INSTITUTE OF PHYSICS

(AN AUTONOMOUS RESEARCH INSTITUTE OF DEPARTMENT OF ATOMIC ENERGY, GOVERNMENT OF INDIA)

P.O. SAINIK SCHOOL, SACHIVALAYA MARG, BHUBANESWAR – 751005, ORISSA

TENDER NOTICE No. IP/AC-ELECTRICAL/003-2007-08

Reference : Our advertisement published in "The Samaja" & "The Times of India" on 02.02.08

Last date of Tender invited for the proposed renovation and modification of 33kv switch yard at the institute is extended up to 3:00 pm of 12.03.08.

Date and time of opening of tender (Technical bid) : 12.03.08, 4:00 pm

All other terms & conditions of the contract remain unaltered.

Tender document is available at website : http://www.iopb.res.in

DIRECTOR

INSTITUTE OF PHYSICS
PO.SAINIK SCHOOL, SACHVALAYA MARG
BHUBANESWAR - 751005
ORISSA
(AN AUTONOMOUS RESEARCH INSTITUTE UNDER DEPARTMENT OF ATOMIC ENERGY GOVERNMENT OF INDIA)

TENDER NOTICE

NO: IP/AC-Electrical/003-2007-08

Sealed tenders are invited by the "Director", Institute of Physics, Bhubaneswar-751005, Orissa, comprising of technical and financial bid separately, from registered and reputed contractors, with valid HT Electrical License issued by Electrical Inspector of Government of Orissa/ manufacturer of VCB, Transformer, CT, PT on turnkey basis like CGL/ ABB/ BHEL/ AREAVA/ SIEMENS for the Renovation and Modification of 33KV Switch Yard at Institute of Physics, Bhubaneswar, consisting of the Supply, Installation, commissioning and testing of 36 KV, Vacuum Circuit Breaker, 1MVA, 33KV/ 433V, Transformer, CT, PT, Relay Panel, DC Power Supply, 33KV grade 300Sqmm XLPE cable and the ancillary requirements for the same. The contractor should have executed similar type of works and who are on approved list of appropriate class of DAE, CPWD, State PWD, State Electricity Boards, Railways, PSUs etc. and possessing valid class-1 electrical license for the above mentioned work.

Total Estimated cost: Rs.53 Lakhs (Rupees Fifty Three Lakhs)
EMD: Rs.132500.00 (Rupees One Lakh Thirty Two Thousand Five Hundred only)
Cost of tender paper: Rs.1000.00 (Rupees One Thousand only) (Non refundable)
Tender is open for the period from: 05.02.2008 To 25.02.2008
Last date and time of submission of the tender: 25.02.2008, 3PM
Date and time for opening of tender (Technical bid): 25.02.2008 4PM
Date and time for opening of tender (Price bid – Annexure-I): After evaluation of technical bid it will be intimated to the technically successful bidders.
Place of opening of tender: Institute of Physics, Bhubaneswar, Library conference hall.
No tender document can be purchased by post.
Tender Document can be purchased from Institute of Physics, cash counter from 11Am to 1PM on payment of Rs.1000.00 in cash on any working days from: 05.02.2008 to 25.02.2008.
Contractor should have experience and should have executed similar job of minimum Rs.43 lakhs
Full form of Tender Document is available at website www.iopb.res.in Bidders may down load the Tender Documents and submit their bids as per the procedure mentioned in the tender document accompanied by a DD of Rs.1000.00 (Non refundable) favoring "Institute of Physics" payable at "Bhubaneswar" apart from the DD towards EMD.

DIRECTOR
INSTITUTE OF PHYSICS
BHUBANESWAR

INSTITUTE OF PHYSICS

PO: SAINIK SCHOOL, SACHIVALAYA MARG
BHUBANESWAR – 751005

TECHNICAL BID (PART-I)

TENDER NOTICE

NO.IP/AC-ELECTRICAL-003-2007-08

Sealed Tender is invited in two part basis from the registered and reputed contractors, with valid HT Electrical License issued by Electrical Inspector of Government of Orissa/ manufacturer of VCB, Transformer, CT, PT on turnkey basis like CGL/ ABB/ BHEL/ AREAVA/ SIEMENS for the Renovation and Modification of 33KV Switch Yard at Institute of Physics, Bhubaneswar, consisting of the Supply, Installation, commissioning and testing of 33 KV, Vacuum Circuit Breaker-2sets, 1MVA, 33KV/ 433V, Transformer-1no, CT-2sets, PT-2sets, Relay Panel-2sets, DC Power Supply-1set, 33KV grade 240Sqmm XLPE cable and the ancillary requirements for the same. The contractor should have executed similar type of works and who are on approved list of appropriate class of DAE, CPWD, State PWD, State Electricity Boards, Railways, PSUs etc. and possessing valid class-1 electrical license for the above mentioned work.
The work is estimated to cost Rs.53 lakhs. This estimate however, is given merely as a rough guide.

1. Completion time is 4 months.
2. The tender should be submitted in the original tender document super scribing *"Tender for Renovation and Modification of 33KV Switch Yard at Institute of Physics, Bhubaneswar"*.
3. The existing 33KV substation with it's equipments and other documents pertaining to the tender can be inspected by the bidders on all working days during the tender open period between 11AM to 1PM/ 3PM to 5PM.
4. The tender document will be sold to the bidders on payment of Rs.1000.00 (Non refundable) in Institute of Physics cash counter. The tender document will be sold on all working days during the period from 05.02.2008 to 25.02.2008 between 10AM to 3PM. However bidders may down load the tender document from Institute of Physics website (www.iopb.res.in) submit their bids as per the procedure mentioned in the tender document accompanied by a DD of Rs.1000.00 (Non refundable) favoring "Institute of Physics" payable at "Bhubaneswar" apart from the DD towards EMD.
5. **Tender document cannot be purchased through post.**
6. It may please be noted that the bidders submitting tenders after downloading the tender documents from IOP web site, must meet below mentioned requirements and must submit copies of all qualifying papers for verification, failing which tenders submitted by them are liable for rejection. Also no

change i.e. addition, alteration, omission or deletion in original tender document is permitted.

7 Tender documents should accompany all documents showing capability, experience in the field , past performance record, latest balance sheet, annual turn over statement and the details of works executed and must meet following requirements:

(a) Average annual financial turnover during the last three years, ending 31st March of the previous financial year, should be at least 30% of the estimated cost.

(b) Bank solvency certificate should be submitted.

(c) Experience of having successfully completed similar works during last 9 years ending last day of the month previous to the one in which applications are invited should be either of following:

(I) Three similar completed works costing not less than the amount equal to 40% of the estimated cost. OR

(II) Two similar completed works costing not less than the amount equal to 50% of the estimated cost. OR

(III) One similar completed work costing not less than the amount equal to 80% of the estimated cost.

(IV) The Bidder should have executed at least 1 No. of 33KV or 132KV MRSS under Turnkey basis within stipulated period.

(V) The Bidder has to submit the Performance/Completion certificate of owner for successful commissioning of Line, Bay or MRSS.

8 The tenderers are advised to inspect and survey the site and its surroundings and satisfy themselves before submitting their tenders as to the form and nature of the site, the means of access to the site. In general the tenderers shall themselves obtain all necessary information as to risks, contingencies and other circumstances, which may influence or affect their tender. A tenderer shall deemed to have full knowledge of the site, whether he inspects it or not and no extra claims due to any misunderstanding or otherwise shall be allowed.

9 Submission of a tender by a tenderer implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done, local conditions and other factors bearing in the execution of the works.

10 The tenderer should quote his rates in figures as well as in words. The amount for each item should be worked out and the requisite totals given. The total amount shall be written both in figures and in words.

11 Address for submission of tender : DIRECTOR, INSTITUTE OF PHYSICS, BHUBANESWAR – 751005, ORISSA.

12 Tender is open for the period from: 05. 02.2008 to 25.02.2008.

13 **Last date & Time of receipt of tender is Date 25.02.2008 & Time 3PM.**

14 **Submission of Tender**: Tenders should be submitted in sealed envelops in two parts separately, i.e. “Technical bid” and “Price bid”. Both the parts should be further sealed in an envelope super-scribing Tender no. & name of work, due date for opening, bidder’s name and address. The tender duly filled in & signed on each page, accepting the terms and conditions, may be sent to

above mentioned address either by post or hand delivered in **tender box kept in the office of the Director, after ensuring that due entries are made in the tender register kept at the counter. It should not be handed over to any employee of the Institute. No tender shall be accepted later than the time schedule specified above. Institute will not be responsible for delay in transit if sent by post.**

15 **Opening of tender – Technical Bid:** Tenders shall be received up to 15:00 Hours on 25.02.2008 and the Technical Bid (Part-I) shall be opened at 16:00 Hours on the same day in the presence of those tenderers who may be present (in case that day becomes a non-working day tenders (Technical Bid) shall be opened on next working day at the same time).

16 **Place of opening of tender**: Institute of Physics, Library conference hall.

17 **EMD: The tender shall be accompanied by earnest money of Rs. 132500.00(Rupees One Lakh Thirty Two Thousand Five Hundred) only. The earnest money may be paid in the form of Demand Draft of any Nationalized Bank drawn in favor of "Institute of Physics" payable at Bhubaneswar.**

18 **Date and time for opening of tender - Price Bid**: After evaluation of technical bid it will be intimated to the technically successful bidders

19 On acceptance of tender, earnest money will be treated as part of security deposit.

20 The tenderer shall submit the tender which satisfies each and every condition laid down in the tender documents failing which, tender is liable to be rejected.

21 Institute of Physics do not bind themselves to accept the lowest or any tender or to give any reason for their decision.

22 Institute of Physics reserve to themselves right of accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at his quoted rates.

23 This Notice Inviting Tender shall form part of the contract document.

24 Income Tax and Work Contract Tax at the prescribed rate shall be deducted at source from your bill and will be deposited with the concerned authority. Necessary TDS certificate will be issued in your favor.

25 Sales Tax, Service Tax or any other taxes and duties on materials in respect of this contract shall be payable by the contractor and Institute of Physics will not entertain any claim whatsoever in this respect.

26 **VALIDITY:** The **tenders submitted shall remain valid for acceptance for a period of 180 days from the date set for opening of the tender**. The tenderer shall not be entitled during the said period of validity to revoke or cancel his tender or vary the tender given or any item thereof. In case of tenderer revoking or canceling his tender, varying any terms in regard thereof, the earnest money paid by the tenderer along with the tender shall be forfeited by the Institute of Physics.

PART - II
SPECIAL INSTRUCTIONS TO TENDERERS

PART-II: SPECIAL INSTRUCTIONS TO TENDERERS:

1. **Introduction**: Sealed tenders are invited on two part basis (i.e. 1.Technical Bid & 2. Price Bid), by the "Director, Institute of Physics, Bhubaneswar, Orissa for the work of Renovation, Modification and Installation of existing 33KV Sub-Station. The tender paper consists of the following:

   TECHNICAL BID

   Part-I - Tender Notice
   Part-II - Special Instructions to tenderers
   Part-III - Technical Specifications
   Part-IV - Schedule of quantities
   APPENDIX-I, II, III
   DRAWINGS I & II
   PRICE BID - Schedule of quantities and rates

2. **Acceptance of Tenders:**

   The "Director, Institute of Physics, Bhubaneswar reserves the right to reject any or all tenders without assigning any reasons therefore. The lowest or any tender will not necessarily be accepted. Any tender not supported by the information requested in tender documents or not complying the provisions in the tender is liable to be rejected.

3. **Compliance with specification and tender clarifications:**

   Each bid shall deemed to be in full compliance with every clause of the specifications asked, unless exceptions are clearly defined and set forth in a separate sheet.

   The tenderer shall note that if any clarifications regarding specifications, conditions of contract, schedule of quantities and scope of work required, he should contact Institute of Physics, Engineer-in-Charge. No claim on account of any ambiguity in any respect will be entertained after issue of work order.

4. **Sub Contractors:**

   The contractor shall not sublet any/ whole part of the work with out written consent of the competent authority of Institute of Physics.

5. **PRICES:**

   The tenderers shall bid for the works in Indian Rupees for the Items listed in PRICE BID – Schedule of quantities and Rates.

   Each tenderer shall submit unit prices and total price (as per schedule of quantities and rates)

   The quantities mentioned in this schedule (Price – Bid – Schedule of quantities and Rates) shall be considered approximate only and the unit price entered in the schedule shall apply to the actual quantities measured in the completed work in accordance with the specifications. The prices quoted by the tenderer shall include the full cost of material, labour, equipment, transportation, overheads, insurance, taxes, profit and other costs associated with the completion of the work involved under the items and shall account for the full scope of the work.

Income Tax and Work Contract Tax at the prescribed rate shall be deducted at source from your bill and will be deposited with the concerned authority. Necessary TDS certificate will be issued in your favor.

The tenderer's prices shall include all insurance, taxes and duties, all traveling, transportation and accommodation costs of all his staff including supervisory personnel.

6. **Miscellaneous Works:**

In addition to the items of work specifically set out in the form of tender schedule to be performed by the contractor as per the agreement, the contractor shall at the request of Engineer, whose decision in this regard shall be final, perform such works and supply such materials, facilities and services which are contingent to the work covered by the contract or are required for the completion of the works.

7. **Co-ordination of Works:**

The contractor shall plan his works suitably so as to avoid interference with the operations of the existing systems and the work will be carried out with minimum shut down period of the power supply systems.

8 **Information to be included with the tender:** The tender shall be submitted as mentioned below:

8.1 **PRICE-BID:** All supporting data as required in PRICE-BID i.e. Schedule of Quantities and Rates has to be filled in the space provided in the same and to be submitted in separate sealed envelope as Price Bid. No other document is to be kept inside this envelope and the envelope is to be super scribed as **"Price Bid for the work of Renovation, Modification and Installation of existing 33KV Sub-Station of IOP".**

In this bid the bidder is required to quote his rates/ prices for the works mentioned in the scope of work & technical specifications. The rates/ price should be inclusive of all material cost, labor, services, charges for the plant/ machinery/ tools & tackles required for work, freight, insurance, octroi, Govt. duties, taxes, levies up to IOP site basis. No charges towards quantity variation, escalation, site difficulties, other hidden cost even though they may not have been explicitly mentioned in the scope and schedule of works shall be payable extra or separately. It is mandatory on bidder to quote all items rate as asked for in the BOQ/ Price schedule. Failure to adhere to this condition will lead to rejection of tender. The bidders should quote unconditional rates, neatly written without any overwriting/ white fluid/ erasing and duly signed & stamped at all pages.

8.2 **TECHNICAL-BID:** In this bid, the bidder should submit his company profile, organizational setup, credentials, list of plant, machinery & tools in his possession, copies of work orders successfully executed during last five years and earnest money draft. No deviations in respect of tender conditions are acceptable. **The bidder is required to attach entire tender conditions including the appendix – I, II, III (excluding Price Bid) & Drawings duly signed & stamped on each page as a token of acceptance to the tender conditions with this bid.** The following specific conditions/ documents are essential for pre-qualification:

8.2.1 The full tender document duly signed on each page with seal has to be submitted as token of acceptance of the terms and conditions mentioned therein (Excluding the price bid.

8.2.2 Earnest Money deposit (Bank Draft).

8.2.3 Receipt of the cash deposit for the cost of tender paper/ DD towards the same

8.2.4 The tenders shall contain sufficient information to permit a detailed comparison and evaluation of the tenders.

8.2.5 Copies of work orders of the similar works executed earlier shall be enclosed.

8.2.6 Schedule of similar works executed earlier shall be submitted (Appendix-II).

8.2.7 Schedule of quantities for all the items including all other consumables supplied by the contractor required for the completion of the work such as installation, testing and commissioning.

8.2.8 Satisfactory Completion & Performance certificate from the user of the works completed (preferably as per Appendix-III)

8.2.9 Details of any deviations from the specifications.

8.2.10 The detail name with address of the supplier/ makers of the equipments to be supplied for this work.

8.2.11 Confidential report from the bank.

8.2.12 Income Tax Clearance certificate

8.2.13 Copy of the service tax registration certificate.

8.2.14 Copy of TIN under VAT & PAN under IT act.

8.2.15 Copy of the Valid Electrical (HT) Contractor License.

8.2.16 Proof for approved contractor of appropriate class of DAE, CPWD, State PWD, State Electricity Boards, Railways, PSUs etc

9 **Scope of Work:**

9.1 Scope: This specification covers the work of Renovation and Modification of 33KV Switch Yard at Institute of Physics, Bhubaneswar, consisting of the Supply, Installation, commissioning and testing of 33 KV, Vacuum Circuit Breaker, 1MVA, 33KV/ 433V, Transformer, CT, PT, Relay Panel, DC Power Supply, 33KV grade HT, XLPE cable and the ancillary requirements for the same.

9.2 Inspection of the site: The contractor or his representative shall deemed to have inspected and examined the site and the surrounding before submitting his tender and to have obtained the necessary information as to risks, contingencies and other circumstances which may influence or affect his tender.

9.3 Superintendence and Labor: The contractor shall provide a competent supervisor with minimum qualification of Diploma in Electrical Engineering & who is sufficiently experienced in erection, commissioning & testing of high voltage/ medium voltage equipments. Who should be competent in reading electrical drawings and wiring diagrams. The supervisor will take care of the unloading, assembly, installation, repairs and replacement of any damaged components and the field alterations required to correct errors in detailing.

9.4 Notices: Any notice, order, direction or other communication to be given to the contractor under any of the provisions of the contract shall without limitation be conclusively deemed to have been received by the contractor if delivered or mailed to the contractor at the address mentioned in the work order or to the contractor's last known place of business or residence or to his supervisors.

9.5 Clean up & Observances of Safety and Security Precautions: The Contractor shall at all times keep the site free from the accumulation of waste material and debris and upon completion of work shall clear away and dispose off all the surplus materials rubbish and temporary works of whatsoever nature and kind as directed by the Engineer and shall leave the works and the site clean and tidy. The

contractor shall be responsible for taking all the safety precautions during construction and for keeping the site safe at all times. At the end of each working day and at all times, when the work is temporarily suspended he shall protect all the material, equipment and facilities from damage & theft.

9.6 Workmanship: The contractor shall ensure that the quality of workmanship is of the highest standard and the satisfaction of the EIC and in accordance with all relevant codes of practice issued by the ISI and the latest revisions there to, as accepted by the Engineer and local statue in force where applicable to the satisfaction of the EIC.

9.7 Deletion of Work: Portions of the work described in the specification and required to be installed by the contractor may not be required to be installed as per actual requirement and considering the actual specifications/ dimensions of each equipment keeping in view of the site space constraint. These portions of the work are not considered to be a substantial reduction of the total works to be undertaken by the contractor. The Engineer reserves the right to delete any portion of the work before or after the contract is awarded and to accept all or portions of the tender without assigning any reasons therefore.

10 **Terms and Payment:** 70% of the price for supply F.O.R site will be made on acceptance of materials at site by the Engineer-In-Charge, IOP and 20% will be paid after erection, installation, testing and successful commissioning. Balance 10% will be retained as security deposit, which will be refunded after expiry of defect liability period (Guarantee period).

11 **Penalty for the delay in completion:** If the contractor fails to execute and complete the work within the time specified in the agreement or within the period of extension granted, except is so far as the delay is on the IOP account, the contractor shall accept reduction in the total amount payable to him by the IOP at the rate of **Rs.0.5% (Half percent) per week** of the contract value for the actual pay occasioned and until the work shall have been completed under the contract.

12 **Proof of Ability:** The contractor shall submit the details of similar works executed by him in the form given in the Appendix-I as a proof of his ability to carry put the specified work.

13. **Increase or Decrease in Scope of Work:** The contractor shall carry out extra work at their quoted prices in their tender document for respective items of work so long as the entire total cost of the work executed is within the limits of ±25% of the contract value. **The quantities mentioned in schedule of quantities are indicative only and actual requirement may vary in field.**

14 **Guarantee:** All supplied materials including hardware's and work executed by the contractor shall be guaranteed for one year from the date of commissioning.

15 **Validity of the Tender:** The tender shall be valid for a period of 180 days from the date of opening of the tender.

16 **Insurance:** Contractor shall obtain and keep alive a workman all risk insurance policy to cover all persons working for this contract. The insurance policy shall be valid till the completion of contract.

17 **Security Deposit:** 10% of contract value will be deducted as security deposit and will be released after one year from the date of completion of work (Defect

liability period). No interest shall be paid on EMD/ Security deposit or the amount to the contractor under contract.

18. **Earnest Money:** An earnest money of Rs.132500.00 has to be enclosed along with the technical bid. The EMD shall be only in the form of Bank Draft in favor of Institute of Physics, payable at Bhubaneswar. No Cheques/ cash shall be accepted. EMD of technically disqualified bidders will be returned within 30 days from the date of evaluation of the technical bids. Refund of EMD to the bidders except the lowest 4 (four) bidders shall be made within 15 days from the date of opening of price bid. Refund of EMD of the L2, L3, & L4 bidders shall be made after award of work and site mobilization by the successful bidder. EMD of successful bidder will be retained by IOP during pendancy of the contract & shall be adjusted towards security deposit. No interest shall be given on such EMD

19. **Escalation:** No escalation over and above items' rates quoted by the bidder shall be paid during the execution of contract.

20. **Rights reserved by IOP:** Institute of Physics reserves the right to reject any or all the tenders in full or in part without assigning any reasons whatsoever, and the decision of the Institute in this regard will be binding on all the bidders. Tenders not complying any of the provisions stated in this tender document are liable to be rejected. **Director, IOP reserves the right to accept or reject any tender, either in full or part, without assigning any reasons thereof and does not bind himself to accept the lowest tender.**

21. **Entry and exit of materials from IOP campus:** Materials belonging to the contractor whether consumable or non consumable should be brought inside the IOP campus with proper entry at the main gate and any material to be taken out with proper gate pass issued by the Institute.

22. **Termination of the contract:** The Director, IOP reserves the right to terminate the contract on account of poor workmanship, failure to mobilize site, non-compliance of set norms/ specifications for the works, delay in progress of work, violation of any contract provisions by the contractor. In such cases the contractor is liable to pay liquidated damages amounting to one-month contract fees held with IOP in the form of BG along with the EMD amount held as security deposit with IOP.

23. **Dispute:** Any dispute arising out of this contract will be subjected to jurisdiction of Bhubaneswar.

24. **Statutory condition:** Tender once submitted will remain with the Institute and will never be returned to the bidders. The bids will be IOP property.

PART-III
TECHNICAL SPECIFICATIONS

GENERAL TECHNICAL REQUIREMENTS:

1. **Site Inspection:** Intending tenderers are advised to visit the site and fully familiarize themselves with the site conditions before submitting their tender. Non familiarity with site condition will not be considered a reason either for extra claims or for not carrying out the work in strict conformity with drawings and specifications.

2. **Codes and Standards:** Installation, Testing and commissioning of all the equipments shall comply with the requirements of latest editions of Indian Standards, IEC codes and practices. In addition to this installation shall meet the requirement of all applicable IE rules, Fire Insurance Regulations and all other statutory codes. Not withstanding any omissions from the specifications.

3. **Drawings:** The drawings attached with this tender document are part of the specification. The drawings are purely informative in nature and are being furnished to asses the approximate quantum of work involved in this specification. The drawings are intended to illustrate and generally indicated the scope and nature of supply and work involved and shall not necessarily be considered final and accurate in any or all respects. Drawings as per the actual requirement has to be prepared by the contractor for all the equipments considering all the aspects of the site condition before the starting of installation and shall be submitted and got approved from the EIC, IOP.

4. **Scope of Work:**

4.1 Renovation, Modification of 33KV Switch Yard at Institute of Physics, Bhubaneswar, consisting of the Supply, Installation, commissioning and testing of 33 KV, Vacuum Circuit Breaker, 1MVA, 33KV/ 433V, Transformer, CT, PT, Relay Panel, DC Power Supply, 33KV grade 240Sqmm XLPE cable, LT cables and the ancillary requirements for the same. The scope of work includes supply of workman, supervisors, tools and tackles, instruments and erection materials as required for satisfactory completion of the job.

4.2 It is not intent of this specification to specify completely herein all details of the work and materials equipment. Nevertheless all supply, installation, testing and commissioning works shall be carried out in accordance with specification, recognized standards and modern approved practices. It shall also meet the requirements of the latest issued applicable codes, Safety codes and all standard accepted practices in the locality of Institute of Physics.

4.3 Design, supply, erection, testing and commissioning of the following items:

4.3.1 Out door 36KV, 25KA, 1600Amp, and 3 pole Vacuum Circuit Breaker – 2 sets.

4.3.2 25/5/5 ratio, 30VA, 33KV CT, each set comprise of 3 no.s of single pole out door type, oil immersed CT – 2 sets.

4.3.3 33KV/110V, 200VA, oil immersed, out door type PT, each set comprise of 3 no.s of single pole PT – 2 sets.

4.3.4 Control Relay Panel suitable for the above mentioned VCB – 2 sets

4.3.5 1.5MVA, ONAN, 33KV/ 433V, 50Hz, Dyn11, core type, double wound, out door type transformer with transformer oil, copper winding complete with HT porcelain bushing to receive over head 33 KV grade, ACSR, Dog conductor and LT connection chambers suitable for connecting LT, 6 x 300 Sqmm Al, PVC insulated, armored cable – 1 set

4.3.6 Earth station with 600mm x 600mm x 10 mm GI plate electrode – 13 no.s

4.3.7 Outdoor hot dip heavily galvanized steel structure complete with all accessories for installation of the above mentioned equipments.

4.3.8 ACSR Dog Conductor for connection of above mentioned equipments.

4.3.9 1.1KV grade, 19 core, 2.5 sqmm, PVC insulated, tapped PVC inner sheath, G.I. wire armored, multi strandard copper conductor.

4.3.10 1.1KV grade, 4 core, 2.5 sqmm, PVC insulated, tapped PVC inner sheath, G.I. wire armored, multi strandard copper conductor.

4.3.11 33KV (E), 3core x 300 sqmm circular stranded Al. conductor, conductor screened with extruded cross linked (with radiant curing process) polythene (XLPE) insulated power cable.

4.3.11 End termination of 33KV, 3 core x 300Sqmm stranded Al. conductor XLPE insulated screened cable

4.3.12 Other miscellaneous requirements for the installation of above mentioned items.

5 **Installation Requirements:**

5.1 Before starting the installation work the complete layout diagram of the proposed equipments and the existing equipments with placement and distance between the same has to be prepared by the contractor. The electrical circuit diagram also has to be prepared by the contractor. All the diagrams has to be got approved by the IOP EIC. After the IOP EIC approval, the same drawings has to be got approved by the contractor from the state Electrical Inspector and following the same diagrams all the installation work has to be carried out. **All types of liaison work with the state electrical Inspector office and electricity distribution board comes under the scope of the contractor.**

5.2 All equipments, materials and accessories, provided by the contractor under the terms of this contract shall confirm to be relevant Indian standards specifications. The items shall be offered for inspection at the factory and materials shall be dispatched only after issue of shipping release by IOP EIC.

5.3 Good workmanship is the essence of this contract and shall be complied with at all times. The contractor shall have the works supervised by qualified and experienced engineers. All defects pointed out by the engineer shall be rectified immediately by the contractor free of cost.

5.4 The contractor shall terminate and connect all cables, overhead Dog conductors etc installed. The requirement of all double compression cable glands for power and control cables shall form part of the contractor's scope of supply and installation. All connections to equipment terminals shall be with crimped type Copper/ Aluminum lugs "Dowell's" make and crimped with tool and dies as approved by IOP EIC.

5.5 The contractor has to make suitable arrangement for applying to the state electrical Inspector office for the inspection of the total substation by the electrical inspector after the necessary installation work. Any defects pointed out by the Electrical Inspector on the works done by the contractor shall be rectified by the contractor free of cost. The required liaison work shall be carried out by the contractor. The approval certificate from Electrical Inspector has to be submitted to IOP EIC.

5.6 On completion of erection work then contractor shall request the engineer for inspection and tests giving 05 days in advance notice. The IOP EIC will arrange for inspection. Any defects found out by the EIC shall be rectified free of cost by the contractor.

5.7 After successful commissioning, testing and submission of all as built drawings, test reports, inspection reports etc. The contractor shall request the EIC in writing for taking over the installation. Till the engineer takes over the installation the entire installation will be under the contractor's responsibility against thefts, damages, etc. The contractor shall provide suitable watch and ward to take care of the installation till it is taken over for operation by the IOP EIC.

6 **Drawing, QA plan, Test Certificates & Inspections:**

6.1 The GA drawings and QA plan shall be submitted for approval for the following equipments:

6.1.1 Complete layout of all equipments in the substation.

6.1.2 Relay Panels with Annunciation windows.

6.2 For the following factory test certificates shall be submitted in duplicate:

6.2.1 33/0.433 KV, 1MVA, Transformer

6.2.2 36KV Vacuum Circuit Breaker

6.2.3 CT's and PT's

6.2.4 33KV HG fuses

6.2.5 All relays to be used in the Relay Panel

6.2.6 Heat shrinkable sleeves

6.3 **The contractor shall make suitable arrangements for applying to the state electricity distribution company for obtaining the permission for charging the equipment installed.**

7 TECHNICAL SPECIFICATION OF DISTRIBUTION TRANSFORMER:

7.1 CONSTRUCTION: 1000 KVA, Copper Wound, Oil Immersed, Double wound, Core Type, Delta/Star connected Distribution Transformer to following specification & conforming to IS:2026/Latest amendment :

7.1.1 **SERVICE: OUT DOOR**

7.1.2 Input Voltage: 33000 Volts, 3 Phase, 50 C/s

7.1.3 Output Voltage: 430 Volts, 3 Phase, 50 C/s

7.1.4 Vector Group: DY – 11

7.1.5 Percentage impedance at 75'C, rated current & frequency: 5%

7.1.6 Type of Cooling: Oil Natural Air Natural

7.1.7 Tap Changing range:
Tap range: +7.5% to -7.5%
Tap Step 2.5%

7.1.8 Tap Changer: Externally hand operated "OFF" Circuit tap change Switch on H.V. side with indicating plate and locking device.

7.1.9 Tank: The transformer shall be contained inside a sheet steel tank.

7.1.10 Temperature rise: The transformers shall be installed outdoor without any protection from sun and rain. The maximum temperature of hot-spot shall be limited to 105ºC with Class 'A' insulation. Transformer shall be capable of operating continuously at its normal rating without exceeding the limits of temperature rise above 50ºC (Reference Design Temperature) as below:

Type of Cooling	Top Oil Deg.C	Winding Deg.C	Core Deg.C
ONAN	50	55	55

7.1.11 Radiators: Press Steel Radiators

7.1.12 Terminal Arrangement: (i) H.V. 3-Pole 36KV Out Door Bushings suitable to receive the overhead ACSR Dog conductor.(ii) L.V. 4-Pole LT connection chambers with copper bus bars suitable for connecting LT, 6 x 300 Sqmm Aluminium, PVC insulated, armored cables.

7.1.13 Type of mounting: On wheels:-mounted on rails.

7.1.14 No. of Winding: Two

7.1.15 Insulation level for windings:

a) Impulse withstand voltage (kVpeak): 170 (HV)

b) Power frequency withstand (kV rms): 70(HV)

7.1.16

	Bushings	HV	LVN
a	Reference standard	IS 2099 & 3347	
b	Type of Bushing	Porcelain	Porcelain
c	Voltage Rating in KV	36	1.1
d	Current Rating in Amps	250	2000
e	Fault Current Withstand level	5KA for 1 sec	50KA for 1 sec

7.1.17 One additional LV neutral terminal shall be brought out through a weather proof porcelain bushing to facilitate connection to station grounding system.

7.1.18 The interconnections, joints etc between the inter-windings, turns etc shall be brazed.

7.1.19 The transformer accessories and fittings shall be guaranteed to withstand a vacuum of at least 500mm of Hg.

7.1.18 The Transformer shall be supplied with first filling of oil conforming to relevant IS:335/Latest amendment and will comprise the following fittings and accessories:

a) Rating and Diagram Plate
b) Earthing Terminals Two numbers
c) Lifting Lugs
d) Thermometers Pocket
e) Air Release Plug
f) Oil filling hole with Plug
g) De-Hydrating Breather
h) Oil Level Indicator (Plain)
i) Drain Valve with Plug
j) Oil Conservator with Drain Plug and Cap.
k) Top Filter valve & Bottom filter Valve with Plug
l) Explosive valve with diaphragm
m) L.V. Additional Neutral for solid earthing
n) Unidirectional plain rollers
o) Double Float Buchholz Relay with Shut off Valve and Alarm Trip Contactors.
p) 6" Dial Type Thermometer with maximum reading pointer and resetting device with Alarm and Trip Contacts.
q) Inspection cover.
r) Rating plate
s) Terminal marking plate
t) Oil sampling valve
u) Air release device
v) Jacking lugs
w) Plain oil level gauge with low level marking.
x) Marshalling box
y) Thermometer pocket
z) Valves: The following valves and accessories shall be provided:
z.1) Conservator drain valve with plug
z.2) One valve between the gas and oil actuated relay and the conservator.

z.3) One top filter valve with blanking plate.
z.4) One bottom filter valve with blanking plate.
z.5) One oil sampling valve with plug.
z.6) One oil drain valve with plug.
aa) 6" Dial Winding Temperature Indicator with CT and Alarm and Trip Contacts.
bb) 4" Dial Type Thermometer with maximum reading pointer and resetting device with electrical contacts.
cc) 4" Dial Magnetic Type Oil Level Gauge with Low Alarm Contacts.
dd) Thermo Junction Box with Loose Cables/Marshal box.
ee) Radiators
ff) Bi-directional rollers.

7.2 GENERAL DESIGN:

The transformer should be designed with 50 deg. C reference design temperature. The transformer and accessories shall be defined to facilitate easy inspection, cleaning and repairs. All apparatus shall be designed to ensure satisfactory operation under worst conditions of load and voltage as may be met with under working conditions in the system. All materials used shall be best quality and of the class most suitable for working under the conditions specified, withstanding the variations of temperature and atmospheric conditions without undue stressing etc. not affecting the workability/durability of the various parts of the transformer. All outdoor apparatus, including bushing insulators with their mountings, shall be so designed as to avoid pockets in which water can collect. All electrical connections shall be of ample cross sections for carrying the specified currents continuously without undue heating. All fixing bolts or screws shall be reliable under worst conditions of operations. The transformer shall have minimum hum and no abnormal noise. The manufacturer shall ensure that the noise level shall not be above the value specified in NEMA standard publication TR-1. The transformers shall be suitable for continuous operations with a frequency variation of +/-5% from 50 Hz without exceeding specified temperature rise. The transformers shall be capable of being loaded in accordance with IS.6600 up to loads of 150%. There shall be no limitation imposed by bushings, tap changer, etc. The transformers shall be provided with neutral side CT for owner's use. Centre of gravity: - The centre of gravity of the assembled transformer shall be low and as near the vertical centre line as possible the transformer shall be stable with or without oil 96 the centre of gravity is eccentric relative to the track either with or without oil, its location shall be shown on the location drawing.

7.3 **SPECIFIC TECHNICAL PARTICULARS**:

7.3.1 Terminal Connectors: Connectors shall be heavily tinned and properly treated against corrosion and shall be suitable for continuous operation at full rated capacity and at maximum temperature.

7.3.2 TANKS: The transformer tank and cover shall be fabricated from good commercial grade low carbon steel preferably boiler plate and of adequate

thickness to withstand full vacuum. The tank and the cover shall be of welded construction. All seams shall be welded and wherever practicable they shall be double welded. The tank weld shall be reinforced by stiffener of structural steel of general rigidity. The tank shall have sufficient strength to withstand without permanent distortion. The short ckt forces during fault for 220 kV systems is 20.000 MVA.

i) filling in vacuum

ii) continuous internal excess gas pressure of 0.35 kg/cm sq. for not less than 12 hours.

iii) Mechanical shock during transportation. The tank gaskets to prevent ingress of moisture and also ensure durability.

A man-hole with a welded flanged and a bolted cover shall be provided on the tank cover. The man-hole shall be of a sufficient size to afford easy access to the lower ends of the bushing terminals etc.

All bolted connections to the tank shall be fitted with suitable oil tight gasket which shall give satisfactory service under the operating conditions. Special attention shall be given to the methods of making the hot oil tight joints between the tank and the cover as also between the cover and the bushing and all other outlets to ensure that the joints can be remade satisfactorily and with care, with the help of semi-skilled labour. Where compressible gaskets are used, steps shall be provided to prevent over compression. Bushings, turrets, cover of accessories, holes, and other devices shall be defined to prevent any leakage of water into or oil from the tank.

Lifting eyes or lugs shall be provided on all parts of the transformers requiring independent handling during assembly or dismantling. In addition, the transformer tank shall be provided with lifting lugs and bosses properly secured to the sides of the tank for lifting the transformers either by crane/pulleys or by jacks.

The design of the tank, the lifting lugs and bosses shall be such that the complete transformer assembly filled with oul, can be lifted with the use of these lugs without any damage or distortions.

The tank shall be provided with two suitable copper alloy or any other suitable material lugs for the purpose of grounding. Also, all radiators, marshalling box etc shall be earthed as per ISS.

Each tank shall be equipped with the following valves with standard screw connection for piping:

i) One drain and lower filter valve, suitably located and placed in a manner to completely drain the tank. The tenderer may furnish in addition to the above, a large valve with reducer, if considered necessary by him for draining the tank. This valve may be equipped with a small sampling cock.

ii) One filter valve suitably located at the top of the tank. The opening of this value shall be baffled to prevent aeration of the oil.

iii) One filter valve, located on the high voltage side of the transformer, above the bottom of the tank.

iv) One relief valve to operate at a specified pressure for the tank.

v) There would be other suitable valves associated with radiators, conservators.

7.3.3 UNDER CARRIAGE : The transformer tank shall be supported on a structural steel base equipped with forged steel or cast single flanged wheel suitable for moving the transformer completely flitted with oil. Provision for jacking shall be provided. It shall be possible to change the direction of the wheels through 90ºC when the transformer is lifted on jacks to permit movement of the transformer both in longitudinal and transverse direction. The track gauge for both longer axis and shorter axis shall be 1676 mm. Pulling eyes shall be provided to facilitate movement of the transformers horizontally and they shall be suitably strengthened so that binding does not occur when the pull has a vertical component.

7.3.4 CORE: The transformer may be core type. The core shall be built up with high grade non-ageing cold rolled super grain oriented silicon steel laminations known as HI-B steel trade name having high permeability and low hysteresis loss. B.H. and specific loss curve shall be furnished in support of the materials. After being sheared, the lamination shall be treated to remove all burrs and shall be re-annealed to remove all residual stresses. The insulation of the lamination, which is to be stated in the tender shall be inert to the action of hot transformer oil. The design of the magnetic circuit shall be such as to achieve minimum possible active and reactive core losses during the entire life of the transformer. Coils shall be so insulated that impulse and power frequency voltage stresses are minimum. Insulation level of graded insulation shall conform to the relevant Indian Standard Specification. The core shall be rigidly clamped to ensure adequate mechanical strength and to prevent vibration during operation. The clamping structure shall be so constructed that eddy currents will be minimum. The core shall be provided with lugs suitable for lifting the complete core and coil assembly of the transformer. The core and the coil shall be so fixed in the tank that shifting will not occur when the transformer is moved or during a short circuit. The transformer shall be designed in such a way that the maximum flux density in any part of the core and yoke at rated MVA, (-3%) frequency and highest system voltage at any tap shall not exceed 2.6 Tesla. Manufacturer should be direct purchaser of Core from the OEM. The core should be of boltless technology.

7.3.5 WINDINGS: The windings shall be so designed that all coil assemblies of identical voltage ratings shall be interchangeable and field repairs possible. The coils shall be supported between adjacent sections by insulating spacers, and the barriers, bracings and other insulation used in the assembly of the windings shall be arranged to ensure a free circulation of the oil and to reduce hot spots in the windings. The stacks of windings shall receive adequate shrinkage treatment before final assembly. The insulation of the coils shall be such as to develop the full electrical strength of the windings. All materials used in the insulation and

assembly of the windings shall be insoluble, non-catalytic and chemically inactive in the hot transformer oil, shall not soften or otherwise be adversely affected under the operating conditions. The dielectric strength of winding insulation shall conform to values given in IS:2026 as amended up to date, or as per Schedule 'A'. All threaded connections shall be provided with locking facilities. All leads from the winding to the terminal board and bushing shall be rigidly supported to prevent injury from vibration. Guide tubes shall be used where practicable. The windings shall be clamped securely in place so that they will not be displaced or deformed during short circuits. The assembled core and windings shall be vacuum dried and suitably impregnated before removal from the treating tank. The copper conductors used in the coil structure shall be best suitable to the requirements and all permanent current carrying joints in the windings and the leads shall be welded or braced.

7.3.6 TAP CHANGING MECHANISM: The transformers shall give full load output on all taps. The transformers shall operate without danger or any particular tapping at the rated MVA with a voltage variation of +/- 10% of the voltage corresponding to the tapping. OFF LOAD TAP CHANGER SHALL BE PROVIDED ON THE HIGH VOLTAGE WINDING. The tapping range shall be –7.5% to +7.5% in 2.5% equal steps.

7.3.7 INSULATING OIL Oil for first filling together with 10% extra shall be supplied with each transformer. The oil shall comply in all respect with the provisions of the latest edition of IS:335 or IEC Publication 296 (as amended up to date) of specification for New Insulation for Transformers and switchgears. Particular attention shall be paid to deliver the oil free from moisture having uniform quality throughout in **non-returnable** steel drum. The quantity of oil for first filling of each transformer shall be stated in the tender.

7.3.8 BUSHING: The bushing shall be anti-fog type with high factors of safety against leakage to ground and shall be so located as to provide adequate electrical clearances between bushings and grounded parts. Bushings of identical voltage rating shall be interchangeable. All bushings shall be equipped with suitable terminals of approved type and size and shall be suitable for bi-metallic connection. The insulation class of the high voltage neutral bushing shall be properly co-ordinated with the insulation class of the neutral of the high voltage side of the transformer HV bushing shall be of out door type and LV bushing shall be of oil filled porcelain communicating type. All main winding and neutral leads shall be brought out through outdoor type bushings which shall be so located that the full flashover strength will be utilized and the adequate phase clearance shall be realized. Location and arrangement of bushings shall follow Indian Standards. All porcelain used in bushings shall be made of the wet process, be homogenous and freed from cavities or other flaws. The glazing shall be uniform in colour and free from blisters, burns and other defects. Bushings shall conform to IS:3447, IS:2099 and IEC: 137. The characteristic of the oil used in the bushing shall be the same as that of the oil in the transformer. Main terminals shall be solder less. The spacing between the bushings must be adequate to prevent flashover between phases under all conditions of operation.

7.3.9 TERMINALS AND CONNECTORS: The bushing terminal shall be provided with terminal connectors of approved and size suitable for connection to external parts. Terminal connectors offered successfully type tested as per IS:5561.

7.3.10 TERMINAL MARKINGS: Each bushing terminal (including the neutral) shall be distinctly marked on both the primary and secondary side in accordance with the diagram of connection supplied with the transformers.

7.3.11 RADIATORS: The transformers shall be fitted with detachable radiators consisting of a series of separate circular/elliptical/rectangular, etc. tubes or oil channels, welded at their top and bottom into headers which in turn are connected to the Tank by means of bolted, oil tight, flanged joints. There shall be butterfly or similar valves fitted in between the Tank and the headers. There shall also be valves for circulation of oil, at each of top and bottom header. One air release cock at the top header shall be provided. The radiator tubes shall be seamless and made of galvanized mild steel of minimum wall thickness not less than 1.2 mm, with a clean bright internal surface free from rust and scale. They shall be suitably braced to protect them from mechanical shocks normally met in transportation. A separate oil right blank flange shall be provided for each tank connection for use when the cooler unit is detached. Each cooler unit shall have a lifting eye, an oil drain at the bottom and a rent at the top. The tenderer shall clearly specify the time limit for operation of a transformer carrying full load without forced cooling.

7.3.12 ACCESSORIES: Transformer shall be provided with the following accessories:

a) OIL TEMPERATURE INDICATOR: Dial type thermometer for oil temperature indication: The dial type indicating thermo-meter of robust design is to be mounted on the side of the transformer at a convenient height to read the temperature in the hotspot part of the oil and shall have contacts for switching alarm as well as trip contacts for all transformers.

b) HOTSPSOT WINDING TEMPERATURE: Indicating type winding temperature detector: All transformers shall be provided with a device for indicating the combination of top temperature and winding current calibrated to follow the hottest spot temperature of the transformer winding. The device shall have a dial type indicator and in addition a pointer to register the hottest temperature reached, mounted on the side of transformer. The hottest spot temperature detector shall be connected with the secondary of CT mounted in one phase of each winding of the transformer. It shall have contacts for switching on/out the cooling employing ONAN system and alarm as well as trip contacts for all transformers. One winding temperature meter with four potential free mercury contacts for control and indication with independent facility for setting the contacts at any temperature over the whole working range of 0ºC to 120ºC. Winding temperature indicator shall have repeater for remote indication in the Tap Change Control Panel.

c) MAGNETIC OIL LEVEL GAUGE: One magnetic oil level gauge with low oil level, alarm contacts and a dial showing maximum, normal and

minimum oil levels is to be provided in conservator. The gauge should be readable from the transformer base level.

d) PRESSURE RELIEF DEVICES: It shall be of sufficient size to release pressure rapidly to prevent damage to any part of the transformer. It shall operate at a static pressure less than the hydraulic test pressure of the tank. Design shall be such as to prevent ingress of rainwater.

e) BUCHHOLZ RELAY: One double float gas detector relay (Buchholz relay) of reputed make with alarm and tripping contacts to detect accumulation of gas and sudden changes of oil pressures, complete with two shut-off valves and flange coupling to permit easy removal without lowering oil level in the main tank, a bleed valve for gas venting and a test valve is to be provided.

f) GROUNDING TERMINALS: Two grounding terminals capable of carrying for 3 seconds the full short circuit current of the transformer.; Provision shall be made at positions close to each of the bottom two corners of the tank for bolting for earthing terminals to the tank structure to suit local conditions.

g) RATING PLATE, DIAGRAM PLATE: The plates shall be fixed to the transformer tank at an average height readable from the transformer base level. A rating plate bearing the data specified in the appropriate clauses of IS:2026. A diagram plate showing the internal connections and also the voltage vector relationship of the several windings in accordance with the IS and in addition, a plant view of the transformer giving the correct physical relationship of the terminals. No load voltage shall be indicated in each tap. The winding temperature CT and the thermo-meter pocket shall also be indicated in the said plate. The plate showing the location and function of all valves and air release cocks or plugs.

A set of devices for lifting the various parts of the transformer.

Any other accessories or appliances recommended by the manufacturer for the satisfactory operation of the transformer together with their prices, shall be given in the tender.

7.3.13 MARSHALLING BOX: A suitable weather proof cubicle for housing the control equipment, terminal blocks etc. made of 3 mm. sheet steel, shall be provided for the transformer. The box shall contain all auxiliary devices except those which must be located directly on the transformer. All terminal blocks for user's cable connection shall be located in this box. The marshalling box shall be provided with cubicle lamp with door switch, space heater with thermostat and removable cable gland plate.

WIRING: All control, alarm and indicating devices provided with the transformer shall be wired up to the terminal blocks.

Wiring from transformer to the cubicle, shall be done with PVC wires in conduit or by PVC armoured cable. Minimum wire size shall be 2.5 mm sq. copper. Not

more than two wires shall be connected to a terminal. 10% spare terminals shall be provided.

All devices and terminal blocks within the marshalling box shall be identified by symbols corresponding to those in applicable schematic or wiring diagram.

7.3.14 **EVALUATION OF LOSSES AND PENALTY**: The tenderer shall state the transformer losses viz:

i) Guaranteed iron (core) loss.

ii) Guaranteed Copper loss at 75ºC

iii) Guaranteed auxiliary losses.

Also the tenderer shall guarantee the resistance values, % impedance, stray loss values as furnished by them in the GTP.

The iron loss (no-load loss) in KW at rated voltage and at rated frequency, and load losses (copper and auxiliary losses) in KW at rated full load capacity and at rated voltage and frequency shall be guaranteed.

For the purpose of comparison of bids, the capitalized cost of iron loss (KW) and load losses(KW) shall be added to the quoted price of the transformer at the following rates:-

(a) Rs.97,040/- per KW of no load loss.

(b) Rs.58,000/- per KW of load loss.

(c) Rs 58,000/-Auxiliary losses per KW

No tenderer shall specify any tolerance limit in respect of these losses.

If any or all actual losses after tests are found to exceed the guaranteed values, the penalty will be imposed for the excess loss over the corresponding guaranteed loss (any or all). The penalties shall be calculated for excess of no load loss and for the excess of the load losses separately at the rates specified earlier. For fraction of a KW, the penalties shall be applied pro-rate. If the test figure of losses is less than the guaranteed values, no bonus will be allowed.

Also on testing of any of the test results do not match with the values given in the guaranteed technical particulars and as per technical specification, IOP reserves the right to reject the transformer or free to take any other decision.

IOP also reserves the right to retain the rejected transformer and take in to service until the contractor replaces it with a new transformer at no extra cost.

7.3.15 GUARANTEED PERIOD:- The equipment covered by the specification should be guaranteed for satisfactory operation and against defects in design, material, workmanship **for a period of at least 24 months from the date of delivery or 18 months** from the date on which the equipment has been put up for operation, whichever is earlier. The above guarantee certificate shall be furnished in triplicate to the purchaser for his approval. Any defects noticed during this period should be rectified/replaced by the supplier free of cost within 3 months from the date of information of such defects by the Employer provided such defects are

due to faulty design bad workmanship or bad materials used upon written notice from the Employer. If it is required to take back the transformer by the supplier to their factory for repair, all arrangements towards transportation of the equipment from the transformer foundation plinth, repair of the equipment, return and unloading of the same on the plinth of the substation or as advised by the consignee, will have to be completed, free of cost within 3 months from the date of intimation of such defects by the supplier. If it will not be completed within the stipulated period the supplier shall pay the penalty @ 0.5% of the contract price for each calendar week of delay from the end of 3 months that is date of intimation of defects.

7.3.16 CLEANING AND PAINTING: Before painting or filling with oil, all un-galvanized parts shall be completely clean and freed from rust, scale and grease and all external rough surfaces on castings, shall be filled by metal deposition. The interior of all transformer tanks and other oil filled chambers and internal structural steel work shall be cleaned of all scale and rust by sand blasting or other approved method. These surfaces shall be painted with an oil resisting varnish or paint. Except for nuts, bolts and washers, which may have to be removed for maintenance purposes, all external surfaces shall receive a minimum of three coats of paint. The primary coat shall be applied immediately after cleaning. The second coat shall be of oil paint of weather resisting nature and of a shade or colour easily distinguishable from the primary and the seconds and the final coats shall be applied after the primary coat has been touched up where necessary. The final coat shall be of glossy, oil and weather resisting non-fading paint of battle ship grey colour. All interior surfaces of mechanism chambers and kiosks except these which have received anti-corrosion treatment shall receive three coats of paints applied to the thoroughly cleaned metal surfaces. The final coat shall be of light coloured anti-condensation mixture.

7.3.17 PACKING: The transformer shall be shipped filled with oil or with inert gas for foreign supplier due to transport weight regulation, if the transformer is equipped with inert gas pressure system, then a low pressure alarm device is to be provided. For Indian supplier, the transformer shall be filled with oil during transport. All parts shall be adequately marked to facilitate field erection; boxes and rates shall be marked with the contract number and shall have a packing list enclosed showing the parts contained therein. In the case of Synthetic Resin bonded paper type Bushing (SRBP) the lower part not being filled with oil special attention shall be paid in packing so as to avoid moisture ingress. The method of packing the bushing shall be stated.

7.3.18 LABELS: Labels shall be provided for all apparatus such as relays, switches fuses contained in any cubicles or marshalling kiosk. Descriptive labels for mounting indoor or inside cubicles and kiosks shall be of material that will ensure performance of the lettering. A mat or stain finish shall be provided to avoid dazzle from reflected light. Labels mounted on dark surfaces shall have white lettering on a black background. Danger notices shall have red lettering on a white back ground all plates shall be of material which will not be corroded. Labelling shall be clear, concise and adequate. Labels for mounting out doors shall be

weather and corrosion proof, formed by etching to ensure performance. Labels shall be attached to panels with brass screws of with steel screws which have received rust preventive treatment. Labels should have lettering sizes of at least 1 to 1.5 mm stroke width and 3 to 7 mm height.

7.4 **FACTORY TESTS:** Stage inspection on core and winding will be carried out before tanking of core. For this the supplier shall give 20 days notice in advance. The transformer shall be completely assembled and tested at the factory tests shall be performed in compliance of IS:2026 (as amended up-to-date). IEC No. 76.

a) Before calling for final inspection, the supplier shall furnish the factory test results (routine and additional routine test results) of the offered transformer along with list of equipment used during testing with serial number, make class of accuracy the calibration certificates of the equipments/instruments used during testing to the purchaser and shall be furnished before 30 days of calling for final inspection. After scrutiny of the test results and measuring instruments with calibration certificates, IOP may direct the contractor for use of better equipments/meters during inspection/testing.

b) The transformers offered must have type tested as per the relevant standards. Type test of transformer here means, short circuit tests all the routine tests, temporary tests, and impulse test. The bidder shall furnish four sets of type test reports (indicating therein the type and design details) along with the offer without which the tender will be rejected. These tests must have been conducted not less than five years from the date of opening of bid in Govt. recognized laboratory.

The following tests shall be made on the transformer in the event of an order in the presence of purchasers representative and test reports jointly signed by the inspecting officer and Firm's representative shall be submitted to this office for approval before dispatch of the Transformer. No extra cost shall be paid for these tests.

Routine Tests: All standard routine tests in accordance with IS:2026 with dielectric tests corresponding to Method 2 as per amendment No.1 issued in September, 1980 to IS:2026 shall be carried out on the transformer. Winding resistance measurement, short circuit impedance voltage and load loss measurement to be done on the normal tap and extreme taps.

Following are the details of routine tests shall be carried out on the transformers as per IS:2026 and this technical specification.

1. Measurement of winding resistance at Principal and extreme taps.
2. Measurement of voltage ratio and check of voltage vector relationship.
3. Measurement of insulations resistance.
4. Dielectric tests.
    (a) Power frequency tests.
    (b) Induced over voltage tests.

5. Operation of off load tap changer.

6 a) Oil BDV test.

b) Regulation at rated load at unit 0.8 lagging power factors.

c) Efficiencies at 50%, 75% and 100% loading.

Following additional routine tests shall also be carried out on each transformer:

8. a) Magnetic Circuit Test

After assembly each core shall be tested for 1 minute at 2000 volts between all bolts, side plates, structural steel work.

b) Oil leakage test on transformer tank as per details given in this clause subsequently.

c) Measurement of capacitance and tan-delta to determine capacitance between winding and earth. This measurement shall be carried out before and after series of dielectric tests.

d) Polarisation Index shall also be measured in respect of all windings by taking insulation resistance for 10 minutes and 1 minute. This should not be less than 1.5 or more than 5. PI will be measured before and after all the tests.

e) Measurement of Neutral current during load loss test.

f) Magnetic balance test.

g) DGA test before and after all the tests.

Tank Tests

(a) Routine Tests.

(b) Oil leakage test.

All tanks and oil filled compartments shall be tested for oil tightness by completely filling with air or oil of a viscosity not greater than that of insulating oil conforming to IS:335 at the ambient temperature and applying a pressure equal to the normal pressure plus 35 KN/m² measured at the base of the tank. The pressure shall be maintained for a period of not less than 12 hours for oil and one hour for air during which time no leak shall occur.

TEST REPORTS

After all the tests have been completed, 6(six) certified copies of each joint test report in English Language with signature of the inspecting officer and factory testing engineer shall be furnished for approval. The transformer will be dispatched after approval of the test report. Each report shall supply the following information.

a) Complete identification, date, including serial number of the transformer.

b) Method of application, where applied, duration and interpretation of results for each test.

FURTHER TESTS

The purchaser reserves the right to having any other reasonable test carried out at his own expense either before shipment or to ensure that the transformer complies with the requirements of this Specification.

TEST ON ASSOCIATED EQUIPMENT

Porcelain Bushings, Windings, Temperature, Indicating Devices, Dial Thermometers, Buchholz Relays, Auxiliary Meters, Control Devices, Insulation oil and other associated equipment covered by the contract shall be certified by the contractor to have been tested in accordance with the relevant tests, for all auxiliary apparatus. Six certified copies of the aforesaid test reports shall have to be furnished.

DRYING OUT AT THE MANUFACTURER'S WORKS

All the tests shall be conducted after completing drying out at the works. The transformer shall be dispatched complete 'under oil' or under nitrogen sealing after being dried out under vacuum, ready to be put into commission, without further drying out at site.

Fire fighting system – 12 kg fire extinguisher, 3 nos. per transformer shall be provided.

Bid will be rejected if the details of loss calculation, guaranteed technical particulars and short circuit, type test reports have not been submitted along with the bid.

7.5 **Erection and Commissioning of the transformer**:

7.5.1 Supply, construction of RCC Transformer foundation works (1:2:4) including grouting of foundation bolts/ transformer foundation, with 20mm thick water proofing cement finishing work on top of foundation. Scope of supply includes all materials for the construction of foundation and supply & laying of the steel rails on which the transformer will be installed.

7.5.2 Erection scope includes installation of transformer on the transformer plinth and fixing of all accessories such as Radiators, Conservator tank, Breather etc. Top up of the transformer oil to make up the conservator tank oil level and testing of oil as per IS specifications. Scope of supply includes the Supply of oil and testing of the same.

7.5.3 Transformer oil testing shall be got done by Standard Testing laboratory Bhubaneswar or Accredited / Recognized Laboratory. Test report to be submitted for review and acceptance. If the results are not acceptable the transformer oil to be put under hot oil circulation till the required parameters are attained. Required arrangement for the same is to be carried out by the contractor without any extra cost to the Institute.

7.5.4 The HV/MV power and control cables to be laid, termination, connection and testing to be carried out. High voltage test to be carried out for the HT cables as per IS. The reports to be submitted.

7.5.5 The cables laying, termination and connection will be paid under relevant item of schedule of quantities & rates.

7.5.6 The transformer should be provided with individual 2 no.s Earth pit for body earthing and two no.s for Neutral earthing as per IS:3043. 2x50x6mm GI flat to be connected from each pit. The earthing work will be paid under relevant item.

7.5.7 The pre-commissioning checks are to be carried out before commissioning of transformer after getting approval from Engineer-in-charge the transformer shall be commissioned. The commissioning report with test results shall be submitted in triplicate.

7.6 TECHNICAL DATA TO BE SUPPLIED WITH TENDER

Technical particulars, mentioned below, for each transformer operating at site conditions outlined in Technical Specification of this tender document shall be submitted:

Sl.no.	Description	Values to be quoted by the bidder
1	Name of manufacturer, place of Manufacturer, full address Preferable make of the transformer: Crompton Greaves Ltd, AREAVA, BHEL, ABB, SIEMENS, VOLTAMP Transformers or approved equivalent of the same.	
2	Delivery period required for the Transformer by the Manufacturer. (Preference will be given to the bidders with short delivery period)	
3	Type of construction	
4	Standard according to which the transformer is manufactured and guarantee figures are given	
5	Type of cooling	
6	Rating	
6.1	Rated KVA	
6.2	Rated Voltage HV	
6.3	Rated Voltage LV	
6.4	Rated Current HV	
6.5	Rated Current LV	
6.6	Rated frequency	
6.7	Ratio of transformation on principal tap	
6.8	Permissible variations	
6.8a	Voltage	
6.8b	Frequency	

6.9	Overload capacity-short time withstand for 150% with transformer loaded fully at maximum yearly weighted average temperature of 35'C	
6.10	Thermal time constant	
6.11	Installation (Out door)	
7	Temperature rise	
7.1	Of oil by thermometer	
7.2	Of windings by resistance method	
7.3	Estimated max hot spot temperature in the winding	
8	Number of phases	
9	Connections	
9.1	High voltage	
9.2	Low Voltage	
9.3	Vector Group reference	
10	Tapings range of HV winding with step voltage	
11	Losses	
11.1	Guaranteed no-load losses at 75'C on principal tapping at rated voltage and rated frequency.	
11.2	No load losses at 110% rated voltage and rated frequency at 75'C	
11.3	Guaranteed load losses at principal tapping, rated current rated voltage and rated frequency at 75'C	
11.4	Tolerance on losses	
11.5	Total losses at normal ratio, rated output, rated voltage, rated frequency and maximum attainable temp. at site.	
12	Percentage impedance at rated current and frequency at 75'C	
13	Percentage reactance at rated current and frequency.	
14	Percentage resistance voltage drop at 75'C	
15	Efficiency at rated Voltage, rated frequency and at 75'C at UPF	
15.1	Full load	
15.2	¾ Full load	
15.3	½ Full load	
15.4	¼ Full load	
16	Efficiencies at rated Voltage, rated frequency and at 75'C at 0.8 PF lag.	
16.1	Full load	

16.2	¾ Full load	
16.3	½ Full load	
16.4	¼ Full load	
17	Percentage regulation at	
17.1	a) Unity power factor b) 0.8 power factor lag.	
18	No-load current % and p.f.	
18.1	At rated voltage and rated frequency	
18.2	At 110% rated voltage and rated frequency	
19	Current density (A/sq.cm)	
19.1	HV winding	
19.2	LV winding	
20	Conductor area (Sqmm)	
20.1	HV winding	
20.2	LV winding	
21	Highest system voltage for which transformer windings are suitable	
21.1	HV winding	
21.2	LV winding	
22	Type of winding	
22.1	HV	
22.2	LV	
23	Maximum Flux density	
23.1	At rated voltage	
23.2	At 110% rated voltage	
24	Insulation level	
24.1	Separate source power frequency voltage withstand for HV winding – KV rms	
24.2	Induced over voltage withstand	
24.2.1	HV winding – KV rms	
24.2.2	LV winding –KV rms	
24.3	Full wave lightning impulse withstand voltage for HV winding KV peak	
25	Polarization Index	
26	Noise level	
27	Sheet metal treatment and painting procedure	
27.1	Internal	
27.2	External	
28	Maximum operating oil pressure (Kg/cm2)	
29	Weight of Transformer:	
	1. Core and winding (Kg)	
	2. Oil (kg)	
	3. Tank, coolers & fittings (Kg)	
	4. Total (Kg)	

	5. Overall dimensions of the transformer	
	a) at seating rollers	
	b) Over all plan view	
30	Particulars of HT bushing:	
	a) Name of manufacturer, address	
	b) Type	
	c) Dry flashover voltage at 50Hz.	
	d) Wet flashover voltage at 50Hz	
	e) Impulse flashover voltage	
	f) Rating of bushing	
	g) Minimum creepage distance	
31	Particulars of LT bushing:	
	a) Name of manufacturer, address	
	b) Type	
	c) Dry flashover voltage at 50Hz.	
	d) Wet flashover voltage at 50Hz	
	e) Impulse flashover voltage	
	f) Rating of bushing	
	g) Minimum creepage distance	
32	Type of Insulation on	
	a) HT conductor	
	b) LT conductor	
	c) LT to core	
	d) Core to bolts	
	e) Core bolt washer	
	f) Core lamination	

The bidder is deemed to have examined all parts of this tender and be fully informed of the nature of work and scope and conditions of performance. In case of deviation, the bidder shall clearly indicate in his offer the deviations from this complete documents consisting of all parts & clauses. The offer shall be deemed to be in conformity with this document in totality unless deviations are explicitly brought out and mentioned by the bidder in this clause and listed.

Name of the Firm

Signature of the Bidder

Designation & Seal

Date

7.7 INFORMATION TO BE FURNISHED BY THE SUPPLIER AFTERR AWARD OF CONTRACT

7.7.0 Drawings: The following shall be submitted for purchaser's approval within 4 weeks of receipt of the purchase order/ letter of intent.

7.7.1 General outlined drawing as submitted at the bidding stage but with binding dimensions and other details.

7.7.2 General outline drawings showing plan, front elevation and elevation inner view, locating dimensions of cable entries, earthing terminals, foundation/ floor fixing details land weights and indicating all the fittings and accessories.

7.7.2.1 Marshalling box – GA drawings along with the entire components layout.

7.7.2.2 Cable boxes

7.7.2.3 Disconnecting chambers

7.7.3 Bushings, plan, elevation, terminal details, mounting details, make and type number, current and voltage rating, creepage distances and principal characteristics of all bushings used.

7.7.4 Rating and diagram plate.

7.7.5 Marshalling box terminal connections and wiring diagram.

7.7.6 List of routine test to be carried out.

7.7.6.1 Guaranteed vacuum withstand capability of transformer with radiator and other fittings present during oil filling.

7.7.6.2 Detail operation, regular maintenance and trouble shooting manual for the transformer.

8. TECHNICAL SPECIFICATION FOR 33 KV VACUUM CIRCUIT BREAKERS:

8.1 Scope: This specification is intended to cover the design, manufacture, assembly and testing at manufacturer's works, and erection, testing and commissioning of circuit breakers for efficient trouble-free operation as specified hereunder.

8.2 EQUIPMENT & SERVICES TO BE FURNISHED: Circuit breakers of VCB type shall be complete with all accessories, hardware, supporting structures and auxiliary equipment attached with operating mechanism in accordance with this specification.

Special tools and tackles should be tabulated item-wise and individual price mentioned.

All relevant drawings, data and instruction manuals shall be furnished.

8.3 DESIGN CRITERIA: The equipment will be used in solidly neutral grounded system with symmetrical fault level of 25 KA for 33 KV systems. The equipment will be installed outdoor in hot, humid and tropical climate. All equipment, accessories and wiring shall be provided with tropical finish to prevent fungus growth. The maximum temperature attained by any part of the equipment at specified rating should not exceed the permissible limits as stipulated in relevant standards. Equipment shall be designed taking 55° C maximum ambient temperature.

8.4 CONFIGURATION OF BUS AT SWITCHYARD ARE AS FOLLOWS: Applicable standards: IS 13118-IEC 56 & IS – 2516, 33 KV

Phase to Phase	1200 mm
Min. ground clearance	3700 mm

All electrical and mechanical interlocks which are necessary for safe and satisfactory operation of the breaker shall be furnished. The interlocking device shall be of an approved type.

The breaker shall be capable of satisfactory operation even under conditions of phase opposition that may arise due to faulty synchronization of otherwise.

The breaker shall be capable of interrupting rated breaking current with recovery voltage equal to maximum line service voltage.

The breaker shall be capable of clearing "Kilometric" fault without excessive rise of re-striking voltage.

The breaker shall be suitable for interrupting low currents with very high inductance as well as capacitance, without undue over voltage.

Breaker with multi-breaker interrupters shall be so designed that the voltage developed across poles is uniformly distributed over power breakers.

The Bidder may indicate in his offer the methods adopted for limiting over voltages.

8.5 PRINCIPAL TECHNICAL REQUIREMENT: The breakers shall conform to the specific technical requirements specified hereunder:

Sl.No.	I t e m	Requirements for systems
1.	Rated voltage (kV rms)/ nominal voltage	36/33
2.	Frequency (Hz)	50Hz ±5%
3.	Continuous current rating (A) rms	1600A
4.	Type	Outdoor, Vacuum
5.	Mounting	Hot dip galvanized lattice steel support structure
6.	System earthing	…effectively earthed…..
7.	Number of poles	…….3……
8.	Type of operation	…. Gang operated…….
9.	Operating Mechanism	Spring charged type of 240V AC motor Operated Spring Charged.
10.	Auto closing duty	3 phase, electrically, manually operated.
11.	Rated operating duty	0-0.3 Sec-co
12.	First pole to clear factor	1:3
13.	1.2/50 microsecond impulse withstand voltage (dry)	
	i) to earth (KVp)	170
	ii) Across the open contacts with impulse on one terminal and power frequency voltage on opposite, terminal (kVp/kV rms)	170
14.	1 minute power frequency withstand voltage (KV rms) (Wet)	70
15.	Rated braking current capacity:	
	a) Short circuit current (KA) rms	62.5KA
	b) AC component (KA)	25
	c) Asymmetrical	27.4KA

16.	Rated short circuit making current capacity (kA)	62.5
17.	Permissible limit of temperature rise	As per IS/IEC
18.	Min. creepage distance of support insulator (mm)	900 mm
19.	Short time current carrying capacity (KA)/3 sec.	25
20.	Rating of auxiliary contacts	48VDC
21.	Breaking capacity of auxiliary contact	2 A DC with the circuit time constant not less than 20 ms.
22.	Terminal connector	
	a) Type	Bimetallic, clamp type
	b) Suitable for	as per requirement.
23.	Auxiliary voltage	
	a) Closing	48V DC (85-110%)
	b) Tripping	48V DC(70 – 110%)
	c) Heater, Lamps	240V, 1 phase 50 Hz.
24.	CONTROL	LOCAL/REMOTE

8.6 CONSTRUCTION: Circuit breaker offered shall be VCB type for 33KV. Any part of the breaker, especially the removable ones, shall be freely interchangeable without the necessity of any modification at site.

Circuit breaker shall comprise of three identical single pole units. In the circuit breaker not meant for single pole reclosure, these units shall be linked together either electrically or electro hydraulically. Complete circuit breaker with all the necessary items for successful operation shall be supplied, including but not limited to the following:

Breaker assemblies with bases, support structure for circuit breaker as well as for control cabinet, central control cabinet and foundation bolts for main structure as well as control cabinet and central control cabinet, terminals and operating mechanisms. Necessary concrete foundation required for the installation of the Breaker with mounting structures has to be fabricated by the contractor and

necessary payment for the same will be paid as per the item in the scheduled quantities and rates.

One central control cabinet for each breaker and one control box for each pole with all the required electrical devices mounted therein and the necessary terminal blocks for termination of interpole wiring. Necessary interpole wiring at site shall be done by the contractor based on the schematic, wiring diagram scheduled to be carried out as per requirement.

All necessary parts to provide a complete and operate circuit breaker installation such as main equipment, terminal, control parts, connectors and other devices, whether specifically called for herein or not.

The circuit breaker shall be designed for high speed single and three pole reclosing with and operating sequence and timing as specified in clause 8.5 "Principal Parameters".

The circuit breaker shall consist of 3 phase vacuum circuit breaker consist of porcelain clad for each phase mounted on common clad and mechanically connected for gang operation. The unit shall be capable of with-standing pressure resulting from any specified performance of the breaker.

The vacuum interrupter bottles shall be completely maintenance free.

Tips of main contacts shall be heavily silver plated.

8.7 OPERATING MECHANISM AND CONTROL REQUIREMENTS:

The circuit breaker shall be designed for electrical local as well as remote control. In addition there shall be provision for local mechanical control .There shall be mechanical ON/OFF indicator for each pole for breaker and also provision for remote indication.

All three poles of circuit breaker shall operate simultaneously. Pole discrepancy feature shall be provided, to trip the breaker if all the poles do not close simultaneously.

The reclosing features shall be high-speed single shot and shall trip in three phases and lock out in 3 phases for persistent faults.

The relay shall be supplied loose to mount on respective control panel.

The operating mechanism shall be of spring charging type by electrical control under normal operation. The mechanism shall be adequately designed for the specified tripping and reclosing duty. The entire operating mechanism control circuitry, spring charging motor etc., as required, shall be housed in an outdoor type, steel enclosure.

All metal parts in the mechanism shall be of corrosion resistant material. All bearings which require greasing shall be equipped with pressure grease fittings.

The design of the operating mechanism shall be such that it shall be practically maintenance free. The guaranteed number of years of maintenance free operation, the number of possible full load and full rated short circuit current breaking operations without requiring any maintenance or overhauling shall be clearly stated in the tender bid. As far as possible, the need for lubricating the operating mechanism shall be kept to the minimum and eliminated altogether, if possible.

The operating mechanism shall be anti-pumping and trip free There shall be no rebounds in the mechanism and it shall not require any critical adjustments at site. Operation of the power operated closing device, when the circuit breaker is already closed, shall not cause damage to the circuit breaker or endanger the operator. Provision shall be made for attaching an operation analyser to facilitate testing of breaker at site.

The circuit breaker shall be provided with motor operated spring charged closing. Spring charging motor shall be suitable for 240V, 50 Hz, single phase AC.

Suitable rating starter shall be provided for Motor protection.

Spring release coil for closing shall be suitable for 48V DC. Provision shall be available for charging the springs manually as well, and to close CB mechanically.

Tripping of the circuit breakers shall be through "Shunt trip" coils rated for 48V DC operation.

It shall be possible to trip the breaker manually in case of necessity.

In circuit breaker, one potential free contact of the limit switch of spring charging motor shall be provided for remote indication of spring charged. This contact shall be wired up and brought to the terminal block.

(OPERATING MECHANISM)

1. SPRING OPERATING MECHANISM:

1.1. The spring operating mechanism shall have adequate energy stored in the operating spring to close and latch the circuit breaker against the rated making current and also to provide required energy for the tripping mechanism in case the tripping energy is derived from the operating mechanism. The mechanism shall be capable of performing the rated operating duty cycle of O-0.3 Sec - CO – 3 min - CO. The spring charging motor shall not take more than 30 secs for fully charging the closing springs and provision shall be made for automatic charging of the closing springs as soon as they are discharged in a closing operation.

For this, the mechanism shall be such that the charging of the springs by the motor does not interfere with the operation of the breaker.

1.2. The motor shall be adequately rated to carry out a minimum of 10 close and open operations continuously. Also provision shall be made to protect the motor against overloads.

1.3. In case of failure of power supply to the spring charging motor, the mechanism shall be capable of performing one sequence of 0 - 0.3 Sec - CO.

1.4. Mechanical interlocks shall be provided in the operating mechanism to prevent discharging of the closing springs when the breaker is already in the closed position. Provision Shall also be made to prevent a closing operation to be carried out with the spring partially charged.

1.5. **Facility shall be provided for manual charging of the closing springs. The actuating force required for manually charging the spring shall be less than 250N.**

In support of this requirement the tenderer shall furnish the test report for actual requirement of force based on actual measurement.

SPECIFICATION FOR OPERATING MECHANISM HOUSING AND CONTROL CABINETS

1. The specification covers the requirements of control cabinets and associated control and equipment. Cabinets shall preferably be of the free standing floor mounting type for HV CBs.

2. Control cabinets shall be sheet steel enclosed and shall be dust, water and vermin proof. Sheet steel shall be at least 3.0 mm thick when control cabinets are intended for outdoor operation. There shall be sufficient reinforcement to provide level surfaces, resistance to vibrations and rigidity during transportation and installation.
Control cabinets shall be provided with double hinged door and padlocking arrangement. The door hinges shall be of union joint type to facilitate easy removal and the distance between hinges shall not exceed 350 mm. Door shall be properly braced to prevent wobbling. It shall be painted white on the interior and Dark Admiralty Grey to shade no 632 of IS-5 on exterior surface. The enclosures shall be dust, moisture and vermin proof, to provide a Degree of protection to IP 55 in accordance with IS:13947. 15mm thick neoprene or better type of gaskets shall be provided to ensure degree of protection of at least IP55 as per IS:13947 It shall have backwards slanting rain hood of 2 mm thick (14 SWG) sheet for protection against rain water.

3. Equipment and devices shall be suitable for operation on specified auxiliary A.C. supply system.

4. Motors would be suitable for operation on a 240V, 1Phase, two pole 50 Hz A.C.supply system, with one pole grounded.

5. Push button shall be rated for, 240 Volts AC/ 48V DC and shall be flush mounted on the cabinet door and provided with appropriate name plates. Red, green and amber indicating lamps shall be flush mounted and provided with series resistors to eliminate the possibility of short circuiting of control supply in the event of fusing of lamps.

6. Contactor shall be provided with a three element, positive acting ambient temperature compensated, time lagged, hand reset type thermal over load relay with adjustable setting. Hand reset button shall be flush with the front door of the cabinet and suitable for resetting with starter compartment door closed. Relays shall be direct connected.

7. Single phasing protection shall be built in the thermal over load protection.

8. A removable gland-plate, 3.00 mm thick shall be provided at the bottom of the cubicle for employer's cable entry. Glands of sizes suitable for entry of 19/ 12/ 8/ 4 core cables for 230 V shall be provided.

9. Wiring for all control circuits shall be carried out with 1100 Volts grade PVC insulated tinned copper stranded conductors of sizes not smaller than 2.5 mm. At

least 15% spare terminal blocks for control wire terminations shall be provided on each panel. The terminal blocks shall be similar to ELMEX type CAT-M4. All terminals shall be provided with ferrules indelibly marked or numbered and these identifications shall correspond to the designations on the relevant wiring diagrams. The terminals shall be rated for adequate capacity which shall not be less than 10 Amps. Terminals for receiving purchaser's cables should be marked as per purchaser's standard. Terminals for AC & DC shall be kept separate.

10. Control cabinet shall be provided with 240 V, 1-phase 50 Hz, 20W fluorescent lighting fixture with on /off switch and a suitably rated 240 V, 1 phase, 5 amp, 3 pin socket for hand lamp.

11. Suitable thermostat controlled heaters shall be provided inside each cabinet. Heaters shall be controlled by suitable MCBs.

12. All AC control equipment shall be suitable for operation on 240V, 1 Phase two wire 50 Hz system, with one pole grounded.

13. Items inside the cabinet made of organic material shall be coated with a fungus resistant varnish.

14. For protection of AC/DC aux. circuits, MCBs of suitable capacity & reputed make to be provided.

15. The schematic/ wiring diagram plate shall be provided on the door of the mechanism Box.

OPERATING MECHANISM HOUSING:

All the electrical control equipments/switches, the operating point for manual spring charging handle etc. shall not be at a height of 1200mm from ground level OR from a suitable platform which shall be provided by tenderer on the structure at a height not more than 750mm from ground level. The size of the platform shall be such that clear working space on the platform shall not be less than 300 mm from all sides of operating mechanism/control box. The tenderer shall specifically confirm that the offered breaker meets this requirement and furnish the G. A. Drawing showing the arrangement. Bidder also shall submit detail control schematics based on operational requirement for approval.

8.8 AUXILIARY CONTACTS:

The breaker shall be provided with 16 N.O. + 16 N.C. spare auxiliary contacts in addition to the auxiliary contacts required for breaker's own operational requirements.

The auxiliary contacts shall preferably be convertible type so that N.O. contacts can be converted into N.C. contacts and vice-versa.

The auxiliary contacts shall have continuous current rating of at least 10A. The breaking capacity shall be adequate for the circuits controlled or at least 2A at 110 V DC with a circuit time constant of minimum 20 ms.

All auxiliary contacts shall be wired up to terminal block in the control cubicle.

Auxiliary contacts which are installed on the frame of circuit breakers shall be suitably protected against accidental arcing from main circuit. Insulating materials of contacts shall be ceramics or other non-tracking materials.

8.9 GROUNDING: Each equipment shall be provided with two grounded pads per pole each with 2 nos. tapped holes for M10 bolts and spring washers for connection of employer's ground conductor.

The operating rod of each disconnecting switch shall have flexible copper braid fixed above the mechanism box for connecting the rod directly to station ground.

8.10 BUSHING & INSULATOR:

The basic insulation level of the bushings and support insulator shall be as per clause 8.5 and the circuit breakers shall be suitable for installation in heavily polluted atmosphere. The porcelain used shall be homogenous and free from cavities or other flaws. These shall be designed to have adequate insulation, mechanical strength and rigidity for satisfactory operation under conditions specified above. All the bushings of identical ratings shall be interchangeable. The puncture voltage shall be entirely free from disturbances, when operating at voltage up to a voltage 10% above rated voltage and shall also be free from external and internal corona. Metal parts and hardware shall be hot dip galvanized as per ISS-2633 latest edition.

8.11 RATING PLATE: Circuit breaker and its operating device shall be provided with a rating plate marked with but not limited to following data.

Manufacturer's name, Type of breaker.

Serial Number.

Rated voltage.

Rated normal continuous current.

Rated insulation level.

Rated frequency.

Rated short time breaking current with rated duration.

Total weight of breaker.

8.12 PAINTING:

All interior or exterior steel surfaces shall be thoroughly cleaned to produce smooth surfaces devoid of all rusts, scales, grease or any foreign matters.

External surfaces shall be given a coat of high quality red oxide or yellow chromite primer and finished in battleship grey (IS:632) with two coats of synthetic enamel paints.

The paint shall be carefully selected to withstand tropical heat, rain etc. The paint shall not scale off or crinkle or be removed by abrasion due to normal handling.

Some quantity of touch-up paint shall be furnished for application at site.

8.13 ACCESSORIES: Each breaker shall be furnished complete with fittings and accessories as listed below (The list is illustrative and not exhaustive).

1) Clamp-type bimetallic terminal connectors for ACSR, DOG conductors.
2) Base frame and foundation/anchor bolts.
3) Operating mechanism, trip and close coils, pole discrepancy features and low pressure blocking device. Auto re-closing device wherever required.
4) Set of valves, pressure gauges and pressure switches.
5) Auxiliary contacts and relays.
6) Local-remote selector switch, trip-normal close pistol grip control centre switches.
7) Manual close and trip devices.
8) Mechanical ON/OFF indicators.
9) Operation counter.
10) Weather proof control cubicle and pole boxes, with locking arrangement.
11) Set of switch fuse units for AC and DC supply.
12) Insulation valves or piping of SF6 system, hydraulic lines and nitrogen system, wherever necessary.
13) Space heaters with thermostat and switch.
14) Cubicle illumination lamp with switch.
15) Terminal blocks and internal wiring lot.
16) Two (2) nos. 12-way terminal blocks on secondary connection.
17) Set of pre-fabricated pipe with fittings, clamps, and hard wares for connection between central control cubicle and pole boxes.
18) Interconnecting wires, GI conductors and accessories for connection between Central Control Cubicle and pole boxes.
19) SF6 gas filling/monitoring device.
20) Nitrogen monitoring device, where applicable.
21) Breaker sealing elements in sufficient quantity.
22) Sufficient spare quantity of hydraulic oil, where applicable.
23) Sufficient spare quantity of SF6 and Nitrogen Gas filled in cylinders.
24) Other standard accessories which are not specified but supplied with breakers of such type and rating for efficient and trouble free operation.
25) Two (2) ground pads per pole.
26) Alarm for auxiliary AC/DC supply failure
27) Indication for Breaker ON/OFF and Spring charged.
28) Anti pumping feature.
29) Independence of trip circuit from local and remote selection.
30) Conveniently located manual emergency trip.
31) Trip circuit supervision for pre-trip as well as post trip.

8.14 EQUIPMENT FOUNDATION AND STEEL STRUCTURES: All equipment shall be furnished complete with base frame, anchor/foundation bolts and hardwares. All ferrous parts including all sizes of nuts, bolts, supports, channels structures etc. as also the mechanism housing shall be hot dip galvanized confirming to latest version of IS:2629, spring washers shall be electro galvanised.

8.15 TESTS:

8.15.1 TYPE TESTS: THE EQUIPMENT OFFERED SHALL BE TYPE TESTED. TYPE TEST REPORT SHOULD NOT BE MORE THAN 7 YEARS OLD, RECKONED FROM THE DATE OF BID OPENING, IN RESPECT OF THE FOLLOWING TESTS, CARRIED OUT IN ACCORDANCE WITH ISS-13118/IEC-56 FROM GOVT./GOVT. APPROVED TEST HOUSE, SHALL BE SUBMITTED ALONGWITH BID.

i. Impulse withstand voltage tests.
ii. Power frequency voltage dry and wet tests on main circuits.
iii. Short circuit withstand capability test (making and breaking).
iv. Mechanical endurance tests.
v. Temp. Rise test.

Note: However, the mechanical endurance test and temperature rise test conductor at firm's works in the presence of representative of any of the SEB's/State Power Utilities shall be acceptable.

The remaining type test report as per clause 6.0 of ISS-131118/IEC-56 shall be submitted by the successful bidder with in three months of the issue of letter of intent and these type test reports shall be from Govt./Govt. approved test house and will not be more than 7 (seven) years old reckoned from the date of placement of order.

8.15.2 ACCEPTANCE AND ROUTINE TESTS:

All acceptance and routine tests as specified hereunder shall be carried out by the Bidder in the presence of Purchaser's representative.

i Dry power frequency voltage withstand tests on the main circuit.
ii Voltage withstand test on control and auxiliary switch.
iii Measurement of resistance of the main circuit.
iv Mechanical operation test.
v Design and visual checks.

Additional Tests:

The purchaser reserves the right for carrying out any other type tests of a reasonable nature at the works of the supplier/laboratory or at any other recognised laboratory/research institute in addition to the above mentioned type, acceptance and routine tests at the cost of the purchaser to satisfy that the material complies with the intent of this specification.

8.16 INSPECTION: Pre-dispatch inspection will be carried out by the IOP representative at the manufacturer's works for the acceptance and routine tests. No material shall be dispatched from the point of manufacture unless the material has been satisfactorily inspected tested and further dispatch authorized by IOP representatative.

8.17 TEST REPORTS: Two sets of test reports has to be submitted along with the BID for the type tests and Two sets of test reports has to be submitted along with breaker for the acceptance and routine tests and additional tests if any.

8.18 DRAWINGS & MANUALS: Bidder has to submit two sets of detail drawings of the breaker and the technical literature along with the bid. Bidder has to supply the detailed drawings of the breaker and the manual for operation, trouble

shooting parameters, maintenance requirements, list of spares etc. along with the breaker.

8.19 GUARANTEE: The Bidder shall guarantee that the material, workmanship and performance of the breaker and accessories for a period of two years/ more in conformity with the specifications from the date of installation. Any deviation for this has to be clearly mentioned in the bid. The equipments found defective / failed within the above guarantee period shall be replaced or repaired by the supplier free of cost within one month of date of intimation. Manufacturer has to submit the warranty certificate for the same.

8.20 ERECTION & COMMISSIONING: The erection and commissioning of the breaker has to be carried out by the contractor. This includes the RCC foundation required for the installation, fixing of the support structure for installation of the breaker and installation & connection of the breaker with the existing overhead structure supply points by ACSR DOG conductor, connection of all control cables etc. and testing of the breaker after installation.

8.21 SPARES: The detailed list of optional spares and the recommended spares required has to be furnished along with the bid.

8.22 GUARANTEED TECHNICAL PARTICULARS FOR 33KV VACUUM CIRCUIT BREAKER

Sl.No.	Description	IOP Requirements	Bidder's Specifications (To be filled by the Bidder)	Remarks
1	Manufacturer's Name and Address	Preferable manufacturers: AREAVA, CGL, ABB, SIEMENS, BHEL or approved equivalent of the same.		
2	Delivery period required by the manufacturer for the VCB	Early delivery will be preferred		
3	Applicable technical standards	IEC 56/IS 13118		
4	Highest system voltage (KV)	36		
5	Rated Frequency (Hz)	50		
6	Number of poles	3		
7	Type of Installation	Out Door		
8	Rated normal current			
8.1	Rated (Amps)	1600A		
8.2	RMS value of AC component of rated short circuit current (KA)	25		
8.3	Percentage of DC component	32		
8.4	Asymmetrical breaking current (including DC component)	27.4 KA rms		
9	First pole to clear factor	1.3		
10	Rated operating sequence	0 – 0.3 sec – CO – 3 min – CO 0 -0.3s –CO – 15s –CO		
11	Rated duration of short circuit	3 Sec		
12	Rated out of phase breaking current (KA)	6.25		
13	Arcing time (ms)	< 15		
13.1	At 10% rated breaking current	Do		

13.2	At 25% rated breaking current	Do		
13.3	At 50% rated breaking current	Do		
13.4	At 100% rated breaking current	Do		
13.5	Maximum arcing time at lowest fault currents	Do		
14	Break Time (ms)	< 75		
14.1	At 10% rated breaking current	Do		
14.2	At 25% rated breaking current	Do		
14.3	At 50% rated breaking current	Do		
14.4	At 100% rated breaking current	Do		
14.5	Maximum arcing time at lowest fault currents	Do		
15	Closing time (ms)	< 75		
16	Maximum Cable Charging Current			
16.1	On Supply side	50A		
16.2	On Line side	50A		
17	Rated small inductive breaking current (KA)	1% of rated current		
18	Max rise of temperature over ambient temperature over ambient temperature for current rating under clause 8	As per IEC 56/ IS 13118		
19	Interrupting capacity on duty cycle			
19.1	AC component (KA)	25		
19.2	Percentage DC component	32		
20	No. of breaks in series per pole	One		
21	Length of contact travel (mm)			
22	Total length of break per pole (mm)			
23	Type of main contact			
24	Material of contacts			
24.1	Main			
24.2	Arcing			
24.3	Auxiliary			

25	Contact pressure (Kg/sqmm)			
26	Insulation level of the breaker			
26.1	One minute power frequency withstand voltage (KV rms)	70KV		
26.2	Impulse withstand test voltage (KV Peak)	170		
27	Minimum clearance in Air (mm) as per IEC/ IS			
27.1	Between phases (Live Parts)			
27.2	Centre to centre distance between phases			
27.3	Between live parts and earth			
28	Whether the circuit breaker is suitable for fixed trip operation or trip free operation and whether it is provided with a lock out device preventing closing of the breaker	Trip free		
29	Method of closing			
29.1	Normal	Motor operated spring stored energy		
29.2	Emergency	Manual charging		
30	Type of closing mechanism	Motor operated spring stored energy		
30.1	Normal voltage of closing	48V DC		
30.2	Pick-up range (Volts)	70-110%		
31	Type of tripping mechanism	Shunt trip		
32	Normal voltage of tripping coils	48V DC		
33	Total interrupting time measured from instant of trip coil energisation to arc extinction of resistor current (cycles)			
34	When switching of synchronous systems			
34.1	Max Current (KA)	25		
34.2	Max contacts of 1 pole (KV)	20.8		
35	Weight & Dimensions			
35.1	Weight of complete Circuit			

	Breaker (Kg)			
35.2	Impact loading for foundation design to include deed load plus impact value on opening at maximum interrupting ratings in terms of equivalent static load (Kg)			
35.3	Overall dimensions Height(mm) Width(mm) Length(mm)			
36	Porcelain			
36.1	Make			
36.2	Type	Hollow		
36.3	Insulation class	"C"		
36.4	One minute dry power frequency withstand KV (rms)	100		
36.5	10 Second wet power frequency withstand KV (peak)	95		
36.6	Flash over voltage (KV)	105 (Dry), 100(Wet)		
36.7	Full wave impulse withstand voltage KV (peak)	250		
36.8	Switching surge withstand voltage KV (Peak)			
36.9	Corona discharge voltage KV (rms)	27 (inception voltage)		
37	Creepage distance total/ protected (mm)	900/ 300		
38	Permissible safe cantilever loading on installed porcelain (Kg.m)	900		
39	Mechanically operated or Pneumatically or Hydraulically operated	Motor operated spring stored energy.		
40	Time required for the motor to charge the spring fully (Secs)			
41	Details of the 33KV VCB s			
41.1	Make of the Vacuum bottle/ interrupter			
41.2	Pressure maintained in the			

	vacuum interrupter			
41.3	Minimum pressure to be maintained in the vacuum interrupter for safe working of the breaker.			
41.2	Method of checking the pressure in vacuum interrupter / procedure to check up			
41.3	Periodical maintenance required to maintain the pressure in the vacuum interrupter.			
42	Auxiliary Contacts			
42.1	No. of contacts required	16 NO + 16 NC (Total 32 no.s)		
42.2	Continuous rating of the contacts	10A		
43	Whether the equipment covered by this bid have been type tested and if so, whether the copies of the test certificate enclosed with the bid offer.	Bidder to specify		

Name of the Firm

Signature of the Bidder

Designation & Seal

Date

9. TECHNICAL SPECIFICATIONS FOR CURRENT TRANSFORMER

9.1 SCOPE: The scope of contract includes design, manufacture, testing at manufacturer's works, packing, delivery and installation, testing & commissioning of the current transformers for protection and metering services in Institute of Physics 33KV substation. Each set of CT will comprise of 3 numbers of single pole CT for 3 phases.

9.2 TEMPERATURE RISE:

The maximum permissible temperature rise of the current transformer winding when carrying a primary current equal to the rated continuous current at rated frequency and with rated burden over ambient Temp. 50 ˚C.

(a) All classes immersed in oil (Measured by 50 ˚C Resistance method)

(b) Oil at the top of the tank or housing (measured by Thermometer)

9.3 TYPE AND CONSTRUCTION:

The design features and construction details of current transformer shall be in accordance with the requirement stipulated hereunder.

a) The current transformers shall be complete in all respects and shall conform to relevant IS: standard.

b) The 33 KV current transformers shall be of Dead Tank outdoor type, single phase, 50 Hz, mounted in oil filled, self cooled, shaded porcelain bushing suitable for operation under the service conditions as specified in the general conditions at site.

a) The current transformers shall be suitable for upright mounting on steel structures and shall preferably be suitable for horizontal transportation.

b) The CT shall be oil immersed type provided with Class 'A' insulation. The design and construction of CTs shall be sufficient to withstand the thermal and mechanical stresses resulting from the specified short circuit currents.

c) The core of the CTs shall be high grade non-ageing electrical, silicon laminated steel of low hysteresis loss and high permeability to ensure high accuracy at both normal and over-current. The core material used for metering shall be stated in tender.

d) The exciting current shall be as low as possible and the CTs shall be capable of maintaining its rated accuracy for burdens and saturation limits.

e) Rating plate marking as per IS: 2705 shall be provided.

f) CT characteristics shall be such as to provide satisfactory performance for burdens ranging from at least 25% to 100% of rated burden over a range of at least 10% to 100% rated current in case of metering CT cores and upto the accuracy limit factor/knee point voltage in case of protection CT cores.

g) The rated extended primary current shall be 120% of the rated primary current as per IS:L2705 (Part-II).

9.4 BUSHING: Oil filled condenser type porcelain bushing conforming to latest edition of IS:2099/IS:5621 shall be used for the CT. The bushings shall have ample insulation, mechanical strength and rigidity for the condition under which they shall be used and shall be designed to prevent accumulation of explosive gases and provide adequate oil circulation to remove the internal heat.

There shall be no undue stressing of any parts of the bushings due to temperature changes and adequate means shall have to be provided to accommodate conductor expansion.

Cast metal end caps for the bushings shall be of high strength hot-dip galvanized malleable iron. They shall have smooth surface to prevent discharge taking place between the metal parts and porcelain as a result of ionization.

The insulation of bushings shall be coordinated with that of the current transformer such that the flash over, if any, will occur only external to the CT.

1. **Primary terminals suitable for connection with ACSR DOG conductor.**
2. **Oil level gauge, convenient means of filling, sampling and draining of oil.**
3. **End shields for distribution of stresses.**
4. **Corona shields for bushings if required.**

9.5. INSULATION OIL: The quantity of insulating oil for the filling and the complete specification of insulating oil shall be stated. The oil shall comply in all respects with the provisions of the latest edition of IS: 335.

9.6. GROUND TERMINALS: Two grounding terminals suitable for receiving grounding connections shall be provided. The grounding conductor shall be GI Flat of size 50 mmx6 mm size.

9.7 SECONDARY TERMINAL BOX: All secondary terminals shall be brought out in a compartment on one side of each current transformer for easy access. The exterior of this terminal box shall be hot-dip galvanized. A terminal board which shall have arrangement for series/parallel connection and arrangement for shorting of secondary terminals shall be provided.

The terminal box shall be provided with a removable cable gland plate at bottom for mounting cable glands for 1.1 KV PVC insulated PVC sheathed 19/12/08/04 core stranded copper conductor control cables

The terminal box shall be provided with a door in front so as to have easy access of secondary terminals. The door shall have a sealing/locking arrangement and shall be suitable to prevent penetration of moisture and rainwater.

All terminals shall be clearly marked with identification number to facilitate connection to external wiring.

9.8 WINDING GENERAL: The rating of secondary winding shall be as specified in technical particulars. Secondary winding should be made out of suitably insulated copper wire of electrolytic grade. Primary winding shall be hair pin type or wound type made out of high conductivity copper. Copper used for the primary winding shall be rigid. Unavoidable joints in the primary winding shall be welded type preferably lap type. If wound primary is used then each section shall be insulated with special paper having mechanical strength, high electrical withstand properties and good ageing qualities.

9.9. PRINCIPAL TECHNICAL PARMETERS FOR CT:

Sl.No.	Item	IOP specifications	Remarks
01	Type	Each set comprise of 3 numbers of single core/ dead tank/ out door/ oil filled and hermetically sealed CT	
02	Type of mounting	Pedestal type on steel structures	
03	System frequency	50 Hz.	
04	Method of earthing the system to be connected	Effectively earthed	
05	Rated continuous thermal current	120% of the rated primary current	
06	Acceptable limit of temperature rise above the specified ambient temperature for continuous operation at rated current	As per latest IS - 2705	
07	Current Ratio	25 – 25 / 5 -5 A	
08	Insulation Class	36 KV (rms)	
09	Basic Insulation level	170 KV (rms)	
10	One minute dry power frequency withstand voltage, primary	70KV	
11	Minimum creepage distance of porcelain housing (mm)	25mm/KV of the highest system voltage	
12	Rated short time withstand current for 3 Sec	25 KA rms	
13	Rated dynamic withstand current	65.5 KA Peak	
14	Number of Core	Two	
15	Purpose of two cores	Metering & Protection	
16	Burden of the two cores	30VA & 30VA	
17	Class of Accuracy	Metering – Class 1 Protection – 5P10	
18	Instrument Security Factor	5 or less than 5	

GUARANTEED TECHNICAL PARTICULARS FOR CURRENT TRANSFORMER

TO BE FILLED IN BY THE BIDDER

Sl.no.	Description of the item	Specification to be quoted by the Bidder
01	Name and address of the Manufacturer (Preference will be given to the bidders quoted for the CT being supplied by the manufacturer of the Vacuum Circuit Breaker quoted in this Bid) Kappa/ Controls & Switch Gears/ Crompton Greaves/ Automatic Electricals Ltd./ Pragati Electricals or Approved equivalent of the same	
02	Rated Insulation Class (KV)	
03	Max Current ratio error at rated frequency with Sec. burden between 25% to 100% of rated burden	
04	Rated Primary Current	
05	Rated Secondary Current	
06	Details of the Cores Class of Accuracy Accuracy limiting Factor Knee point voltage Secondary Resistance Corrected to 75'C Instrument Security Factor for Metering winding Secondary limited Voltage Rated output at 0.8 p.f. lagging	
07	Rated short time withstand current for 3 Sec duration (KA rms)	
08	Rated dynamic withstand current (KA peak)	
09	Rated continuous thermal current (pu) where pu=rated current	
10	One minute Power frequency withstand voltage (KV rms) Dry	

	Wet	
11	1.2/50 micro-second impulse withstand voltage (KV peak)	
12	One minute power frequency withstand voltage of secondary winding (KV rms)	
13	Minimum Creepage distance (mm)	
14	Weight of oil (Kg)	
15	Total Weight (Kg)	
16	Mounting details	
17	Overall dimensions	
18	Type of Primary Winding	
19	No. of Primary Turns	
20	No. of Secondary Turns	
21	Flux Density at Knee point voltage (Tesla)	
22	Variation in ratio and phase angle error due to variation in i) Voltage by 1% ii) Frequency by 1Hz	
23	Whether pressure relief device provided, if so type (i.e. spring type or explosion type etc.)	
24	Delivery period required by the manufacturer fro supply the CT	
25	Whether the following are enclosed with the tender (Yes or No) i) All type test reports ii) Drawings	

Name of the Firm

Signature of the Bidder

Designation & Seal

Date

10. TECHNICAL SPECIFICATIONS FOR POTENTIAL TRANSFORMER

10.1. SCOPE: This specification covers the design, manufacture, and assembly, testing at the manufacturer's works, supply, delivery, installation, testing and commissioning at Institute of Physics 33KV substation of single-phase outdoor type potential transformers. Each set of PT comprise of 3 numbers of single pole, out door type potential transformers suitable for 3phase use.

The potential transformers will be used as Bus-Bar PT for voltage indication through switch board type instruments, supply of potential to tariff meters, high speed distance relays for feeder protection and synchronization devices.

10.2. DESIGN OF POTENTIAL TRANSFORMERS:

The potential transformers shall be electromagnetic outdoor type, single phase, oil filled, self cooled, having shaded porcelain bushing, suitable for operation under the service conditions as specified in the general conditions, without protection from sun, rain and dust.

The potential transformers shall be suitable for up-right mounting on steel structures and shall preferably be suitable for horizontal transportation.

The potential transformer shall be completed with all accessories like primary terminals, terminal connectors, weather proof terminal box for secondary connection, lifting lugs, grounding terminals, oil sight glass, pressure relief device, filling and draining plugs and name plate.
The potential transformers shall be oil immersed type provided with Class-A insulation. It shall be of hermetically sealed type construction to prevent air and moisture from entering the tank.
The core of the PTs shall be high grade non-ageing, silicon laminated steel of low hystresis loss and high permeability to ensure high accuracy at both normal and over-voltages conforming to ISL: 3024.
The PT secondary terminals shall be brought out in a weather proof terminal box for easy access.
There shall be adequate coordination between the manufacturer of PT and circuit breaker in order to avert the possibility of Ferro resonance effects.

10.3 BUSHING:

Oil filled condenser type porcelain bushing conforming to latest edition of IS:P2099 IS:5621 shall be used for the PT.

The bushings shall have ample insulation, mechanical strength and rigidity for the condition under which they shall be used and shall be designed to prevent accumulation of explosive gases and provide adequate oil circulation to remove the internal heat.

There shall be no undue stressing of any parts of the bushings due to temperature changes and adequate means shall have to be provided to accommodate conductor expansion. Cast metal end caps for the bushings shall be of high strength hot-dip galvanized malleable iron. They shall have smooth

surface to prevent discharge taking place between the metal parts and porcelain as a result of ionization.The insulation of bushings shall be coordinated with that of the current transformer such that the flash over, if any, will occur only external to the PT.

Primary terminals suitable for connection with overhead ACSR DOG conductor.
Oil level gauge and convenient means of filling, sampling and draining of oil.
End shields for distribution of stresses.
Corona shields for bushings if required.

10.4 INSULATING OIL: The quantity of insulating oil for the filling and the complete specification of insulating oil shall be stated. The oil shall comply in all respects with the provisions of the latest edition of IS: 335.

10.5 GROUNDING TERMINALS: Two grounding terminals suitable for receiving grounding connections shall be provided. The grounding conductor shall be GI Flat of size 50x6mm size.

10.6 SECONDARY TERMINAL BOX:

All secondary terminals shall be brought out in a compartment on one side of each potential transformer as per para 6.01h. The exterior of this terminal box shall be hot-dip galvanized.

The terminal box shall be provided with a removable cable gland plate at bottom for mounting two cable glands of 1.1 KV/660 V grade steel wire armoured, PVC insulated PVC sheathed 4x2.5 sq. mm stranded copper conductor cables. The cable glands shall be included within the scope of supply.

The terminal box shall be provided with a door in front so as to have easy access of secondary terminals. The door shall have a sealing/locking arrangement and shall be suitable to prevent penetration of moisture and rain water.

All terminals shall be clearly marked with identification number to facilitate connection to external wiring in accordance with relevant Indian Standards.

10.7 NAME PLATE: The nameplate of the PT shall contain all relevant particulars as per IS: 3156.

10.8. PRINCIPAL TECHNICAL PARAMETERS OF PT:

Sl.No.	Description of the item	Specifications
01	Type	Single Phase, Out Door type, Oil Filled, Dead Tank design. Each set comprise of 3 no.s of single pole PT for 3 phase use.
02	Type of Mounting	Pedestal type on steel structures
03	Voltage Ratio	$33000/\sqrt{3}$ / $110/\sqrt{3}$ V
04	System Voltage (KV rms)	33 KV

05	Basic Insulation (KV Peak)	170 KV
06	One minute dry power frequency withstand Voltage KV (rms) a) Primary Terminal b) Secondary Winding	 70 02
07	Minimum Creepage Distance (mm)	25mm/KV of Highest system Voltage
08	Burden (VA)	200
09	Acceptable limit of temperature rise	As per latest IS-3156
10	System Frequency (Hz)	50± 5%
11	Highest system Voltage	36KV
12	Voltage variation	10%
13	No. of Phases	3
14	**Preference will be given to the Potential transformers with HT fuse.**	

GUARANTEED TECHNICAL PARTICULARS OF POTENTIAL TRANSFORMERS

TO BE FILLED IN BY THE BIDDER

Sl.No.	Description of Item	Specification to be quoted by the Bidder
01	Name and address of the Manufacturer (Preference will be given to the bidders quoted for the PT being supplied by the manufacturer of the Vacuum Circuit Breaker quoted in this Bid) Kappa/ Controls & Switch Gears/ Crompton Greaves/ Automatic Electricals Ltd./ Pragati Electricals or Approved equivalent of the same	
02	Delivery period required by the manufacturer to supply the PT	
03	Type of PT	
04	Rated insulation class for primary voltage (KV)	
05	Rated Secondary Voltage (Volts)	
06	Rated Burden (VA)	
07	Accuracy Class	
08	Maximum Ratio error with burden between 25% to 100% and at any voltage between 80 to 120% of rated voltage at rated PF – (%)	
09	Quantity of oil (liters)	
10	Temperature rise at 1.1 time rated voltage with rated burden	
11	Rated Voltage factor and time	
12	Temp. rise for 11 above	
13	One minute power frequency withstand test (wet) voltage (KV peak)	
14	1.2/ 50 micro second impulse wave withstand test voltage (KV peak)	
15	One minute power frequency withstand voltage on secondary (KV	

	rms)	
16	Minimum creepage distance (mm)	
17	Weight of oil (Kg)	
18	Weight of complete PT (Kg)	
19	Overall Dimensions	
20	Mounting details	
21	Thickness of tank (mm) side/ top & bottom	
22	Details of HT fuse (if any)	

Name of the Firm

Signature of the Bidder

Designation & Seal

Date

11. TESTS FOR CT & PT

11.1. TYPE TESTS: All the equipments offered should have been successfully type tested in line with standard and technical specifications, within the last 5 years from the date of offer. The tenderer shall furnish the following type tests reports (along with General arrangement drawing, Rating and Diagram Plate and internal Constructional drawing) along with the offer:

i) Impulse Voltage withstand test

ii) Temperature rise test

iii) Short Circuit Test (Not applicable in case of PT)

11.2 ACCEPTANCE & ROUTINE TESTS: All acceptance and routine tests as stipulated in the relevant standards shall be carried out by the supplier in the presence of IOP representative.

Immediately after finalization of the programme of acceptance/ routine testing the supplier shall give 15 days advance intimation to IOP to depute the representative for witnessing the tests.

12. SPECIFICATION FOR 33 KV INDOOR CONTROL PANEL

(The 33KV Relay control panel will be accepted only from the same manufacturer of the Vacuum circuit breaker quoted in this bid or approved equivalent of the same)

12.1. SCOPE: Design, fabrication, supply, installation, commissioning of the 33KV Indoor control, indication, metering, Annunciation and relay panel suitable for the above mentioned switch gears, transformers etc mentioned in this bid to be installed on the existing cable trench in IOP 33KV substation LT panel room. The control and relay panel shall be complete in themselves with all main and auxiliary relays, fuses, links, switches, wirings, labels, terminal blocks, earthing terminals, foundation bolts, illumination, cable glands etc.

12.2. TYPE TEST CERTIFICATES FOR RELAYS: Following type test certificates of relays are required to be submitted by the bidder:-

(i) Performance test
(ii) Thermal requirement test
(iii) Accuracy test
(iv) Re-set value test
(v) Re-set time test
(vi) Over shoot time test
(vii) Rated burden & impedance test
(viii) Insulation requirement test
(ix) Mechanical requirement test
(x) Contact performance test

12.3. PANEL CUT OUT: The panels shall be fabricated from 2mm steel sheet free from all surface defects. The panels shall have sufficient structural re-enforcement to ensure a plain surface to limit vibration and to provide rigidity during despatch and installation. All control panels and switchgear cubicles shall be made absolutely vermin-proof

12.4. PANEL LIGHTING: For interior illumination, CFL/ fluorescent tube operating at 230V AC 50 Hz with On/ Off switch shall be provided in each panel. The lamp/tube shall be located at the ceiling and guarded with protective cage. The On/Off switch shall be mounted on one of the side walls and shall be easily accessible.

One 3 pin-5 Amp. receipt able socket with On/Off switch and fuse shall be provided in each control panel.

12.5 AUXILIARY SUPPLY: For each Control Panel, IOP will provide the following :-

i) 230 V (+ 10% to - 20%) single phase 2-wire, 50 Hz neutral grounded A.C. supply, frequency variation+ 4 to-4%
ii) 48 V (+ 10% to - 15%) D.C. supply

For each Control Panel, supplier will provide the following

(a)H.R.C. fuses shall be provided by the supplier for both the A.C. and D.C. power supplies.

(c) All H.R.C. fuses and links shall be with holder, the base of fuse holder shall be mounted on slant support and with identification labels.

12.6 CONTROL WIRING:

(a) The supplier shall provide complete wiring up to the terminal block for the equipment, instrument devices mounted in the control panel strictly according to the wiring diagram prepared by the supplier based on the purchaser's information and schematic diagram and get approved from the purchaser.

(b) The wiring shall be completed in all respects so as to ensure proper functioning of control, protection and metering schemes.

(c) All spare contacts of relays and switches shall be wired up to the terminal.

(d) The Control Panels shall be supplied completely wired ready for purchaser's external connections at the terminal blocks. For CT & PT circuits the wiring shall be carried out with 1100V grade PVC insulated stranded copper conductor of size 2.5sq.mm.

(e) Color coded wires should be used to facilitate easy tracing, as under:-

i) Three Phase, A.C. Circuit:-Red for R Phase, Yellow for Y Phase, Blue for B Phase, Black for Neutral

ii) Single Phase A.C. Circuit:- Red for Phase, Black for Neutral, Green for Earthing

iii) D.C. Circuit:- Red for Positive, Black for Negative

iv) Control Wiring:- Gray for annunciation and other control circuits.

(f) Each wire shall be identified at both ends with wire designation number by plastic ferrules, as per wiring diagram based on latest revision of IS-375 to denote the different circuit functions. The supplier shall take approval for the system of wire numbering.

(g) All wire termination shall be made with compression type connectors. Wires shall not be tapped or spliced between terminal points. All wire shall have crimp type termination and direct connection at any place is not at all required.

(h) All series connected devices and equipment shall be wired-up in sequence. Loopin/ loop-out system of wiring shall be avoided, as far as possible and the common buses shall normally be made through the terminal block for better reliability of testing and maintenance.

(i) Fuses and links shall be provided for isolation of individual circuit from the bus wires without disturbing the other circuits and equipments.

(j) The DC trip and DC voltage supplies and wiring to main protective gear shall be segregated from these for back up protection and also for protective apparatus for special purposes. Each such group shall be fed through separate fuses, either direct from main supply fuses or the bus wires.

(k) Since a number of wires will run from one point to another, it is desired that the support arrangement should be adequate and neat. The conventional method of bunching of wire should not be adopted, since the same may create problems in case any wire is to be removed. The wires should be accommodated in plastic channel with sliding plastic cover mounted inside the panel, suitably. Inspection/removal of wires should be possible by sliding the covers.

(l) Blank plastic channels should be provided by the sides of the panel to accommodate the incoming cables from switchyard through the cable glands.

(m) The circuit diagram of control circuit along with operating instructions (DOS/DONT) embossed on metallic plate duly laminated shall be provided on rear side of the door.

12.7. TERMNIAL BLOCKS: (a) Multi-way terminal blocks complete with necessary binding screws and washers for wire connections and marking strips for circuit identification shall be provided for terminating the panel wiring and outgoing cables. The terminal block shall be suitable for receiving at least 2x2.5 sq.mm or 2x1.5 sq.mm. Stranded copper conductor wire per terminal.

(b) Terminal blocks shall have shorting and disconnection facilities. The panel-side and outgoing wires should be dis-connectable just by opening the disconnecting links which slide up/down or left/right without dislodging the wires from their position. However, dis-connectable type terminal connectors may be limited to CT & PT circuits only.

(c) Instrument transformer wires shall be terminated through suitably mounted test terminal blocks for site testing facility.

(d) The terminal blocks shall be grouped according to circuit functions and each terminal block group shall have at least 20% spare terminals. Adjacent rows of terminal block shall be spaced not less than 100 mm apart. These shall be mounted vertically at the sides of the cubicle and set obliquely towards rear doors to give easy access of terminating end to enable ferrule number to be read without difficulty. The bottom of terminal blocks shall be spaced at least 200 mm the cable gland of incoming multi-core cables.

12.8 CABLE ENTRY: The control panel shall have provision of cable entry from the bottom. One detachable gland plate suitable for 19/ 12/ 08/ 04 core 2.5 sq.mm unarmored cable entry with stamped holes and covered with dummy plate shall be provided by the supplier. All cable glands shall be double compression type. The panel will be installed on a cable trench for easy access to the cable entries.

12.9. GROUNDING: (a) 25 mm x 6 mm x 250 mm copper ground bus shall be provided inside the panel and effectively grounding all metal structures.

(b) Each continuous length of ground bus shall have provision of two terminals at two separate points for connection to main ground grid of the sub-station.

(c) Potential and current transformer neutrals shall be grounded only at the terminal blocks where they enter the control panel from the instrument transformers.

(d) Wherever a circuit is shown grounded in the drawings, a single wire for the circuit shall run independently to the ground bus and connected to it.

12.10. PRE-TREATMENT AND PAINTING PROCESS: The panel has to be undergone for seven tank metal treatment process as per standard norms and procedure. After metal treatment 2 coats of red oxide primer has to be applied and over which two coats of approved epoxy paint has to be applied. Necessary heat treatment has to be carried out for better finishing.

12.11. PROTECTION SCHEME: Control Panel is required for control/ protection on LT side of Transformers. This will be in the form of a relay set having 2 Nos. O/C and 1 no. E/F elements. The current settings of O/C relay elements shall be from 50% to 200% and of E/F element from 10% to 40%. They shall be suitable to work on 48 Volt D.C. supply. The secondary rating of C.T. shall be 5 Amps. The O/C and E/F relays shall have operating time of 1.3 sec. at 10 times of plug setting current. The relay shall be of draw out type with CT shorting facility. Further, the relay shall have self re-set contacts and hand reset flag arrangement.

12.12. CONTROL AND INDICATING CIRCUITS:

Sl.No.	Item Description	Quantity	Bidder's Specifications/ make/ deviations
01	3 Pole 5Amp Relay suitable for 48V DC with self-reset contacts and reset flag with following settings: a) O/C Element (50% to 100%)- 2no. b) E/F Element (10% to 40%)- 1no. c) Operating time – 1.3 Sec (Flush pattern, Horizontal) Make: CDG-61 of EE make or approved equivalent of same.	One Set	
02	Trip Circuit Supervision Relay, 48V DC, with 2NC & 2 NO, Flag, Flush type, Horizontal Mounting type. Make: VAX 31 of EE make or approved equivalent of the same.	One set	
03	A Three element voltage operated 48V DC auxiliary relay with 2 pairs of NO hand reset contacts and Flag for Transformer protection such as Buchholz relay Alarm/trip, Winding Temp Alarm/trip, OT Alarm/trip. (Flush Pattern, Horizontal) Make: VAA-33 of EE make or approved equivalent of the same.	Two set	
04	Over Voltage, Under Voltage, No Voltage, Instantaneous no voltage or under voltage or over voltage protection relay (48V DC) with Aux unit and flag. Under Voltage – 20%-step10%-80% Over Voltage–110%-step10% - 140% No Voltage – 25 -60% Flag – U/V – Rev.Flag, O/V – Std Flag, No Voltage – Rev.Flag. Resetting – U/V 110% of the setting, O/V – 90% of the setting. Aux contact – 2NO, 1 NC Make: VAG -21 of EE make or Approved equivalent of same.	One set	
05	Ammeter, Analog pointer type, Flush pattern, 25/5 CT operated, 0 to 25 Amp range, with selector switch for 3 phases.	One	
06	KV meter, Analog pointer type, 0 to 40KV, PT operated, Flush pattern, PTR 33KV/110V, with selector switch for 3 phases	One	
07	Microprocessor controlled Digital display meter		

	to read the following (with PTR- 33/√3KV/110/√3V, CTR- 25/5 A) 1. Power factor meter (Cosϕ)- (0.5 lag– 1- 0.5 lead), 3Phase load. 2. Kvar Meter (0 to 1500), with suitable Transducer. 3. Frequency Meter (45Hz to 55Hz.) 4. Energy meter, 3Ph, 3 Wire 5. Maximum Demand meter	One set	
08	Test Terminal Block (CT) suitable for 3 phase.	One	
09	Circuit Breaker Control Switch (Pistol Grip) T-N-C	One	
10	Indicating Lamps (LED)for the following: a) CB-ON b) CB-Off c) TCH coil-1 d) TCH coil-2 e) Auto Trip f) DC Fail g) Buchholz Alarm h) Buchholz Trip i) Winding Temp. Alarm j) Winding Temp Trip k) Oil Temp Alarm l) Oil Temp Trip m) Low oil level n) Incoming supply failed o) OCR Trip p) EFR Trip	 One One One One One One One One One One One One One One One One	
11	Push Buttons: a) Alarm accept b) Alarm Reset c) Trip Ckt. Check Coil – 1 d) Trip Circuit Check Coil -2	 One One One One	
12	Illumination lamp with Protective cage & On/off Switch	One	
13	250V,3 Pin, 5A Power Socket with On/Off Switch	One	
14	Alarm Bell (DC)	One	
15	Other miscellaneous requirements like Double compression type cable glands, Foundation Bolts, Name plates for indicating lamps and other requirements required for the panel for installation.	One lot	

A trip healthy lamp shall be provided for each circuit breaker and connected in such a way as to indicate the healthy condition of the trip circuit. The lamp should have the indication on demand when breaker is on. Such indication is also necessary when the breaker is off, but it should be possible to check the trip circuit condition before closing

the circuit breaker. In brief, pre and post close trip supervision facility on demand is required and shall be included.

The automatic tripping of the circuit breaker due to operation of protective relays shall be indicated by a common audible alarm.

The automatic tripping of the circuit breaker due to operation of protective relay shall be indicated by audible alarm. The offered alarm scheme shall be complete in all respects including one DC bell for trip alarm with a contractor/ auxiliary relay suitable to handle breaking of DC bell current. The contractor/auxiliary relay will get energised through the self reset alarm contacts of protective relay and will remain actuated by its own seal-in contact. A push button shall be provided to accept alarm by breaking the seal in contact.

NOTE: Any other indications which are required for proper protection/ operation of circuit breaker should be provided in control panel, without any extra cost

12.13. TESTS :-

1 Each control panel shall be completely assembled, wired, adjusted and tested at the factory, prior to despatch.

2 The tests shall include wiring continuity tests, insulation tests and functional tests to ensure operation of the control scheme and individual equipment.

3 The test procedures shall have prior approval of the purchaser.

4 All instruments, meters and relays shall be tested and calibrated in accordance with relevant standards.

5 All auxiliary instrument transformer shall be tested in accordance with procedure as laid down in relevant standards.

TEST CERTIFICATE :-

Each control & relay panel should be tested by the manufacturer at their works for all routine and acceptance tests and copies of test certificate in duplicate giving results of these tests shall be furnished to the purchaser along with letter / offer for Inspection.

TEST WITNESSING :-

The routine/ acceptance tests results shall be witnessed by IOP's representative, if so desired by the EIC, IOP prior to despatch of the equipment from the works. The supplier shall give at least Fifteen (15) days advance notice of the date when the tests are to be carried out.

TEST CERTIFICATE OF COMPONENTS:-

Test certificate for important components like Ammeter, Voltmeter, Relays, Control Switch shall be produced at the time of inspection and shall be enclosed with the inspection report.

12.14 INSTALLATION AND COMMISSIONING: The Relay panel is to be installed on the existing cable trench of IOP 33KV substation LT panel room. All the requirements for the installation and commissioning of the panel is under the scope of bidder. If required the cutting of the trench cover plate (MS-5mm) by gas cutter, welding of any type, connection of the control cables and termination of the same are covered under the scope of the bidder.

13. TECHNICAL SPECIFICATIONS OF THE 33KV, 240SQMM XLPE CABLE:

33 kV XLPE armoured cable of size 300 sq. mm stranded aluminium conductor cross linked, polyethylene insulated, copper tape screened inner sheath of thermo plastic material, galvanized, steel strips and armoured and over all PVC sheathed three core cable of size 300 sq. mm.suitable for 33 kV effectively earthed system conforming to IS 7098 (Part II)1985 with latest amendments, if any. The cable shall have a minimum short circuit current rating of 37.6 KA for one second. The cable manufactured with dry –cure process, i.e. with inert gas curing using CCV system, radiation curing system or die- line system only is acceptable. The cable should be duly ISI marked.

The construction of cable shall include Aluminium conductor, semi-conducting material conductor shield, Cross linked polyethylene insulation, semi-conductive insulation shield, sheath, steel armour, PVC protective layer.

The conductor shall conform to IEC228 (latest rev.) or equivalent. The XLPE compound shall comply IEC502 (latest rev.) or equivalent for test voltages and insulation resistance. The outer protective layer/ sheath shall comply to IEC 502 as per application

Preferable Make: POLYCAB or Approved equivalent of the same for the XLPE cable and End Termination kits should be of RAYCHEM or approved equivalent of the same.

PART-IV
SCHEDULE OF QUANTITIES

SCHEDULE OF QUANTITIES

(TO BE SUBMITTED WITH TECHNICAL BID)

Name of the work: Design, supply, installation, testing and commissioning of 36KV out door VCB, CT, PT, 1MVA, 33/0.433KV out door transformer, Relay panel, 33KV XLPE cable and associated works at IOP, Bhubaneswar.

Sl. No.	Description	Qty	Bidder to specify the following	Bidder's Comments
1	36KV out door VCB		1. Whether quoted in price Bid: Yes/No. 2. Make of the VCB: 3. Delivery Period required by the Manufacturer:	
1.1	Design, fabrication, testing at factory, supply, installation, testing & commissioning of 36KV, 25KA, 1600 Amps, 3pole, porcelain clad outdoor vacuum circuit breaker. The closing and tripping solenoid should be rated for 48V DC. All indication lamp shall be of 48V DC supply. The HT bushings should be suitable to receive overhead, ACSR, Dog conductor. All the specifications should be as per technical details mentioned in **Technical specifications point no.8.**of the Technical bid. **(MAKE: AREAVA, CGL, ABB, SIEMENS, BHEL or approved equivalent of the same.)**	Two set		
2	Design, fabrication, testing at factory, supply, installation, testing & commissioning of one set comprise of **3 no.s** of out door mounting type oil immersed, single pole, Current transformer, of dual core, 25/5/5 ratio, 30VA, suitable for system voltage of 33KV, 3phase, 50Hz with HT bushings suitable to receive overhead, ACSR, Dog conductor. All the specifications should be as per technical details mentioned in **Technical specifications point no.9.**of the Technical bid. **(Preference will be given to the bidders quoted for the CT being supplied by the manufacturer of the Vacuum Circuit Breaker quoted in this Bid)** Make: Kappa/ Controls & Switch Gears/ Crompton Greaves/ Automatic Electricals Ltd./ Pragati Electricals or approved equivalent of the same..	2 sets	1 Whether quoted in price Bid: Yes/No. 2. Make of the CT: 3.Delivery Period required by the Manufacturer:	
3	Design, fabrication, testing at factory, supply, installation, testing & commissioning one set comprise of **3 no.s** of outdoor mounting type oil immersed, single pole, Potential transformer 33KV/ 110V, 200VA, suitable for system voltage 33KV, with HT bushings suitable to receive	2 sets	1 Whether quoted in price Bid: Yes/No. 2. Make of the PT:	

	overhead, ACSR, Dog conductor, **Fuse on HT side will be preferable**. All the specifications should be as per technical details mentioned in **Technical specifications point no.10.** of the Technical bid. **(Preference will be given to the bidders quoted for the PT being supplied by the manufacturer of the Vacuum Circuit Breaker quoted in this Bid)** Make: Kappa/ Controls & Switch Gears Crompton Greaves/ Automatic Electricals Ltd. / Pragati Electricals or approved equivalent of the same.		3.Delivery Period required by the Manufacturer:	
4	Design, fabrication, testing at factory, supply, installation, testing & commissioning of the Control and Relay panel for the above item suitable for indoor use at control room complete scheme to be got approved by department. Control panel should consists of the following meters/ relays: Earth fault protection, Over current protection, Instantaneous earth fault protection ,Trip Circuit Supervision Relay, Aux. Relay for transformer, winding, Oil over temp, Buchholz Relay, Ammeter, KVoltmeter, Digital meter for: PF meter, Kvar Meter, Energy meter, Maximum demand meter, Frequency meter, Annunciation panel, Rotary switch for breaker trip/ On, Indication lamp for trip / on, Alarm for trip of breaker etc. All the specifications should be as per technical details mentioned in **Technical specifications point no.12.** of the Technical bid. . **Make: CGL/ ABB/ AREAVA/ SIEMENS/ EASUN REYROLLE LTD or approved equivalent of the same. (The 33KV Relay control panel will be accepted only from the same manufacturer of the Vacuum circuit breaker quoted in this bid or Approved equivalent of the same)**	2 sets	1 Whether quoted in price Bid: Yes/No. 2. Make of the Relay Panel: 3.Delivery Period required by the Manufacturer:	

Note for the above items:

1.Routine tests on the breaker shall be performed in presence of departmental engineers as per relevant IS/BS/IE specifications at works.

2. Type test certificate as indicated in the specification shall be submitted before commencement of routine test for scrutiny and approval by department.

3. Proper labels and ferrule numbers should be affixed alongside for various components, concurrence of dept. engineers shall be obtained on location, quantity etc.

4.The tenderer shall include all extra hardware items needed at site for installation like angles, channels etc. in his scope. The scope shall also include grouting of base channels.

5. Co-ordination with state electricity board if required and electrical inspector of central electricity authority/ state electrical Inspector and subsequent approvals is included in the scope of the tender.

6. Tenderer is advised to seek the guidance of supplier of 36KV VCB/ CT/ PT for installation, testing and commissioning.

7. VCB, CT & PT to be mounted in the existing switch yard and in line with the existing facilities available. Tenderer is advised to visit the site before quoting the same.

8**. Preference will be given to the bidders who has quoted the VCB, CT, PT, Relay panel supplied by one firm/ make.**

5	Over head bus-bar/ Jumper connection: Supply, installation, testing and commissioning of Aluminum ACSR Dog conductor (103.60sqmm) all as per specifications and drawings, and instructions of EIC.	400mtr	Whether quoted in price Bid: Yes/No.	
6	Design, fabrication, supply and installation of outdoor hot dip heavily galvanized steel structure complete with all accessories as per enclosed detailed specifications, basic conceptional drawings and as per instructions of EIC, suitable for mounting the following equipment's: a) 2 no. 36KV VCB b) 2 sets of oil immersed single pole CT, 33KV, 30VA, 25/5/5A (each set comprise of 3 CT) c) 2 sets of oil immersed single pole PT, 33KV/110V,200VA (each set comprise of 3 PT) d) Support structure for the 33KV XLPE cable & it's end joints. e) Jumpers and interconnections etc. f) Connection to transformers	5MT	Whether quoted in price Bid: Yes/No.	

NOTE: QUANTITY MENTIONED IN POINT 5 & 6 ARE APPROXIMATE VALUES AND PAYMENT WILL BE MADE AS PER ACTUAL MEASUREMENTS AFTER COMPLETION OF THE WORK.

Note: 1. Tenderer to submit the complete G.A. drawings for departmental approval and shall incorporate all the requirements as per Orissa State Electrical Inspector and to be got approved by them. Department approval shall also to be obtained at every stage of fabrication & galvanization at their works including testing of structural member's samples as per relevant IS. 2. The entire installation shall be got approved by Central Electricity Authority/ State Electricity Board and connection release order is to be obtained by the contractor.				
8.	Civil works for out door structure			
8.1	Excavation in all types of soil/ including soft rock, construction of RCC foundation as per relevant IS including shuttering work, back earth filling, consolidation, curing, removing extra earth & disposing with a lead of 500mtr, grouting of structure for mounting VCB, CT, PT, Transformer providing foundation bolts as per detailed specifications and drawings & as per instruction of E-I-C as detailed below:			
8.1.1	Excavation in soil/ soft rock	100 Cu.Mtr.	Whether quoted in price Bid: Yes/No.	
8.1.2	Plain cement concrete work as per specification 1:3:6	40 Cu. Mtr.	Whether quoted in price Bid: yes/no.	
8.1.3	RCC works 1:2:4 including grouting of below mentioned foundation bolts/ transformer foundation, G.I. structure, Scope includes supply of steel rods.	60 Cu. Mtr.	Whether quoted in price Bid: Yes/No.	
8.1.4	20mm thick water proof cement finishing on top of foundation Note: The design of the RCC foundation details shall be got approved by the Dept. whose decision is final and binding.	20 Sq.Mtr.	Whether quoted in price Bid: Yes/No.	
8.1.5	Supply of foundation GI bolts complete with washers and nuts	200 Kg	Whether quoted in price Bid: Yes/No.	
8.1.6	Supply and spreading of river bed sand in the switch yard to thickness of 100mm above the soil.	1000 Sq mtr	Whether quoted in price Bid: Yes/No.	
8.1.7	Supply & spreading of No.3 metal non flammable (40mm) in switch yard 100mm thick	4Cu. Mtr.	Whether quoted in price Bid: Yes/No.	
NOTE: QUANTITY MENTIONED FOR THE ITEMS IN POINT NO.8 ARE APPROXIMATE VALUES AND PAYMENT WILL BE MADE AS PER ACTUAL MEASUREMENTS AFTER COMPLETION OF THE WORK.				
9	Earth Stations:			
9.1	Supply, installation, testing & commissioning of Galvanized Iron plate			

	electrode earth station, 2.5 mtr. below ground level conforming to latest IS specifications complete with all required materials like coke/charcoal, salt, GI, nut bolts & washers, watering arrangements, 40mm dia G.I. pipe (B class) with funnel for the full depth, masonry chamber 1000x 500x 500mm (Inside), heavy duty cast iron cover plates and excavation in all types of soil in ground, refilling and removal of excess earth within a radius of 500mtr etc. as per instruction of EIC drawing & specification. Note: Scope of work includes the following: 1. Measurement of resistance of earth station and resistance of complete scheme of earthing lay out shall be measured, recorded & got approved by EIC. 2. The GI plate should be of electrolytic grade. 3.Two no.s 50x6mm GI flat shall be welded to the earth plate and brought up to the top of the pit.			
9.1.1	Earth station with 600mm x 600mm x 10 mm GI plate electrode.	13 sets	Whether quoted in price Bid: Yes/No.	
10.0	Earthing leads Supply, installation, testing and commissioning of G.I. earth strip/ wire fixed to side of trench/ shaft connection to panel/ on out door structure/ transformer with all accessories or in ground, 750mm below, including excavation in ground, with protective baked bricks, refilling and removal of excess earth within a radius of 500mm, temporary reinstatement & back filling of trench, consolidation, interconnection with earth strip/ wire shall be welded joints, painting with two coats of black bituminous compound for earth strip in ground & green enamel paint for earth wire/ strip on surface etc. as per instructions of EIC, specification & drawing.			
10.1	50mm x 6mm GI earth strip	400 mtr.	Whether quoted in price Bid: Yes/No.	
10.2	25mm x 6mm GI earth strip	100 mtr.	Whether quoted in price Bid: Yes/No.	
NOTE: QUANTITY MENTIONED FOR THE ITEMS IN POINT NO.10 ARE APPROXIMATE VALUES AND PAYMENT WILL BE MADE AS PER ACTUAL MEASUREMENTS AFTER COMPLETION OF THE WORK.				
11	Transformer			
11.1	Design, manufacture, shop testing at works, Supply, assembling,	1 set	1 Whether quoted in	

	installation, pre-commissioning, testing at site and commissioning of One MVA, ONAN, 33KV/ 433V, 50Hz, Dyn11, core type, double wound, out door type transformer with transformer oil, copper winding complete with HT porcelain bushing to receive over head 33 KV grade, ACSR, Dog conductor and LT connection chambers with copper bus bars suitable for connecting LT, 6 x 300 Sqmm Al, PVC insulated, armored cable, Winding temperature indicator, Oil temperature indicator, off load tap changer (+ 7.5% to –7.5% in the step of 2.5%), Standard mounting accessories epoxy painting at works & touch up painting at site etc.including10% extra transformer oil in non returnable drums all above conforming to IS 2026/1972 of latest amendments and complete as per relevant IS specifications & as per instructions of EIC. All the specifications should be as per technical details mentioned in **Technical specifications point no.07.** of the Technical bid. **Preferable make of the transformer: Crompton Greaves Ltd, AREAVA, BHEL, ABB, Siemens, VOLTAMP Transformers or approved equivalent of the same.**		price Bid: Yes/No. 2. Make of the Transformer: 3.Delivery Period required by the Manufacturer:	
Note: 1. G.A. Drawing to be got approved. 2. Tenderer is advised to seek guidance of supplier of transformer for installation, testing & commissioning. 3. Use of crane for installation/ assembly of transformer is to be included in the scope of tender. 4. Co-ordination with electrical inspector of CEA/ State Electrical Inspector and subsequent approvals are included in the scope of the tender for VCB, CT, PT &Transformer etc. 5. Routine tests, heat run tests, on transformer shall be performed in presence of departmental engineers as per relevant IS/BS/IE specifications at works, before dispatch after clearance and tests at site as per specification shall be submitted before commencement of routine test of transformers for scrutiny & approval				
11.1.1	Heat run test on the above transformer as per IS/IEC specifications	1 job	Whether quoted in price Bid: Yes/No.	
11.1.2	Filtration of transformer oil of above referred transformer at site including testing of breakdown value and acidity of oil and topping of oil after fiteration, all as per relevant IS specifications and as per instructions of EIC	1 job	Whether quoted in price Bid: Yes/No.	
11.2	Spares for transformers:			

11.2.1	Complete set of gaskets	1 set	Whether quoted in price Bid: Yes/No.	
11.2.2	HV bushing complete with all metal parts	3 no.s	Whether quoted in price Bid: Yes/No.	
11.2.3	LV bushing complete with all metal parts	3 no.s	Whether quoted in price Bid: Yes/No.	
11.2.4	Dial type thermometer 15mm dia	1 no.	Whether quoted in price Bid: Yes/No.	
11.2.5	Winding temperature indicator 150mm dia	1 no.	Whether quoted in price Bid: Yes/No.	
11.2.6	Plain oil level gauge	1 no.	Whether quoted in price Bid: Yes/No.	
11.2.7	Explosion vent diaphragm	1 no.	Whether quoted in price Bid: Yes/No.	
11.2.8	Silica gel breather container	1 no.	Whether quoted in price Bid:	
11.2.9	Magnetic oil level gauge	1 no.	Whether quoted in price Bid: Yes/No.	
11.2.10	Bucchholz relay	1 no.	Whether quoted in price Bid: Yes/No.	
11.2.11	One valve of each type as given in transformer specifications of tender documents	1 set	Whether quoted in price Bid: Yes/No.	
Note: Spares shall also be inspected before dispatch. Test certificate to be submitted for approval.				
12	PG clamps & T clamps (Gun metal) : Supply & installation of PG clamps and T clamps for Aluminum to Aluminum/ Copper (Bimetallic Clamps) connections of various components as per specifications, drawings & as per instructions of EIC.	50Kg	Whether quoted in price Bid: Yes/no.	
13	Supply installation of GI Nuts and Bolts with washers for installation of the different equipments as mentioned.	40Kg	Whether quoted in price Bid: Yes/No.	
NOTE: QUANTITY MENTIONED FOR THE ITEMS IN POINT NO.12 & 13 ARE APPROXIMATE VALUES AND PAYMENT WILL BE MADE AS PER ACTUAL MEASUREMENTS AFTER COMPLETION OF THE WORK.				
14	Supply, Installation, testing and commissioning of substation equipment's & accessories as detailed below:		Whether quoted in price Bid: Yes/No.	

14.1	Enamel danger board of size 200x 150 mm made from 18 G.G.I sheet for 33KV conforming to relevant IS.	6 no.s	Whether quoted in price Bid: Yes/No.	
14.2	Supply of rubber gloves of approved quality confirming to relevant statutory regulation, IS and high voltage with standard capacity	2 pairs	Whether quoted in price Bid: Yes/No.	
14.3	HT discharge rod of at least 4 meters in two sections of 2m each complete with brass link chain of 2 meters suitable for discharging 33KV equipment as per relevant standards	1 set	Whether quoted in price Bid: Yes/No.	
14.4	Dry powder type fire extinguisher 5 KG capacity with clamps, nut, bolts etc. with suitable stand	3 no.s	Whether quoted in price Bid: Yes/No.	
14.5	13 liters capacity G.I. bucket round bottom duly painted & filled with dry sand and suitable stand	4 no.s	Whether quoted in price Bid: Yes/No.	
15	Control cables: Supply, Installation, testing, commissioning, of PVC insulated, tapped PVC inner sheath, G.I. wire armored, multi stranded copper conductor, overall extruded PVC sheathed control cable as per IS 1554 part I & latest amendments laid in ground to a depth of 900mm below the ground level/ in RCC hume pipe/ fixed on trench/ on wall/ etc. on 5mm thick GI spacer/ 2mm thick GI saddle/ MS flats/ angle support fixed with wood screws/ coach screws/ anchor fasteners including painting of saddle/ flat/ angle iron etc. The cables in ground shall be covered on top & sides with baked bricks conforming to latest I.S. 1077 including excavation in all types of soil, soft rock, de-watering, sand bedding, back filling and reinstatement, consolidation & removal of excess earth within a radius of 500 meters, complete & as per dept. specifications drawings & as per instructions of Engineer-in-charge. Make of the cables: Finolex/ CCI/ NICCO or approved equivalent of the same.			
15.1	On wall/ in false ceiling/ in trench/ in existing panel/ shaft/ Nichies/ angle support fixed with wood screws/ coach screws/ anchor fasteners etc.			
15.1.1	1.1KV grade, 19 core, 2.5 sqmm, copper conductor control cable	20 mtr	1.Whether quoted in Price Bid: Yes/ No 2. Make of the cable:	

15.1.2	1.1KV grade, 12 core, 2.5 sqmm, copper conductor control cable	40 mtr	1.Whether quoted in Price Bid: Yes/ No 2. Make of the cable:	
15.1.3	1.1KV grade, 1x4 core, 2.5 sqmm, copper conductor control cable	40 mtr.	1.Whether quoted in Price Bid: Yes/ No 2. Make of the cable:	
15.1.4	1.1KV grade, 2x4 core, 2.5 sqmm, copper conductor control cable	20 mtr.	1.Whether quoted in Price Bid: Yes/ No 2. Make of the cable:	
15.2	In existing hume pipes/ cable tray:			
15.2.1	1.1KV grade, 19 core, 2.5 sqmm, copper conductor control cable	10 mtr.	1.Whether quoted in Price Bid: Yes/ No 2. Make of the cable:	
15.2.2	1.1KV grade, 12 core, 2.5 sqmm, copper conductor control cable	20 mtr.	1.Whether quoted in Price Bid: Yes/ No 2. Make of the cable:	
15.2.3	1.1KV grade, 1x4 core, 2.5 sqmm, copper conductor control cable	20 mtr.	1.Whether quoted in Price Bid: Yes/ No 2. Make of the cable:	
15.2.4	1.1KV grade, 2x4 core, 2.5 sqmm, copper conductor control cable	10 mtr.	1.Whether quoted in Price Bid: Yes/ No 2. Make of the cable:	
15.3	Cables laid in ground to a depth of 900mm below ground level			
15.3.1	1.1KV grade, 19 core, 2.5 sqmm, copper conductor control cable	70 mtr.	1.Whether quoted in Price Bid: Yes/ No 2. Make of the cable:	
15.3.2	1.1KV grade, 12 core, 2.5 sqmm, copper conductor control cable	140 mtr.	1.Whether quoted in Price Bid: Yes/ No 2. Make of the cable:	
15.3.3	1.1KV grade, 1x4 core, 2.5 sqmm, copper conductor control cable	140 mtr.	1.Whether quoted in Price Bid: Yes/ No 2. Make of the cable:	
15.3	1.1KV grade, 2x4 core, 2.5 sqmm, copper conductor control cable	70 mtr.	1.Whether quoted in	

.4			Price Bid: Yes/ No 2. Make of the cable:	
16	End jointing of above control cables by crimping with supply of all materials like Elmex type connector block mounted inside 36KV CB panel/ in a separate MS box, transformer marshalling with box, solder less tinned copper socket, cable gland, gland earthing, insulation tape, flux, earthing clamp with 3mm thick x 10mm wide tinned copper strip & duplicate earthing with minimum 8 SWG tinned copper wire to the nearest earth point of panel etc. as per IS specifications, drawings & as per instructions of EIC.			
16.1	19 core x 2.5 sqmm	4 no.s	1.Whether quoted in Price Bid: Yes/ No	
16.2	12 core x 2.5 sqmm	4 no.s	1.Whether quoted in Price Bid: Yes/ No	
16.3	4 core x 2.5 sqmm	10 no.s	1.Whether quoted in Price Bid: Yes/ No	
17	33KV screened XLPE Cable			
17.1	Design, manufacture, inspection, testing at works, supply, laying, testing, commissioning and guarantee for 1 year of 33KV (E), 3core x 300 sqmm circular stranded Al. conductor, conductor screened with extruded cross linked (with radiant curing process) polythene (XLPE) insulated, insulation screened with free strippable extruded semi-conducting compound followed by lapping with copper tape, wires laid together with suitable fillers in the interstices, covered with inner sheath of extruded PVC type ST-2, galvanized steel round wire armoured & overall serving of extruded PVC type ST-2 conforming to IS-7098 (Part-II) of 1985 with latest amendments. Make: POLYCAB or approved equivalent of the same.		:	
17.1.1	1200mm below ground level including excavation in all types of soil including soft rock/ hard rock and covering top by RCC tiles inscribed with “HV Cable 3core x 300 sqmm” side supported by baked bricks conforming to IS: 1077 as amended up to date including supply of sand for cushioning, back filling, consolidating, temporary reinstatement and	30 mtr	1.Whether quoted in Price Bid: Yes/ No 2. Make of the cable	

	removal of excess earth to a distance of within 500 mtrs away from site.			
17.1.2	Cable on out door structure in vertical run routed in 150mm dia GI pipe class B with necessary GI clamps fixed to the structure and sealing the ends with M-seal compound etc.	10 mtr	1.Whether quoted in Price Bid: Yes/ No 2. Make of the cable	
NOTE: QUANTITY MENTIONED FOR THE ITEMS IN POINT NO.15, 16 & 17 ARE APPROXIMATE VALUES AND PAYMENT WILL BE MADE AS PER ACTUAL MEASUREMENTS AFTER COMPLETION OF THE WORK.				
18	HT cable joints			
18.1	End termination of 33KV, 3 core x 300Sqmm stranded Al. conductor XLPE insulated screened cable including supply of out door type end termination kit for HT cable of 33KV grade with all grunting materials like sleeves, tinned copper cable sockets, tinned copper lugs and earthing complete as required & tested as per relevant IS specifications including testing & commissioning all as per instructions of EIC. **(Preferable Make: Raychem standard Kit and Jointing also has to be carried out by the Raychem Cable Jointer)**			
18.1.1	At the out door switch yard with boot	2 set	1.Whether quoted in Price Bid: Yes/ No 2. Make of the cable end joint kit:	
19	Cable Marker Supply, installation of oval/ circular shaped G.I. cast cable marker complete with 38mm dia GI nut bolts, engraved as "33KV HT cable" all as per relevant BS/IS specifications, drawings & as per instructions of EIC	15 no.	Whether quoted in Price Bid: Yes/ No	
20	Battery & Battery Charging Equipment: Design, manufacture, Supply, assembly, installation, testing and commissioning of 150AH, 48V Exide sealed maintenance free (SMF) battery complete with all accessories and spares, tinned copper bus bar, wooden stand of adequate size & 150AH self contained Battery charging Equipment cubicle panel, dust & vermin proof, well ventilated, intended to operate on 415 volts +/ - 10%, 50Hz +/- 5%, 3Phase AC supply, floor mounting, indoor type fabricated out of 2mm thick MS CRCA sheet complete with 40 x 40 x 6 mm iron angle frame work & channel ISMC - –75 for floor circuit etc. housing float charger & boost.	One set	1 Whether quoted in price Bid: Yes/No. 2. Make of the Battery Charger: 3.Delivery Period required by the Manufacturer:	

	Charger units (motorized regulator with CP controller for float & manual control for boost) complete with under & over voltage sensing relays, over current limit control SCR, alarm, annunciation scheme, DC distribution board, contactors, switches, indications, Ammeters & Voltmeters of faut band type of size 96mm x 96mm square, interconnections, metal treatment (seven tank process) & painting in light grey color of shade no.631 of IS-5 all as per relevant BS/IS specifications, drawings & as per instructions of Engineer-in-charge. Note: The scope also includes load testing of battery **Make: Exide, Aplab, Numeric Power systems Ltd, Dubas, Power One, Emerson Network, or approved equivalent of same.**			
21	Supply, installation (including cutting to suitable size) of 1 meter wide electrically tested rubber matting suitable for use as per IS a) HV matting tested for 33KV (12mm thick)	20 Sq. mtr.	Whether quoted in Price Bid: Yes/ No	
22	Supply, installation, testing, and commissioning of 150mm dia RCC hume pipe in 900mm/ 1200 mm below ground level including excavation in all types of soil/ hard rock including existing road cutting, foot path, drainage etc and making good to it's original finish and covering the ends by wooden bushes at both ends and bituminous compound, all as per specifications, drawings & as per instructions of Engineer-in-charge.	10 mtr.	Whether quoted in Price Bid: Yes/ No	
23	Supply, installation, Testing and commissioning of 150mm dia GI pipe (Class-B) sleeves in wall trench/outdoor structure etc all as per specifications, drawings & as per instructions of EIC.	10 mtr	Whether quoted in Price Bid: Yes/ No	
24	Supply, installation, testing & commissioning of MS channels, MS angles, MS Flat associated hardware like anchor fastners etc for power & control cable supports inside trench/wall/column/ beam etc. The scope also includes control cable tray stand etc as per instructions of EIC.	50 Kg	Whether quoted in Price Bid: Yes/ No	
25	Dismantling of existing SF-6 KIOSK (Breaker, CT, PT), with it's concrete foundation and mounting fixtures and removal of the same to a suitable place within 100mtr. Distance as per the instructions of the IOP EIC. The job includes the following: 1. Disconnection of the overhead jumpers connected to the	2 jobs	Whether quoted in Price Bid: Yes/ No	

	KIOSK. 2. Opening of the mounting fixtures bolted with the foundation and if required dismantling of the internal parts. 3. Removal of the same to a suitable place within 100mtr. Distance as per the instructions of the IOP EIC. 4. Use of crane if required for the removal of the KIOSK. 5. Excavation and dismantling of the concrete foundation size 1.6 mtr.x 1.7 mtr.x 1 mtr.(depth) and removal of the debris to a suitable place within 100 mtr. Distance as per the instruction of the IOP EIC. 6. Refilling of the earth after excavation of the foundation.			
26	Dismantling of the existing Control Relay Panel (for SF-6 Breaker and Transformer) mounted on the existing cable trench and removal of the same to a suitable place within 100 mtr. Distance as per the instructions of the IOP EIC. The job includes the following: 1. Disconnection of the all control cables connections to the panel. 2. Opening of the mounting fixtures bolted with the foundation and if required dismantling of the internal parts. 3. Removal of the same to a suitable place within 100mtr. Distance as per the instructions of the IOP EIC. 4. Use of crane if required for the removal of the panel.	2 jobs	Whether quoted in Price Bid: Yes/ No	
27	Disconnection & Removal of the existing 300Sqmm PILCA cable from the feeder no.1 & 2 of IOP 33KV switch yard and connection of the cable from feeder-1 to the feeder no.2 of IOP 33KV switch yard within minimum shutdown period. The job includes the following: 1. Disconnection of the PILCA cable (only supply end) from the Sf-6 Breaker by removing the jumpers – 2 Feeders 2. Removal of the clamps and other fixtures to open the 2 x 6 mtrs of PILCA cable from the support structure. 3. Excavation of earth and removal of the 25 + 20 mtrs of PILCA Cable from earth. 4. Refilling of the trench after removal of the cable. 5. Excavation of earth and laying of the PILCA cable of 25 meters	One Job	Whether quoted in Price Bid: Yes/ No	

	length in coil shape with both side bricks, top concrete plate cover and sand cushioning. 6. Fixing of the 6 Meters of PILCA cable with the existing Feeder-2 support structure with existing available clamps and fixtures. 7. Connection of the PILCA cable to the supply point of SF6 Breaker of feeder-2 with existing available jumpers and other fixtures.			
28	Disconnection & Removal from trench of the existing 5x400 sqmm 3&1/2 core PVCA, Aluminium cable of length 25 meters connected from Main LT panel ACB to the Transformer no.2. The job includes the following: 1. Disconnection of the 5 cables from the ACB and Transformer end by removing the Gland, socket etc. 2. Excavation of earth of 25 meters length to remove the cables from the trench. 3. Transportation and keeping the cables at a suitable place after coiling the same within 100 meters of distance as per the instruction of IOP EIC. 4. Refilling of the cable trench.	One Job	Whether quoted in Price Bid: Yes/ No	
29.	**SUPPLY & LAYING OF PVCA, AL. CABLE:** Supply, installation testing & commissioning of 1.1KV grade PVC insulated, inner sheath tapped, outer sheath PVC extruded, GI strip/armored, multistranded/ Aluminum conductor power cable as per IS 1554 specifications, fixed on wall/column/slab/in existing hume pipes/ trenches by 5mm thick GI spacer fixed/coach screws/anchor fasteners in brick/stone wall /column/slab with 2mm thick GI saddle, all fixing accessories etc. complete including painting of saddle /flat/angle iron etc. The space between two supports shall be generally 600mm or in ground at a depth of 900mm, below ground including excavation in all types of soil excluding hard rock if any cutting of existing footpath, roads etc, sand bedding, laying of baked bricks as per IS on side & top, temporary reinstatement, back filling, de-watering if necessary,			

	consolidation, disposal, of excess earth with in the radius of 500mtr. Etc. all as per the instructions of engineer-in-charge. Note: 1.Scope includes all types of masonry work required making good to its original finish of holes through wall, roads, slopes etc. after laying of the cable. Make of the cable: Finolex, CCI, NICCO or approved equivalent of the same.			
29.1	In ground at a depth of 900mm, below ground/ on concrete/stone/brick wall/Pit/cable trench: **2 no x 3 1/2 core x 300 Sqmm Al. PVCA cable**	60 mtrs	1.Whether quoted in Price Bid: Yes/ No 2. Make of the cable end joint kit:	
NOTE: QUANTITY MENTIONED FOR THE ITEM IN POINT NO.29 IS APPROXIMATE VALUES AND PAYMENT WILL BE MADE AS PER ACTUAL MEASUREMENTS AFTER COMPLETION OF THE WORK.				
30	**SAME AS ABOVE POINT NO.29 (Excluding the supply of cable))** In ground at a depth of 900mm, below ground/ on concrete/stone/brick wall/Pit/cable trench: **3 no x 3 1/2 core x 300 Sqmm Al. PVCA cable** ***(3 1/2 core x 300 Sqmm Al. PVCA cable of 210 mtrs length will be supplied by IOP, available with IOP EIC.)***	70 mtrs	1.Whether quoted in Price Bid: Yes/ No	
30	**END TERMINATION OF ARMOURED CABLES:** End termination and connection of the following cables by crimping with supply of all jointing materials like tinned copper cable sockets, cable glands, gland earthing insulation tape, flux, duplicate interconnection between gland earthing strip and the nearest earthing bus terminals as per the drawing, specifications and as per the instruction of the Engineer in charge.			
30.1	3 1/2core,300Sqmm PVCA, AL. cable	10 no.s	1.Whether quoted in Price Bid: Yes/ No	
31	Dismantling of the existing Barbed wire Fencing & removal of the gate one side (25mtrs) of the 33KV switch yard. The job includes the following: 1. Dismantling and opening of the barbed wires from the MS angles mounted in concrete foundation for support and removal of the same to a suitable place as directed by IOP EIC within 100mtrs of distance.	One Job	1.Whether quoted in Price Bid: Yes/ No	

	2. Removal of the MS angles from the concrete base and removal of the same to a suitable place as directed by IOP EIC within 100mtrs of distance. 3. Removal of the Gate with the support MS channels and removal of the same to a suitable place as directed by IOP EIC within 100mtrs of distance. 4. Dismantling of the concrete foundation of the barbed wire fencing and removal of the debris to suitable place as directed by IOP EIC within 100mtrs of distance.			
32	Supply, construction & providing of barbed wire fencing for 30 meter length and installation of the Gate (only) removed as mentioned above in item no.31. All in line with the existing barbed wire fencing around the IOP 33 KV switch yard. The size & shape of the MS angles, space between the support angles, grouting of the angles in concrete base, size of the concrete foundation with a proportion of 1:3:6, Height of the fence, fixing of the barbed wires with two crossed wires in each section, re-installation of the old removed gate all has to be provided by the contractor in line with the existing fencing around the IOP 33KV switch yard after completion of the renovation work. Note: 1. The supply of MS Angles, Concrete materials, Barbed Wires, and any required welding work is under the scope of the contractor. 2. Bidder is requested to visit and asses the quantum of work before quoting for this item	One Job	1.Whether quoted in Price Bid: Yes/ No	
33	Cleaning and mobilization of the ground of the 33KV switch yard by removing the existing metals spread over the ground (Approximate area 500sqft) and excavation of the existing asphalt road (Approximate area 200sqft) at one side of the switch yard. Scope of work includes the removal of the debris to a suitable place within 100 meters of distance as directed by IOP EIC.	One Job	1.Whether quoted in Price Bid: Yes/ No	
34	Approval of the detailed lay out and GA drawing before starting the commissioning work of the above equipments from the Orissa State Electrical Inspector.	One Job	1.Whether quoted in Price Bid: Yes/ No	
35	Orissa State Electrical Inspector licensing/ permission shall be taken for	One Job	1.Whether quoted in	

	all the equipments newly commissioned through this contract. Permission from the Orissa State Electricity Distribution Agency (CESU) shall be taken for charging all the equipments newly commissioned through this contract.		Price Bid: Yes/ No	
36	Dismantling and removal of the exiting AB Switch with it's mounting accessories from the IOP 33KV Switch Yard. The job includes the following: 1. Disconnection of the overhead ACSR conductors connected to the AB switch and removal of the same to a suitable place as per the instructions of IOP EIC within 100 mtr. Distance. 2. Dismantling of the AB switch mounting structure and removal of the same to a suitable place as per the instructions of IOP EIC within 100 mtr. Distance. 3. Dismantling and excavation of the concrete base of the AB switch mounting structure and removal of the debris to a suitable place as per the instructions of IOP EIC within 100 mtr. Distance. 4. Refilling of the excavated earth after removal of the concrete base.	One Job	1.Whether quoted in Price Bid: Yes/ No	
37	Preparation and submission to IOP EIC the detailed lay out diagram of all the equipments and electrical single line diagram for approval before taking up the installation and commissioning work and the same will be subsequently submitted for Electrical Inspector's approval.	One Job	1.Whether quoted in Price Bid: Yes/ No	

Name of the Firm

Signature of the Bidder

Designation & Seal

Date

(BIDDER SHALL SIGN WITH SEAL ON ALL PAGES)

PRICE BID

(THIS IS THE ONLY DOCUMENT TO BE SUBMITTED IN PRICE BID ENVELOPE OF BID)

Name of the work: Design, supply, installation, testing and commissioning of 36KV out door VCB, CT, PT, 1MVA, 33/0.433KV out door transformer, Relay panel, 33KV XLPE cable and associated works at IOP, Bhubaneswar.

Sl. No.	Description	Qty	Rate			Unit	Amount
			Supply	Install	Total		
1	36KV out door VCB						
1.1	Design, fabrication, testing at factory, supply, installation, testing & commissioning of 36KV, 25KA, 1600 Amps, 3pole, porcelain clad outdoor vacuum circuit breaker. The closing and tripping solenoid should be rated for 48V DC. All indication lamp shall be of 48V DC supply. The HT bushings should be suitable to receive overhead, ACSR, Dog conductor. All the specifications should be as per technical details mentioned in **Technical specifications point no.8.**of the Technical bid. **(MAKE: AREAVA, CGL, ABB, SIEMENS, BHEL or approved equivalent of the same.)**	Two set				Set	
2	Design, fabrication, testing at factory, supply, installation, testing & commissioning of one set comprise of **3 no.s** of out door mounting type oil immersed, single pole, Current transformer, of dual core, 25/5/5 ratio, 30VA, suitable for system voltage of 33KV, 3phase, 50Hz with HT bushings suitable to receive overhead, ACSR, Dog conductor. All the specifications should be as per technical details mentioned in **Technical specifications point no.9.**of the Technical bid. **(Preference will be given to the bidders quoted for the CT being supplied by the manufacturer of the Vacuum Circuit Breaker quoted in this Bid)** Make: Kappa/ Controls & Switch Gears/ Crompton Greaves/ Automatic Electricals Ltd./ Pragati Electricals or Approved equivalent of the same	2 sets				set	
3	Design, fabrication, testing at factory, supply, installation, testing & commissioning one set comprise of **3 no.s** of outdoor mounting type oil immersed, single pole, Potential transformer 33KV/ 110V, 200VA,	2 sets				set	

	suitable for system voltage 33KV, with HT bushings suitable to receive overhead, ACSR, Dog conductor, **Fuse on HT side will be preferable**. All the specifications should be as per technical details mentioned in **Technical specifications point no.10.** of the Technical bid. **(Preference will be given to the bidders quoted for the PT being supplied by the manufacturer of the Vacuum Circuit Breaker quoted in this Bid)** Make: Kappa/ Controls & Switch Gears Crompton Greaves/ Automatic Electricals Ltd. / Pragati Electricals. or Approved equivalent of the same						
4	Design, fabrication, testing at factory, supply, installation, testing & commissioning of the Control and Relay panel for the above item suitable for indoor use at control room complete scheme to be got approved by department. Control panel should consists of the following meters/ relays: Earth fault protection, Over current protection, Instantaneous earth fault protection ,Trip Circuit Supervision Relay, Aux. Relay for transformer, winding, Oil over temp, Buchholz Relay, Ammeter, KVoltmeter, Digital meter for: PF meter, Kvar Meter, Energy meter, Maximum demand meter, Frequency meter, Annunciation panel, Rotary switch for breaker trip/ On, Indication lamp for trip / on, Alarm for trip of breaker etc. All the specifications should be as per technical details mentioned in **Technical specifications point no.12.** of the Technical bid. **Make: CGL/ ABB/ AREAVA/ SIEMENS/ EASUN REYROLLE LTD or approved equivalent of the same. (The 33KV Relay control panel will be accepted only from the same manufacturer of the Vacuum circuit breaker quoted in this bid or Approved equivalent of the same).**	2 sets				set	

Note for the above items:

1.Routine tests on the breaker shall be performed in presence of departmental engineers as per relevant IS/BS/IE specifications at works.

2. Type test certificate as indicated in the specification shall be submitted before commencement of routine test for scrutiny and approval by department.

3. Proper labels and ferrule numbers should be affixed alongside for various components, concurrence of dept. engineers shall be obtained on location, quantity etc.

4.The tenderer shall include all extra hardware items needed at site for installation like angles, channels etc. in his scope. The scope shall also include grouting of base channels.

5. Co-ordination with state electricity board if required and electrical inspector of central electricity authority/ state electrical Inspector and subsequent approvals is included in the scope of the tender.

6. Tenderer is advised to seek the guidance of supplier of 36KV VCB/ CT/ PT for installation, testing and commissioning.

7. VCB, CT & PT to be mounted in the existing switch yard and in line with the existing facilities available. Tenderer is advised to visit the site before quoting the same.

8**. Preference will be given to the bidders who has quoted the VCB, CT, PT, Relay panel supplied by one firm/ make.**

5	Over head bus-bar/ Jumper connection: Supply, installation, testing and commissioning of Aluminum ACSR Dog conductor (103.60sqmm) all as per specifications and drawings, and instructions of EIC.	400mtr				mtr	
6	Design, fabrication, supply and installation of outdoor hot dip heavily galvanized steel structure complete with all accessories as per enclosed detailed specifications, basic conceptional drawings and as per instructions of EIC, suitable for mounting the following equipment's: a) 2 no. 36KV VCB b) 2 sets of oil immersed single pole CT, 33KV, 30VA, 25/5/5A (each set comprise of 3 CT) c) 2 sets of oil immersed single pole PT, 33KV/110V,200VA (each set comprise of 3 PT) d) Support structure for the 33KV XLPE cable & it's end joints. e) Jumpers and interconnections etc. f) Connection to transformers	5MT				MT	

NOTE: QUANTITY MENTIONED IN POINT 5 & 6 ARE APPROXIMATE VALUES AND PAYMENT WILL BE MADE AS PER ACTUAL MEASUREMENTS AFTER COMPLETION OF THE WORK.

Note: 1. Tenderer to submit the complete G.A. drawings for departmental approval and shall incorporate all the requirements as per Orissa State Electrical Inspector and to be got approved by them. Department approval shall also to be obtained at every stage of fabrication & galvanization at their works including testing of structural member's samples as per relevant IS. 2. The entire installation shall be got approved by Central Electricity Authority/ State Electricity Board and connection release order is to be obtained by the contractor.							
8.	Civil works for out door structure						
8.1	Excavation in all types of soil/ including soft rock, construction of RCC foundation as per relevant IS including shuttering work, back earth filling, consolidation, curing, removing extra earth & disposing with a lead of 500mtr, grouting of structure for mounting VCB, CT, PT, Transformer providing foundation bolts as per detailed specifications and drawings & as per instruction of E-I-C as detailed below:						
8.1.1	Excavation in soil/ soft rock	100 Cu.Mtr.				Cu. Mtr	
8.1.2	Plain cement concrete work as per specification 1:3:6	40 Cu. Mtr.				Cu. Mtr	
8.1.3	RCC works 1:2:4 including grouting of below mentioned foundation bolts/ transformer foundation, G.I. structure, Scope includes supply of steel rods.	60 Cu. Mtr.				Cu. Mtr	
8.1.4	20mm thick water proof cement finishing on top of foundation Note: The design of the RCC foundation details shall be got approved by the Dept. whose decision is final and binding.	20 Sq.Mtr.				Sq. Mtr.	
8.1.5	Supply of foundation GI bolts complete with washers and nuts	200 Kg				Kg.	
8.1.6	Supply and spreading of river bed sand in the switch yard to thickness of 100mm above the soil.	1000 Sq mtr				Sq mtr.	
8.1.7	Supply & spreading of No.3 metal non flammable (40mm) in switch yard 100mm thick	4Cu. Mtr.				Cu. Mtr.	
NOTE: QUANTITY MENTIONED FOR THE ITEMS IN POINT NO.8 ARE APPROXIMATE VALUES AND PAYMENT WILL BE MADE AS PER ACTUAL MEASUREMENTS AFTER COMPLETION OF THE WORK.							
9	Earth Stations:						
9.1	Supply, installation, testing & commissioning of Galvanized Iron plate						

	electrode earth station, 2.5 mtr. below ground level conforming to latest IS specifications complete with all required materials like coke/charcoal, salt, GI, nut bolts & washers, watering arrangements, 40mm dia G.I. pipe (B class) with funnel for the full depth, masonry chamber 1000x 500x 500mm (Inside), heavy duty cast iron cover plates and excavation in all types of soil in ground, refilling and removal of excess earth within a radius of 500mtr etc. as per instruction of EIC drawing & specification. Note: Scope of work includes the following: 1. Measurement of resistance of earth station and resistance of complete scheme of earthing lay out shall be measured, recorded & got approved by EIC. 2. The GI plate should be of electrolytic grade. 3.Two no.s 50x6mm GI flat shall be welded to the earth plate and brought up to the top of the pit.						
9.1.1	Earth station with 600mm x 600mm x 10 mm GI plate electrode.	13 sets				sets	
10.0	Earthing leads Supply, installation, testing and commissioning of G.I. earth strip/ wire fixed to side of trench/ shaft connection to panel/ on out door structure/ transformer with all accessories or in ground, 750mm below, including excavation in ground, with protective baked bricks, refilling and removal of excess earth within a radius of 500mm, temporary reinstatement & back filling of trench, consolidation, interconnection with earth strip/ wire shall be welded joints, painting with two coats of black bituminous compound for earth strip in ground & green enamel paint for earth wire/ strip on surface etc. as per instructions of EIC, specification & drawing.						
10.1	50mm x 6mm GI earth strip	400 mtr.				mtr	
10.2	25mm x 6mm GI earth strip	100 mtr.				mtr	
NOTE: QUANTITY MENTIONED FOR THE ITEMS IN POINT NO.10 ARE APPROXIMATE VALUES AND PAYMENT WILL BE MADE AS PER ACTUAL MEASUREMENTS AFTER COMPLETION OF THE WORK.							
11	Transformer						
11.1	Design, manufacture, shop testing at works, Supply, assembling, installation, pre-commissioning, testing at site and commissioning of One MVA, ONAN, 33KV/ 433V, 50Hz, Dyn11, core type, double	1 set				set	

	wound, out door type transformer with transformer oil, copper winding complete with HT porcelain bushing to receive over head 33 KV grade, ACSR, Dog conductor and LT connection chambers with copper bus bars suitable for connecting LT, 6 x 300 Sqmm Al, PVC insulated, armored cable, Winding temperature indicator, Oil temperature indicator, off load tap changer (+ 7.5% to –7.5% in the step of 2.5%), Standard mounting accessories epoxy painting at works & touch up painting at site etc.including10% extra transformer oil in non returnable drums all above conforming to IS 2026/1972 of latest amendments and complete as per relevant IS specifications & as per instructions of EIC. All the specifications should be as per technical details mentioned in **Technical specifications point no.07.** of the Technical bid. **Preferable make of the transformer: Crompton Greaves Ltd, AREAVA, BHEL, ABB, Siemens, VOLTAMP Transformers or approved equivalent of the same.**						
Note: 1. G.A. Drawing to be got approved. 2. Tenderer is advised to seek guidance of supplier of transformer for installation, testing & commissioning. 3. Use of crane for installation/ assembly of transformer is to be included in the scope of tender. 4. Co-ordination with electrical inspector of CEA/ State Electrical Inspector and subsequent approvals are included in the scope of the tender for VCB, CT, PT &Transformer etc. 5. Routine tests, heat run tests, on transformer shall be performed in presence of departmental engineers as per relevant IS/BS/IE specifications at works, before dispatch after clearance and tests at site as per specification shall be submitted before commencement of routine test of transformers for scrutiny & approval							
11.1.1	Heat run test on the above transformer as per IS/IEC specifications	1 job				job	
11.1.2	Filtration of transformer oil of above referred transformer at site including testing of breakdown value and acidity of oil and topping of oil after filtration, all as per relevant IS specifications and as per instructions of EIC	1 job				job	
11.2	Spares for transformers:						
11.2.1	Complete set of gaskets	1 set				set	

11.2.2	HV bushing complete with all metal parts	3 no.s				each	
11.2.3	LV bushing complete with all metal parts	3 no.s				each	
11.2.4	Dial type thermometer 15mm dia	1 no.				each	
11.2.5	Winding temperature indicator 150mm dia	1 no.				each	
11.2.6	Plain oil level gauge	1 no.				each	
11.2.7	Explosion vent diaphragm	1 no.				each	
11.2.8	Silica gel breather container	1 no.				each	
11.2.9	Magnetic oil level gauge	1 no.				each	
11.2.10	Bucchholz relay	1 no.				each	
11.2.11	One valve of each type as given in transformer specifications of tender documents	1 set				set	
Note: Spares shall also be inspected before dispatch. Test certificate to be submitted for approval.							
12	PG clamps & T clamps (Gun metal) : Supply & installation of PG clamps and T clamps for Aluminum to Aluminum/ Copper (Bimetallic Clamps) connections of various components as per specifications, drawings & as per instructions of EIC.	50Kg				Kg.	
13	Supply installation of GI Nuts and Bolts with washers for installation of the different equipments as mentioned.	40Kg				Kg.	
NOTE: QUANTITY MENTIONED FOR THE ITEMS IN POINT NO.12 & 13 ARE APPROXIMATE VALUES AND PAYMENT WILL BE MADE AS PER ACTUAL MEASUREMENTS AFTER COMPLETION OF THE WORK.							
14	Supply, Installation, testing and commissioning of substation equipment's & accessories as detailed below:						
14.1	Enamel danger board of size 200x 150 mm made from 18 G.G.I sheet for 33KV conforming to relevant IS.	6 no.s				each	

14.2	Supply of rubber gloves of approved quality confirming to relevant statutory regulation, IS and high voltage with standard capacity	2 pairs				pair	
14.3	HT discharge rod of at least 4 meters in two sections of 2m each complete with brass link chain of 2 meters suitable for discharging 33KV equipment as per relevant standards	1 set				set	
14.4	Dry powder type fire extinguisher 5 KG capacity with clamps, nut, bolts etc. with suitable stand	3 no.s				each	
14.5	13 liters capacity G.I. bucket round bottom duly painted & filled with dry sand and suitable stand	4 no.s				each	
15	Control cables: Supply, Installation, testing, commissioning, of PVC insulated, tapped PVC inner sheath, G.I. wire armored, multi stranded copper conductor, overall extruded PVC sheathed control cable as per IS 1554 part I & latest amendments laid in ground to a depth of 900mm below the ground level/ in RCC hume pipe/ fixed on trench/ on wall/ etc. on 5mm thick GI spacer/ 2mm thick GI saddle/ MS flats/ angle support fixed with wood screws/ coach screws/ anchor fasteners including painting of saddle/ flat/ angle iron etc. The cables in ground shall be covered on top & sides with baked bricks conforming to latest I.S. 1077 including excavation in all types of soil, soft rock, de-watering, sand bedding, back filling and reinstatement, consolidation & removal of excess earth within a radius of 500 meters, complete & as per dept. specifications drawings & as per instructions of Engineer-in-charge.						
15.1	On wall/ in false ceiling/ in trench/ in existing panel/ shaft/ Nichies/ angle support fixed with wood screws/ coach screws/ anchor fasteners etc.						
15.1.1	1.1KV grade, 19 core, 2.5 sqmm, copper conductor control cable	20 mtr				mtr	
15.1.2	1.1KV grade, 12 core, 2.5 sqmm, copper conductor control cable	40 mtr				mtr.	
15.1.3	1.1KV grade, 1x4 core, 2.5 sqmm, copper conductor control cable	40 mtr.				mtr.	
15.1	1.1KV grade, 2x4 core, 2.5 sqmm, copper conductor control cable	20 mtr.				mtr	

.4							
15.2	In existing hume pipes/ cable tray:						
15.2.1	1.1KV grade, 19 core, 2.5 sqmm, copper conductor control cable	10 mtr.				mtr.	
15.2.2	1.1KV grade, 12 core, 2.5 sqmm, copper conductor control cable	20 mtr.				mtr.	
15.2.3	1.1KV grade, 1x4 core, 2.5 sqmm, copper conductor control cable	20 mtr.				mtr.	
15.2.4	1.1KV grade, 2x4 core, 2.5 sqmm, copper conductor control cable	10 mtr.				mtr.	
15.3	Cables laid in ground to a depth of 900mm below ground level						
15.3.1	1.1KV grade, 19 core, 2.5 sqmm, copper conductor control cable	70 mtr.				mtr.	
15.3.2	1.1KV grade, 12 core, 2.5 sqmm, copper conductor control cable	140 mtr.				mtr.	
15.3.3	1.1KV grade, 1x4 core, 2.5 sqmm, copper conductor control cable	140 mtr.				mtr.	
15.3.4	1.1KV grade, 2x4 core, 2.5 sqmm, copper conductor control cable	70 mtr.				mtr.	
16	End jointing of above control cables by crimping with supply of all materials like Elmex type connector block mounted inside 36KV CB panel/ in a separate MS box, transformer marshalling with box, solder less tinned copper socket, cable gland, gland earthing, insulation tape, flux, earthing clamp with 3mm thick x 10mm wide tinned copper strip & duplicate earthing with minimum 8 SWG tinned copper wire to the nearest earth point of panel etc. as per IS specifications, drawings & as per instructions of EIC.						
16.1	19 core x 2.5 sqmm	4 no.s				each	
16.2	12 core x 2.5 sqmm	4 no.s				each	
16.3	4 core x 2.5 sqmm	10 no.s				each	
17	33KV screened XLPE Cable						
17.1	Design, manufacture, inspection, testing at works, supply, laying, testing, commissioning and guarantee for 1 year of 33KV (E), 3core x						

	300 sqmm circular stranded Al. conductor, conductor screened with extruded cross linked (with radiant curing process) polythene (XLPE) insulated, insulation screened with free strippable extruded semi-conducting compound followed by lapping with copper tape, wires laid together with suitable fillers in the interstices, covered with inner sheath of extruded PVC type ST-2, galvanized steel round wire armoured & overall serving of extruded PVC type ST-2 conforming to IS-7098 (Part-II) of 1985 with latest amendments. (Preferable make: Polycab or approved equivalent of the same)						
17.1.1	1200mm below ground level including excavation in all types of soil including soft rock/ hard rock and covering top by RCC tiles inscribed with "HV Cable 3core x 300 sqmm" side supported by baked bricks conforming to IS: 1077 as amended up to date including supply of sand for cushioning, back filling, consolidating, temporary reinstatement and removal of excess earth to a distance of within 500 mtrs away from site.	30 mtr				mtr	
17.1.2	Cable on out door structure in vertical run routed in 150mm dia GI pipe class B with necessary GI clamps fixed to the structure and sealing the ends with M-seal compound etc.	10 mtr				mtr.	
NOTE: QUANTITY MENTIONED FOR THE ITEMS IN POINT NO.15, 16 & 17 ARE APPROXIMATE VALUES AND PAYMENT WILL BE MADE AS PER ACTUAL MEASUREMENTS AFTER COMPLETION OF THE WORK.							
18	HT cable joints						
18.1	End termination of 33KV, 3 core x 300Sqmm stranded Al. conductor XLPE insulated screened cable including supply of out door type end termination kit for HT cable of 33KV grade with all grunting materials like sleeves, tinned copper cable sockets, tinned copper lugs and earthing complete as required & tested as per relevant IS specifications including testing & commissioning all as per instructions of EIC. **(Preferable Make: Raychem standard Kit and Jointing also has to be carried out by the Raychem Cable Jointer)**						
18.1.1	At the out door switch yard with boot	2 set				set	
19	Cable Marker Supply, installation of oval/ circular shaped G.I. cast cable marker complete with 38mm dia GI nut bolts, engraved as "33KV HT cable" all	15 no.				no	

	as per relevant BS/IS specifications, drawings & as per instructions of EIC						
20	Battery & Battery Charging Equipment: Design, manufacture, Supply, assembly, installation, testing and commissioning of 150AH, 48V Exide sealed maintenance free (SMF) battery complete with all accessories and spares, tinned copper bus bar, wooden stand of adequate size & 150AH self contained Battery charging Equipment cubicle panel, dust & vermin proof, well ventilated, intended to operate on 415 volts +/ - 10%, 50Hz +/- 5%, 3Phase AC supply, floor mounting, indoor type fabricated out of 2mm thick MS CRCA sheet complete with 40 x 40 x 6 mm iron angle frame work & channel ISMC - –75 for floor circuit etc. housing float charger & boost. Charger units (motorized regulator with CP controller for float & manual control for boost) complete with under & over voltage sensing relays, over current limit control SCR, alarm, annunciation scheme, DC distribution board, contactors, switches, indications, Ammeters & Voltmeters of faut band type of size 96mm x 96mm square, interconnections, metal treatment (seven tank process) & painting in light grey color of shade no.631 of IS-5 all as per relevant BS/IS specifications, drawings & as per instructions of Engineer-in-charge. Note: The scope also includes load testing of battery **Make: Exide, Aplab, Numeric Power systems Ltd, Dubas, Power One, Emerson Network, or approved equivalent of same.**	One set				set	
21	Supply, installation (including cutting to suitable size) of 1 meter wide electrically tested rubber matting suitable for use as per IS a) HV matting tested for 33KV (12mm thick)	20 Sq. mtr.				Sq. mtr.	
22	Supply, installation, testing, and commissioning of 150mm dia RCC hume pipe in 900mm/ 1200 mm below ground level including excavation in all types of soil/ hard rock including existing road cutting, foot path, drainage etc and making good to it's original finish and covering the ends by wooden bushes at both ends and bituminous compound, all as per specifications, drawings & as per instructions of Engineer-in-charge.	10 mtr.				mtr	

23	Supply, installation, Testing and commissioning of 150mm dia GI pipe (Class-B) sleeves in wall trench/outdoor structure etc all as per specifications, drawings & as per instructions of EIC.	10 mtr				mtr	
24	Supply, installation, testing & commissioning of MS channels, MS angles, MS Flat associated hardware like anchor fastners etc for power & control cable supports inside trench/wall/column/ beam etc. The scope also includes control cable tray stand etc as per instructions of EIC.	50 Kg				mtr	
25	Dismantling of existing SF-6 KIOSK (Breaker, CT, PT), with it's concrete foundation and mounting fixtures and removal of the same to a suitable place within 100mtr. Distance as per the instructions of the IOP EIC. The job includes the following: 1. Disconnection of the overhead jumpers connected to the KIOSK. 2. Opening of the mounting fixtures bolted with the foundation and if required dismantling of the internal parts. 3. Removal of the same to a suitable place within 100mtr. Distance as per the instructions of the IOP EIC. 4. Use of crane if required for the removal of the KIOSK. 5. Excavation and dismantling of the concrete foundation size 1.6 mtr.x 1.7 mtr.x 1 mtr.(depth) and removal of the debris to a suitable place within 100 mtr. Distance as per the instruction of the IOP EIC. 6. Refilling of the earth after excavation of the foundation.	2 jobs				job	
26	Dismantling of the existing Control Relay Panel (for SF-6 Breaker and Transformer) mounted on the existing cable trench and removal of the same to a suitable place within 100 mtr. Distance as per the instructions of the IOP EIC. The job includes the following: 1. Disconnection of the all control cables connections to the panel. 2. Opening of the mounting fixtures bolted with the foundation and if required dismantling of the internal parts. 3. Removal of the same to a suitable place within 100mtr. Distance as per the instructions of the IOP EIC. 4. Use of crane if required for the removal of the panel.	2 jobs					

27	Disconnection & Removal of the existing 300Sqmm PILCA cable from the feeder no.1 & 2 of IOP 33KV switch yard and connection of the cable from feeder-1 to the feeder no.2 of IOP 33KV switch yard within minimum shutdown period. The job includes the following: 1. Disconnection of the PILCA cable (only supply end) from the Sf-6 Breaker by removing the jumpers – 2 Feeders 2. Removal of the clamps and other fixtures to open the 2 x 6 mtrs of PILCA cable from the support structure. 3. Excavation of earth and removal of the 25 + 20 mtrs of PILCA Cable from earth. 4. Refilling of the trench after removal of the cable. 5. Excavation of earth and laying of the PILCA cable of 25 meters length in coil shape with both side bricks, top concrete plate cover and sand cushioning. 6. Fixing of the 6 Meters of PILCA cable with the existing Feeder-2 support structure with existing available clamps and fixtures. 7. Connection of the PILCA cable to the supply point of SF6 Breaker of feeder-2 with existing available jumpers and other fixtures.	One Job				job	
28	Disconnection & Removal from trench of the existing 5x400 sqmm 3&1/2 core PVCA, Aluminium cable of length 25 meters connected from Main LT panel ACB to the Transformer no.2. The job includes the following: 1. Disconnection of the 5 cables from the ACB and Transformer end by removing the Gland, socket etc. 2. Excavation of earth of 25 meters length to remove the cables from the trench. 3. Transportation and keeping the cables at a suitable place after coiling the same within 100 meters of distance as per the instruction of IOP EIC. 4. Refilling of the cable trench.	One Job				job	
29.	**SUPPLY & LAYING OF PVCA, AL. CABLE:**						

	Supply, installation testing & commissioning of 1.1KV grade PVC insulated, inner sheath tapped, outer sheath PVC extruded, GI strip/armored, multistranded/ Aluminum conductor power cable as per IS 1554 specifications, fixed on wall/column/slab/in existing hume pipes/ trenches by 5mm thick GI spacer fixed/coach screws/anchor fasteners in brick/stone wall /column/slab with 2mm thick GI saddle, all fixing accessories etc. complete including painting of saddle /flat/angle iron etc. The space between two supports shall be generally 600mm or in ground at a depth of 900mm, below ground including excavation in all types of soil excluding hard rock if any cutting of existing footpath, roads etc, sand bedding, laying of baked bricks as per IS on side & top, temporary reinstatement, back filling, de-watering if necessary, consolidation, disposal, of excess earth with in the radius of 500mtr. Etc. all as per the instructions of engineer-in-charge. Note: 1.Scope includes all types of masonry work required making good to its original finish of holes through wall, roads, slopes etc. after laying of the cable. (Make of the cable Finolex, CCI, NICCO or approved equivalent of the same).						
29.1	In ground at a depth of 900mm, below ground/ on concrete/stone/brick wall/Pit/cable trench: **2 no x 3 1/2 core x 300 Sqmm Al. PVCA cable**	60 mtrs				mtr	
NOTE: QUANTITY MENTIONED FOR THE ITEM IN POINT NO.29 IS APPROXIMATE VALUES AND PAYMENT WILL BE MADE AS PER ACTUAL MEASUREMENTS AFTER COMPLETION OF THE WORK.							
30	**SAME AS ABOVE POINT NO.29 (Excluding the supply of cable))** In ground at a depth of 900mm, below ground/ on concrete/stone/brick wall/Pit/cable trench: **3 no x 3 1/2 core x 300 Sqmm Al. PVCA cable** ***(3 1/2 core x 300 Sqmm Al. PVCA cable of 210 mtrs length will be supplied by IOP, available with IOP EIC.)***	70 mtrs				mtr	
30	**END TERMINATION OF ARMOURED CABLES:** End termination and connection of the following cables by crimping with supply of all jointing materials like tinned copper cable sockets, cable glands, gland earthing insulation tape, flux, duplicate interconnection between gland earthing strip and the nearest earthing bus						

	terminals as per the drawing, specifications and as per the instruction of the Engineer in charge.						
30.1	3 1/2core,300Sqmm PVCA, AL. cable	10 no.s				no	
31	Dismantling of the existing Barbed wire Fencing & removal of the gate one side (25mtrs) of the 33KV switch yard. The job includes the following: 1. Dismantling and opening of the barbed wires from the MS angles mounted in concrete foundation for support and removal of the same to a suitable place as directed by IOP EIC within 100mtrs of distance. 2. Removal of the MS angles from the concrete base and removal of the same to a suitable place as directed by IOP EIC within 100mtrs of distance. 3. Removal of the Gate with the support MS channels and removal of the same to a suitable place as directed by IOP EIC within 100mtrs of distance. 4. Dismantling of the concrete foundation of the barbed wire fencing and removal of the debris to suitable place as directed by IOP EIC within 100mtrs of distance.	One Job				job	
32	Supply, construction & providing of barbed wire fencing for 30 meter length and installation of the Gate (only) removed as mentioned above in item no.31. All in line with the existing barbed wire fencing around the IOP 33 KV switch yard. The size & shape of the MS angles, space between the support angles, grouting of the angles in concrete base, size of the concrete foundation with a proportion of 1:3:6, Height of the fence, fixing of the barbed wires with two crossed wires in each section, re-installation of the old removed gate all has to be provided by the contractor in line with the existing fencing around the IOP 33KV switch yard after completion of the renovation work. Note: 1. The supply of MS Angles, Concrete materials, Barbed Wires, and any required welding work is under the scope of the contractor. 2. Bidder is requested to visit and asses the quantum of work before quoting for this item	One Job				job	

33	Cleaning and mobilization of the ground of the 33KV switch yard by removing the existing metals spread over the ground (Approximate area 500sqft) and excavation of the existing asphalt road (Approximate area 200sqft) at one side of the switch yard. Scope of work includes the removal of the debris to a suitable place within 100 meters of distance as directed by IOP EIC.	One Job				job	
34	Approval of the detailed lay out and GA drawing before starting the commissioning work of the above equipments from the Orissa State Electrical Inspector.	One Job				job	
35	Orissa State Electrical Inspector licensing/ permission shall be taken for all the equipments newly commissioned through this contract. Permission from the Orissa State Electricity Distribution Agency (CESU) shall be taken for charging all the equipments newly commissioned through this contract.	One Job				job	
36	Dismantling and removal of the exiting AB Switch with it's mounting accessories from the IOP 33KV Switch Yard. The job includes the following: 1. Disconnection of the overhead ACSR conductors connected to the AB switch and removal of the same to a suitable place as per the instructions of IOP EIC within 100 mtr. Distance. 2. Dismantling of the AB switch mounting structure and removal of the same to a suitable place as per the instructions of IOP EIC within 100 mtr. Distance. 3. Dismantling and excavation of the concrete base of the AB switch mounting structure and removal of the debris to a suitable place as per the instructions of IOP EIC within 100 mtr. Distance. 4. Refilling of the excavated earth after removal of the concrete base.	One Job				job	
37	Preparation and submission to IOP EIC the detailed lay out diagram of all the equipments and electrical single line diagram for approval before taking up the installation and commissioning work and the same will be subsequently submitted for Electrical Inspector's approval.	One Job				job	

Name of the Firm

Signature of the Bidder

Designation & Seal

Date

(BIDDER SHALL SIGN WITH SEAL ON ALL PAGES)

APPENDIX-I

TENTATIVE TIME SCHEDULE

Name of the work: Design, Supply, Installation, testing and commissioning of 36KV outdoor VCB, CT, PT, Relay panel, One MVA, 33/0.433KV out door Transformer and associated work at Institute of Physics, Bhubaneswar, Orissa.

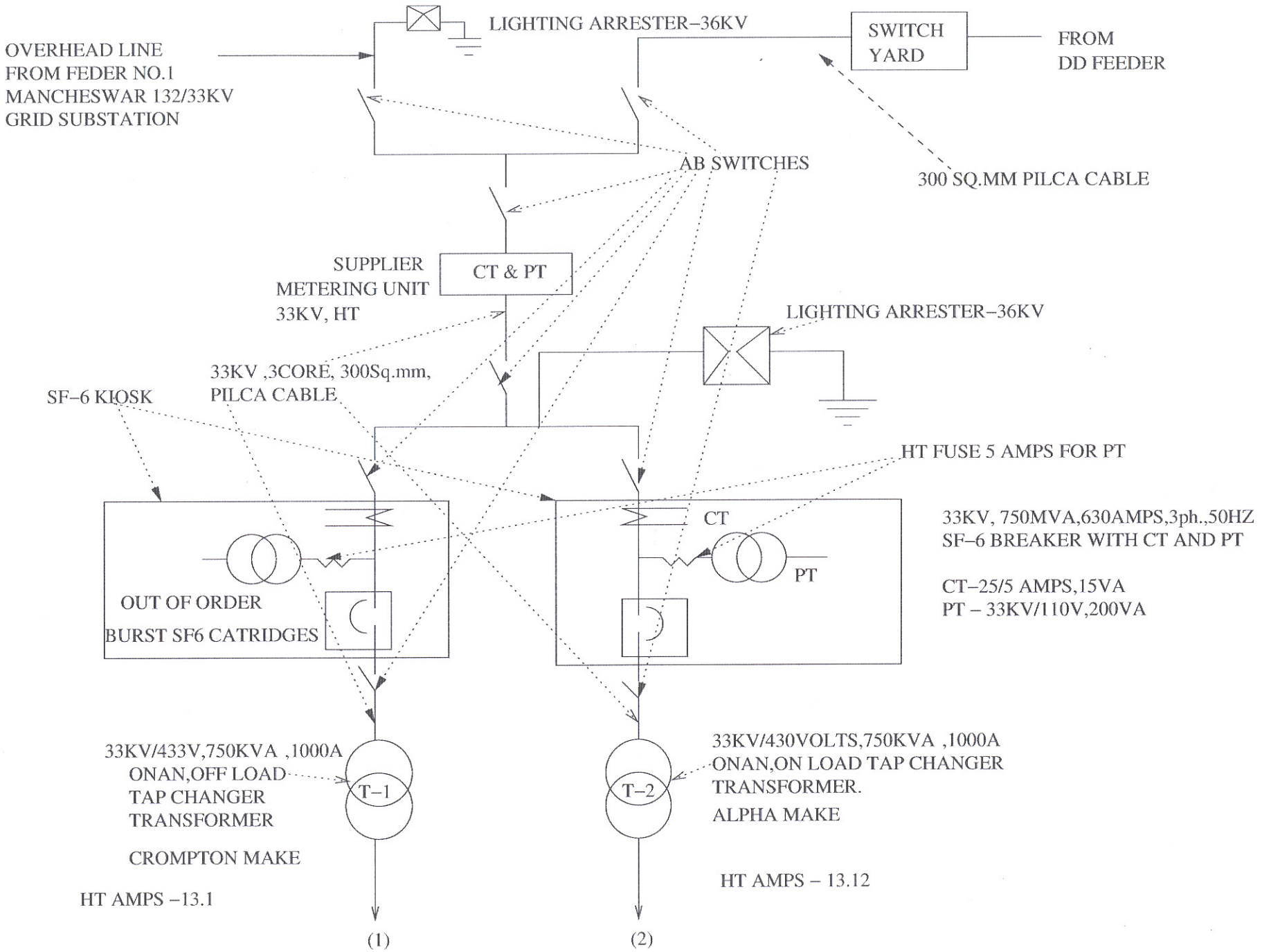
Completion period: Four Months

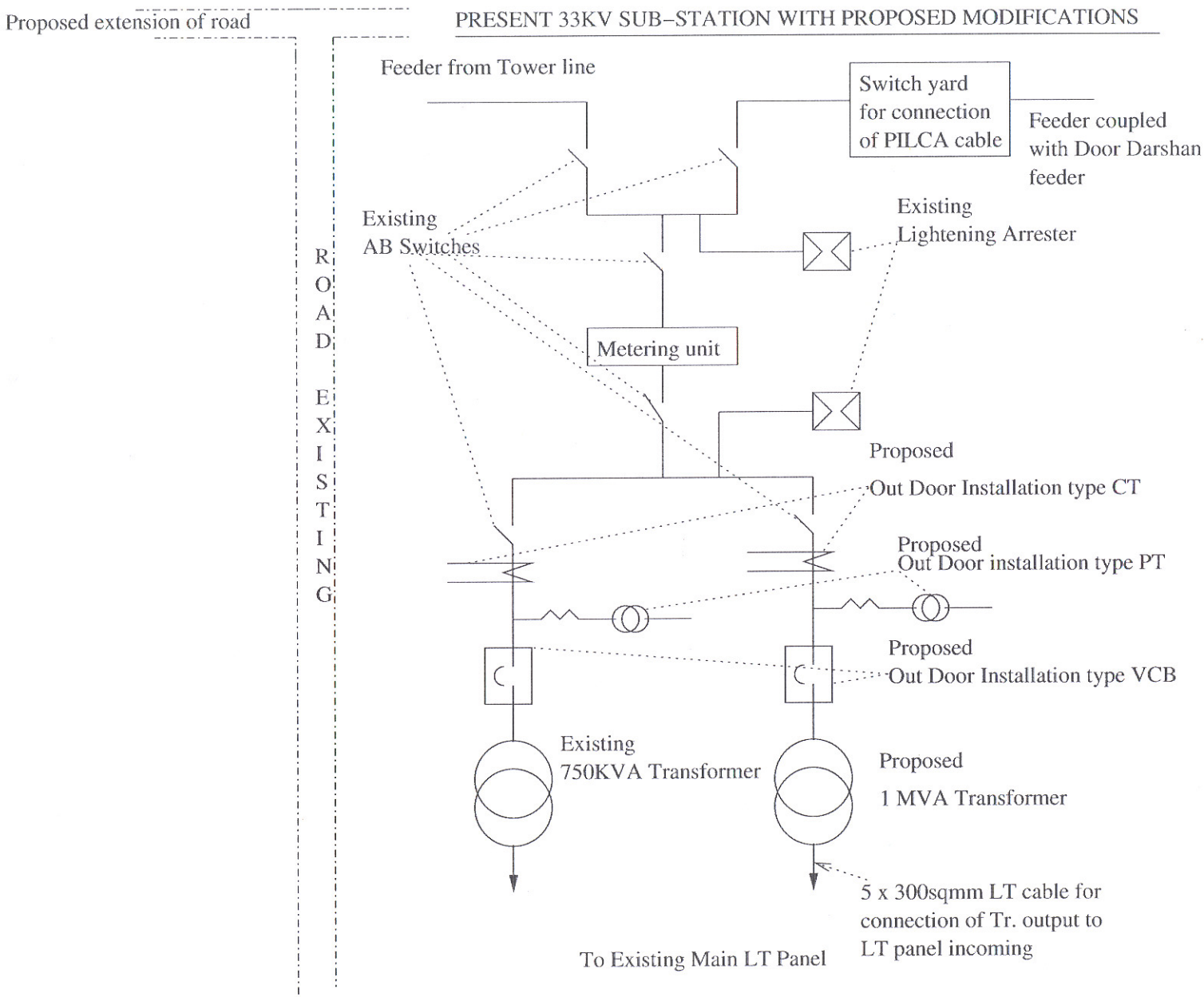
Sl. No.	Description	Time in Months			
		1	2	3	4
1	Submission of drawings for Transformer, VCB, CT, PT, Relay panel and makes of material for approval				
2	Dismantling of existing structures as per schedule of quantities and site mobilization				
3	Manufacturing of Transformer, VCB, CT, PT, Relay Panel including stage and final inspection and testing at works				
4	Installation of Transformer, VCB, CT, PT and Relay panel				
5	Supply and Installation of earthing, control cable and accessories				
6	Supply and Installation of 33KV XLPE cable				
7	Obtaining approval from the competent authority (Electrical Inspector)				
8	Testing & Commissioning & handing over to Department.				

APPENDIX – II
FORM OF EVIDENCE OF PREVIOUS EXPERIENCE

SL. No.	Name of Work	Value of Work	Officer in Charge	Brief Description of Work	Whether the work has completed in time	Whether a certificate about the satisfactory completion of work was issued to the Contractor (If so, copy to be attached herewith)	Any other particulars the contractor wishes to mention in support of his experience

EXISTING 33KV SUBSTATION HT LAYOUT




Proposed extension of road
PRESENT 33KV SUB–STATION WITH PROPOSED MODIFICATIONS
Feeder from Tower line
Switch yard for connection of PILCA cable
Feeder coupled with Door Darshan feeder
Existing AB Switches
Existing Lightening Arrester
ROAD EXISTING
Metering unit
Proposed Out Door Installation type CT
Proposed Out Door installation type PT
Proposed Out Door Installation type VCB
Existing 750KVA Transformer
Proposed 1 MVA Transformer
5 x 300sqmm LT cable for connection of Tr. output to LT panel incoming
To Existing Main LT Panel