
(d)	Software used		
7)	DC SYSTEM (To be indicated for each type battery system)		
a)	BATTERY		
1	Manufacturer's name		
2	Manufacturer's type and designation		
3	Capacity of the battery at 10 hour discharge rate		
4	Cell designation in accordance with relevant Indian Standard		
5	Number of positive plates per cell and its type		
6	Number of negative plates per cell and its type		
7	Type, material and thickness of seperators		
8	Open circuit voltage of battery cell		
a)	Full charge		
b)	Floating condition		
c)	When completely discharge at		
I)	10 hour rate		
ii)	5 hour rate		
iii)	1 hour rate		
iv)	1/2 hour rate		
v)	1 minute rate		
9	Recommended starting and finishing rate of charging		
10	Trickle charging rate per cell		
11	Maximum short circuit current		
12	Allowance duration of short circuit current		
13	Containers		
a)	Type		
b)	Material		
c)	Outline dimension		
14	Terminal Connectors		
a)	Description		
b)	Type and size		
c)	Material		
15	Time to full charge at finishing rate		
16	Time to full charge at high charging rate		
17	Time to full charge in two steps, charging at starting and finishing rates		
18	Internal resistance of each cell at		
a)	Fully charged condition		
b)	Fully duischraged condition		
c)	Floating condition		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
19	Curve of internal resistance at the end of various discharge rates		
20	Weight of cell complete with acid		
21	Distance between the centres of cells when erected		
22	Racks		
a)	Outline dimension		
b)	Type and material		
c)	Antiacid coating		
d)	Weight		
23	Guaranteed/estimated life of battery		
24	Recommended quick charging voltage per cell and maximum variation		
25	Maximum electrolyte temperature that the cell can withstand without injurious effect		
a)	Continuously		
b)	Short periods		
26	Battery discharge curves at various rates between one minute and ten hour rate		
27	Curves showing relation between cell voltage and charging current, when charged at		
a)	Finishing rates		
b)	High charging rate		
c)	Two step charging by starting and finishing rates		
b)	BATTERY CHARGER		
1	Charging units		
a)	Manufacturer's name		
b)	Manufacturer's type and designation		
c)	Type of rectifier used		
d)	Rated r.m.s. A.C. voltage		
e)	Number of phases		
f)	Rated frequency		
g)	Rated D.C. voltage		
h)	Rated D.C. current		
I)	Short time rating		
j)	Type of cooling methods used		
k)	Forward power loss		
l)	Reverse power loss		
m)	Conversion efficiency		
n)	Forward voltage drop		
o)	Reverse voltage drop		
p)	Ripple factor		
q)	Voltage characteristics (showing performance curve of D.C. voltage, characteristic curve of D.C. out-put voltage plotted against D.C. output current).		
2	Rectifier Transformers		
a)	Type of rectifier transformer		
b)	Rated primary voltage		
c)	Rated secondary voltage		
d)	Rated frequency		
e)	Continuous rating		
f)	Rated output		
g)	Turns ratio		
h)	Insulation level		
I)	One minute power frequency test voltage		
I)	Primary winding		
ii)	Secondary winding		
j)	Temperature rise with 10% over load		
k)	Off load/ON load taps		
3	Voltage Regulator		
a)	Manufacturer's name		
b)	Type		
c)	Percentage stabilization of the rectifier with the help of AVR when		
I)	Input voltage changes within +/- 10% of its nominal value.		
ii)	D.C. output of the rectifier varies from no load to full load		
d)	Allowable A.C. frequency fluctuation		
e)	Percentage output voltage to which other equipment can be operated for automatic voltage regulation with the number of steps for setting as specified.		
f)	Time sensitivity of the AVR		
4	Blocking Diodes		
a)	Manufacturer's name		
b)	Continuous current rating		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
c)	Short time rating		
d)	Forward power loss and reverse power loss		
e)	Forward voltage drop on rated current		
f)	Resistance offered for reverse current flow		
g)	Peak inverse voltage		
5	D.C. Contactor		
a)	Type		
b)	Rated Voltage		
c)	Rated continuous current		
d)	Contact material		
e)	Operating coil		
i)	Voltage		
ii)	Voltage range and power for closing and holding		
iii)	Voltage range and power for drop off		
f)	Thermal trip rating		
g)	Auxiliary contact		
i)	Number		
ii)	Current rating		
6	Circuit Breaker (Details to be given for each type breaker)		
a)	Name of manufacturer		
b)	Type		
c)	Ratings		
i)	Number of poles		
ii)	Service voltage		
iii)	Normal current		
iv)	Making Capacity		
v)	Breaking capacity		
vi)	Breaking current		
vii)	Short time current (1 second)		
d)	Certificate or report of short circuit type tests		
e)	Constructional features		
i)	Number of breaks in circuit per pole		
ii)	Type of main contacts		
iii)	Type of arcing contacts and/arc control device		
iv)	Method of closing		
	Whether manual or power		
	Whether the circuit breaker trip free		
f)	Weight of circuit breaker complete with one extinguishing mechanism		
g)	Operating particulars		
i)	Opening time		
ii)	Make time		
iii)	Arc duration, to be stated for the breaking current		
c)	D.C. DISTRIBUTION BOARD		
1	Air Circuit Breakers (Details to be given for each type of circuit breaker)		
a)	Information as asked in item b) above to be furnished		
2	Under Voltage Relays (A.C. or D.C.)		
a)	Manufacturer's name		
b)	Type		
c)	Rated voltage		
d)	Number of taps		
e)	Tap range		
f)	V.A. Burden		
i)	Highest tap		
ii)	Lowest tap		
g)	Power consumption		
i)	Highest tap		
ii)	Lowest tap		
h)	Number of trip contacts and their		
i)	Making capacity		
ii)	Breaking capacity		
I)	Whether seal in contact provided or not		
j)	Description leaflet		
3	Ground Detector Relays (D.C.)		
a)	Manufacturer's name		
b)	Type		
c)	Resistance		
d)	Rated current		
e)	Sensitivity		
f)	Number of trip contacts and their		
i)	Making capacity		
ii)	Breaking capacity		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
g)	Whether seal in contact provided or not		
h)	Description leaflet		
4	Indicating Instruments (Details to be furnished for each type of instrument)		
a)	Manufacturer's name		
b)	Type		
c)	Size		
d)	Maximum scale length		
e)	Limits of error in the effective range		
f)	Short time over load capacity		
g)	Power consumption		
h)	Temperature at which instrument is calibrated		
I)	type of selector switch		
j)	Value of shunt resistance in case of ammeters		
5	Bus-Bars		
a)	Material		
b)	size		
c)	Ratings		
d)	Short circuit capacity		
e)	Short time overload capacity		
6	Panels		
a)	Manufacturer's name		
b)	Dimensions		
c)	Weight		
d)	Thickness of panel sheet		
8)	POWER & CONTROL CABLES AND CABLE TRAYS (To be indicated for each type of cable)		
1	GENERAL		
a	Name of the manufacturer.		
b	Country of Origin		
c	Manufaturer's type Designation		
d	Type & size of cable		
e	Standard Application		
f	Voltage Rating		
g	Permissible variation in voltage & Frequency		
h	Suitable for earthed/unearthed system		
2	CONDUCTOR		
a	Grade of copper/ Aluminium used		
b	Nominal Cross sectional Area		
c	Form of conductor-Circular /shaped		
d	. No. of strands in each core		
e	Nominal dia of each core		
f	Whether strands / conductor are tinned or not		
g	Maximum DC resistance at 20 deg celsius		
h	No. of cores		
3	INSULATION		
a	Material		
b	Minimum Thickness		
c	Tolerance on the smallest measured value of thickness of insulation		
d	Minimum volume resistivity at 27 deg. & 70 deg. Celsius		
e	Colour scheme of identification of cores		
f	Average dielectric strength of insulation		
g	Suitability with regard to moisture,fungus,acid,oil & alkaline surroundings		
h	Type of insulation		
4	ARMOUR		
a)	Type & Material		
b)	Nominal dimension of armour strip/wire		
c)	Whether galvanized steel wire/form wire used		
d)	Whether Aluminium strip wire used		
e)	Hardness grade of armour		
f)	Resistance of armour		
g)	Capacity to withstand fault current level and duration		
5	INNER SHEATH		
a	Material & type		
b	Whether extruded		
c	Minimum thickness of inner sheath		
d	Tolerance on the measured value of thickness		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
e	Calculated Diameter over stranded core of the cable		
f	Whether the inner sheath & the filling material are suitable for the operating temperature of the cable		
6	OUTER SHEATH/SHIELD		
a	Material		
b	Whether extruded		
c	Minimum thickness		
d	Tolerance on smallest measured value of thickness of outer sheath		
e	Whether shield is provided for special control cables		
f	Material of the shield		
g	Oxygen Index		
h	Flame retandance on single cable		
i	Flame retandance on bunched cable		
j.	Specific optical density of smoke		
k	Halogen acid gas evolution		
l	Temperature Index		
7	ELECTRICAL PROPERTIES		
a	Conductor Resistance at 20 deg. Celsius / Km.		
b	Maximum permissible conductor temperature		
I	Under continuous load		
ii	Under short circuit condition		
c	Minimum Thickness		
d	Reactance at 50 Hz. Per Km.		
e	Capacitance at 50 Hz. per Km.		
f	Current ratings		
i	In air(Continuous)		
ii	In duct(Continuous)		
g	Reference ambient temperature		
h	Short Circuit Current rating of 3 sec. Duration		
l	Derating Factor & Current Carrying Capacity under the Following conditions		
	For ambient temperature of 50 deg. Celsius		
	For Grouping of 4-6 cables in cable trench/cable rack trays & in 4-6 tiers for different spacing & also touching each other		
8	Insulation Resistance per Km. at 27 deg. Celsius		
a	Partial Discharge Level		
b	Test voltage AC & DC value & its duration for the test		
9	Mechanical Data		
a	Overall dia of cable(MM.)		
b	Dia of the cable under the sheathe		
c	Dia over the strand cores		
d	Weight of cables per Km.		
e	Drum Length		
f	Tolerance on Drum Length		
g	Total weight of the drum		
h	Dimensions of the Drum		
l	Whether identification as per the specification is being provided		
j	Whether the material will be ISI mark or not if yes photocopy of ISI license duly renewed to be submitted		
10	Cable trays, racks & supports (all type)		
a	Applicable Standards		
b	Minimum spacing between tiers		
c	Material of tray		
d	Corrosion protection		
e	Material of fasteners (bolts, nuts, washers)		
f	Proposed size of tray (L x W x H)		
g	Type of Tray		
h	Maximum permissible loading weights with the proposed supporting arrangement		
i	Type of support		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
9)	ILLUMINATION SYSTEM		
1	Moulded Case Circuit Breaker /Air circuit breaker		
a)	Name of manufacturer		
b)	Manufacturer's type and designation		
c)	Ratings		
d)	Number of poles		
e)	Service voltage		
f)	Continuous current rating		
i)	As per manufacturer's standard		
ii)	As desired for specified site conditions		
g)	Frequency		
h)	Making Capacity in Peak KA		
I)	Breaking Capacity in MVA		
j)	Breaking current in kA		
k)	Short time current rating (1 sec)		
l)	Whether indoor or outdoor		
2	Miniature Circuit Breaker		
a)	Name of manufacturer		
b)	Manufacturer's type and designation		
c)	Rating		
I)	Number of poles		
ii)	Service voltage		
iii)	Continuous current rating		
d)	Frequency		
e)	Making Capacity in Peak KA		
f)	Breaking Capacity in MVA		
g)	Breaking current in kA		
h)	Short time current rating (1 sec)		
I)	Whether indoor or outdoor		
3	Switches and other accessories		
a)	Make and type designation		
b)	Voltage grade		
c)	Current rating		
4	Distribution Boards		
a)	Make and type designation		
b)	No. of ways		
c)	Overall dimension		
d)	No. and size of cable glands		
e)	Size of bus bars		
f)	Neutral bus and neutral arrangement		
g)	Breaking capacity		
h)	Sheet thickness		
I)	Type of finish		
5	Main Lighting Boards		
a)	Overall dimension		
b)	No. and rating of incoming feeders		
c)	No. and rating of outgong feeder		
d)	Bus bar rating and breaking capacity		
e)	Clearance		
I)	Phase to Phase		
ii)	Phase to earth		
f)	Sheet thickness		
g)	No. and size of cable		
h)	Type of finish		
6	Luminaires		
a)	Make and type designation		
b)	Material		
c)	Overall dimension		
d)	Recommended location		
7	Cables		
a)	Size		
b)	Current rating		
c)	Short circuit rating		
8	Lighting Transformer		
a)	Make		
b)	Continuous Rating		
c)	Rated Voltage		
d)	Type		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
10)	EARTHING SYSTEM		
1	Grounding Conductor		
a)	Size of the conductor for earth mat		
b)	Size of the conductor for riser		
c)	Size of the conductor for equipment connection		
d)	Material of conductor for earth mat, riser, equipment connection		
e)	Fault current for calculation of size of the conductor		
f)	Duration of fault		
g)	Type of joints in the earthmat (Welded/bolted)		
h)	Corrosion Allowance		
I)	maximum conductor temperature during the fault		
2	Grounding Rods		
a)	Diameter of rods		
b)	Length of the rod		
c)	No. of rods provided		
d)	Arrangement of connection of rod to the Mat		
3	Earth Mat		
a)	Soil resistivity		
b)	Area of the Mat		
c)	Size of the grid		
d)	Size of the conductor for earth mat		
e)	length of the conductor		
f)	Resistance of the Mat		
g)	Calculated resistance of the ground rods		
h)	Combined resistance of Mat & Rods		
I)	Effective resistance of Mat Conductoir & Rods		
4	Step & Touch Potential		
a)	Resistivity of the concrete		
b)	Fault clearing time for calculation of touch/step potential		
c)	Fault current		
d)	Grid current		
e)	Allowable touch potential		
f)	Actual potential of Mat during Fault		
g)	Whether Mat potential is safe/unsafe		
h)	If unsafe, measures adopted for limiting the potential within safe value		
I)	Whether penstocks included in the Mat calculation		
j)	Drawings enclosed with the bid.		
11)	EMERGENCY DIESEL GENERATOR SETS		
1	Diesel engine		
1.1	Manufacturer/ Type designation		
1.2	Applicable standards		
1.3	Engine gross power		
1.4	Engine net power		
1.5	(rated continuous output A)		
1.6	Engine overload capacity (output B) for one hour		
1.7	Radiator capacity		
1.8	Lubrication oil consumption (max.)		
1.9	Fuel consumption under N.T.P		
	100 % load		
	75 % load		
	50 % load		
	10% overload		
1.10	Engine speed		
1.11	Method of Engine cooling		
1.12	Maximum starting time (from starting signal up to full output)		
1.13	Exhaust outlet diameter		
1.14	Exhaust flow (Total)		
1.15	Air aspiration		
2.00	**Generator**		
2.10	Rated generator Voltage & frequency		
2.20	Rated generator output		
2.30	Rated power factor		
2.40	Diesel generator set continuous output		
2.50	Overload capacity		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
2.60	Rated speed		
2.70	Temperature rise of field winding above ambient air temperature at rated output		
2.80	Temperature rise of armature winding above ambient air temperature at rated output		
2.90	Maximum starting time from rest to full load		
2.10	Generator efficiency at rated output and power factor		
2.11	Variation in terminal voltage		
2.12	Variation in frequency		
2.13	Short circuit ratio		
2.14	Protection class of enclosure		
2.15	Capacity		
2.16	Day tank		
2.17	Main oil storage tank		
2.18	Control panel		
2.19	Size of control panel		
12)	COMMUNICATION SYSTEM		
1.00	Telephone System		
(a)	Make/No. of analogue sets		
(b)	Make/No. of digital sets		
(c)	Make/No. of outdoor sets		
(d)	Make/No. of telephone sets		
(e)	Type & make of PABX System		
(f)	Capacity of subscriber		
(g)	Capacity of trunk lines		
(h)	Input power		
(i)	Tie line features		
(j)	Voice over internet protocol (VOIP)		
(k)	Computer telephony integration		
(l)	Voice mail features		
(m)	Built-in call center features		
2.00	Public Address & Alarm System		
(a)	No. of Channels		
(b)	Input power		
(c)	Band width		
(d)	No. of weather resistant outdoor speakers		
(e)	No. of indoor speakers		
(f)	No. of gooseneck microphones		
(g)	PABX telephone access		
(h)	Auxiliary audio input		
(i)	Page/party access		
(j)	Message storage and replay facility		
3.00	SECURITY & SURVEILLANCE (CCTV)		
(a)	Type/Designation		
(b)	Interfacing with Plant SCADA		
(c)	Interfacing with Access control system		
(d)	Camera		
(e)	Make of fixed dome IP camera		
(f)	Nos of fixed dome IP camera		
(g)	Dome camera resolution		
(h)	Make of IP fixed box camera		
(i)	No. of IP fixed box camera		
(j)	Box camera resolution		
(k)	Make/rating of UPS System		
(l)	Following information shall be supplied with the bid		
(m)	Pamphlets with detailed description and technical data of the proposed cameras UPS detailed write up, selection etc		
13)	33 KV SWITCHYARD		
	CURRENT TRANSFORMER		
1	Name of the manufacturer.		
2	Type		
3	Manufaturer's type Design		
4	Rated Voltage		
5	Normal Ratio of Transformer		
6	Rated primary current		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
7	Rated secondary current		
8	Number of cores		
9	Purpose of core		
10	Accuracy class		
11	Rated Burden		
12	Number of primary turns		
13	Number of secondary turns		
14	Size of primary and secondary winding conductors		
15	Instrument security factor		
16	Guaranteed temp. rise of C.T.windings when carrying a primary current equal to the rated continuous thermal current at rated frequency and burden above ambient temperature		
17	Guaranteed temp. rise of exposed current carrying parts terminal connected to external conductor by screw or bolts when carrying continuous thermal rated current		
18	PRIMARY WINDING		
i.	Rated short time current		
a.	One second kV		
b.	Three Second kV		
ii.	Rated current dynamic (peak value)		
iii	Rated continuous thermal current kA		
iv	One Minute power frequency dry kV,rms		
v	One minute power frequency wet withstand test voltage , kV , rms		
vi	1.2 / 50 micro sec. Impulse withstand voltage , kV , peak		
19	Secondary Winding		
I	One minute power frequency withstand test voltage on secondaries,kV ,rms		
ii	Voltage developed on secondary side when it gets open circuited while primary rated current at rated frequency		
iii	Measures provide against dangerous over voltage hazard due to secondary winding open circuiting		
20	WEIGHT & DIMENSIONS		
I	Wt. Of oil filling kg		
ii	Total Wt.		
iii	Mounting details		
iv	Magnetization curves of CT cores,		
v	Over all dimensions		
vi	Flux density at Rated current, frequency & rated burden		
21	PORCELAIN BUSHING		
a)	Type		
b)	Dry flash over voltage		
c)	Wet flash over voltage :		
d)	(a) Dry 60-S withstand voltage		
e)	(b) Wet 80-S withstand voltage		
22	CHARATRICTERSTICS OF BUSHING OIL		
I)	Name and type of Transformer oil		
ii)	Appearance		
iii)	Density at 30 ºC (Max.)		
iv)	Kinetic viscosity (max.)		
a)	At 30 ºC		
b)	Sub zero temperature		
v)	Interfacial tensions at 30 ºC (Min.)		
vi)	Flash point		
vii)	Pour point		
viii)	Neutralization value (total acidity max.)		
ix)	Corrosive sulfur		
x)	Dielectric strength		
a)	New un treated Oil		
b)	After treatment		
xi)	Dielectric dissipation factor (Tan □) at 90 ºC (Max.)		
xii)	Specific resistance		
a)	At 90 ºC (max)		
b)	At 27 ºC (min)		
xiii)	Oxidation ability		
a)	Neutralization value after oxidation (max)		
b)	Total sludge after oxidation		
xiv)	Presence of oxidation inhibitor		
xv)	Water contents in (max) PPM		
xvi)	Detailed specification of oil to be supplied		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
	LIGHTNING ARRESTER		
1	Name of manufacturer & country of origin		
2	Arrester class & type		
3	Applicable standard		
4	Rated voltage (KV rms.)		
5	Max. continuous operating voltage (MCOV)-(KV) rms		
6	Nominal discharge current with 8/20 microsecond wave (KA)		
7	Long duration impulse current discharge class		
8	Maximum energy discharge capability (KJ/KV)		
9	Maximum swutching current impulse residual voltage at :		
a)	1000 Amps.		
b)	500 Amps		
c)	125 Amps		
10	Maximum residual voltage with 1/20 Microsecond current wave at 10 KA (KVp)		
11	Maximum residual voltage with 8/20 Microsecond current wave for : KVp		
a)	5KA		
b)	10 KA		
c)	20 KA		
12	Prospective symmetrical fault current for witch lightning Arrester has been tested (KAp)		
13	Lightning Impulse withstand voltage of Arrester housing woth 1.2/50 microsecond wave (KVp)		
14	One minute power frequency withstand voltage of Arrester housing (dry/wet) KV rms.		
15	High current short duration impulse withstand level with 4/10 microsecond wave (KA)		
16	Pressure relief current		
i)	High current		
ii)	Low current		
17	Temporary over voltage withstand capability (KV) (Characteristic curve is to be enclosed)		
a)	0.1 second		
b)	1 second		
c)	10 second		
18 (a)	Reference voltage (KV)		
b)	Reference current (mA)		
19	Number of units per phase & rating of each unit		
20	Minimum total creepage distance (mm/KV)		
21	Leakage current (mA)		
a)	Max. Resistive		
b)	Max. Capacitive		
22	Volt.-Ampere characteristic for class I &II Arrester (to be enclosed by the tenderer)		
23	Type of Arrester terminals and possible conductor size		
24	Max. possible length of lead between surge Arrester and surge counter an earth		
25	Total weight of Arrester (Kg)		
26 (a)	Max. cantilever strength of Arrester housing (including wind load) Kgm./		
b)	Internal diameter and thickness of housing (mm)		
c)	Dry arcing distance		
27	Overall height of LA (mm)		
28	Max. distance recommended from equipment to be protected		
	By LA (mm)		
29	Min. distance between grounded object (mm)		
30	Min. distance between Arrester		
31	Max. partial discharge level (pC)		
32	Country of manufacture and size of metal oxide disc (Dia. and thickness)		
33 (a)	Lightning Impulse beyond which surge counter will respond faithfully		
b)	Scale range of leakage current meter		
	CIRCUIT BREAKER		
1	Name of the manufacturer		
2	Country of Origin		
3	Manufaturer's type & Designation		
4	No. of Poles		
5	Rated Voltage		
6	Standard Application		
7	Normal current Rating		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
a)	Symmetrical in KA		
b)	Asymmetrical in KA		
8	Frequency in Hz.		
9	Making Capacity in Peak KA		
10	Breaking Capacity		
a)	Symmetrical in KA		
b)	Asymmetrical in KA		
11	1 sec. Short Time Current Rating		
12	Total Break Time in ms		
a)	at 10 % rated interrupting capacity		
b)	at 30% rated interrupting capacity		
c)	at 60 % rated interrupting capacity		
d)	at 90 % rated interrupting capacity		
e)	at 100 % rated interrupting capacity		
13	Maximum temperature rise above ambient		
a)	Live Parts (Deg. Celsius)		
b)	Enclosure (Deg. Celsius)		
14	Breaker		
a)	Opening time in ms with no current		
b)	Opening time in ms at rated breaking current		
c)	Arcing Time in ms		
d)	Time in ms from the extinction to contact fully open		
e)	Dead time in ms for single phase reclosing		
f)	Time in ms		
i)	from ckt. energised to contacts make		
ii)	from contact make to contact fully closed		
g)	One minute power frequency withstand voltage to earth KV (rms.)		
i)	Dry		
ii)	Wet		
h)	First pole to clear factor		
I)	Out of phase switching capability of the breaker		
j)	Rated out of phase breaking current		
k)	Switchgear component load requirment		
15	CIRCUIT BREAKER MECHANISM		
a)	Type of operating mechanism		
b)	Driving mechanism motor		
c)	Close coils		
d)	Open coils		
e)	Heaters		
16	Control cubicle		
a)	Relays		
b)	Heaters		
c)	Indicators		
17	Other requirements		
18	Maximum line charging current that the breakers can interrupt		
19	Maximum overvoltage developed while breaking line charging current		
a)	Supply side in KV		
b)	Line side in KV		
20	Maximum cable charging current breaking capacity & corresponding overvoltage		
a)	supply side		
b)	line side		
21	Short time fault current breaking capacity (KA)		
22	Maximum overvoltage magnetizing current of transformer (KV)		
23	Rated operating duty cycle		
24	Minimum clearance in air in mm.		
a)	Between Poles		
b)	Between Live Parts		
c)	Between Live Parts to ground level		
25	Creepage Distance in mm.		
a)	To ground		
b)	Between Terminals		
26	Protective Creepage Distance mm.		
27	No. of Breakers in series per pole		
28	Type of main contacts		
29	Type of arcing contacts and/ or arc control device		
a)	Contact silver plated or not		
b)	Thickness of silver plating		
c)	Contact pressure		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
d)	Electric contact		
e)	Resistance at 20 deg. Celsius in Ohms.		
f)	Type of device, if any used to limit rate of rise of restriking voltage		
g)	Number & Type of spare		
h)	Auxiliary Switches provided		
i)	those closed when breaker is closed		
ii)	those open when breaker is closed		
iii)	those adjustable with respect to position of main contact		
30	Rated voltage of auxiliary contacts		
31	Material of Auxiliary Contacts		
32	Current carrying capacity of auxiliary contacts		
33	Over all dimensions in mm.		
a)	Height		
b)	Width		
c)	Length		
34	Seismic level for which the breaker is designed		
a)	Horizontal acceleration		
b)	Vertical Acceleration		
35	Weight of complete circuit breaker for foundation design		
36	Height of supporting structure		
37	Material of supporting structure		
38	Noise level of circuit breaker at 5 m distance		
39	Whether the circuit breaker is fixed trip or trip free		
40	Short Circuit type test report		
41	Porcelain Bushing / Insulatots		
a)	type		
b)	dry flashover voltage		
c)	Wet flashover voltage		
d)	Dry 60 s withstand test voltage		
e)	Wet 80 s withstand test voltage		
f)	Under oil flashover or puncture withstand test voltage (Powerfrequency)		
g)	Full wave impulse withstand test voltage with 1.2 / 50 micro sec. Wave kvp		
h)	Creepage distance in air (Total)		
I)	Protected Creepage distance		
j)	Whether the bushing is suitable for outdoor installation and extreme humid condition		
k)	Weight of assembled bushing Kg.		
l)	Whether terminal connection for all bushings included in scope of supply		
m)	test (routine / type) to be conducted on the bushing		
42	Bushing Clearances in mm.		
a)	Between Phases		
b)	Between Phase to ground		
43	Dynamic load to be transferred to foundation		
a)	C-operation (Compressive)		
b)	C-operation (Tensile)		
44	Guaranteed no. of operation		
a)	with no load current		
b)	with full fault current		
	ISOLATOR		
1	Name of the manufacturer		
2	Country of Origin		
3	Type & Application		
4	Whether Manual operated		
5	Indoor or outdoor		
6	Rated frequency		
7	No. of Poles		
8	Rated Voltage		
9	Max. permissible voltage		
10	Power frequency withstand test voltage		
a)	against ground		
I)	Dry		
ii)	Wet		
b)	Across the open poles		
I)	Dry		
ii)	Wet		
c)	Between phases		
I)	Dry		
ii)	Wet		
11	Impulse withstand test voltage without arcing horns for 1.2/50		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
	Microsecond impulse wave		
a)	Against ground		
b)	Across the open ends of the same phase		
c)	Between phases		
12	100 % impulse flashover voltage with arcing horns for 1.2/50 Micro sec.impulse wave against ground		
13	No. of break per phase		
14	Continuous current rating		
15	Rated current at		
a)	reference ambient temperature		
b)	ambient temperature of 50 deg. Celsius		
16	Rated short time withstand current of isolator and earth blade.		
17	Rated dynamic short circuit withstand current of isolator and earth switch		
18	Temperature rise over design ambient temperature		
19	Rated mechanical terminal load		
20	Thermal Lightning current at Power frequency		
a)	During 1 sec.		
b)	During 3 sec.		
21	Type test report for thermal limiting current (copy to be enclosed)		
22	Transformer magnetizing current which can be broken		
23	Line charging current which can be broken		
24	Type of terminals for receiving line / bus conductor		
25	No of terminals in control cabinet		
26	Phase to phase distance		
27	No of Auxiliary Contacts on each isolator		
a)	No. of normally open & normally closed switches		
b)	Rated Voltage		
c)	Rated Current		
d)	Test Voltage		
28	Main Contacts		
a)	Type		
b)	Materials		
c)	Surface treatment and thickness of surface coating		
29	Temperature rise of contact when carrying rated current at 50 deg celsius ambient temperature		
l)	Milli Voltage drop at the contacts		
30	Cantilever strength of the isolators		
a)	Upright		
b)	Underhung		
31	Torsional Strength		
32	Type of Mounting		
33	Bearings		
34	Insulators		
a)	Make		
b)	Type		
c)	Size		
d)	Strength		
e)	Weight		
f)	No. of unit per stack		
g)	Diameter of shed		
h)	Length of stack		
I)	Total Creepage distance		
j)	Dry arcing distance		
k)	1 min dry withstand voltage		
l)	30 sec. wet withstand voltage		
m)	power frequency withstand voltage		
n)	impulse withstand voltage		
o)	Hissing voltage at which audible noise can be detected		
p)	Puncture Voltage		
35	Clearance Minimum		
a)	Between Live Parts & Ground		
b)	Between Phases		
36	No. of times the switch can be operated without any need for inspection		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
37	No. of operation which the switch can withstand without deterioration of contacts		
38	Details of Electrical Interlocking device		
39	Weight one three pole isolating switch without earthing blade		
40	Weight of one three pole isolating switch with earthing blade		
41	Drawing for reference		
42	Motor Operating operating mechanism(The station being proposed as manned, we need only hand operated isolators)		
a)	Type		
b)	Power at normal operating		
c)	Interlocking Coil		
d)	Heating Element		
e)	Operating Time		
f)	Weight of operating mechanism		
g)	Motor		
I)	Whether AC or DC		
ii)	HP of motor		
h)	Type of interlocks provided		
I)	Reference drawings for motor operated mechanism		
43	Type of motor used		
a)	Motor whether induction / squirrel cage/universal/DC shunt / DC series		
b)	Rated voltage for operation		
c)	Single phase or three phase or DC motor		
d)	Normal rated current of motor		
e)	RPM		
f)	Whether DOL / star delta starter is used		
g)	Relays/ contactors used for reversal of direction		
h)	Direction of rotation		
i)	For opening the isolator		
ii)	For Closing the isolator		
I)	Make of motor used		
j)	Operating time of isolator		
i)	Opening in seconds		
ii)	Closing in seconds		
k)	Type of interlocks provided		
l)	Reference drawings for motor operated mechanism alongwith the detailed wire up to be submitted with the offer		
44	Current Density (Amps/sq. mm.) at the minimum cross section of		
a)	Moving blade		
b)	Terminal Pad		
c)	Contacts		
d)	Terminal Connectors		
45	Derating factor for specified site conditions		
	VOLTAGE TRANSFORMER		
1	Manufacturer's name		
2	Type of voltage transformer		
3	Rated primary voltage		
4	Number of secondary winding		
5	Rated secondary voltage		
6	Rated burden		
7	Accuracy class		
8	Material of winding		
9	Rated voltage factor for continuous and 30 secs at rated frequency and burden		
10	Temp rise at 1.9 times rated voltage for 30 seconds after stable operation at 1.2 times rated continuous voltage		
11	One minute power frequency withstand voltage(dry) on primary winding		
12	One minute power frequency withstand voltage(wet) on primary winding		
13	1.2/50 microsec impulse wave withstand test voltage on primary winding		
14	One minute power frequency withstand test voltage on secondary winding		
15	Variation in ratio and phase angle error for variation in		
a)	Voltage by 1%		
b)	frequency by 1 cycle		
16	Whether corona shield is provided		
17	Specification of insulating Oil		
18	Details of pressure relief device provided		
19	Weight and dimension		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
a)	Weight of oil		
b)	Total weight		
c)	Overall dimension		
d)	Mounting details		
e)	Shipping dimensions of largest package		
f)	Shipping weight of heaviest package		
20	Copies of type test reports conducted on similar equipment enclosed		
21	Details of Drawing enclosed		
22	Details of Galvanised Steel Structure		
I)	Weight		
ii)	Height		
iii)	Fixing Details of the equipment to the structure		
23	Details of junction boxes		
24	Details of insulators		
25	Any other information not covered above		
	SWITCHYARD STRUCTURE		
1	Tendere's name and address		
2	Manufacturer's name and address		
3	Weights of structures in tonnes		
a)	Column		
I)	Column 1		
ii)	Coumn 2		
b)	Beams		
I)	Beam 1		
ii)	Beam 2		
c)	Bus support Beams		
I)	Beam 1		
ii)	Beam 2		
d)	Lightning cum lighting Masts if provided		
e)	Post insulator supporting structure		
4	Basic Design data		
a)	Basic wind speed		
b)	Meteorogical reference wind speed		
c)	Design wind speed		
d)	Design wind pressure		
e)	Reliability level		
f)	Terrain category		
g)	Drag co-efficient for tower		
h)	Drag co-efficient for tower		
I)	Gust response factor		
j)	Drag co-efficient for conductor & ground wire		
k)	Gust response factor for conductor and groundwire		
l)	Wind span		
m)	Conductor diameter		
n)	Drag co-efficient for insulator string		
o)	Gust response factor for insulator string		
p)	50% of projected area of the insulator string		
q)	Loading calculation on tower for		
i)	Transverse load		
ii)	Vertical loads		
iii)	longitudinal loads		
5	Other Forces		
i)	Short circuit forces		
ii)	Seismic forces		
6	Maximum working stresses employed in design		
a)	Tension on net sectional area		
b)	Compression on gross sectional area at maximum slenderness ratio		
c)	Shearing stress on steel bolts		
d)	Bearing stress on steel bolts		
7	Other particulars		
i)	Maximum slenderness ratio used in design		
a)	Main leg members of column		
b)	Main boom members of beams		
c)	redundant members having normal stress		
d)	Lattice member having calculated stresses		
e)	Member under tension only		
f)	Strut formula used		
ii)	Standards according to which properties of sections have been adopted in design		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
iii)	Standard specification to which the quality of steel for the section would conform and mechanical properties of the type of steel offered		
iv)	Standard to which galvanizing shall conform		
v)	Minimum sheared edge distances		
vi)	Minimum rolled edge distances		
vii)	Quality of zinc used for galvanising		
viii)	Weight of zinc coating per ton of structure weight and minimum thickness of zinc coating		
ix)	Sizes of bolts and bolt holes		
x)	Standard to which bolts and nuts shall conform		
8	Factor of safety for structure		
a)	Normal condition		
b)	Abnormal condition of broken wire condition		
c)	Abnormal condition of Structure circuit		
	ACSR CONDUCTOR		
1	Code Name		
2	Standard to which conductor conforms		
3	Quality of material and standard to which conforming		
a)	Aluminium		
b)	Steel		
c)	Zinc		
4	Manufacturer's name and address		
a)	Aluminium rods		
b)	Steel wire rods		
c)	Complete conductor		
d)	Zinc		
5	Chemical composition		
a)	Aluminium		
b)	Steel		
c)	Zinc		
6	Composite conductor		
a)	Nominal Aluminium area		
b)	Stranding and stand diameter		
c)	No. of strands		
i)	Steel Layer		
ii)	Aluminium Layer		
	1st Layer		
	2nd Layer		
	3rd Layer		
d)	Sectional area of Aluminium		
e)	Total sectional area of Aluminium		
f)	Approximate overall diameter		
g)	Approximate weight		
h)	Calculated maximum D.C. resistance at 20 deg C		
i)	Approximate calculated breaking load		
j)	Co-efficient of linear expansion		
k)	Initial modulus of elasticity		
l)	Final modulus of elasticity		
m)	Lay ratio		
i)	Steel Core (6 wire layer)		
ii)	Aluminium		
	1st Layer		
	2nd Layer		
	3rd Layer		
n)	Continuous maximum current rating at 75 deg C corresponding to ambient temp. of 50 deg C (calculation may be enclosed)		
o)	Corona		
7	Single wire before Stranding		
a)	Diameter		
i)	Nominal Aluminium area		
ii)	Maximum		
iii)	Minimum		
b)	Cross-sectional area of nominal diameter wire		
c)	Weight		
d)	Minimum breaking load		
*i)	Before stranding		
ii)	After stranding		
e)	Calculated maximum D.C. resistance at 20 deg C		
f)	Co-efficient of linear expansion		
g)	Modulus of elasticity		
i)	Initial modulus of elasticity		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
ii)	Final modulus of elasticity		
8	Minimum stress in the steel wire corresponding to 1% elongation		
9	No. of twists on steel wire of length equal to 100 times the diameter which it can withstyand according to torsion test		
10	Zinc coating on steel strand		
a)	Method of galvanizing		
b)	No. of 1 minute dips.		
c)	No. of 1/2 minute dips		
d)	Minimum weight of zinc coating		
e)	Quality and standard to which zinc conforming		
11	Joints in standards		
a)	Method of making joint		
i)	Steel strand		
ii)	Aluminium strand		
b)	Minimum tensile strength of the finished strand with joint, if any, made in the base rod or semifinished wire		
i)	Steel		
ii)	Aluminium		
12	Length		
a)	Standard length		
b)	Tolerance,if any, on standard length		
c)	Random length		
d)	No. of random length		
13	Drum		
a)	Dimension of drum		
b)	Constructional details		
i)	Type of wood used		
ii)	No. and thickness of the piles forming the flange		
iii)	No. and diameter of barrel bolts		
iv)	Thickness of barrel batons		
v)	Thickness of external leggings		
vi)	Spindle hole diameter		
vii)	Details of protective wrapping		
viii)	Weight of the empty drum with protective wrapping and external leggings		
ix)	Weight of the conductor on the drum		
x)	Gross weight of the drum with conductor and protective leggings		
14	Standard to which the conductor drum conforms		
15	Whether the drums are suitable for use with tension stringing equipment		
16	Certification mark (ISI/BS/Any other standard)		
	GALVANISED STEEL EARTH WIRE		
1	Manufacturer's name and address		
a)	Steel wires/rods		
b)	Zinc		
c)	Galvanised steel earth wire		
2	Standard to which steel wires/rods conform		
3	Standard to which zinc conforms		
4	Standard to which complete earth wire comforms		
5	Chemical composition		
a)	Steel wire		
b)	Zinc		
6	Galvanised steel earth wire		
a)	Stranding wire size and quality of wire		
b)	Overall diameter		
c)	Cross sectional area		
d)	Minimum breaking load		
e)	Modulus of elasticity		
i)	Initial modulus of elasticity		
ii)	Final modulus of elasticity		
f)	Co-efficient of linear expansion (per deg C)		
g)	Length of Lay		
i)	maximum		
ii)	minimum		
h)	Calculated max. d.c. resistance at 20 deg C		
I)	Standard length		
j)	Tolarance,if any, on the standard lengths		
k)	Random length		
l)	No. of random length		
7	Single wire befor stranding		
a)	Diameter		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
b)	Tolerance		
c)	Weight		
d)	Minimum elongation in 1 m length		
e)	Minimum breaking strength		
f)	Minimum tensile strength		
g)	Calculated maximum D.C. resistance at 20 deg C		
h)	Normal length without joint or weld		
I)	Minimum complete turns of wrap on a material with diameter equal to four times the wire diameter		
8	Minimum elongation in 100 mm long steel wire taken from the galvanised steel ground wire		
9	Zinc coating on steel strand		
a)	Method of galvanizing		
b)	No.of 1 min dips.		
c)	No. of 1/2 minute dips		
d)	Minimum weight of zinc coating		
e)	Quality of zinc		
10	Joints in the steel strand		
a)	method of making joints		
b)	Minimum tensile strength of the finished strand with joint, if any, made in the base rod or semifinished wire		
11	Drum		
a)	Dimension of drum		
b)	Constructional details		
i)	Type of wood used		
ii)	No. and thickness of the piles forming the flange		
iii)	No. and diameter of barrel bolts		
iv)	Thickness of barrel batons		
v)	Thickness of external leggings		
vi)	Spindle hole diameter		
c)	Details of protective wrapping		
d)	Weight of the empty drum with protective leggings		
e)	Gross weight of the drum with protective leggings including ground wire		
12	Standard to which ground wire drum conforms		
13	Whether the drums are suitable for use with tension stringing equipment (yes/no)		
14	Certification mark (ISI/BS/Any other standard)		
	INSULATOR DISC AND HARDWARE		
1	Type of insulator		
2	No. of insulator Discs		
3	Maker's name and address		
4	Material and Governing standard		
5	Detailed dimensional drawing indicating tolerance. (yes/no)		
6	Dimensions		
a)	Diameter		
b)	Spacing		
c)	Creepage distance		
7	Pin-ball-shank diameter		
8	Colour		
9	Electromechanical strength		
10	Mechanical breaking strength		
11	Power frequency one-minute withstand voltage		
a)	dry		
b)	wet		
12	Impulse 1.2x50 microsecond withstand voltage		
a)	+ve wave kV (peak)		
b)	-ve wave kV (peak)		
13	Power frequency voltage (rms)		
a)	Dry		
b)	Wet		
14	Impulse 1.2x50 microsecond flashover voltage (kV)		
a)	+ve wave kV (peak)		
b)	-ve wave kV (peak)		
15	Power frequency puncture voltage		
16	Creepage distance		
17	Weight of insulator disc		
18	Locking device		
a)	Type		
b)	Material		
c)	Standard to which conforming		
19	Socket and ball ended component		
a)	Standard to which conforming		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
b)	Material and standard to which conforming		
c)	Process of galvanizing		
d)	Quality of zinc and standard to which conforming		
e)	Weight of zinc		
f)	Number of one-minute dips.		
20	Packing details (No. of disc insulators of each type per package and gross weight)		
21	Certification mark (ISI/BS/Any other standard)		
	POST INSULATOR		
1	Type of post insulator		
2	Maker's name and address		
3	Governing Standard		
4	Material		
5	maximum permissible continuous service voltage		
6	Power frequency withstand test voltage for the post insulator		
a)	Dry		
b)	Wet		
7	Lightning impulse withstand test voltage (peak)		
8	Power frequency flashover voltage		
a)	Dry		
b)	Wet		
9	Lightning impulse flashover voltage		
10	Minimum total creepage distance		
11	Height of insulator		
12	Net weight (approx.)		
13	Outside diameter		
14	Corona extinction voltage		
15	Mechanical values		
a)	Bending strength		
b)	Compression strength		
c)	Tensile strength		
d)	Torsional strength		
e)	Cantilever strength		
16	Type of mounting		
17	Dimension of post insulator		
a)	Weight		
b)	Height		
c)	insulating part diameter		
d)	Top pitch circle diameter		
e)	Bottom pitch circle diameter		
18	Fixing arrangemet for post insulator		
a)	No. of bolts per insulator		
i)	Top pitch circle diameter		
ii)	Bottom pitch circle diameter		
b)	Diameter of bolt holes		
i)	Top		
ii)	Bottom		
	OPTICAL FIBRE GROUND WIRE		
1	Manufacturer		
2	No. of fibre in OPGW		
3	Mode of transmission		
4	Buffer type		
5	Buffer tube diameter		
6	Buffer tube material		
7	No. of buffer tubes		
8	No. of fibres per tube		
9	Identification number system for individual tubes		
10	No.of empty tubes if applicable		
11	Filling material		
12	Strength members		
13	Binding yarn		
14	Aluminium alloy wires (diameter and numbers)		
15	Aluminium tube diameter		
16	Niloproximate outside diameter		
17	Cable diameter		
18	Cable cross section area		
19	Min. Breaking load /Ultimate Tensile Strength		
20	Fibre Strain margin		
21	Description		
22	Weight		
23	Crush strength		
24	Modulus of elesticity		
25	Minimum bendibng radius		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
26	Maximum bending radius		
27	Permissible tensile stress		
28	Coefficient of inner expansion		
29	Coefficient of expansion		
	• Core		
	• Cladding		
30	Nominal operating temperature range		
31	Short circuit current transient peak temp		
32	Maximum allowable temperature for lightning strike		
33	Available length of cable drum		
	• Minimum		
	• Maximum		
34	Maximum and minimum allowable Splice loss		
14)	ELECTRICAL WORKSHOP (To be indicated for each type of instrument)		
	Measuring devices		
1	Hand Operated megger (Insulation tester)		
(a)	Manufacturer		
(b)	Measuring range		
(c)	Voltage level		
2	Motorized Megger (Insulation tester)		
(a)	Manufacturer		
(b)	Measuring range		
(c)	Voltage level		
3	Digital Multimeter		
(a)	Type/Manufacturer		
(b)	Measuring range for AC Voltage		
(c)	Measuring Range for DC Voltage		
(d)	Measuring range for current (DC)		
(e)	Measuring range for current (AC)		
(f)	Measuring range in resistance		
4	Analog Multimeter		
(a)	Type/Manufacturer		
(b)	Measuring range for AC Voltage		
(c)	Measuring Range for DC Voltage		
(d)	Measuring range for current (DC)		
(e)	Measuring range for current (AC)		
(f)	Measuring range in resistance		
5	Phase sequence indicator		
(a)	Type/Manufacturer		
(b)	Input voltage (min to max)		
6	Portable digital frequency meter		
(a)	Type/Manufacturer		
(b)	Range		
7	Portable temperature measuring instrument		
(a)	Type/manufacturer		
(b)	Measuring range		
(c)	Type of sensor used		
8	Portable sound level measuring instrument		
(a)	Type/manufacturer		
(b)	Measuring range		
(c)	Frequency		
9	Clamp - on - volt - ammeter		
(a)	Type /Manufacturer		
(b)	Measurement range for AC voltage		
(c)	Measurement range for AC current		
(d)	Accuracy of measurement in Voltage range		
(e)	Accuracy of measurement in current range		
(f)	Number of Ranges in voltage mode		
(g)	Number of Ranges in current mode		
10	Portable multi-channel vibration meter		
(a)	Type		
(b)	Manufacturer		
(c)	Range of measurement		
(d)	Type of pick up		
11	Portable earth resistance measuring device		
(a)	Type		
(b)	Manufacturer		
(c)	Range of measurement		
(d)	Accuracy class		
12	DC earth fault locator		
(a)	Type		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
(b)	Manufacturer		
(c)	Range of measurement		
13	Digital Storage Oscilloscope		
(a)	Type/ Designation		
(b)	Frequency range		
(c)	Sensitivity per division		
(d)	Time basis		
14	Single phase and three phase continuously variable auto transformer		
(a)	Type		
(b)	Make/Model		
(c)	Rating		
(d)	Input voltage		
(e)	Accuracy class		
(f)	Type of transformer and rating		
15	Portable Analogue instruments (AC/DC V, amps)		
(a)	Make/Model		
(b)	Rating		
(c)	Input voltage		
(d)	Accuracy class		
16	Testing Devices		
17	Primary / secondary injection kit		
(a)	Type		
(b)	Manufacturer		
(c)	Rating		
(d)	Input voltage		
(e)	Current ranges /voltage		
(f)	Type of cooling of regulating transformer		
(g)	Rating of regulating transformer		
(h)	Rating of main transformer		
(i)	No of taps on main transformer		
(j)	Type of cooling of main transformer		
18	Electrical insulation dielectric strength test set (AC high voltage testing kit)		
(a)	Input voltage requirement		
(b)	Accuracy		
(c)	Maximum Output High voltage		
(d)	Input power requirement		
(e)	Output current		
(f)	Duty cycle		
(g)	Type of timer		
(h)	Capacity of regulating transformer		
(i)	Type of cooling in regulating transformer		
(j)	Capacity of main HV transformer		
(k)	Type of cooling in main HV transformer		
(l)	Type of reactor		
19	Thermal imaging camera		
(a)	Type		
(b)	Manufacturer		
(c)	Measuring range		
(d)	Minimum measuring distance		
(e)	Output		
(f)	Supply voltage		
(g)	Accuracy		
(h)	Response time		
20	Testing and calibration instruments		
21	Pressure transmitter		
(a)	Type		
(b)	Manufacturer		
(c)	Sensing pressure range		
(d)	Output		
(e)	Instrument supply voltage		
(f)	Type of pressure connection		
(g)	Accuracy		
22	Differential pressure transducer		
(a)	Measuring range		
(b)	Input supply voltage		
(c)	Output		
(d)	Accuracy		
(e)	Overload		
23	DC Shunt		
(a)	Type		
(b)	Manufacturer		

GUARANTEED TECHNICAL PARTICULARS			
Sl. No.	**Description**	**To be filled by the Bidder**	**Remarks (if any)**
(c)	Current range		
(d)	Voltage drop		
24	General tools and devices		
25	Hydraulic Crimping tool		
(a)	Manufacturer		
(b)	Maximum size of mould		
(c)	Hydraulic pressure		
26	Silica gel drying oven		
(a)	Manufacturer		
(b)	Size of oven		
(c)	Power requirement of oven		
(d)	Maximum temperature of the oven		
(e)	Maximum setting on thermostat		

ASSAM POWER GENERATION CORPORATION LIMITED

FORMAT of QUERIES

Sl No	Clause No IFT/GCC/PCC etc	Tender Specifications	Queries Bidder	APGCL Reply