RAMAN RESEARCH INSTITUTE

C.V. Raman Avenue, Sadashivanagar

Bengaluru – 560080

"UPGRADATION OF 11KV HT & 0.415KV LT ELECTRICAL INSTALLATION"

Upgradation of 11KV HT & 0.415KV LT Electrical Installation (Design, Supply, Transportation, Installation, Testing and Successful Commissioning of 11KV BESCOM 3way RMU and BESCOM approved 11KV 4Way RMU in RRI, HT metering centre, two numbers of 800KVA compact substation with 11KV/0.415KV, Dry type OCTC Transformer & Main Power control centre (PCC) with integration to the existing synchronising panel including construction of LT panel room.

NIT No: L/210/EB/2022-2023 Dated 11.11.2022

TENDER DOCUMENT

2022-23

RAMAN RESEARCH INSTITUTE

C.V. Raman Avenue, Sadashivanagar

Bengaluru - 560080

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RAMAN RESEARCH INSTITUTE

C.V. Raman Avenue, Sadashivanagar

Bengaluru – 560080

NOTICE INVITING TENDER

Tender Notice Number: L/210/EB/2022-2023 dated 11.11.2022

The Raman Research Institute invites Sealed Tenders for **Upgradation of 11KV HT & 0.415KV LT Electrical Installation (Design, Supply, Transportation, Installation, Testing and Successful Commissioning of 11KV BESCOM 3way RMU and BESCOM approved 11KV 4Way RMU in RRI, HT metering centre, two numbers of 800KVA compact substation with 11KV/0.415KV, Dry type OCTC Transformer & Main Power Control Centre (PCC) with integration to the existing synchronising panel including construction of LT panel room from Eligible bidders.**

Sl No	Description	Details
1	Title of Work	**Upgradation of 11KV HT & 0.415KV LT Electrical Installation (Design, Supply, Transportation, Installation, Testing and Successful Commissioning of 11KV BESCOM 3way RMU and BESCOM approved 11KV 4Way RMU in RRI, HT metering centre, two numbers of 800KVA compact substation with 11KV/0.415KV, Dry type OCTC Transformer & Main Power control centre (PCC) including construction of LT panel room**
2	Estimated cost	**Rs. 2,29,35,384/- (Rupees Two crore Twenty-Nine Lakh Thirty-Five Thousand Three Hundred Eighty-four only)**
3	Period of completion of work in months reckoned from the date of commencement of work as per the work order.	**Five (5) months**
4	Last date and time for receipt of tenders	**02.12.2022 up to 2.00 P.M only**
5	Tender document fee	**Rs.1180/- (Inclusive of GST) -** In the prescribed form as mentioned in other terms and conditions.
6	Earnest Money Deposit (EMD)	Rs. 4,60,000.00. Earnest Money Deposit in the form of DD/ Banker's Cheque only, should accompany the tender enclosed along with the technical bid (envelope).

Important Note: All the bidders are requested to attend the Pre-bid meeting to be held on 18.11.2022 at 3.00 P.M at the office of Raman Research Institute, Bengaluru – 560080

Eligibility Criteria:

Only those bidders fulfilling the following criteria should respond to the tender.

Sl. No	Eligibility Criteria	Documentary proof for the eligibility (Self attested copies to be submitted along with technical bid)
1	Documents defining the constitution or legal status of the Bidder	Bidders should furnish Self Certified Copies of original documents defining the constitution or legal status, place of registration, and principal place of business, PAN/GST, EPF and ESI registration certificates.
2	The bidder should be registered under the Companies Act, 1956 or a registered firm.	Registration certificate to be submitted.
3	The bidder must not be blacklisted by Central Government, State Government or any Organization in India.	A certificate or undertaking to this effect must be submitted.
4	Performance Declaration.	A self-declaration towards not having record of poor performance such as abandoning the works/ not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc., has to be provided

5	I) As per the Government of India, Ministry of Commerce and Industry and Department for Promotion of Industry and Internal Trade (Public Procurement Section) Order No. P-45021/2/2017-PP (BE-II) dated 04 June 2020 a) The Bidder shall produce a certificate whether he/she belong to "Class – I' and 'Class – II supplier' and Non – Local suppliers. b) Class – I' and 'Class – II supplier' and Non – Local suppliers as classified under above mentioned Order are eligible to submit the offer. While finalising the tender, the instructions given in the above order shall prevail. II) As per the Government of India, Ministry of Finance and Department of Expenditure, Public Procurement Division – Office Memorandum No. F.No.6/18/2019-PPD dated 23.07.2020, the Institute reserves the right by order in writing, impose restrictions, including prior registration and/or screening, on procurement from bidders from a country or countries, or a class of countries, on grounds of defence of India, or matters directly or indirectly related thereto including national security; no procurement shall be made in violation of such restrictions.	Self-certification that item offered meets the local content requirement for Class-I local supplier'/ 'Class-II local supplier' as the case may be. They shall also give details of the location(s) at which the local value addition is made. Self-attested copy of Annexure-IV about Make in India

6	Should have satisfactorily completed Similar works as mentioned below during the last **Seven years** from the last date of submission of bids. i. Three similar works each costing not less than **Rs.9174153/-** (OR) ii. Two similar works each costing not less than **Rs.13761230/-** (OR) iii. One similar work costing not less than **Rs.18348307/-** (AND) iv. One Completed similar work of costing not less than the amount equal to **Rs.9174153/-** with any Central/State Government Organization/Central Autonomous Body/Central Public Sector undertaking/State public sector undertaking/City development authority/Quasi Central/ state government organisation /Municipal corporation of city formed under any Act by Central/State government and published in central/state gazette.	i. Certified copy of work orders, Schedule of quantities (BOQ) and completion certificates issued by the authority concerned to establish work experience. ii. Completion certificates for works issued by Private parties shall be supported by TDS (Tax Deducted at Source) certificates.
	Note: **i. Similar work shall mean having** experience in executing Supply, Installation, Testing and commissioning of 11KV / 0.415 KV substation consisting of HT panel, LT panel & Minimum transformer capacity of 500KVA or higher including associated electrical works. ii. The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum, calculated from the date of completion to last date of receipt of application for bids. **iii. Work executed as sub-contract or joint-venture will not be considered for eligibility/evaluation.**	
7	Should have had average annual financial turnover not less than **Rs11467692/-** in the last three years ending 31st March 2022	Certified copy from chartered Accountant for the Annual financial turnover and balance sheet showing Profit & Loss as per the Form A
8	Should not have incurred any loss in more than two years during the last five years ending 31st March 2022	

9	Should have a solvency of **Rs.9174153/-**	A valid solvency certificate for this particular tender to be submitted for the said value, issued by any scheduled bank as per the Form B
10	Valid Class 1 Electrical License issued by central or State Electric Authority from the Electrical inspectorate authorities. Note: Class 1 contractor shall undertake electrical installation work from low voltage to high voltage up to 33KV	Certified copy of valid Class 1 Electrical contractor's License of the bidder issued by central or State Electric Authority from the Electrical inspectorate authorities. **Note: Class 1 Electrical contractor's License should be in the name of Bidder only, sub-contractor or joint-venture Licences will not eligible or considered.**
11	The vendor should undertake a commitment that they will execute the work without any delay and monitor the project effectively.	Self-declaration about the project commitment
12	The bidding capacity of the contractor should be more than the estimated cost of the work put to tender. The bidding capacity shall be worked out as declared by the tenderer and enclosed along with the technical bid based on the formula: (AxNx2)-B N=01 where, A- Maximum value of work executed in any one year during last 5 years at current price level taking into account the work completed as well as work in progress. B- Value of existing commitments and ongoing work to be completed during the next 'N' years (during the period for which the tenders are invited) at current price level. N- Number of years prescribed for completion of the subject contract for which tenders are invited. It should be considered as ONE (01)	i. Statement showing the value of existing commitment and ongoing works as well as the stipulated period of completion remaining for each of the works listed to be furnished. ii. The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum, calculated from the date of completion to last date of submission of bids.

EVALUATION OF BIDS:

- A duly constituted Technical Evaluation Committee will shortlist tenderers on the basis of eligibility criteria of this tender. The bids conforming to eligibility criteria will be considered for further evaluation.
- The Technical Evaluation Committee will technically qualify the bids based on detail scrutiny of all documents furnished by the tenderers and checklist criteria stipulated in the tender document. In this stage the committee may inspect selected works carried out by tenderers.
- The price bid of only those tenderers who have been qualified during the scrutiny and technical evaluation will be opened separately on a specified date (with due intimation to the qualified tenderers) and further processed, as per tender procedure/stipulations.

Construction of LT Panel Room:

The construction of LT panel room shall be entrusted by the successful bidder to class-1 civil contractor who shall have experience of executing general civil works involving residential and industrial buildings costing more than 25 lakhs, the civil contractor should have executed at least one work in central Government or Quasi-Government or State Government for the above value.

This should be supported by work order and work completion certificates issued by the clients including their credentials for approval from the Institute.

Construction of LT panel room shall be taken-up first on priority basis and completed within a period of **Three months** from the date of issue of work order.

IMPORTANT NOTE

- **The supply and installation of LT Panels shall be taken-up only after completion of LT Panel room in all respect. If LT Panels supplied before the completion of the building shall be the responsibility of the tenderer and payment towards supply of LT Panels will not be effected.**

OTHER TERMS AND CONDITIONS:

The Institute is eligible to issue Central Excise Duty Exemption Certificate or Customs Duty Concession certificate.

1. Bid documents may be obtained from the Estate office, RRI, Bengaluru on payment of **Rs.1180/- (Inclusive of GST)** in the form of DD drawn in favour of Raman Research Institute, Bengaluru. Those who download the tender document from Central Public Procurement Portal (CPPP)/ RRI website, should submit a DD for **Rs.1180/- (Inclusive of GST)** towards the cost of bid document along with technical bid. Submission of DD for **Rs.1180/- (Inclusive of GST)** towards the cost of bid document is mandatory. The bid submitted without the tender document fee will be rejected.

2. The tender shall be divided into two parts:

   I. The first part shall be "Technical" Bid, which includes the following details:

   a) Detailed literature including Data Sheets of quoted products

   b) Supporting Documents as per the Eligibility Criteria & Checklist.

   Note:

   The first part (Technical Bid) shall not contain any financial aspects of the offer. If financial aspects are found into this part, their tender shall be substantially rejected.

   II. The Second part (Financial Bid) should contain detailed financial outlay with List of deliverables / Bill of materials / Bill of Quantities and services, unit price of items as in the technical bid (i.e., First Part).

   Each of these tenders should be sealed in a separate envelope and bear the reference number and due date of this enquiry and indicate their contents: as Technical Bid or Financial Bid. These sealed quotations should be enclosed in an outer cover, which bears only the address of this office without any indication that there is a tender within with a name of work on the envelope.

3. The Tenderer should ensure that all the pages of tender/bid submitted are duly signed by the Authorised Signatory before submission of Bid.

4. The tenders should be complete in all respects and the details specified in this request should be adhered to before submission. Otherwise, tenders are liable to be rejected.

5. Tender should be valid for 180 days from the date of opening of technical bid.

6. EMD of **Rs.4,60,000/-** should accompany the tender enclosed along with the technical bid (envelope). Payment should be by way of DD / Banker's cheque only, drawn in favour of "Raman Research Institute, Bengaluru". No other form of payment will be accepted.

7. EMD of successful tenderer will be returned / adjusted on satisfactory completion of order.

8. EMD of unsuccessful tenderers will be returned within Thirty (30) working days of opening the tender.

9. Work Completion period shall be **FIVE (5) MONTHS** from the date commencement of work as per the Work order.

10. The Unit price should be mentioned legibly and clearly. Taxes and other levies should be indicated separately. The rates quoted by the bidder will be deemed to be inclusive of taxes applicable, if it is not explicitly mentioned in the tender.

11. The Institute will have the right to issue the addendum to tender documents to clarify, amend, modify, supplement or delete any of the conditions, clauses or

items/specifications stated therein, each addendum so issued shall form part of original invitation to tender and will be duly notified in the website

12. After awarding the work, the final work order quantity may be varied than that mentioned in the tender document, depends on the site conditions. Up to 25% deviation in tendered amount, the tenderer has to execute the work as per the quoted rates in the tender. Any further deviation beyond this limit Up to 50%, the contractor shall be paid rates at agreement rate/Market rate (including profit and overhead charges of 15%) whichever is lower.

13. **Work executed as sub-contract or joint-venture will not be considered for eligibility/evaluation.**

14. For technical evaluation, at the discretion of the Technical Evaluation Committee (TEC), one completed work and one on-going work of the tenderer of similar nature and magnitude may be inspected. Tenderers to submit the list of works as per Form C & D

15. The Institute reserves the right to reject any or all of the tenders received without assigning any reason. It also reserves the right to accept an offer other than the lowest.

16. The Institute reserves the right to postpone/extend the due date for submission/opening date of the tender without assigning any reason

17. The work should be completed within the stipulated time as per the work order. While the Institute reserves the right not to accept work in part or full, beyond this date, liquidated damages at 1% of the value of the work order per week of delay will be levied. Exceptions: Force Majeure.

18. Successful Design, Supply, Installation, Testing and Commissioning should be made at the site as per the tender document at RAMAN RESEARCH INSTITUTE, Sadashivanagar, Bengaluru – 560 080, at suppliers cost and risk. The design shall be got approved before supply and Installation.

19. Tenders will be **accepted up to 2.00 PM on 02.12.2022** of the deadline mentioned and technical bids will be **opened at 4.00 PM on 06.12.2022**. Bidders and/or their authorised representatives desirous can be present at the time of tender opening.

20. Performance Security: Successful Tenderer has to provide 3% of performance security in the form of Bank Guarantee within 15 days after receiving of purchase/ work order. It should be valid through the period of completion of work, plus six months as claim period.

21. Performance Bank Guarantee (PBG): Successful Tenderer must submit 3% PBG immediately from the date of successful installation and commissioning, valid during the warranty period, plus six months as claim period.

22. Any Technical clarification required towards submission of offer may please be mailed to **estate**@rri.res.in

23. The acceptance or rejection of the Tender would vest with Raman Research Institute (RRI), Bengaluru, India. RRI also reserves the right to reject any or all tenders in part or in full without assigning any reasons thereof.

24. Canvassing in connection with tender will result in disqualification.

25. In the event, no rate has been quoted for any item / items, leaving space both in figure(s), word(s) and amount blank, then the tenderer has to confirm if included elsewhere. Otherwise, the rates for such items will be considered zero for processing the bid

26. Rates quoted by the Tenderer in item rate, in figures and words should be accurately filled in so that there is no discrepancy in the rates written in figures and words. However, if any discrepancy is found, the rates which correspond with the, quoted amount worked out by the Contractor shall be taken as correct.

27. Even though the tenderers meet the qualifying criteria, they are subject to be disqualified if they have made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements.

28. A self-declaration towards not having record of poor performance such as abandoning the works/ not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc., has to be provided.

29. The Tenderer along with his team, at the Tenderer's own cost, responsibility and risk may visit and examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing the Bid and entering into a contract. Nature of the site, means of access to the site and in general shall themselves obtain all the necessary information as to risks, contingencies and other circumstances which may influence or affect their tender. The tenderer shall be deemed to have full knowledge of the site whether he inspects or not and no extra charges consequent on any misunderstanding or otherwise shall be allowed. (Timings 2.00 pm to 5.00 pm – Monday to Friday) For any clarification, tenderer may discuss with the Engineer-in-Charge.

30. The Unit rates and the prices should be quoted by the tenderer in Indian Rupees only.

31. **The offer price shall include Transportation, Insurance, Delivery, supply & Installation, Testing and Commissioning of the complete Project.**

32. Any bids received by the Institute after the due Date & Time will be rejected.

33. Payment terms for the work is as follows

    a. 60% on supply of HT and LT panels and CSS.

    b. 30% on successful Installation, Testing, Commissioning

    c. 10% on approvals from concerned authorities and handing over of the Entire project & submission of PBG

34. The tenderer, on award of work is expected to enter into an agreement with the Institute on Rs. 100/- stamp paper as per **Annexure – VI.**

35. The tenderer has to comply with the labour laws while executing the work.

36. The tenderer will be responsible for the insurance, safety and health of all the workers during the execution of work.

37. The Institute will have no liability to the tenderer, if he/she incurs loss on account of stoppage of work or delay due to violation with respect to safety & quality procedure.

38. The relevant drawings are attached as **Annexure – VII**.

39. For specialised items the work shall be carried out completely as per the manufacturer's specifications and recommendations/CPWD specifications/IS specifications, if the item specifications are incomplete.

40. The work to be carried out under the Contract shall, except as otherwise provided in these conditions, include all labour, materials, tools, plants, equipment and transport which may be required in preparation of and for the full and entire execution and completion of the works. The descriptions given in the Schedule of Quantities shall, unless otherwise stated, be held to include wastage on materials, carriage and cartage, carrying and return of empties, hoisting, setting, fitting and fixing in position and all other labours necessary in and for the full and entire execution and completion of the work as aforesaid in accordance with good practice and recognized principles.

41. A pre-bid meeting will be held on **18.11.2022 at 3.00 P.M** at RRI to help the tenderers to seek clarifications, if any.

42. The support contact details and escalation matrix has to be provided.

43. In addition to the above mentioned all terms & conditions the tenderer shall execute the work as per the latest CPWD General Conditions of Contract (GCC).

44. **Preference to Make in India**

This invitation is only for Class "1" and Class "2" Suppliers as prescribed in "Public Procurement (Preference to Make in India) order 2017 of GOI. Department for Promotion of Industry and Internal Trade" Order Number P45021/2/2017-PP (B.E.-II) dated 15.06.2017 (subsequently revised vide orders dated 28.05.2018, 29.05.2019, 04.06.2020 and as 16.09.2020). Necessary certification for local content must be submitted by the prospective tenderers strictly as per **Annexure – IV** attached with the tender document.

For indicating the price, the tenderers may choose any/all of the following: The 'Class-I Local Supplier' / 'Class-II Local Supplier' at the time of tender, bidding or solicitation shall be required to indicate percentage of local content and provide self-

certification that the item offered meets the local content requirement for 'Class-I Local Supplier' / 'Class-II Local Supplier' as the case may be.

A) **PRIOR REGISTRATION AND / OR SCREENING OF TENDERERS:**

As per O.M No. F.No.6/18/2019-PPD, dt.23/07/2020, the following condition to be fulfilled and the tenderer to submit the following declaration on their Letter head.

I. Any tenderer from a country which shares a land border with India will be eligible to bid in this tender only if the tenderer is registered with the Competent Authority.

II. **"Tenderer" (including the term 'Bidder', 'consultant' or 'service provider' in certain contexts)** means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of tenderers stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

III "Tenderer from a country which shares a land border with India" for the purpose of this Order means: -

a. An entity incorporated, established or registered in such a country; or
b. A Subsidiary of an entity incorporated, established or registered in such a country; or
c. An entity substantially controlled through entities incorporated, established or registered in such a country; or
d. An entity whose beneficial owner is situated in such a country; or
e. An Indian (or other) agent of such an entity; or
f. A natural person who is a citizen of such a country; or
g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above.

45. All disputes, arbitration, if any are subject to jurisdiction of courts in Bengaluru only.

Special Terms and conditions

1. Site Engineer (Preferably Electrical Engineer) with experience in similar projects has to be deployed for this project and the details of the person has to be attached along with the technical bid.
2. The after-sales service has to be provided by the tenderer with support from the OEM. The support contact details and escalation matrix has to be provided.
3. All extra item/substitution item will be derived on the basis of condition of contract of CPWD
4. Price escalation clause is not applicable.

5. **Safety codes and labour regulations**

   In respect of all labour employed directly or indirectly on the work for the performance of the contractor's part of work, the contractor at his own expense, will arrange for the safety provisions as per the statutory provisions, B.I.S recommendations, factory Act, workman's compensation Act, CPWD code and instructions issued from time to time.

   The contractor shall provide necessary barriers, warning signals and other safety measures while executing the works or wherever necessary so as to avoid accident. The Institute will not be responsible for any accident occurred or damage incurred or claims arising there from during the execution of work.

6. Supply of Electricity: - Electricity required for construction shall be arranged by the contractor/ will be provided by Institute on chargeable basis*. *Energy meter with necessary protection, switch gear, earthing, and inter-connection as per the relevant standard and code of practice shall be arranged by contractor
7. **Machinery For Erection:**

   All tools and tackles required for unloading / handling of equipment's and materials at site, their assembly, erection, testing and commissioning shall be the responsibility of the contractor.

8. **Care of the Campus & Building:**

   The tenderer shall ensure the work area of the campus is kept clean and the movements are controlled so as to avoid disturbance to work area/Campus. The waste shall be handled in environmentally friendly way. Any damage to the existing service lines during execution of the work shall be got rectified by the tenderer at his own cost & risk.

CHECKLIST

SELF ATTESTED COPY OF THE FOLLOWING DOCUMENTS SHALL BE SUBMITTED ALONG WITH TECHNICAL BID, FAILING WHICH THE TENDERS ARE LIABLE TO BE REJECTED

SL.NO	CRITERIA / SPECIFICATION / CONDITION		YES/ NO
1.	EMD of Rs. **Rs.4,60,000/-** should be enclosed along with the technical bid		
2.	Enclose Tender Document **Fee of Rs.1180/-** (Inclusive of GST) in the form of DD, drawn in favour of Raman Research Institute, Bengaluru		
3.	Certified copy of valid Class 1 Electrical contractor's License of the bidder		
4.	Bidders should furnish Self Certified Copies of original documents defining the constitution or legal status, place of registration, and principal place of business, PAN/GST, EPF and ESI registration certificates.		
5.	The bidder must not be blacklisted by Central Government, State Government or any Organization in India. A certificate or undertaking to this effect must be submitted.		
6.	A self-declaration towards not having record of poor performance such as abandoning the works/ not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc., has to be provided		
7.	Tenders shall be valid for **180** days from the opening of Bid. Bid submitted with a shorter validity period will be rejected.		
8.	Should have had average annual financial turnover not less than **Rs. 1,14,67,692/-** in the last three years ending 31st March 2022 Should not have incurred any loss in more than two years during the last five years ending 31st March 2022	Certified copy from chartered Accountant for the Annual financial turnover and balance sheet showing Profit & Loss as per the Form A	
9.	Should have a solvency of **Rs.9174153/-**	A valid solvency certificate for this particular tender to be submitted for the said value, issued by any scheduled bank as per the Form B	

<table>
<tr><td rowspan="3">10.</td><td colspan="2">Documentary proof for having executed the work of similar nature and comparable magnitude as per the list below</td><td></td></tr>
<tr><td>Should have satisfactorily completed the similar works as mentioned below during the last Seven years from the last date of submission of bids.

i. Three similar works each costing not less than Rs.9174153/-
(OR)
ii. Two similar works each costing not less than Rs.13761230/-

(OR)
iii. One similar work costing not less than Rs.18348307/-

(AND)

iv. One Completed similar work of costing not less than the amount equal to Rs.9174153/-with any Central/State Government Organization/Central Autonomous Body/Central Public Sector undertaking/State public sector undertaking/City development authority/Quasi Central/ state government organisation /Municipal corporation of city formed under any Act by Central/State government and published in central/state gazette.</td><td>i. Certified copy of work orders, Schedule of quantities and completion certificates issued by the authority concerned to establish work experience.

ii. Completion certificates for works issued by Private parties shall be supported by TDS (Tax Deducted at Source) certificates.</td><td></td></tr>
<tr><td colspan="2">Note:

i. Similar work shall mean having experience in executing Supply, Installation, Testing and commissioning of 11KV / 0.415 KV substation Consisting of HT panel, LT panel & Minimum transformer capacity of 500KVA or higher including associated electrical works.

ii. The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum, calculated from the date of completion to last date of receipt of application for bids.

iii. Work executed as sub-contract or joint-venture will not be considered for eligibility/evaluation.</td><td></td></tr>
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11.	Details of similar works completed in the last seven years as per the Form-C	
12.	Details of on-going/awarded works as per the Form-D	
13.	Duly filled-in Schedule of Quantities	
14.	Guaranteed Technical Particulars of Compact substation, Transformer (As per **Annexure – III)**	
15.	Self-certification that item offered meets the local content requirement for Class-I local supplier'/ 'Class-II local supplier' as the case may be. They shall also give details of the location(s) at which the local value addition is made. Self-attested copy of Annexure-IV about Make in India. (As per **Annexure – IV)**	
16.	Project commitment letter submitted on the letter head as per the **Annexure V** format	
17.	Additional Documents if any	

FORM 'A'

FINANCIAL INFORMATION

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

Particular	Financial Year				
	2017-18	2018-19	2019-20	2020-21	2021-22
(i) Gross Annual Turnover					
(ii) Profit / Loss (Standalone)					
(iii) Certified by					

2. The following certificates are to be submitted:

   (a) Profit & loss account certified by CA & as submitted to Income Tax Department.
   (b) Solvency Certificate from banker's a per the Form 'B'

Signature of Chartered

Accountant with seal

FORM 'B'

FORM OF BANKER'S CERTIFICATE FROM A SCHEDULED BANK

DATE:

This is to certify that to the best of our knowledge and information that M/s._____(with address) a customer of our bank are/ is respectable and can be treated as good for any engagement up to a limit of Rs. _____(Rupees_____).

This certificate is issued without any guarantee or responsibility on the bank or any of the officers.

(Signature)

For the Bank

NOTE: (1) Banker's certificate should be on letter head of the Bank.

(2) Addressed to Raman Research Institute for this tender.

FORM 'C'

DETAILS OF ALL SIMILAR WORKS COMPLETED IN ALL RESPECT DURING **THE LAST SEVEN YEARS** ENDING PREVIOUS DAY OF LAST DATE OF SUBMISSION OF TENDERS (STARTING WITH LATEST WORK)

Sl No	Name of Work	Nature Of Work	Value of Work	Date of completion As per the Work Order	Actual Date of Completion	Whether extension of time of contract was availed		Name of client, Official Contacts and full address
						With levy Of Compensation	Without Levy Of Compensation	

Notes:

(i) The tenderer may submit separate form for giving details of work (completed) for each year to fill up the details as above. Separate sheets if any shall be numbered in sequence.

(ii) The copies of the work orders for each work should be enclosed.

(iii) Certified that the above list of works is complete and no work has been left-out and the information given is correct to my knowledge and belief.

(iv) The hard copy of all similar works completed during the last seven years ending previous day of last date of submission of tenders (starting with latest work) shall also be submitted along with the technical bid.

(v) Completion certificates for works issued by Private parties shall be supported by TDS (Tax Deducted at Source) certificates.

FORM 'D'

DETAILS OF ALL WORKS OF ANY NATURE **UNDER EXECUTION** OR AWARDED
(No works shall be left out)

Sl No	**Name of Work**	**Nature of Work**	**Value of Work**	**Date of completion As per Work Order**	**Present Status of in Percentage**	**Expected date Of Completion**	**Expected commitment During the period for which bids are invited**	**Name of client and full address**

Notes:

(i) **The copies of the work orders** for each work to be enclosed.
(ii) Certified that, no work has been left-out in the above list and the information given is correct to my knowledge and belief.

General Scope of Bid

The Raman research Institute, Bengaluru, India invites bids for Upgradation of 11KV HT & 0.415KV LT Electrical Installation (Design, Supply, Transportation, Installation, Testing and Successful Commissioning of 11KV BESCOM 3way RMU and BESCOM approved 11KV 4Way RMU in RRI, HT metering centre, two numbers of 800KVA compact substation with 11KV/0.415KV, Dry type OCTC Transformer & Main Power control centre (PCC) with integration to the existing synchronising panel including construction of LT panel room. detailed in the table given in Summary.

The successful bidder will be expected to complete the works within **5 Months**. The time frame of 5 Months includes the Design, Supply, Transportation, Installation (as per approved plan of Electrical Inspectorate Office and BSECOM), Inspection and necessary approvals as per IE Rules and regulations of the complete setup of the installed and executed works from Electrical Inspectorate Office and BESCOM (O&M and Testing Department), Testing of the installed equipment's complying to and as per all the latest norms and IS standards with latest amendments.

A. The successful bidder shall have following teams dedicated for the project –

   i. Design
   ii. Project
   iii. Execution & Commissioning
   iv. After Sales & maintenance.

Each team will work in does co-ordination with each other, technical evaluation committee for shop drawing approvals (design) followed by identification of equipment on site with approvals (project), charging of the equipment in presence of the competent representatives after getting necessary approvals (execution & commissioning)

B. Power shall be extended from Compact Substation I & II (CSS I & II) which shall operate in stand-alone mode.

C. In case of utility failure, power shall be extended through DG set that are rated at 320KVA & 500KVA (Existing) & 750KVA (New). Emergency power shall be available at the point of the DG incomers of PCC panel. **The power supply shall be either stand alone or sync depending upon the load schedule. This part is included in the scope of DG vendor.**

D. At the point of BBT coupling DG power connected to the incomer of DG @ PCC, close co-ordination of both the bidders (Transformer) & DG is needed.

E. The overall work shall be executed to the best of industrial practices and in a very environmentally friendly way.

1. **Equipment procured by** RAMAN RESEARCH INSTITUTE; BENGALURU has **certain material** required for the above expansion project. Whatever, material

present with RRI shall be used on site as per instruction of the Engineer on site.

2. LT Cables – Existing to be used wherever possible. The contractor's scope for above material shall include unloading of material on receipt of the same at site, storing at allocated place until preparation of site, transportation of the equipment to location of installation, unpacking, installation, testing and commissioning. All the hardware and consumables required for fixing of the equipment at location and its connection to neighbouring equipment etc. shall be contractor's responsibility.
3. **Equipment to be supplied, transported to site, installed, tested and commissioned by the contractor (complying to all the latest IE rules and BIS standard, regulations, Utility Boards, Corporations etc.)**
4. The contractor shall supply and install following equipment/material as per the approved makes and in case not mentioned he shall take the approval of Engineer In charge before its use on site.
5. HT termination kits and HT Cable for tapping the 11KV supply from the BESCOM RMUs. BESCOM has identified the RMU and please refer the attached Drawing.
6. BESCOM approved RMUs as per the specification and to be installed in the RRI. BESCOM approved HT Metering section. RRI HT Incomer after the HT Metering shall be installed to extend the power supply to 2nos. of the Compact Substation Units- CSS.
7. 800KVA CSS DRY, OCTC 11KV/0.415KV with HT SF6 incomer and LT Panels PCC-I and II.
8. All earthing material including G.I. strips & Copper Strips etc. as well as material for preparation of earth pit station including providing of earth pit chambers.
9. LT Cables and termination accessories like glands and lugs
10. **Power control Centre (PCC)** I and II as per the SLD
11. Safety equipment such as rubber mats, hazard charts, shock treatment charts, hand gloves etc. as required by the statutory authorities and as per the IS standards with all necessary test certificates.
12. All above material shall be of approved make; however, prior approval of the material is mandatory before procurement on site. Approval from Technical Evaluation Team shall be sought for all Material not mentioned in the approved make list.
13. The Electrical Inspector sanctions and approvals is included in the scope of Contractor.
14. RAMAN RESEARCH INSTITUTE reserves rights for inspection and testing at the work of manufacturer before despatching the goods. The travelling / transportation arrangement for inspection and testing should be borne by the contractor.
15. **Statutory Approvals**

    All the statutory approvals (from Electrical Inspectorate Office CEA and CEIG, BBMP, BWSSB all State and Central bodies etc.) as required for taking up the installation work as well for commissioning etc. shall be obtained by the contractor. The statutory fees shall be paid by RAMAN RESEARCH INSTITUTE, BENGALURU. Required number of copies of drawings will be provided to the

contractor for submission. Contractor shall duly inform the concerned authorities before starting of Work.

16. **Installation of CSS, BESCOM RMU, RRI RMU and BESCOM Metering cubicle.** The Contractor shall maintain the floor level as per the specifications of the vendors and BESCOM to erect the **BESCOM RMU, BESCOM Metering cubicle, RRI RMU (HT Incomer) and CSS**, it involves design, fabrication, installation work and civil works including required materials, accessories and labour charge shall be borne by the contractor. Supplying and spreading **stone metal** 60 mm size for 100 mm depth above the ground level complete…above the cable loop. Detailed civil drawings of the foundation and cable trenches shall be prepared by the contractor and submitted to RRI for approval.

17. **Testing and commissioning:**

    a) After completion of the work complete illumination system shall be thoroughly checked and tested by contractor in presence of RRI EIC or his representative as per check list.
    b) The contractor shall provide all tools, materials, labour and supervisory personnel for carrying out the tests.
    c) The contractor shall carry out all rectifications repairs of adjustment work found necessary during testing and commissioning.
    d) The contractor shall record the test result on approved proforma and furnish test report/results [4copies] for approval.
    e) On successful commissioning of the system and on carrying out necessary rectification work, the RRI will take over the installation either wholly or in parts, as the case may be.

TECHNICAL SPECFICATION

I Specification of outdoor type Compact Substation (CSS)

1. **Scope**

This specification covers the technical requirements of Design, Fabrication, testing at manufacturer's works, packing, forwarding, Supply and unloading at store/site and Installation of two numbers of compact substation suitable for outdoor installation and it's comprising an enclosure containing high voltage switchgear, transformer and low voltage switchgear with LT Multi-Function Metering (MFM) & APFC unit. The transformer shall be of **800KVA resin cast Dry Type Transformers copper wound** complying to the ECBC norms – The HT and LT terminals of the transformer shall be connected with copper bus bar covered colour coded with heat shrinkable sleeves to HT and LT switch gear respectively.

The HV compartment shall comprise:

1 Way Indoor type 11KV HT breaker as per the SLD with necessary metering & protection

The LV compartment shall comprise:

1. One number of 1250A 4P LT EDO type ACB as outgoing feeder
2. 800A MCCB with 8stages of APFC of 200KVAR compensation with a 4-standby compartment for future

2. **Climatic conditions of the installations:**

The Package substation shall be suitable for continuous operation under the basic service conditions indicated below

Ambient Temperature : Bengaluru –Average- 29.8* Degree centigrade

Relative Humidity : up to 95%

Altitude of Installation : up to 921m

The Enclosure of High Voltage switchgear-control gear, Low Voltage switchgear-control gear & Transformer of the package substation shall be designed to be used under **normal outdoor service condition** as mentioned. The enclosure should take minimum space for the installation including the space required for approaching various doors & equipment inside.

The atmosphere is generally laden with and dust suspended during dry months and subjected to fog in cold months.

The Package substation shall be suitable for continuous operation under the basic service conditions indicated below.

1.	Location	Bengaluru
2.	Maximum ambient air temperature	34 deg C
3.	Minimum ambient air temperature	26.5 deg C
4.	Average daily maximum ambient temperature	29.8 deg C
5.	Maximum altitude above mean sea level	921meters
6.	Minimum relative humidity	70%
7.	Max. relative humidity	100%
8.	Max. Wind Speed	6.5km/hr.

3. **General Construction:**

Sl. No.	**Description**	**Required**
	A. FOR ENCLOSURE	
1.	Application	Outdoor
2.	Rated voltage	12kV
3.	Service voltage	11kV
4.	System frequency	50Hz
5.	Rated Impulse withstand voltage	75kVp
6.	Rated power frequency withstand voltage	28kVrms
7.	Rated LT voltage	433V
8.	Degree of protection	Transformer Compartment: - IP23 HV Compartment: - IP54 LV Compartment: -IP54
9.	Internal arc test	IAC-AB as per IEC 62271-202
10.	Maximum permissible temp. for any accessible part of the enclosure.	As per IEC 62271-202:2006
11.	Minimum thickness of sheet a) Sides b) Base	 2 mm 4 mm
12.	Control wiring a) Type and insulation b) Conductor Material and Size	 PVC and 1.1 KV (max) Copper and 1.5 & 2.5 sq mm
13.	Ventilation Aperture	Class K10
14.	Locking arrangement	The doors shall be padlocked as well as lock protected
15.	Paint	RAL7035-Powder coated paint with Seven tank process shall be followed and thickness of the

		paint shall be not less than 80microns.
Technical specification of 11kV RMU – VCB/SF6 Breaker		
1.	Application	Enclosed inside the Enclosure
2.	Rated voltage	11kV
3.	Number of Phases	3
4.	Breaking Current	21kA rms/3sec
5.	Making Current	52kA peak
6.	Rated withstand voltage at power frequency of 50Hz	28 kV rms
7.	Rated Impulse withstand voltage	75 kV peak
8.	Operating Mechanism	Trip free and free handle type with mechanically operated indication and pad locking.
9.	Isolator – LILO	
10.	Type	Load and Fault breaking in SF6 tank
11.	Rated Ampere	630A
12.	Fault making current	52kA peak
13.	Number of Poles	3
14.	Operating Mechanism	Operating handle with ON/OFF/Earth position with padlocking in earth position.

4. **Transformer**: Please refer technical specification of DRY type distribution transformers Package type substation is designed to comprise the following main components:
   a) Enclosure suitable for outdoor installation.
   b) HV compartment consisting of 11kV breaker.
   c) Dry Type Distribution transformer.
   d) LV compartment consisting, LT ACB, MCCBs with Interconnections and APFC (microprocessor based) capacitor panel.

5. **OUTDOOR ENCLOSURE**

The enclosure shall be made of minimum 2mm thick MS sheet steel with a base of 4 mm (min.), tropical zed to meet Indian weather conditions. The base of the enclosure shall ensure rigidity for easy transport and installation. The structure of the substation should be provided with additional supporting beams capable of supporting the gross weight of all the equipment's. The roof of the sub-station compartments shall be designed to support adequate loads with sufficient clearance for removal/installation of components inside the package sub-station. There shall be provision of proper ventilation through louver apertures so as to allow circulation of hot air inside enclosure naturally. The complete design shall be compartmentalized.

The HV compartment shall comprise of one no. 1 Way, non-extensible indoor type, 11kV RMU with one no. circuit breaker as outgoing. Termination kits and Boots for RMU shall be supplied by the bidder as per RRI approved make.
Degree of Protection for the HV compartment, Transformer compartment and LV compartment shall be IP54, IP23 and IP54 respectively in accordance with IEC recommendation. There shall be no bolting arrangement on the doors and sides (periphery) so as to avoid access of dust and water inside. This would also ensure that the unit is well protected from outside public nuisance.

HV and LV compartments shall be accessible on the sides of substation through double doors equipped with key lock and nit rile/neoprene rubber seal. The doors shall be Pad locked and/or lock protected to ensure theft prone locking arrangement. Heavy duty hinges shall be provided for each door such that they are not visible from outside and hence not removable. The outgoing of the distribution transformer shall be connected directly to Incomer of LV distribution through copper bus bars. Transformer chamber door can be opened by accessing from the door arrangement from LT compartment. HV, LV and Transformer compartment should be isolated from each other internally. Also, the locking arrangement shall be such that the transformer chamber door cannot be opened when HT is energized. Minimum two Nos. lifting arrangements shall be provided on both sides of transformer chamber.

There shall be an arrangement for internal lighting activated by associated switch on doors for HV, Transformer and LV compartments separately. Heater with thermostat shall be provided in LV compartment along with Hooter. Suitable arrangement for lifting of Package type substation shall be provided.

Ventilation aperture shall be as per Class K10 and the sub-station shall be Type tested for Internal Arc Withstand test as per IEC. The Bidder shall provide provision for remote monitoring of the status of RMU, Fault passage indicator, LT ACB & MCCB's, Transformer OTI. Necessary type test certificates shall be enclosed.

6. Earthing

All non-current carrying parts of the sub-station shall be earthed to a common earth conductor at two points with 50mmX6mm GI strip running all long the periphery of the Package sub-station. Four nos. earthing terminals/studs shall be provided on the enclosure at each corner positions which shall be internally connected to the common earth conductor/strip provided for the entire sub-station. The diameter of the stud shall be at least 12mm and shall be able to connect and terminate the external earth conductor.

The connecting point shall be marked with the "Protective earth" symbol as per IEC. Separate earthing conductor/strip shall be provided for transformer Neutral and the same shall be insulated black colour codes with heat shrinkable PVC Sleeves from the body earth and suitably brought out from the enclosure for connecting to external system earth. All hinge doors shall be earthed to the enclosure with green color copper flexible wire of size 2.5 sq mm (min).

7. Paint

All paint shall be applied on clean, dry surfaces under suitable atmospheric conditions by seven tank process and powder coating. The paint shall not scale off or crinkle or be removed by abrasion during normal handling. The enclosure for the sub-station shall be painted with shade as above. Sufficient quantity of touch-up paint shall be furnished for application at site.

8. Galvanizing:

The galvanizing shall be carried out by the hot dip process in accordance with IS 2629/ ISO 1460 amended to date. However, high tensile steel nuts, bolts & spring washers shall be electro- galvanized to service condition. The zinc coating shall be smooth, continuous and uniform. It shall be free from acid spots and shall not scale, blister or removable by handling or packing. There shall be no impurity in the zinc or additives to galvanic bath, which could have a detrimental effect on the durability of the zinc coating.

After galvanizing no drilling or welding shall be performed on the galvanized parts of the equipment except that nuts may be threaded after galvanizing.

To avoid the formation of white rust, galvanized material shall be stacked during transport and stored in such a manner as to permit adequate ventilation. Sodium dichromate treatment shall be provided to avoid formation of white rust after hot dip galvanization. The galvanized steel shall be subject to tests as per IS 2633/ BS 729 amended to date.

9. LV Compartment

The complete arrangement of ACB, MCCB and APFC with Thyristor switch and Capacitors shall be provided on a framework of channels with adequate strength to support the weight of the ACB, MCCB, Capacitors and Reactors. The Framework shall be covered from the front with GI sheet of thickness not less than 2 mm. such that no live part is accessible at any time during the operation or testing period. All mechanism shall be made of such material as to prevent corrosion due to sticking of dust. Cast iron shall not be used for any part of the equipment which may be subjected to mechanical stresses. All connections and contacts shall be of ample section and surfaces for carrying continuously the specified current without undue heating and shall be secured rigidly & locked in position.

All apparatus shall be so designed and constructed as to obviate the risks or short circuits of the live parts by lizards / rodents. Corresponding parts of similar apparatus shall be mutually interchangeable. All apparatus, connections and cabling shall be designed / arranged to minimize risks of fire and any damage which might cause in the event of fire.

10. Detailed Specifications of APFC:

APFC shall be integral part of the Compact Substation unit. This shall be installed in the Compact Substation as indicated in the SLD.

i. The 8 Stage Automatic Power Factor Controller shall maintain the lagging and leading KVArh within limit while maintaining the power factor above 0.9. It shall have 3CT's operated suitable to switch Thyristor at zero crossing. The SLD indicates the total capacitor required to be connected to maintain the p.f. to above 0.9. Steps shall be decided so as to maintain the KVArh within limit as mentioned above.

ii. The APFC panel shall be provided with Auto and Manual options. Capacitors shall be switched automatically to maintain the p.f. as per the set point based on the actual load conditions and required KVAr to be compensated. Manual operations shall be operated using the local PBs for each of the capacitor feeders. Auto and Manual selection shall be through 3 position selector switch.

iii. 3nos. of CTs provided shall be installed in such a manner that in case of replacement it should be easy. CTs shall be resin cast with provisions of shorting terminals.

iv. APFC shall display the following parameter –
   a. 3phase current and voltage
   b. PF display - 3digit decimal
   c. Communication capable – RS485 Protocol
   d. Display of Harmonics up to 31st order

v. The capacitors shall be connected in series with a 7% detuned reactor.

vi. The Capacitor shall be rated at UN=480VAC.

vii. The following shall be applicable –
   a. Qc - Reactive power of the Capacitor at Uc
   b. Qn - Reactive power of the Capacitor at Un
   c. Qn=1.34Qc
   d. Detailed Calculations shall be submitted for reference.

viii. The capacitors shall be switched using a heavy duty Thyristor Switch as per approved make.

ix. The Thyristor Switch shall be protected using Super-fast HRC fuses mounted on suitable base. Provision of Isolation for Maintenance is required. MCCB shall be used for the purpose of the isolation.

x. Suitable Discharge reactors shall be used.

xi. The following IEC shall be complied –
   a. IEC60831: Shunt power capacitors of the self-healing type for ac systems having rated voltage up-to 1KV
   b. IEC60076-6: REACTORS
   c. IEC60947: LV SWITCHGEAR
   d. IEC60529: Degree of protection.

xii. The provision of 25KVAr fixed capacitor switched through a proper sized Power Contactor with all necessary protections shall be provided for the Transformer-fixed.

xiii. The above feeder shall be timer operated that shall be adjustable from 1sec to 1hour indicated in SLD.

xiv. The overall compensation required is **200KVAr** before the detuned filters.
xv. The NLL is >30 %
xvi. The capacitors thus provided should be heavy duty.
xvii. The reactor shall be Three phase, dry type, magnetic circuit impregnated with IP00, H class insulation, Inductance tolerance per phase +-5%, insulation level-1.1KV, Dielectric test between the windings and winding and earth - 4KV, 1min and thermal protection system brought out on the terminals for annunciation.
xviii. The thermal protection system shall be used to trip the respective circuit in case of alarm.
xix. The maximum permanent current (Imp) at a supply operating voltage (1.1xUs) shall be 1.2 times Is.
xx. The Capacitors shall be protected using MCCB with thermal setting of 1.31xIn and magnetic setting at 10 times of thermal.
xxi. The ambient temperature around the capacitors must not exceed 45 degrees centigrade over 24hours.
xxii. Sufficient gaps shall be maintained above the capacitors.
xxiii. The capacitor body shall be earthed at the bottom.
xxiv. Forced ventilation with extractor fans on the top of the cubicle roof shall be provided.
xxv. Heavy Duty cooling fans suitable to operate in continuous mode shall be used.
xxvi. The opening for the bottom air inlet shall be as low as possible and compatible with the IP rating.
xxvii. The gap between the modules and fans shall be more than 100mm.
xxviii. Proper de-rating shall be accounted for to ascertain the real air flow.
xxix. Detuned reactors shall be installed in a separate column specially reserved for the reactors.
xxx. Separate cooling fans based on heat dissipation shall be used for the DR column.
xxxi. Installation shall be Indoor.
xxxii. Bus Bar shall be copper for Main and Tapping's to Capacitor through protection switchgear shall be copper flexible / bus.
xxxiii. The cables shall be of minimum 1.5times the capacitor current rating.
xxxiv. The panel shall be type and routine tested before dispatch.
xxxv. The panel fabrication and the colour of the panel shall be followed as per the PCC specification mentioned in the specification of the PCC panel.
xxxvi. Main Bus shall be Aluminium that shall be sleeved with identification of the of phases.
xxxvii. Capacitors shall be Heavy duty APP type.
xxxviii. APFC panel at LV side of CSS consisting of Power capacitor, APFC relay, Reactor & Power contactors etc. shall be as per IS: 16636-2017 or IEC 61921-2017 as applicable.

11. Name Plate & Marking: -

Enclosure:

a) Manufacturer's Name
b) Rated Voltage
c) System Frequency
d) Rated Short time withstand current for 1sec
e) Rated Impulse withstand Voltage
f) Degree of Protection

g) Rated class of enclosure

12. Tests:

a. Pre- Despatch Inspection

Equipment shall be subject to inspection by a duly authorized representative of the RRI. Inspection may be made at any stage of manufacture at the option of the RRI and the equipment if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall always grant free access to the places of manufacture to the RRI's representatives when the work is in progress. Inspection by the EIC or its authorized representatives shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by the RRI.

b. Inspection after Receipt at Store:

The material received at the RRI's store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Pre – Despatch Section.

13. Warranty:

Bidder should stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the contract for the period of 2 years (**Comprehensive free)** from the date of installation and commissioning of HT & LT panels and CSS. Bidder shall be liable to undertake to replace/rectify such defects at his own costs within mutually agreed timeframe, and to the entire satisfaction of the RRI, failing which the recovery all such expenses plus the RRI's own charges from the Bidder or from the "Security /Performance Deposit" as the case may be. In case of CSS fails within the guarantee period the RRI will immediately inform the bidder who should take back the failed CSS within 15 days from the date of intimation at his own cost and replace / repair the box within forty-five days of date of intimation with a roll over guarantee.

14. Packing

Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit. The material used for packing shall be environmentally friendly.

15. Quality Control

The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The RRI's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.

a. Minimum Testing Facilities

Bidder shall have adequate in-house testing facilities for carrying out all routine tests, acceptance tests as per Indian /International standards.

16. Manufacturing Activities

The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order. Time being essence of the contract, the completion period mentioned earlier has to be honoured and should reflect in the bar chart.

17. Spares, Accessories and Tools

Bidder shall provide a list of recommended spares with quantity and unit prices for 5 years of operation after Commissioning. The EIC RRI may order all or any of the spare parts listed at the time of contract award and the spare parts so ordered shall be supplied as part of the definite works. The EIC may order additional spares at any time during the contract period at the rates stated in the Contract Document. The bidder shall provide one no. SF6 gas leak indicator & one no. phase comparator. The bidder shall also provide the required quantity of 11kV cable whenever the same is asked for by the EIC. A list of complete set of special tools and gauges required for erection & maintenance and installation procedure should be submitted.

Bidder shall give an assurance that spare parts and consumable items will continue to be available through the life of the equipment which shall be 25 years minimum. However, the RRI shall be given a minimum of 12 months' notice in the event that the Bidder or any sub-vendor plans to discontinue manufacture of any component used in this equipment.

Any spare apparatus, parts or tools shall be subject to the same specification, tests and conditions as similar material supplied under the Contract. They shall be strictly interchangeable and suitable for use in place of the corresponding parts supplied with the plant and must be suitably marked and numbered for identification.

18. Drawing and Documents:

Following drawings and documents shall be prepared based on TENDER specifications and statutory requirements and shall be submitted with the bid:

- Completely filled in Technical Particulars
- General description of the equipment and all components including brochures.
- Type test certificates

After the award of the contract, four (4) copies of following drawings, drawn to scale, describing the Equipment in detail shall be forwarded for approval.

Sl. No.	Description	For Approval	For Review	For Submission
1.	Technical Parameters	√		√
2.	General Arrangement drawings	√		√
3.	Power Flow Diagram	√		
4.	HV and LV Compartment layout	√		√
5.	Schematic diagrams	√		√
6.	Earthing plan	√		√
7.	Bill of Material	√		
8.	Foundation Plan & Loading details	√		√
9.	Installation Instructions	√		√
10.	Instruction for Use & Maintenance	√		√
11.	Transport/ Shipping dimension drawing	√		√
12.	QA & QC Plan	√		√
13.	Test Certificates	√		√

Bidder shall subsequently provide Four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy (Compact Disk CD) of all the drawing, GTP, Test certificates shall be submitted after the final approval of the same to TEC.

All the documents & drawings shall be in English language.

Instruction Manuals: Bidder shall furnish two softcopies (CD) and four (4) hard copies of nicely bound manuals (In English language) covering erection and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices.

II. Technical Specification for Dry Type Transformers

1. SCOPE

This specification covers design, material, construction, manufacture, inspection, testing, packing, forwarding, delivery at site and unloading of resin cast Dry Type Transformers with all accessories as described in this specification.

The SUPPLIER shall supply the transformers with following in accordance with the specification

Sl. No.	Name of the Description	Qty
1	800 KVA, 11kV / 433V, Dry type transformer.	1 no
2	Type Test Report of Temperature rise test on one transformer as per the specification	1 no
3	Type Test Report of Impulse test on 800KVA dry type transformer – impulse test on 3 limbs of HV side on one transformer as per the specification.	1 no
4	Essential spare items along with transformers as per the specification	1 Set
Test Reports of earlier sample Transformer is conducted through government approved agency shall be submitted.		

Essential spare parts mentioned above as described in clause no.4 of this specification shall be supplied by the SUPPLIER. Whether called for specifically or not, all accessories (Winding Temperature Indicator /Transformer Protection Relay, Temperature Sensors) required for normal operation of equipment are deemed to be considered as a part of the SUPPLIER's scope of supply. Other than embedment in concrete any hardware required for mounting and installation of the transformers are within the scope of work.

It is not the intent to specify completely herein, all details of design and construction of the equipment. However, the equipment shall conform in all respects to high standard of engineering, design and workmanship and be capable of performing in continuous commercial operation up to the SUPPLIER's guarantees in a manner acceptable to the TEC, who will interpret the meaning of the drawings and specifications and shall be entitled to reject any work or material which is not in full accordance there with.

2. Applicable Codes, Standards and Specifications: -

The design, material, construction, manufacture, inspection, testing and performance of dry type transformers and associated equipment / accessories shall comply with all currently applicable Indian Standard (IS), regulations and safety codes in the locality where the equipment will be installed. Nothing in this

specification shall be construed to relieve the SUPPLIER of his responsibility. Where no standards are available, the supply items shall be of good quality and workmanship and backed by test results. Any supply items which are bought out by the SUPPLIER shall be procured from approved MANUFACTURER acceptable to the RRI TEC.

Equipment shall conform to the latest applicable standards and codes of practice as mentioned in this specification. In case of conflict between the standards, stringent specifications out of these standards shall govern, whereas in case of conflict between the standards and this specification, requirements of this specification shall govern**.**

Other national standards are acceptable, if they are established to be equivalent to or superior to the listed standards. The RRI and the SUPPLIER shall provide English version of standards and codes applicable. The Dry type transformers shall conform to the currently applicable standards and codes of practice and reports as listed below:

3. Technical specification of dry type transformers: -

Sl. No	**Description**	**Technical Parameters**
1.	**GENERAL**	
	Application/designation	Distribution transformer
	Service	Step down transformer
	Type	Dry type cast resin / two winding
	Installation	Indoor
	Degree of protection for transformers with enclosure as per IS:2147	IP-33
	Applicable Standards and codes	As listed Clause No.2 in Specification
2.	**RATINGS**	
	Rating	800 KVA
	Rated primary voltage	11000 V
	Rated no load secondary voltage	433 V
	No. of phases	3-phase on HV 3-phase with neutral on LV
	Frequency	50 Hz
	Vector group	Dyn 11
	Permissible tolerance on impedance	± 10%
	System fault current for 1 second duration	HV Wdg : 25 kA (rms) LV Wdg : 50 kA (rms)

	Type of cooling	Natural air cooling (AN)
3.	**SYSTEM VOLTAGE**	
	Nominal system voltage	11000 V
	Highest system voltage	12 kV for 11 kV winding 1.1 kV for 433 V winding.
4.	**NEUTRAL EARTHING**	
	Transformer neutral earthing	LV Winding: Effectively earthed Note: -1) Additional neutral bushing shall be provided for neutral earthing. Note: - 2) Neutral CT Shall be provided for REF Protection. CT Details shall be finalized during drawing approval stage.
5.	**INSULATION WITHSTAND VOLTAGE**	
	Impulse (1.2/50 μ-sec. wave)	HV Winding: 75 kV peak for 11 kV winding
	One minute power frequency	HV Winding: 28 kV for 11 kV winding LV Winding: 3.0 kV
	Class of Insulation	F class
6.	**TEMPERATURE**	
	Reference Ambient Temperature (Design)	45°C
	Temperature rise by winding resistance at lowest tap (Max)	90°C
	Temperature on enclosure by thermometer (Max)	50°C
7.	**Noise level**	
	Permissible noise level (Max)	73 dB
8.	**TAP CHANGING LINKS**	
	Taps required	Off-circuit full MVA rating at each tap
	Type	Bolted link (Tinned copper links)
	Tappings on windings	HV
	Total tapping range	±7. 5%
	Steps	2.5%
	Parallel Operation	Momentary with similar transformer.
9.	**BUSHINGS/SUPPORT**	
	Voltage class	HV line end - 11kV LV line end / LV neutral - 1.1kV

	Impulse (1.2/50 μ-sec. wave)	HV Winding : 75 kV peak
	One minute power frequency	HV Winding : 28 kV LV Winding / LV neutral : 3.0 kV
	Minimum creepage distance	25 mm / kV
10.	**SURGE DIVERTER**	3 nos. of Polymeric Zinc Oxide surge Arrestors, Make: TYCO / Oblum, (10 kV , 10 kA , line discharge Class-2)
11.	**MINIMUM CLEARANCE IN AIR**	
	HV phase to phase	230 mm
	HV phase to earth	180 mm
	LV phase to phase	25.4 mm
	LV phase to earth	25.4 mm
12.	**TERMINAL CONNECTIONS**	
	HV line end terminal with HT cable box	Suitable for terminating 11 kV x 3Cx 240sq.mm, Aluminum XLPE insulated armored earthed grade cables.
	LV line end terminal	Suitable for 300sq.mmX3.5c Aluminum multi run cables.
	Neutral earthing	Provisions so that either - Two no's of 185 sq mm OR copper earth Conductor / 2 nos. of 50x6mm Copper strip shall be suitably terminated
	Colour finish shade of enclosure Interior/ exterior Cable/bus entry (bottom/Top side)	Glossy finished RAL 7038 Bottom for HT Cables/Side for LT bus duct
13.	**ENCLOSURE**	
	Details of enclosure material and thickness	As mentioned earlier
14.	Orientation of HT and LT termination Compartments.	Inline preferred

4. List of Essential Spares to be supplied

	Description	Quantity
i.	HV Bushing with metal part	2 Nos.
ii.	Support Insulators for Terminal	2Set
iii.	winding temperature Indicator	1Set

5. SPECIFICATION OF MAIN EQUIPMENT AND ACCESSORIES: -

This section covers the brief specifications and parameters of dry type transformers. The transformers shall be dry type with cast resin two winding, three phase, 50 Hz, indoor type, connected in Dyn11 with off circuit tap ranging from +5% to -5% in steps of 2.5%. HV side termination shall be designed for connecting copper bus as mentioned earlier in the enclosure specifications of CSS. LT side terminations shall be suitably designed for connecting to switchgear (PCC) by means of the direct connection (side connectivity) to the 1250A Copper bus. The neutral of the star connected winding shall be brought out in separate bushing terminal. The Neutral earth conductor shall be connected to this point as mentioned in table above. The HV and LV bus bars/terminals shall be sleeved with suitable system voltage levels and if necessary, where ever joints/tap off/terminations shall be provided with button type flexible shrouds. Technical parameters for the transformers and accessories are indicated in data sheets enclosed under this section.

6. General Constructional Features: -

All material used shall be of best quality and of the class most suitable for working under the conditions specified and shall withstand the variations of temperature and atmospheric conditions, overloads, over excitation, short circuits as per specified standards, without distortion or deterioration or the setting-up of undue stresses in any part and also without affecting the strength and suitability of the various parts of the work which they have to perform. Transformer shall be provided with suitable enclosure / cubicle. It shall be possible to withdraw the transformer from the enclosure after disconnecting the terminations without disturbing bus bars and cables. All transformers supplied for system shall be identical. Further similar parts, particularly removable ones, shall be interchangeable. Nuts, bolts and pins used inside the transformer shall be provided with lock washers or locknuts.

6.1 CORE: -

a. The magnetic circuit shall be constructed from high grade cold-rolled non-ageing grain oriented low loss silicon steel laminations and shall be of 'Core' type. The core shall be painted with suitable resin to protect it against corrosion and other parts shall be hot dip galvanised. The lamination shall be free of all burrs and sharp projections. The lamination Grade shall be laser etched type and shall be subject to the TEC approval.

b. The core shall be of Boltless type.

c. All steel sections used for supporting the core shall be non-magnetic. They shall be thoroughly shot or sand blasted, after cutting, drilling and welding.

d. The design of the magnetic circuit shall be such as to avoid static discharges, development of short circuit paths within itself or to the earthed clamping structure and production of flux component at right angles to the plane of laminations which may cause local heating.

e. The finally assembled core with all the clamping structures shall be free from deformation and shall not vibrate during operation.

f. The core clamping structure shall be designed to minimize eddy current loss and bolts shall not pass through the lamination for any purpose whatsoever. Fibre glass or equivalent tapes of adequate strength shall be used for clamping the core through an approved procedure.

g. The core shall be provided with lugs suitable for lifting the complete core and coil assembly.

h. The transformer core should be equipped with minimum of 15mm thickness cooling duct.

6.2. Windings: -

a. Windings shall be of Electrolytic Copper Conductors (circular in shape) of high conductivity and 99.9% purity as per the IS. The conductors shall be transposed at intervals in order to minimize eddy currents and equalize the distribution of currents and temperatures along the windings. The insulation class for the windings shall be at least Class-F having high tensile and dielectric strength. Low voltage windings shall be of foil type. High voltage windings can be cross over coils or disc type coils separated from each other by keyed radial spacers.

b. Both HV and LV windings of one phase shall be separately cast on one rigid tubular coil co- axially arranged with no mechanical connection between their arrangements. The completed coil assembly shall be cast under vacuum into moulds, which forms the Insulation System. The coil shall be casted in epoxy resin with a fibre glass or super enamel covering on the conductor to form a compact tubular spool for achieving high mechanical strength. Cooling ducts should be provided on LV and HV winding. HV winding cooling duct should be formed not more than 4 segments per layer to utilize more area for cooling.

c. The resin used for winding insulation shall be non- hygroscopic to prevent the penetration of moisture into windings. It should be possible to energize the transformer without pre-drying even after a long period of service interruption. The resin used shall be self-extinguishing and void free and shall be suitable for tropical climate and 100% air humidity.

d. The transformer shall be free of partial discharges at least up to 1.2 times of the rated voltage and shall be able to withstand short circuits as well as switching and atmospheric impulse voltages as specified.

6.3. Temperature sensors: -

Two nos. sensing elements (RTDs) shall be provided in each phase. The RTDs shall be embedded at the hottest spot. The type of RTD shall be simplex and the material shall be platinum.

6.4. Core and Coil Assembly: -

The cast coils are inserted on to the core limbs. The resin cast spacer blocks, end blocks and separators are used as required. The end frames are then assembled.

6.5Earthing:

This section covers the earthing requirement of CSS. Copper plate earthing as per standard dimension shall be provided for Neutral Grounding, The GI strip earthing shall provide for body earthing. The generating set and all associated equipment's control and switch gear and switch gear panels must be earthed before the set is put into operation.

6.5 (a) Copper Plate Earthing (for Neutral Earthing):

Providing standard plate earth for earth station with 600x600x3.15mm electrolytic tinned copper plate at 3.0 Meter depth, conforming to IS:3043 & NBC2016 with latest amendments including excavation and refilling of earth and supply of all materials and providing chamber with necessary civil works using good quality bricks, sand etc. with a cover plate made of GI for the chamber with all necessary materials complete as required.

6.5 (b) Body Earthing:

Providing earth station consisting of 1 no. of copper coated earth rod 20mm Dia, 3.0 mtr long STD. with universal clamp made of Stainless steel (SS) to connect flat conductor with earth rod. The earth rod shall be copper bonded low carbon steel electrode with copper coating 250 microns, with earth enhancing compound & Tested as per IEC 62561 - 2, meets the requirements of IS: 3043 and IEC 60364-5-54, tested for short circuit current withstanding capacity and all other materials and tools required for excavation of earth hard/ soft soil and driving the rod in ground and other associated civil work, including with a cover plate made of GI for the chamber with all necessary materials complete as required as per the approved make list.

All internal metal parts of the transformers shall be earthed at one point only. The magnetic circuit shall be connected to the clamping structure at one point only. The frame work and clamping arrangements of core and coil shall be securely earthed by copper strip connection to the main frame and enclosure. Two earthing terminals shall be provided on the frame for external earthing. The terminals shall be suitable for the earthing conductor of size indicated in the Technical Specification.

6.6. Terminations:

a. The HV side termination facility to be provided on transformer shall be suitable to match the outgoing of the HT Breaker.

b. Phase to phase and phase to ground clearances within the enclosure shall be such as to enable either the transformer or cable to be subjected separately to HV tests. Minimum clearances shall be as specified in datasheets.

c. The Bus-bars shall be sleeved with respective voltage insulation levels.

d. The bottom of HT cable box shall be 1 meter from the enclosure bottom plate. The height of HT connectors shall be 750 mm from gland plate.

e. Cable supports shall be provided from enclosure bottom to cable box. Support arrangement will be approved during drawings approval stage.

f. Tinned Copper flat of size 50 x 6 mm shall be provided at bottom of cable box for terminating cable armoured earthing.

g. One neutral bushing shall be provided to facilitate leading the earth conductor down to the ground level. The terminal shall be suitable for connecting to two separate earthing pads. Suitable arrangements shall be supplied by the SUPPLIER for connecting the earthing conductors as mentioned in the Specification

6.7. Bushings / Support Insulators: -

a. Bushings/Support Insulators shall be designed and tested to comply with the applicable standards.

b. Bushings shall have non- ferrous and non-magnetic flanges and hardware Fittings made of steel or malleable iron shall be galvanized.

c. All bushings/support insulators shall be supplied with terminal connector clamp suitable for supporting the bushing terminal

d. Minimum air clearance and minimum creepage distances shall be as per datasheet.

e. Bushing/support insulators material shall be porcelain.

6.8. Winding Temperature Indicators/Transformer Protection Relay with Healthiness:

a. A device for measuring the hot spot temperature of the winding shall be provided. Winding temperature indicators consisting of temperature sensing elements. The no. of sensing elements shall be provided as indicated in SectionD1.

b. Local indicating instrument with four adjustable electrically independent ungrounded contacts brought out to separate terminals for winding temperature high alarm and trip. One indicating instrument shall be provided for each phase. Contacts shall be suitable for 110V DC rated minimum 0.5A. Instrument shall be suitable for 110V D.C auxiliary power supply if required.

c. A temperature scanner shall be provided for taking inputs from RTDs in all the phases. This scanner shall have an accuracy of ±1%. RTD / Scanner output shall be suitable for connection to SCADA inputs.

6.9 Marshalling Box:

a. The SUPPLIER shall provide a 1 no marshalling box and shall mount the 2 no winding temperature indicators in the marshalling box and shall marshal to it all the contacts/and winding temperature indicators required for the transformer. i.e. 3nos of sensor probes of each phase should connect to first temperature indicators and remaining three will be connected to send other temperature indicators.

b. The SUPPLIER shall provide the interconnection cabling between the above equipment and the marshalling box. The winding temperature indicator shall be mounted in the marshalling box. The marshalling box shall have viewing window for temperature indicator. This interconnection shall be through wires in GI conduits or through armoured cables. The insulation for the wires/cables shall be consistent with the ambient temperature in the housing. Compression type brass cable glands required for these interconnections shall be supplied by the SUPPLIER

c. The marshalling box shall be mounted on the transformer housing. All doors, covers and plates shall be provided with neoprene gaskets. Bottom of the marshalling box shall be at least 600 mm above floor level and provided with removable bolted, undrilled gland plate.

d. All contacts for alarm. Trip and indication circuits shall be electrically free, wired for auxiliary D.C. supply as specified and brought out to separate terminals at the terminal blocks in the marshalling box. Terminal blocks shall be preferably of GE Power Controls/Elmex. Terminals shall be rated for 10A. Wiring shall be with PVC insulated, stranded, copper conductors of sizes not smaller than 2.5 sq.mm for control with ring type lugs. Engraved identification ferrules, marked to correspond with the approved wiring diagrams shall be fitted to each wire. Ferrules shall be of yellow colour with black lettering. Local and Cross ferruling shall be provided.

6.10 Enclosure for Transformers: -

a. The core and coil assembly shall be enclosed on the four sides and as well as on the top by a sheet metal enclosure. The purpose of having the enclosure is to provide safety from live parts and prevent ingress of dust, vermin and rodents. Sufficient louvers may be provided on the side enclosure for cooling purposes.

The louvres should be covered with stainless steel wire mesh having holes that shall meet IP 33 protection. The enclosure should have structural steel frame work with lockable hinged door on front and back of the transformer. Width of the back door shall be restricted to one metre. The doors shall be provided to facilitate the inspection of the transformers. Door should be gasketed.

b. The enclosure frame shall be fabricated using suitable mild steel structural sections or pressed and shaped sheet steel of thickness not less than 2.5 mm for hot rolled or 2 mm for cold rolled.

c. Frames shall be enclosed by sheet steel of thickness not less than 2 mm for hot rolled, levelled and free from flaws. Doors and covers shall be made of sheet steel of thickness not less than 2 mm for hot rolled. Stiffeners shall be provided wherever necessary.

d. All panel edges and door edges shall be reinforced against distortion by rolling, bending or by the addition of welded reinforcement members.

e. The complete structure shall be rigid, self-supporting, free from vibration, twists and bends and shall be suitable for connecting ventilation hood on the top. At the top of enclosure flanged throat connection, suitably drilled with gasket shall be provided for connection with ventilation duct. Size will be furnished at drawing approval stage. A wire mesh shall be provided on the top of the enclosure where ventilation hood is to be connected. The type of wire mesh shall be stainless steel.

f. The enclosure shall be provided with a degree of protection not less than IP: 33 as per IS: 2147 with cooling fans.

g. The enclosure shall be provided with a metal sill frame made of structural steel channel section properly drilled for mounting the enclosure with the transformer along with necessary mounting hardware.

h. The SUPPLIER shall ensure the arrangement and orientation of the LV and HV terminals, bus bars and cable termination such that whenever required, it shall be possible to draw out the transformer without disturbing either the bus bars or the cables.

i. A door switch with 2NO+2NC auxiliary contacts shall be provided. It will be used for providing interlock in the HV breaker circuit. Also, Enclosure door shall be provided with Castle Lock & Key arrangement. This interlock ensures that transformer enclosure door shall be opened only when respective feeder breaker in OFF condition.

6.11. Painting:

Sheet metal shall be treated with 7 tank process before painting. Paint shall be made on the enclosure with Glossy finished RAL7038.

7. Performance Requirements: -

a. Transformers shall operate without injurious heating at the rated kVA at any voltage within
b. ±10% of the rated voltage of that particular tap.
c. Transformers shall be designed for 110% continuous over fluxing withstand capability.
d. The continuous and short time over loading capacities shall be furnished in detail. Overloads shall be allowed within the conditions defined in the loading guide of the applicable standard. Terminal bushings, tap changers or any other auxiliary equipment shall not limit such over loading.
e. The neutral terminal of windings with star connection shall be designed for the highest over current that can flow through this winding.
f. Every care shall be taken to ensure that the design and manufacture of the transformers shall be such as to reduce noise and vibration to the level obtained in good modern practice. The SUPPLIER shall ensure that the noise level of the transformer, with its enclosure in position does not exceed 73 dB when measured in accordance withIEC-551.
g. The transformer shall deliver full power at all tappings.
h. The transformer is intended to operate in parallel with the standby transformer for a short period. The transformer shall be designed accordingly.
i. The transformers shall be designed such that when mounted inside its enclosure, it shall be capable of delivering its rated output with temperature rise within limits specified with natural air cooling and at an ambient temperature of 45°C outside the transformer cubicle. All other performance requirements as called for in this specification and as per the relevant standards and codes shall also be met with the conditions specified above.

8. Fittings and Accessories:

Following fittings shall be provided,

a. Terminals complete suitable for the RRI's external conductors as specified.
b. Rating and terminal marking plates.
c. Two earthing terminals, for earthing the body of the transformers and its enclosure (sizes of earthing conductor will be furnished to successful Bidder).
d. Lifting lugs for lifting complete transformer (core and coil assembly) and separately for enclosure.
e. Jacking pads (Transformers weighing above 3000Kg.)
f. The base provided with channels etc.
g. Four bi-directional flat tread rollers in base frame with stopper arrangement to lock the transformer in the required position either from the wheel or from the base frame.

9. Tap Changing Arrangement: -

Off circuit tap changing links (With tinned copper links) shall be provided with total tapping range of ±5% insteps of 2.5% each at HV side.

10. Losses: -

The losses shall comply to the ECBC Standards with latest amendment guidelines/regulations.

11. Acceptance criterion as per the IS standards:

RRI will accept the transformer meeting with the following criteria:

a) No load loss and Load loss should not exceed the guaranteed value as mentioned by IS.
b) Impedance value should not differ the guaranteed value by ±10% or more.
c) Winding temperature rise should not exceed the specified value of 90 °C.
d) Transformer should not fail on impulse test
e) Transformer should not fail on partial discharge test.
f) Transformer should not fail on power frequency voltage withstand test or induced over voltage test.
g) All the bought-out item certificates will be verified and test results shall not be varied as per respective standards.

12. INSPECTION AND TESTING:

Inspected before dispatch: All routine tests shall be carried out on all equipment as per latest IS and IEC standards in the presence of RRI's representative.

The routine tests to be carried out by the SUPPLIER shall include but not be limited to the following:

1.	**ROUTINE TEST** a) Measurement of winding resistance for all windings at all taps. b) Measurement of voltage ratio at all taps and check of vector group relationship. c) Measurement of impedance voltage at all taps /short circuit impedance and load loss at all taps.	To be witnessed by Engineers at factory

	d) Measurement of no-load loss and current at 90% 100% and 110% rated voltage and at rated frequency e) Measurement of insulation resistance and polarization index f) 2 kV power frequency withstand test (for one minute) on control wiring. g) Dielectric tests shall do with enclosure: • Separate source voltage withstands test (High Voltage test) • Induced over voltage withstand test. h) Insulation power loss factor and capacitance for each winding and between windings	
2.	**TYPE TEST**	Type test certificates to be furnished in Techno-commercial bid

12.1. Test Certificates: - All routine and type test certificates including test records, performance curves, etc. shall be supplied according to the distribution schedule. All the tests shall be carried out in accordance with the provisions of this contract.

12.2. TEST AT SITES:

In addition to tests at manufacturer's premises all relevant pre-commissioning checks and tests conforming to IS code 10028 shall be carried out at site before energizing. Following tests are to be particularly done before cable jointing or connecting the bus bar trunking.

1. Insulation test between HV to earth and HV to LT.
2. Insulation test between LT to earth.
3. All test results are to be recorded and reports should be submitted.

All devises shall be checked for satisfactory operation.

12.3. Material Tests: -

In the event of the EIC or his representative being supplied with the particulars of tests which have been carried out for the SUPPLIER by the suppliers of material, he may, at his own discretion, accept the same as proper evidence of compliance with the requirements of appropriate specifications for the materials.

In case the correlating test certificates are not available the SUPPLIER, at no extra cost to the RRI will get all the tests done to establish conformity of the material to its relevant code/specification.

12.4. Tests at Manufacturer's Works: -

General: -

The tests at Works shall include electrical, mechanical and hydraulic tests in accordance with the appropriate clauses of Statutory Regulation, relevant Codes and Standards and in addition any test called for by the EIC or his representative to ensure that the equipment being supplied fulfils the requirements of the specification. The SUPPLIER shall carry out all the shop tests and inspections specified in the following clauses in addition to those normally carried out by him. For equipment not covered by any code or specifically mentioned in this specification, the tests are to be agreed with the TEC. If considered necessary by the EIC or his representative, multipart assemblies shall be fully erected and tested in the works prior to packing and dispatch to the site.

12.5. Test Certificates: -

All routine and type test certificates including test records, performance curves, etc. shall be supplied according to the distribution schedule. All the tests shall be carried out in accordance with the provisions of this contract.

13. Installation of CSS

The Contractor shall maintain the floor level to erect the compact substation. It involves design, fabrication, installation work and civil work including required materials, accessories and labour charge shall be borne by the contractor. Suggestions from the vendor to prepare the civil foundation drawings and submitting to the RRI office for approval before execution shall be followed.

III. Technical Specifications for Low Voltage Switchgear Panel

This specification intends to cover the technical requirements for design, engineering, manufacture, assembling, inspection and testing (as per latest Edition of IEC 61439-1&2) at manufacturer's works, packaging, transporting to site, unloading and installation inside the LT panel room as per the SLD. To avoid any misinterpretation of indent specification, bidders are advised to attend the pre bid meeting.

1. Scope:

The scope includes the jobs to be performed for all equipment and materials furnished under this specification. The scope is however not limited to the items detailed below: as minor details may not reflect, however are deemed to be included in the Quote for successful completion.

- Design, manufacture, testing at manufacturers works packing, dispatch, and installation of LT panel.
- Transportation to site and insurance.
- Receiving at site, unloading, handling, opening, inspecting, reporting and submitting claims in case of damages and short supply items.
- Arranging to repair/re-ordering all damaged and short supply items.

2.1. GENERAL CONDITIONS FOR TENDERING

Please refer to the commercial bidding document for complementary information.

a. The Firm shall be original manufacturers of LT panel as per the IS/IEC 61439-1: 2011 with latest amendments.

Or

b. The firm shall be authorized system integrator / licensed partner of original manufacturers of Panel as per the IS/IEC 61439-1: 2011 with latest amendments

c. The bidder shall have adequate experience (at least 5 years) in manufacturing of LV/MV/HV switchgear and control gear assemblies also the firm shall have in-house Pre-7-Tank processing and powder coating facility

d. The system integrator valid certificate shall be submitted along with pre tested design verification reports of LT panels of suitable shall be submitted before clarifying the GA drawing of LT panel board.

2.2. Deviations from Technical Specification

The technical evaluation committee at their discretion will decide regarding acceptance of deviation looking to standard and project requirement.

2.2.1. **Factory Access**

RRI, BENGALURU and its representative shall have free access during normal working hours to the manufacturing or testing sites, including any subcontractor's premises, during the contract period.

a) The inspection may be carried out by the RRI TEC at any stage of manufacture. The successful bidder shall grant free access to the RRI's representative at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this specification by the RRI shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications and shall not prevent subsequent rejection if the equipment is found to be defective.

b) The supplier shall keep the EIC informed well in advance, about the manufacturing programme so that the arrangement can be made for inspection.

c) No equipment's shall be dispatched before all tests and inspection have been carried out unless otherwise instructed by the EIC.

2.3. Vendor Evaluation criteria:

a) The manufacturer shall submit complete Type test report **as per IEC 61439 – Part 1&2,** conducted on similar LV switchgear and control gear assemblies at CPRI/ERDA/other government accredited laboratory, not older than FIVE (5) years from the date of opening of technical bid. The test certificates shall consist of all relevant tests done as per standard for the particular ratings of the breaker.

b) Compliance Report for Internal arc test as per IEC 61641 shall be submitted.

c) Compliance to Seismic Qualification as per IEC 60068-3-3/ IS-1893 Compliance report for panels designed for Zone-III of seismic qualification as per IEC 60068-3-3/ IS-1893 shall be submitted.

d) The manufacturer shall have ISO 9001 & 14001 certification for quality management system and environmental management system.

e) Details of all the fabrication, assembly & manufacturing facility at the factory shall be submitted.

f) Details of all testing facilities available at the factory shall be submitted.

g) The vendor shall agree to carry out busbar 3rd party lab test to confirm its purity. Samples will be selected randomly from the finished lot of products. If applicable. This will be applicable wherever copper bus is used.

h) Heat load calculation and provisions done in the panel to address this so that temperature rise is within specified limits of the standards.

i) Detailed calculation of the bus-bar size for both the panel shall be submitted.

j) Inhouse seven tank process facility & powder coating facility at factory premisses.

2. Quality Assurance Plan

The bidder shall invariably furnish along with his offer the quality assurance plan adopted for sub-supplies in the process of manufacturing all major equipment/component. Precaution taken for ensuring usage of quality raw materials and subcomponents shall be stated in the quality assurance plan. This specification of all switchgears with complete assembly as specified hereinafter with all accessories/auxiliary equipment as per latest editions of **IEC 61439-1&2.**

3. Constructional Features

3.1. Circuit Breaker Specifications (common for Panel-I & II breakers)

a) The circuit breaker shall confirm to the latest amendments of IS: 13947 / IEC-60947-1 &2- 2003, and shall comply EC directives "Electromagnetic Compatibility Directive" (EMC) N.89/336 EEC.
b) All Circuit Breaker shall be suitable for operation, at 50 Hz +/- 5%, and 415V +/- 10% AC voltage with adequate thermal capacity for continuous operation in the enclosure.
c) The Circuit breaker shall be air break type, 3 Pole (4-Pole type for panel-II, Incomer), electrically operated, draw out type(EOD)
d) Main contacts shall have ample area and contacts pressure for carrying the rated current and the short time rated tripping current of the breakers without excessive temperature rise which may cause pitting or welding.
e) Contacts shall have a minimum of moveable parts. It shall be designed such that no maintenance shall be required under normal condition of use. The contacts shall be replace- able.
f) The temperature rise and maximum temperature on any part of the circuit breaker, while in service under continuous full load conditions shall not exceed the permissible limits of temperature rise as specified in the IEC- 694:1996 publication for alternating current circuit breakers.
g) All MS parts of breakers and ferrous parts such as hangers, supports, bolts & nuts shall be hot dip galvanized as per IS:2629(latest edition) with zinc platting & olive green passivation. The material for spring shall be rustproof.
h) All circuit breakers and their drawings shall have phase indications as R-Red, Y-Yellow and B-Blue or equivalent.
i) All circuit breakers shall be electrically and mechanically trip free in TEST and SERVICE positions with built in anti-pumping feature.
j) The circuit breaker shall be provided with mechanical arc chutes, which shall be removable at site and magnetic, blow outer control device designed to permit rapid dispersion, cooling and extinction of arc.
k) Access to control circuit of circuit breaker shall be from front side.

l) Shunt trip coil and closing coil suitable for operation on 110 volts D.C. The closing coils and tripping coils and other auxiliary devices shall operate satisfactorily at all voltage between 80% and 110% of the rated voltage.
m) The operating mechanism of the breaker shall be stored energy type, operated using pre- charged springs. The springs shall have manual charging mechanism by operating the front lever and electrically using inbuilt geared motor. The spring charging mechanism motor shall be rated for operation on 240 volts A.C.
n) Suitable mechanical indication for service, test and isolated positions should be provided.
o) LED type Red, green, amber and white lamps shall be used to indicate breaker 'close, 'open', 'trip circuit healthy (for incomers)' and 'auto trip' respectively.
p) Mechanical indication for spring charged/discharged condition should be provided. Indicating lamps to be used in addition for spring charge/discharge.
q) Operating mechanism shall be operated by local / remote electrical control.
r) Main contacts must be made up of copper.
s) Potential Free Auxiliary contacts 2 NO + 2 NC or 2 CO shall be provided.
t) Following indications on each breaker shall be provided:

- Mechanical - Close/ open, spring charged/ discharged, service position/test position/ isolated position

- Electrical- ON, OFF, auto-trip, trip circuit healthy (for incomers), R-Y-B phase indication (for incomers).

3.2. The following extra feature (along with above) shall be incorporated in the controllers for the Incomer breakers of Panel-I & II:

a) Protection against phase unbalance, Neutral failure, Phase reversal.
b) Protection against under-voltage.
c) Protection against over-voltage.
d) Protection against reverse active power.
e) Restricted Earth Fault (REF) protection.
f) The controller shall have in built feature to measure display and record the following parameters:

- Current-Phase, neutral
- Voltage, Ph - Ph, Ph-Neutral
- Power (Active, reactive &Apparent)
- Power factor
- Frequency
- Fault wave form capture feature
- Energy

All these alarms shall be displayed on the annunciator (min-16 Window) which shall have the following facility –

- Alarm – Blinking
- Alarm – Acknowledge
- Alarm – Reset
- Hooks in case of alarm

4. Switchgear Cubicles (Common for Panel-I &II)

a) The switchgear shall be totally of enclosed type, dust and vermin proof. It shall compromise of rigid and welded structure frame enclosed completely be metal sheet of 3mm for load bearing members and 2mm for non-load bearing members. The switchgear shall confirm to IP-54 for ingress protection.

b) The panel partitioning shall be **Form 4b**, type-7 as per IEC-61439 i.e., all the individual sections shall be totally separated from each other. All the partitioning shall be by metallic means only. Non-metallic partition shall not be acceptable.

c) The LV switchgear shall comply to internal arc fault containment for 50kA for 1s in accordance to IEC 61641 without compromising on the panel IP levels.

d) The panel construction shall be suitable for Zone-III of seismic qualification as per IEC 60068-3-3.

e) All the Switchgears (ACBs) shall be provided with minimum IP20/finger proof protection i.e., when feeder doors are open, there should not be any live part visible / accessible. These shall be achieved through standard shrouds/metallic partitions FRP/Hylam sheets shall not be acceptable.

f) The steel sheet used in the fabrication of the switchgear housing shall be cold rolled thick & levelled and finished smooth in such a manner that the complete structure shall be rigid, self-supporting. All the steel panels enclosing a switchgear unit, hinged doors, partitions and removable panels shall be provided with stiffeners to minimize flexing and vibration.

g) Structures, buses and control wiring troughs shall be so designed and arranged as to make future extensions readily feasible.

h) Access to the circuit breaker operating mechanism shall be through compartment doors provided with hinges and key type locks. The arrangement shall prevent expose of any live parts or circuits. All compartment doors shall be so constructed that they will not seize in the event of fire within the switchgear.

i) Instruments shall be mounted on hinged type front doors. All doors shall have neoprene gaskets wherever required.

j) Panels shall be supported by strong hinges of concealed type and braced in such a manner as to ensure freedom from sagging, bending and general distortion of panel or hinged parts.

k) The layout of the component inside the module shall be liberal to facilitate maintenance and interconnecting wiring between the components shall not be subjected to any undue stresses at the bends.

l) All the live parts which are accessible after opening of front cover/cable alley

cover / back cover shall be properly insulated or provided with insulating barrier to prevent accidental contact. Removal facility shall be provided for all such parts.

m) Please note that self-threading screws shall not be used for panel fabrication. Suitable clamping arrangements shall be provided for cables and cable termination.

n) The Circuit Breaker shall be fully draw out type. Suitable guides shall be provided to facilitate easy withdrawal of the trolley.

o) All identical feeder compartments shall be interchangeable.

p) There shall be three positions for the draw out trolley; ·"Pull in "or" service" position-in this position both power and control circuits shall be connected. This shall be the normal operating position of the circuit breaker. · "Test" position - The power contacts shall be disconnected in this position but the control connections shall not be disturbed, it shall be possible to close and trip the breakers in this position. · "Full out" position - Both power and control circuits shall be disconnected in this position. It shall be possible to close the cubicle door in this position.

q) The Circuit Breaker shall be lockable in "Service", "Test" and "Full out" positions. The earth connection must remain connected at all the positions.

r) All inter panel/compartments openings for wiring buses or for any other purposes shall be used with PVC bushes so as to make each section vermin proof. The different materials used in the making of switchgear units, such as bus insulation, bus supports etc. shall not support combustion.

s) Panel-I comprises of two incomers. All the incomers shall have arrangements for receiving incoming power supply through sandwiched bus-ducts from top side (Supply of sandwiched bus-duct is not under the scope of the tender). Special arrangements may be made for installation of suitable flange ends at the top of the incomer panel to receive the bus bars.

t) All the compartments for panel-II and for all the outgoing feeders for panel-I, separate compartment totally enclosed from all sides shall be provided for cable termination, preferably on the rear side of circuit breakers. Access to cables shall be from the rear side after opening the cabling compartment door. **Arrangement for the racked-out trolley to replace shall be provided.**

5. Interlocks (Common for Panel-I &II)

5.1. Mechanical Interlocks for All Breakers

The following general mechanical interlocks shall be provided to ensure safety of personnel as well as to prevent damage.

a. Withdrawal or engagement of the circuit breaker shall not be made possible unless it is in open position. Any attempt of the withdrawal of the closed circuit-breaker shall not trip the breaker

b. Provision shall be made for automatic closing of shutters to prevent accidental contact with main stationary contact or other live parts, when

the breaker is drawn out. When the breaker is inserted back into its cubicle it shall automatically raise the shutters allowing the breaker to continue its travel until it finally engages the main stationary contacts.

c. Suitable guides, slides and stops for proper positioning of the truck or trolley with the breaker shall be provided to ensure easy removal, replacement and positioning of the breaker. Locking devices shall be provided on each circuit breaker for securely locking it in the 'Isolated' and 'Test' positions.

   i. It shall not be possible to operate the breaker unless it is fully in the latch-in position, draw- out position or test position.

   ii. Mechanical stopper shall be provided along the breaker sliding guides to prevent the toppling of the breaker by any means.

5.2. Electrical Interlocks

The following general electrical interlocks shall be provided to ensure safety of personnel as well as to prevent damage:

Panel-I

i. The circuit comprises of two incomers and one bus-coupler. The electrical interlocks should prevent the closing of two incomer breakers and the connecting bus-coupler breaker. This shall be selector switch operated.

ii. The interlock shall prevent the closing of an incomer if its adjoining outgoing feeder is being fed from another incomer through the bus-coupler.

Panel-II

i. The circuit comprises of two incomers, one from Utility and other from the Diesel Generator. Under no circumstance both, the incomer shall be ON. The electrical interlocks should prevent the closing of one incomer in case the other incomer is ON.

ii. Both the incomer breaker for Panel-II shall be 4-pole type only.

6. Main Bus-Bar (Common for Panel-I &II)

a) The bus-bars shall be for three phase and neutral. The main bus-bars and connections shall be made of high conducting **Aluminium** Bus.).
b) The horizontal bus-bars shall be insulated with heat shrinkable PVC sleeves of reputed make to protect against approach to live parts. The vertical bus-bars shall be sleeved or shrouded by barriers.
c) The bus-bars shall be amply sized to carry the rated continuous current under the specified ambient temperature without exceeding temperature limits specified in IS:8084. The thermal rating of the bus-bars shall be designed to with stand the system fault current for 1 second without exceeding the temperature limits.
d) The bus-bars shall be arranged and color coded according to IS:5578 / IS:11353.

e) The bus-bars shall be rigidly supported at equal intervals to with stand maximum short circuit stresses. The supports shall be of moulded construction with built – in anti-tracking barriers. The support materials shall be of DMC or fibre-glass reinforced thermo setting plastic.

f) A minimum of two bolts shall be used in bus-bar joints. Only high tensile electric galvanized bolts, nuts and washers shall be used.

g) All joints shall be suitably treated to avoid oxidation of contact surfaces and bimetallic corrosion and proper shrouds shall be provided for bus bar joints.

h) The Emergency DG Power Incomer feeders of proposed PCC panel shall have provision to terminate and connect LT sandwiched bus duct. The GA drawing with provision of connecting LT Sandwiched bus duct shall be submitted to EIC for further clearance & approval purpose.

i) The power to the emergency DG power incomer feeder shall be evacuated from the adjacent sync panel. The sync panel is the origin of the Sandwiched BBT. The sync panel and BBT is I nthe scope of the DG set vendor. GA drawings attached are indicative and for reference. Detailed drawings shall be submitted latter for fabrication. The detailed drawings shall be from the DG vendor.

j) **Bidder shall submit detailed calculation sheet for selection of bus bar size with details of de-rating factors taken into consideration due to ambient conditions, bus-bar positioning, heat dissipation factor, skin effect, proximity effect etc.**

6.1. Neutral Bus-Bar (Common for Panel-I &II)

a) For neutral bus-bar shall be made of made of same material as the phase bus. The size shall be half the size of the main conductor with suitable PVC shrinkable insulation. It shall be suitably braced / supported to withstand the mechanical stresses.

b) The neutral bus shall be insulated from other grounded parts in the panels.

6.2. Test Bus/Control Bus (Common for Panel-I &II)

Two-test bus of 8x4 mm copper as phase and neutral of 240 V test supply shall be provided. The test bus / control bus shall be used for control supply for illuminating local indication lamp and contactor operation etc. when the breaker is in service & test position.

6.3. Ground Bus (Common for Panel-I &II)

The ground bus shall be Aluminum, continuous throughout the switchgear cubicles and shall be bolted on each cubicle frame by means of hexagonal headed bolts and spring washers. Grounding terminals shall be provided at each end of the ground bus for able armoured grounding. Continuity shall be ensured. The non-current carrying metal parts of equipment shall be permanently grounded through the ground bus, which shall be easily accessible from both ends for connections to the station ground system.

7. Internal Wiring and Terminal blocks (Common for Panel-I &II)

a) Wiring shall be carried out with 1100V grade, FRLS-PVC insulated, wires.

b) Each terminal block shall be one piece moulded, barrier type, 650-volt grade, complete with washers, heads, studs with two nuts and identification strips and shall have adequate continuous current rating.

c) Each terminal shall have only one wire terminated on it. For tap-offs, adjacent terminals with shorting strips shall be used. **10% Spare terminal blocks shall be provided.**

d) Wire identification on marking strip shall correspond to the designation of the wiring diagrams. All wire terminals on the equipment shall also be marked with designation corresponding to those of the wiring diagram.

e) Wires shall be provided with printed numbered ferrules at both ends bearing the same numbers.

f) Proper color coding should be followed to differentiate between the CT, control and metering circuits.

g) The copper conductor used for internal wiring be as follows:

- All circuits except instrument transformer circuit of 1.5 Sq.mm FRLS Copper wire
- CT circuit - 2.5 Sq.mm FRLS Copper wire
- Energy metering circuit - 2.5 Sq.mm FRLS Copper wire

h) All auxiliary contacts whether spare or otherwise shall be wired and brought out to the terminal blocks. Wiring between components within switchgear cubicle shall be done through the terminal block only. Direct connection shall not be permitted.

i) Current transformer secondary leads shall be brought on to the terminal of the terminal blocks where facility for short circuiting and grounding of CT secondary shall be provided.

j) All wiring shall be enclosed in plastic channels and neatly bunched and cleated. Wiring between terminals of various devices shall be 'point to point' (no wire splitting or tee connections) with wires neatly trucked along the back of the panels, adequately supported to prevent sagging or damage due to vibration in transit and operation. Double pole M.C.B should be provided for control supply to each of the panels.

k) Provision of single gland plate in the cable alley shall be avoided. Multiple gland plates which can be opened at a later stage to terminate the new cables shall be possible.

8. Space Heaters (Common for Panel-I &II)

Switchgear enclosures shall be equipped with space heaters of adequate capacity to maintain the internal temperature above the dew point to prevent moisture condensation within the enclosure. Space heater shall be rated for 240 volts, single phase, 50 Hz A.C. supply. Differential thermostats shall automatically control the space heaters. ON/OFF and protection should be through adequate rating of MCB for each space heater.

9. Illumination (Common for Panel-I &II)

The control compartment shall be provided with 10W LED lamps, provided with MCB of suitable rating operating on 240 volts, 1phase 50 HzAC supply and 6A socket with switch to be wired in each compartment.

10. Power Cable Supports/Arrangement (Common for Panel-I &II)

All out going feeders of panel-I, and all Incomer/Outgoing feeders of Panel-II shall have arrangements for cable termination at the rear end of the panel. Cable entry shall be from bottom. The Suitable supports shall be provided in each switch gear cubicle for supporting the incoming and outgoing power cables. The gland plate shall be detachable type of nonmagnetic material. Panel-I, incomers (I/C-I, II & III) shall have arrangements for receiving sandwiched bus-ducts from the top.

11. Module/Panel Identifications (Common for Panel-I &II)

a) Engraved metal nameplates shall be provided on the door of the module/compartment. Identification plate shall depict panel number, compartment number, description of feeder, and feeder rating. Each component fixed in the module shall have identification mark as per the wiring diagram **by means of engrave metal sticker properly fixed.**

b) The nameplates on each module shall also furnish the following information by minimum letter size of 12mm:

- Compartment number
- KW / Amp rating
- Description of the feeder

12. Metal Treatment and Paint Finish (Common for Panel-I &II)

Pre-Treatment Chemical Process:

All sheet steel work used in the construction of the modules shall be pretreated with 7-tank chemical process before applying the two coats of zinc chromate primer followed by synthetic enamel/epoxy paint. The following procedure shall be followed for the panel 7-tank painting procedure in the given sequence only:

a) De-greasing

In this process, the M.S. sheets shall be effectively cleaned by dipping in hot alkaline degreasing solution for a period of about 10-20 minute.

b) Water Rinsing

After de-greasing process the M.S. sheets shall be rinsed into the water for a period of about 1- 2-minute store move the loosened oil, grease and adhering alkaline from the surface.

c) De-rusting

In this process, the M.S. sheets shall be dipped into the dilute sulphuric acid for a period of 30 minutes to remove oxide scales and rust from the surface.

d) Water Rinsing

After the de-rusting process, the M.S. sheets shall be rinsed in water for the period of about 1- 2 minutes to remove the traces of acidic solution from the surface.

e) Phosphating

In this process the M.S. sheets shall be dipped into the zinc phosphate solution for the period of about 30 minutes to facilitate durable coating of the paint on the metal surface.

f) Water Rinsing

After the phosphating process the M.S. sheets shall be rinsed in to the water for the period of about 1-2 minutes to remove the traces of phosphate solution from the surface.

g) Passivation

In this process the M.S. sheets shall be dipped in to the de-oxalate solution for the period of about 1 minute to retain and augment the effects of phosphating on the surface. After completion of 7-tank process a fine grained, smooth and compact coating of iron/zinc phosphate shall be applied, this is an excellent base for paint and provides film protection against corrosion. The coating shall meet the Indian Standard Specification IS: 3618-1966 class C.

h) Drying

After the above pre-treatment chemical process, the M.S. sheets shall be dried either by means of hot air circulation oven or by means of blast of compressed air (air drying).

i) Primer Coating

Primer coating with two coats of highly corrosion resistant zinc chromate primer shall be done before applying the final paint finish.

j) Paint Finish

The final finishing shall be epoxy paint of RAL-7032, matte finish powder coated. Paint thickness shall not be of less than 50micron.

13. Tests

All the tests specified below shall be carried out in accordance with the relevant standards by the manufacturer in the presence of RRI representative. If the panel fails to pass the test specified, the RRI shall have the option to reject it. Shipping release shall be obtained from the RRI's representative. The RRI, however reserves the right to waive off the inspection.

The tests at works shall include electrical & mechanical tests in accordance with the appropriate clauses of Statutory Regulation/relevant codes and standards, in addition any test called for by the EIC or his representative to ensure that the equipment being supplied fulfils the requirement of the specification. For test not covered by any code or specifically mentioned in this specification, the test procedures are to be agreed with the TEC.

The manufacturer shall indicate its routine for standard test. All the routine tests as specified in the IEC standards shall be conducted by the Manufacturer at his works in the presence of the Engineer-in-charge or his authorized representative. The supplier shall perform necessary test to ensure that the equipment supplied are in accordance with the stipulations of the specifications.

14. Seismic Qualification of the panel

The panel structural shall be validated over software to qualify the panel, suitable for installation in Zone-III seismic region, **as per IS/IEC-1893 with latest amendments**

15. Compliance to IEC 61439-1&2 for Low Voltage Switch boards.

The LV Switchboards shall be of Type Tested Assemblies as per LT panel as per the IS/IEC 61439-1: 2011 with latest amendments. All type tests must have been done as defined in IEC 61439 -1&2, built up from compartments housing circuit breakers, control gears, relays, bus-bars, controls and other items of equipment etc.

Tenderer should submit the valid type test certificates issued by accredited laboratory (accreditation based on ISO/IEC/Guide 25/17025 or EN 45001 by the national accreditation body of the country) as per IS/IEC/Technical specification, not older than FIVE (5) years from the date of opening of technical bid to substantiate the quality of the product. The test certificates should consist of all relevant tests done as per standard for the particular ratings. Tenderer should submit the type test certificates for all the individual ratings of the breaker. Test report of higher capacity alone shall not be accepted.

The following type test reports as per the IEC/IS 61439-1:2011 with latest amendments as per the annexure D shall be submitted by the bidder for the rated equipment:

i. Breaker Dielectric Properties

ii. Panel Temperature Rise test

Temperature rise test for similar cubicle shall be submitted prior approval, in case of unavailability of report the vendor shall make arrangement for

Temperature rise test on the final panel before dispatch at a government recognized lab.

iii. Breaker Short time withstand current

iv. Breaker Short circuit breaking capacities

v. Breaker Operational Performance capability

vi. Breaker Overload Performance

vii. Breaker Tripping Limits and Characteristic

viii. Compliance to Internal arc test as per IEC61641

The LV Switch boards shall comply with internal arc fault containment tests for 50kA for 1s in accordance with IEC 61641 without compromising on IP levels as required. Internal arc type test must have been done on a panel as stated in standard i.e. on bus bar section, feeder section and cable alley section in order to prove the safety requirement.

ix. Compliance to Seismic qualification as per IEC60068-3-3

All the panels shall be suitable for seismic qualification zone-III as per the IEC 60068-3-3.

x. Compliance to IP-43 Ingress protection

16. Complete Switchgear Assembly Test

16.1. Physical verification of the Panel

a) Inter changeability of the Circuit-Breaker

b) Mechanical operation of the Circuit Breaker, auxiliary switches, manual devices etc.

c) Verification of the control wiring, wire size, ferruling and tightness of terminals

d) Dimensional checks, measurement of creep age distance in between the bus-bars, adjacent phases and ground

e) Physical verification of the components

f) Breaker closing and tripping mechanism electrically and manually.

g) Breaker Spring charging mechanism.

16.2. Electrical Tests on Panel

a) High voltage tests on power and control wiring

2.5 KV for one minute on power circuit and 2 KV for one minute on control circuit with all meters and instruments transformers in circuit. Voltage applied shall be AC.

b) Insulation resistance test on power and control circuit before and after H.V. test.

c) Functional tests of all the relays

d) Relays excitation and Drop Test

e) Functional test on all the interlocks

f) Breaker tripping through relay

g) Continuity test and polarity test of all the coils and circuits

h) Milli-volt drop test on bus bar joint

i) Check thickness of powder coating using DFT meter.

j) Visual & dimension check of LT panel,

k) P-P, P-E, P-N, N-E bus bars clearance check.

16.3. Circuit Breaker Test

a) Measuring the closing time, tripping time, spring charging time of the breaker

b) Checking and measuring the closing coil resistance, trip coil resistance, contact resistance etc.

c) Minimum control voltage at which the breaker trips

d) Closing of the breaker when the voltage at the terminals of the breaker is within 85- 110% of the rated auxiliary voltage

e) Tripping of the breaker when the auxiliary supply voltage is within 70-110%

f) Manual closing and tripping of the breaker

g) Closing with trip coil energized

h) Anti-Pumping feature of the breaker test

i) Milli-volt drop test across the breaker terminals

16.4. Current Transformer Test

The manufacturer must submit all type tests as per IS.2705 Part-I and II including short time current & temperature rise tests issued by accredited laboratory and get approval before commencement of the work.

16.5. Relays

The equipment offered shall be fully type tested as per the relevant standards. Test certificate not older than 5 years shall be supplied along with offer for main relays offered by the bidder. The reports for following type tests shall be submitted by the bidder for the Protective relays:

a) Insulation tests as per IEC –60255-5.

b) Relay characteristics, performance and accuracy test as perIEC-60255.

c) Steady state characteristics and operating time.

d) Tests for thermal and mechanical requirements as perIEC-60255-6f)

e) Tests for rated burden as per IEC – 60255-6

f) Contact performance test as per IEC –60255-0-20

The following Type tests on the Relays will be conducted at the manufacturers firm:

g) Relay Functionality Test

h) Relay pickup and drop test

i) IDMT curve verification for the CDG relay

16.6. For the Bus-bar material, third party lab test shall be done to measurement its purity, resistivity, material/chemical composition etc.

16.7. Manufacturers test certificate for bought out items (like CT, PT, meter, relays etc.) shall be a part of supply and shall be submitted during inspection.

16.8. Tests at RRI BENGALURU Premises

Provisional acceptance test will be carried out at the BENGALURU to establish that no damage or changes have occurred during the panel transportation. In the event of any error found the supplier shall rectify/replace the module immediately at his own cost.

a) Visual inspection of the panel against any damage

b) Panel Electrical and mechanical operations

c) Functional test of CB

d) Panel HV test

e) Panel IR value (before and after HV test)

f) Breaker HV test

g) Breaker IR value (before and after HV test)

h) Breaker milli-volt drop test

i) Milli-volt drop test across the bus-bar joint

j) Relay inter lock verification

k) Functionality Test of relays

l) Tests to prove efficient interlocking between various equipment

m) Tests for satisfactory operation of the Indication lamps.

17. Drawing & Document for Submission

17.1Drawings / Documents to be furnished by the bidder on receiving of the Purchase Order

The following drawings shall be submitted for approval within 3 weeks after receipt of Purchase Order. TEC will accord approval at the earliest. Manufacturer shall start manufacturing of the panels only after receiving the final approval of all the drawings and the QA plan. Any work carried out before the approval shall be totally at supplier's risk.

a) The design of layout and general arrangement along with complete dimensions shall be submitted along with the offer.

b) Complete assembly drawings of the switchgear showing plan, elevation and typical sectional view.

c) Foundation plan showing locations of channel sills, foundation bolts and anchors, floor plans and openings.

d) Complete wiring diagram including terminal wiring designations.

e) Complete terminal block details, showing ferrule numbers wire destinations.

f) Structural drawings to show exact location and size of terminals and conduit connections.

g) Master bill of material

h) Quality action plan

i) Schematic control diagram for both AC and DC controls (if any) for the breaker, interlocks, relays, instruments, space heaters etc.

17.2. Drawings/Documents to be furnished by the bidder on final supply of the panel:

The following shall be submitted on delivery of panels (3 copies each):

a) Installation, operation and maintenance manual.

b) All approved drawings.

c) All test reports

d) Panel schematic and wiring diagram

e) Manufacturers test certificate for bought out items

f) Guarantee Certificates

g) Soft copy of the entire document on Compact Disc (2nos.).

h) Complete terminal block details, showing ferrule numbers wire destinations.

j) Structural drawings to show exact location and size of terminals and

conduit connections.

k) Master bill of material

l) Quality action plan

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c) All test reports

d) Panel schematic and wiring diagram

e) Manufacturers test certificate for bought out items

f) Guarantee Certificates

g) Soft copy of the entire document on Compact Disc (2nos.)

18. PACKAGING & TRANSPORT

All equipment / material shall be suitably packed for transport, carriage at site and outdoor storage during transit. The contractor shall be responsible for any damage to the equipment during transit due to improper and inadequate packing. The cases containing easily damageable material shall be very carefully packed and marked with appropriate caution symbols. The contents of each package shall bear marking that can be readily identified from the package list and packing shall provide complete protection from moisture, termites and mechanical shocks etc.

Wherever necessary proper arrangement for attaching slings for lifting shall be provided and all packages clearly marked with gross weight, signs showing `UP' and `DOWN' sides of boxes, contents of each package, order no. and date, name of the plant of which the material in the package forms part of and any handling and unpacking instructions considered necessary. Any material found short inside the intact packing cases shall be supplied by the manufacturer/supplier without any extra cost.

Fragile material such as relay cases, Instruments and other glass material shall be carefully covered with shock absorbing protective materials, such as thermocol, silica gel or equivalent moisture absorbent material in small cotton bags etc.

The consignment shall be accompanied by a detailed packing list containing the following information:

Purchase order reference.

- Name of consignee
- Details of consignment
- Destination

- Total weight of consignment
- Handling and unpacking instructions
- Bill of materials indicating contents of each package
- Sign showing upper/lower side of the crate.
- The packing box shall contain a copy of the installation, operation and maintenance manual.

Place of Delivery: RRI Stores, Bengaluru.

19. GUARANTEE

The supplier should give a guarantee against any defect in materials and workmanship for a period of **2years Comprehensive (free) from date of installation and commissioning of the HT and LT panels.**

ABSTRACT

Sl. No.	Reference	Description	Total Amount
1	Part-A	BESCOM WORK – Supply & Installation of Ring Main Unit and Metering Centre with Statutory Approvals from the departments for complete successful installation and commissioning.	
2	Part-B	Dismantling of the existing – a) HT Cable from the tapping point of BESCOM RMU b) HT Metering centre and LBS c) Transformer (Buy back) d) BESCOM material – shall be handed over as is and where is basis to the BESCOM store and document of the same shall be submitted to the RRI office for reference.	
3	Part-C	Supply & Installation of Compact Outdoor type 4way Ring Main Unit (RRI) – One Incomer and Two Outgoings with one standby	
4	Part-D	Supply & Installation of 2 nos. of 800KVA Compact Substation Unit with Allied works	
5	Part-E	Supply & Installation of Main LT Panel – Power control centre PCC-I & II with allied works	
6	Part- F	Construction of LT panel Room (including All Allied Civil Work)	
	GRAND TOTAL (Inclusive of GST)		

Note: (For all Parts below)

1. Transportation, Loading, Unloading, handling shall be included in the respective item.
2. Separate charges in any form shall not be paid by the Institute.
3. Transit Insurance for the equipment to be installed at RRI shall be included.

SCHEDULE OF QUANTITIES

PART A

BESCOM RMU & METERING CUBICLE WITH LAYING OF HT CABLES

Part-A: Bidder as per **BESCOM** for Design, Supply, Transportation, Installation, Testing, successful Commissioning of BESCOM Approved DAS Compact Ring Main Unit outdoor type with 2OD + 1 VL rated at 11KV, 630A, TP, SF6 breaker with suitable interlocks and Integration of protection and communication systems as recommended by BESCOM and necessary power (HT and LV) and control wiring and necessary civil works all complete. **TAXES AND OTHER LEVIS SHOULD BE INDICATED SEPERATELY**

Sl.No.	PARTICULARS	Code	UNIT	QTY	RATE/ UNIT	AMOUNT IN RS
	Part 1					
1	11kV HT Metering cubicle of suitable CT Ratio, both side cable entry type with 3CT & 3PTs, With Transparent Cover TTB, with 30x8mm Cu Bus bars, Modem and 2 Nos of Meters for 3Ph 4 Wire Metering without Load Break Switch (HT Metering Box Fabricated out of 3mm MS Sheet duly epoxy powder coated) as per revised Specification (Dwg No. BESCOM/GM/QS&S/-- Dtd 24.11.2018) (CT RATIO 25/1A)-Ratios and the specifications for the CTs and PTs shall be as per the load sanction letter by BESCOM.	358351	Nos	1		
	Rates In words					
2	DAS Specification Compact RMU (SF6 Type) as per IEC-62271 The DAS RMUs shall have the following in addition to the Standards: • DC motors, Numerical Relays, Multifunctional meters, fault passage indicator (FPI), Metering CTs, Protection CTs, Auxiliary transformers, Potential transformer, Batteries, Battery chargers (12V & 24V), AC power	302490	Nos	1		

	socket and light for illumination of Control panel. • Control cable from each panel shall be wired and terminated to suitable 24 pin connectors in the control panel. • Suitable space for fixing the Remote Terminal Unit (RTU) and Radio Modem in Control panel. • Suitable clamps for fixing Antenna Pipe. 3 Way DAS RMU, 2OD + 1VL (One Incomer + One Breakers + One Outgoing) 630A, with Copper Bus Bar.					
	Rates In words					
3	Supply Of 11KV, 3 Core, earthed system, HT UG Aluminium Cable for insulations High quality clean XLPE compound shall be used (Free from micro voids, Moisture content, ambers and contaminations) with pressure extruded, inner sheath ROUND WIRE ARMOURED as per IS-7098 (Part-2) Armouring wires dia in average ± 2.5% and resistivity 14.0 Ohms/KM (Max) as per IS 3975 3C x 240 Sq. mm. HT UG XLPE cable – Aluminium and outer sheath of PVC.	287405	Mtrs	740		
	Rates In words					
4	Heat shrinkable Indoor type heat shrinkable type of termination kit for XLPE - 3x240sqmm Aluminium cable	288334	No	6		
	Rates In words					
5	Heat shrinkable straight through joint kit for XLPE 3x240sqmm Aluminium cable	288324	No	5		

	Rates In words					
6	Cable Route & joint indicating stone with M.S. Anchor rod	802460	No	5		
	Rates In words					
	Sub Total of Part 1					
	Part 2					
1	Opening of cable trench 1.2 m depth 0.5M width for laying of HT cable consolidation and refilling		CMTR	50		
	Rates In words					
2	Construction of platform with size stone, cement concert for erection of Metering cubicle/Heavy Equipment. Construction of platform (1.5x1.5x1.2) meter in size stone, for erection of Heavy equipment including all materials, labour. Excavation of (1.5x1.5x1) meter pit for foundation providing and laying cement concrete 1:4:8 for foundation laid in 10 cm thick layers, well compacted curing etc., complete providing and construction of stone masonry 0.9m below ground level and 1.2m above ground level neatly hammer dressed in cement mortar 1:6.Providing and Laying cement concrete slab 1.5x1.5x0.10Mtr with cement concrete of 1:2:4 mix forming & cutting complete, providing pointing to stone masonry in cement mortar 1:3 after racking joint &nicely lining curing etc., plastering the concrete surfaces in cement mortar 1:4 including smooth rendering curing etc., curing at every stages completely. (1 RMU and 1 Metering Cubicle)		Nos.	2		
	Rates In words					

3	Erection of HT metering Cubicle & R.M.U on Platform		Nos.	2		
	Rates In words					
4	Laying of cable in Existing trench/GI pipe/Stone Ware/RCC Hume pipe using Wooden/Aluminium Rollers as directed by the BESCOM departmental staff. Laying of HT cable in the existing trench size of cable (3C x 240 Sq.mm) HT UG XLPE inside the existing HDPE pipe duct provided by BBMP white topping.		KM	0.6		
	Rates In words					
5	Laying of UG Cables by trenchless technology by adopting horizontal boring & drawing of cable including preparation at site (without HDPE pipe)		Mtr.	100		
	Rates In words					
6	Body Earthing: Providing earth station consisting of 1 no. of copper coated earth rod 20mm Dia, 3.0 mtr long STD. with universal clamp made of Stainless steel (SS) to connect flat conductor with earth rod. The earth rod shall be copper bonded low carbon steel electrode with copper coating 250 microns, with earth enhancing compound & Tested as per IEC 62561 -2, meets the requirements of IS:3043 and IEC 60364-5-54, tested for short circuit current withstanding capacity and all including excavation and refilling of earth and supply of all materials and providing chamber with necessary civil works using good quality bricks, sand etc. with a cover plate made of GI for the chamber with all necessary		Nos	6		

	materials complete as required_as per the approved make list					
	Rates In words					
7	The connection from the earth electrode shall be established though the GI/Copper strip using SS nut and bolts. 50x6mm GI Strip (Hot dipped Galvanized)		Mtrs	100		
	Rates In words					
8	Supply and laying of 100mm dia size of High Density Poly Ethylene (HDPE) Double wall Corrugated pipe confirming to IS:14930 part-II (with latest amendments) for road crossing including excavation and laying 750 mm below ground level and refilling of earth complete as required.		Mtrs	100		
	Rates In words					
9	Making of joint kit		Nos.	5		
	Rates In words					
10	Making pot head for HTUG cable indoor type		Nos.	6		
	Rates In words					
11	BBMP road cutting charges (lump sum)		Lump sum	1		
	Rates In words					
					Sub Total Part 2	
					TOTAL PART1 +PART 2	
					ADD GST	
					GRAND TOTAL	

PART-B

Dismantling of the existing –

- HT Cable from the tapping point of BESCOM RMU
- HT Metering center and LBS (BESCOM Property)
- 630KVA ONAN Transformer (RRI Property)
- BESCOM material – shall be handover on as and where is basis to the respective store and document of the same should be submitted to the RRI office for reference.
- TAXES AND OTHER LEVIES SHOULD BE INDICATED SEPERATELY

Sl. No.	Description	UNIT	QTY	Rate	Amount in Rs
1	Disconnecting the existing 11KV HT Cable (95sqmmX3c Al Armoured) terminations along with the termination kits from the following –	Job	1		
	Existing 11KV RMU to HT Metering				
	Existing HT Metering to LBS				
	LBS to HT side of the Transformer				
	Rates In words				
2	Dismantling of the HT Metering centre with LBS and handing over the same to the stores of the BESCOM.	Job	1		
	Rates In words				
	Note: Loading and Unloading charges to be considered. Transportation charges for handing over to the BESCOM stores to be considered.				
3	Dismantling of the 630KVA oil type ONAN Transformer and moving to the stores of RRI	Job	1		
	Rates In words				
4	Disconnecting the Three Runs (3R) of 300sqmmX3.5c Aluminium Armoured, LT Cables terminations from Transformer Secondary side to LT panel incomer	Job	1		
	Rates In words				
5	Re Termination of Cables	Each	6		
	Providing end terminations for 300sq mm 3.5 core, 1.1kV grade XLPE insulated armoured,				

	Aluminium conductor cables including supply of brass Double compressor gland, aluminium lugs, neoprene bushes and other materials and using one's own tools required complete with terminal connections required complete with terminal connections, earthing of glands complete as required and as directed by EIC.				
	Rates In words				
				TOTAL	
				ADD GST	
				GRAND TOTAL	
	Rates In words				

PART C

RRI 4WAY COMPACT RMU

Part-C-Design, Supply, Transportation, Installation, Testing, successful Commissioning of **4-way outdoor type Compact 11KV RMU** Unit with include 1no. of Incomer rated at 11KV, 630A, with Copper Busbar and TP SF6 breaker and 3nos. of Outgoing rated at 11KV, 630A, TP, LBS include with DC power pack unit for the HT breakers, suitable interlocks and Integration of protection with the New Proposed CSS and necessary power (HT and LT) and control wiring and necessary civil works all complete. TAXES AND OTHER LEVIS SHOULD BE INDICATED SEPERATELY

Sl. No.	PARTICULARS	UNIT	QTY	RATE/UNIT	Amount (Rs.)
1	Design, Fabricating, Supply, Installation and Testing and commissioning of outdoor type outdoor type 11 KV SF6 type non extensible and motorized 4Way Compact Ring Main Unit (RMU) complete with **One number of** SF6 breaker and **Three LBS** with suitable Copper Busbar as per IS and detailed specifications as below with allied civil works like RCC foundation etc. as per the OEM drawings.				
	HT Incomer				
	11kV 630Amps 21KA for 3 Sec. **One number of** SF6 breaker with necessary protection of O/L, S/c, E/f using protection CTs and communication cable MFM operated through measuring CT and PT units all complete and connected to the bus for provision of tapping of 3nos. Of outgoings as specified below all complete. The incomer shall be suitable for 95sqmmx3c, 11KV XLPE cable as per IS: 7098: Part-2 with latest amendments from HT metering centre as per the Approved Make list include with DC power pack unit for the HT breakers	Full Set	1		
	HT Outgoing				
	11KV, 630A, **three numbers of LBS** with necessary protection of using protection CTs and communication capable MFM operated through measuring CTs all complete all complete. The outgoing shall be suitable for 95sqmmx3c 11KV XLPE cable as per IS: 7098: Part-2 with latest amendment tapped to CSS 800KVA downstream				

	Rates In words				
2	Cable Tray				
	Cable Tray 300MM – Perforated Hot dipped galvanized 14swg with all necessary accessories like Anchor fasteners, mounting rails, threaded rods, etc., all complete.	Mtr.	50		
	Rates In words				
	HT CABLE (From RMU to CSS)				
3	Suppling of 11kV grade, **95sq.mm** 3 core, stranded, aluminium conductor, XLPE insulated, PVC bedded, galvanized steel/strip round armoured and PVC overall sheathed, screened cables, conforming to IS:7098 Part II (with latest amendments) suitable for earthed system. The cable shall bear ISI certification mark.	Mtr	50		
	Rates In words				
4	Laying of 11kV grade, 3 core, 11 kV grade, 95 Sq mm XLPE insulated, stranded aluminium conductor armoured cables of suitable sizes, in ground, in all type of soil, 1000mm below ground level including transportation of cable to site, excavation, refilling with sand and baked bricks on sides and 225 x 45 x 40 mm size RCC slabs on top as required complete. **(2 Runs of cables laid in ground)**	Mtr	25		
	Rates In words				
5	Providing **HT Indoor** end terminations to 11kV, 3 Core, 95sq.mm, Aluminum conductor, XLPE cable including supply of heat shrinkable end termination kit with all items complete as required.	Set	4		
	Rates In words				
				TOTAL	
				ADD GST	
				GRAND TOTAL	

PART D

800KVA COMPACT SUBSTATION

Part D-Design, Supply, Transportation, Installation, Testing, successful Commissioning of 2nos 11KV/433V outdoor CSS 800KVA Dry Type Resin Cast CSS with Incomer 11KV, 630A, 21KA SF6 insulated circuit breaker and Outgoing 1250A FP ACB Microprocessor based draw out type and electrically operated and provision of 8 stages APFC through an 800A 3P MCCB protection and necessary power (HT and LT) and control wiring and necessary civil works all complete. TAXES AND OTHER LEVIS SHOULD BE INDICATED SEPERATELY

Sl. No.	Particulars	Unit	Qty	RATE/UNIT	Amount (Rs.)
1	Design, Fabricating, Supply, Installation and Testing and commissioning of outdoor type Compact Substation (CSS), Dry Type Resin Cast Transformer copper wound, 11KV/0.433KV, Delta / Star respectively and star point brought out and connected to solid earth using suitable Flat copper, for reference is Attached SLD all Complete. (Including the APFC Panel integrated with the Outgoing) with allied civil works like RCC foundation etc. as per the OEM drawings. HT Incomer A) 11kV 630Amps 21KA for 3 Sec. SF6 insulated with Copper Bus-bar Non-Extensible Compact switchgear consisting of One No. Fixed Manual Vacuum Circuit Breaker in SF6 insulated robotically welded 304 Grade Non-Ferrite Non-Magnetic Stainless-steel tank of thickness 2.5mm having IP67, with series trip, self-powered microprocessor based numerical over current relay (IDMTL + Inst.) protection along with Metering Cubical of Class 1.0 Accuracy include with DC power pack unit for the HT breakers Interconnection between HT switchgear and transformer shall be	Full Set	2		

	using 1Cx3x95 sq.mm Al. armoured XLPE Cable Or using copper bus.				
	B) Relay shall be as per the make list with Communication (50, 50N,51,51N)				
	C) Protection CT ratio 40/1A 2.5VA 5P10				
	D) Metering CT ratio 40/1A 2.5VA Class 1.0 Accuracy				
	E) Metering PT ratio 11000/√3/ 110V/√3 50VA Class 1.0 Accuracy				
	F) Digital Multifunction Meter of Class 1.0 Accuracy with RS 485/232 communication port in RJ45				
	G) Master trip Protection (86)				
	H) 24V DC Shunt Trip Coil				
	I) 24V DC Battery and Charger				
	J) Manometer				
	K) Operating Handle				
	L) Transformer				
	800KVA, 11KV/0.433KV Dry type Resin Cast Transformer Copper Wound and complying as per ECBC norms (ECBC+ Building) suitable for the CSS and connected to the 11KV /SF6 and LT ACB on primary and secondary side respectively using suitable size copper bus bars all complete.				
	M) LT Outgoing				
	One Number of 1250A 4P, 50kA, microprocessor based ACB (EDO type) with LSIG protection electrically operated with communication capable multi-function meter operated through resin cast CTs and connected to the TC using copper bus all complete. One Number of 800A 3P MCCB 50kA, microprocessor based for LSIG protection for APFC feeder and APFC shall be the 8 Stage Automatic Power				

	Factor Controller thyristor operated capacitors switched through detuned reactors with cooling arrangement etc. all complete as per the SLD.				
	Rates In words				
	SAFETY ITEMS				
2	Supply and fixing of standard Shock Treatment Chart with wooden frame work and glass written in Hindi, English, and Local Languages, framed laminated board as required including supply of all fixing materials as required and as directed by EIC.	Each	1		
	Rates In words				
3	Supply and fixing of standard set of three Fire Buckets inside painted white and outside red with 'FIRE' painted on it in Black along with closing lids. The bucket hanging frame work is made of MS angles with MS sheet top canopy, duly cutting, welding and two coating of anticorrosive paints and shall be fully painted with red colour enamel paint and with all materials required for making frame for hanging Fire buckets and as per the requirements of local electricity authorities. The angle frame shall be provided with extra handle as bottom (each set shall have 3 buckets) including supply & first filling of sand in fire buckets complete as required and as directed by EIC	Each	2		
	Rates In words				
4	Supply, fabrication & installation of Danger board made of 2.0mm thick aluminium /MS sheet of 150mm x 150mm, the content of the board will be in two language viz. English and Local Language Standard safety board and letters are of computer cutting fluorescent stickers required and directed by EIC.	Each	5		

	Rates In words				
5	Supply and fixing of Portable fire Extinguisher DCP type of 10kg capacity complete with hose, nozzle and mounting brackets including fixing on wall with necessary fixing materials and civil works as required and as directed by EIC. The extinguisher cylindrical shape body is fabricated of MS sheet as per IS: 513 grade and welded construction, anticorrosive body type, extinguisher filled with best quality DCP conforming IS: 4308 certified ISI marked as required.	Each	3		
	Rates In words				
6	Supply and fixing of Portable fire Extinguisher CO2 type of 6.8kg capacity complete as per IS: 2878 and with hose, nozzle and mounting brackets including fixing on wall with necessary fixing materials and civil works as required and as directed by EIC.	Each	2		
	Rates In words				
7	Supply of Rubber hand gloves of **12kV class.**	Pairs	2		
	Rates In words				
8	Supply and fixing of First Aid Kit complete with all medicinal items required for first aid purpose including supply of all fixing materials as required and as directed by EIC.	Set	1		
	Rates In words				
9	Supply & fixing of electric shock proof rubber insulation mat suitable for 11kV (Class B) with 2.5mm thickness of standard 1mtr width and necessary chequered grips and ISI mark and as per IS 15652 (with latest amendments).	SQM	30		

	Rates In words				
	MISCELLENOUS WORKS				
10	Supplying and spreading stone metal 60 mm to 100 mm size for100 mm depth above the ground level complete	SQM	50		
	Rates In words				
11	Supply, Installation of **cable markers** in proper concrete pedestal of size 750mm X 300mm X 50 mm (H x W x D) for identifying the cable loop, cable route etc.	Nos.	20		
	Rates In words				
	Earthing				
12	**Copper Plate Earthing for Neutral Earthing** Providing standard plate earth for earth station with 600x600x3.15mm electrolytic tinned copper plate at 2.5m depth, conforming to IS:3043 & NBC-2016 with latest amendments including excavation and refilling of earth and supply of all materials and providing chamber with necessary civil works using good quality bricks, sand etc. with a cover plate made of GI for the chamber with all necessary materials complete as required.	Nos	4		
	Rates In words				
13	**Body Earthing** Providing earth station consisting of 1 no. of copper coated earth rod 20mm Dia, 3.0 mtr long STD. with universal clamp made of Stainless steel (SS) to connect flat conductor with earth rod. The earth rod shall be copper bonded low carbon steel electrode with copper coating 250 microns, with earth enhancing compound & Tested as per IEC 62561 -2, meets the requirements of IS:3043 and IEC 60364-5-54, tested for short circuit current withstanding capacity and all	Nos	8		

	including excavation and refilling of earth and supply of all materials and providing chamber with necessary civil works using good quality bricks, sand etc. with a cover plate made of GI for the chamber with all necessary materials complete as required as per the approved make list				
	Rates In words				
14	The connection from the earth electrode shall be established though the GI/Copper strip using SS nut and bolts.				
	50x6mm GI Strip (Hot dipped Galvanized)	Mtrs	200		
	Rates In words				
15	50x6mm Copper Strip	Mtrs	50		
	Rates In words				
16	25x3mm GI Strip for trays	Mtrs	50		
	Rates In words				
	LT CABLE (From CSS to PCC)				
17	Supply of 300sq mm X 3.5core,1.1 KV grade, XLPE insulated, and overall FRLS type sheathed, stranded aluminium conductor, flat strip armoured cables confirming to IS:7098/Part I (with latest amendments).	Mtrs	320		
	Rates In words				
18	Laying of 300sq mm X 3.5core 1.1 kV grade XLPE cables, armoured, aluminum/copper conductor cables in ground, in all kind of soil, soil should have a minimum depth of 750mm from FGL level and including transportation of cable to site, excavation, refilling with sand and baked bricks on top and sides, finally refilling with earth to finished ground level complete as per specification.	Mtrs	20		

	Note: **3.5C x 300 sq.mm XLPE Aluminium (From both CSS LT breaker to the LT panel room trench (8 Runs of cables laid in ground)**				
	Rates In words				
19	Laying of 300sq mm X 3.5core 1.1 kV grade XLPE cables, armoured, aluminum conductor cables in existing trench including transportation of cable to site, removing of trench covers and reclosing the cover after laying the cables in good condition with supply of all necessary materials such as brackets, clamps, MS/GI spacers complete as required and as directed by EIC. **Note: 3.5C x 300 sq.mm XLPE Aluminium cables (8 Runs of cables laid in Existing Trench)**	Mtrs	20		
	Rates In words				
20	**Terminations:** a) Providing end terminations for 300sq mm 3.5 core, 1.1kV grade XLPE insulated armoured, Aluminium conductor cables including supply of brass Double compressor gland, aluminium lugs, neoprene bushes and other materials and using one's own tools required complete with terminal connections required complete with terminal connections, earthing of glands complete as required and as directed by EIC.	Each	16		
	Rates In words				
				TOTAL	
				ADD GST	
				GRAND TOTAL	

PART E

MAIN PCC PANEL

Part-E-Design, Supply, Transportation, Installation, Testing, successful Commissioning of Indoor type LT PANEL - PCC I AND II and **Integration** with the New Proposed 750KVA DG set and existing 320KVA and 500KVA with necessary power and control wiring to the DG Sync Panel with completion of all necessary civil works. TAXES AND OTHER LEVIES SHOULD BE INDICATED SEPERATELY

Sl. No.	PARTICULARS	UNIT	QTY	RATE/UNIT	Amount
1	Design, Transportation, Fabricating, Supply, Installation, Testing and Commissioning of indoor type Main LT Panel Board (Power Control Centre 1 & Power control Centre 2 as per the IS/IEC 61439-1: 2011 standard and as per the SLD and specification all Complete with comprising of following major components of **Utility Incomer:** 1250A, 4P ACB- **2Nos.** EDO Type (50kA) **DG incomer:** 2500A, 4P ACB- **2Nos.** EDO Type (50kA) **Bus Coupler:** 2500A, 4P ACB- 1**No.** EDO Type (50kA) **Outgoing:** 1000A, 4P ACB- **2Nos.** EDO Type (50kA) **Outgoing :250A(4P) MCCB Microprocessor based – 7 Nos.** **Outgoing: 250A (3P) MCCB Microprocessor based - 2 nos. for Future Active filters** Along with required control MCB's, Indicating Lamps, Digital Multi-Function Meters with communication capable port, CTs of various ratings, SPDS with Isolator for each feeder, outgoing and incoming with suitable bus	**Full Set**	**1**		

	bars. The outgoing bus bars from the ACB and MCCB shall be designed to properly terminate the mentioned cables in the SLD. **Note: In the Main PCC (LT panel all the ACB & MCCB shall be Capable to communicate all parameters using SCADA Switching with (S/W) MOD BUS RTU/TCP, Compatible to IEC 61850 protocol along with inbuilt RS485 ports.**				
	Supply, Installation, Testing and commissioning of the 16window Annunciator with test, reset and acknowledgement to display the faults as below – 1. ACB and MCCB tripped 2. Over Temperature from the TIC – 4nos. of TIC single output to the Annunciator.				
	Supply, Installation, Testing and commissioning of the PLC, HMI (coloured) to select the various modes of operations of the PCC-I and II in Auto and Manual selection.				
	Rates In words				

	Mode of Operations: - Mode-1 Default – TC-1&2 – ON, DG-1 – Off – KEB – Healthy Default – TC-1&2 – OFF, DG-1 – ON – KEB – Shutdown or Breakdown and DG source Mode-2 TC-1&2 – ON, DG-EMM – Off – KEB – Healthy TC-1&2 – OFF, DG-EMM – ON – KEB – Shutdown or Breakdown and DG source Mode-3 Default – TC-1 – ON, BC-ON, DG-1 – Off – KEB – Healthy Default – TC-1 – OFF, BC-ON, DG-1 – ON – KEB – Shutdown or Breakdown and DG source Mode-4 Default – TC-2 – ON, BC-ON, DG-1 – Off – KEB – Healthy Default – TC-2 – OFF, BC-ON, DG-1 – ON – KEB – Shutdown or Breakdown and DG source Mode 5 – DG1 ON, DG2- ON, BC- OFF- KEB OFF The above modes shall operate in Auto and Manual. In Auto mode, based on the mode selection in the HMI, the ACBs shall operate. **In manual mode of operation, the PLC shall be totally by passed and operations of the ACBs shall be through the local PBs and TNC.** In both the modes i.e., Auto and Manual all the interlocks shall be secured to avoid any situations.				
Sl. No.	PARTICULARS	UNIT	QTY	RATE/UNIT	Amount
	Earthing				
2	**Body Earthing** Providing earth station consisting of 1 no. of copper coated earth rod 20mm Dia, 3.0 mtr long STD. with universal clamp made of Stainless steel (SS) to connect flat conductor with earth rod. The earth rod shall be copper bonded low carbon steel electrode with copper coating 250 microns, with earth enhancing compound & Tested as per IEC 62561 -2, meets the requirements	Nos	4		

	of IS:3043 and IEC 60364-5-54, tested for short circuit current withstanding capacity and all including excavation and refilling of earth and supply of all materials and providing chamber with necessary civil works using good quality bricks, sand etc. with a cover plate made of GI for the chamber with all necessary per the approved make list. materials complete as required_as				
	Rates In words				
	The connection from the earth electrode shall be established though the GI/Copper strip using SS nut and bolts.				
3	50x6mm GI Strip (Hot dipped Galvanized)	Mtrs	250		
	Rates In words				
4	50x6mm Copper Strip	Mtrs	50		
	Rates In words				
	LT CABLE (From PCC to RING FEEDERS) To Existing DG change over panel				
5	Supply of 300sq mm X 3.5core,1.1 KV grade, XLPE insulated, and overall FRLS type sheathed, stranded aluminium conductor, flat strip armoured cables confirming to IS:7098/Part I (with latest amendments).	Mtrs	100		
	Rates In words				
6	Laying of 300sq mm X 3.5core 1.1 kV grade XLPE cables, armoured, aluminum conductor cables in existing trench including transportation of cable to site, removing of trench covers and reclosing the cover after laying the cables in good condition with supply of all necessary materials **Note: 3.5C x 300 sq.mm XLPE**	Mtrs	30		

	Aluminium cables (3 Runs of cables laid in Existing Trench)				
	Rates In words				
7	**Terminations:** Providing end terminations for 300sq mm 3.5 core, 1.1kV grade XLPE insulated armoured, Aluminium conductor cables including supply of brass Double compressor gland, aluminium lugs, neoprene bushes and other materials and using one's own tools required complete with terminal connections required complete with terminal connections, earthing of glands complete as required and as directed by EIC.	Each	6		
	Rates In words				
				TOTAL	
				ADD GST	
				GRAND TOTAL	
	Note: Integration – This implies as follows – DG vendor shall supply the 750KVA DG set with sync panel, BBT to evacuate the power from the sync panel to the PCC I and II (PCC in existing vendor scope) The flexible links at the PCC end shall be provided by the DG set vendor however, terminating shall be in the scope of the PCC vendor. Bus taps of the incomers shall be brought to the top and the BBT shall terminate to the incomers through the flexible links. Further, control cabling from the DG set vendor sync panel shall terminate in the marshalling box of the PCC panel. To get a fair idea, the SLD is enclosed with the flow diagram. The GA drawing of the BBT too is attached for reference. This has not to be considered as final and to be used for reference to ascertain that all the components are considered while quoting.				

PART F

NAME OF WORK: CONSTRUCTION OF PROPOSED LT PANEL ROOM TAXES AND OTHER LEVIES SHOULD BE INDICATED SEPERATELY					
Sl.No	**Description of Item**	**Unit**	**Quantity**	**Rate**	**Amount**
1	Earthwork in excavation by mechanical means (hydraulic excavator) / manual means for FOUNDATION TRENCHES in ALL KINDS OF SOILS including dressing of sides, ramming of bottom, disposing the surplus excavated materials within a distance of 50m and lift upto 1.50m complete as per specifications. (Disposed soil to be levelled by breaking clods if any and neatly dressed).	CUM	60		
	Rate in Words:				
2	Providing and laying cement concrete using 20mm nominal size graded hard granite stone aggregates obtained from approved quarry including compaction, finishing top surface to level, curing, cost of formwork, etc; complete all as per specifications. Mix ratio specified is for (cement: M-sand: graded stone aggregates) IN FOUNDATION AND PLINTH/SUB-BASE TO FLOORS. **PCC= 1:4:8**	CUM	4.5		
	Rate in Words:				
3	Providing and laying in position REINFORCED CEMENT CONCRETE using graded hard granite stone aggregate of 20mm nominal size obtained from approved quarry including mechanical mixing, vi brating, compaction, finishing, curing, etc; com plete all as per specifications but excluding the cost of form works and steel reinforcement. (Rate to include labour for keeping embedment if any, wherever required while casting). Mix ratio is specified is for (cement: M-sand: graded stone aggregates) ALL WORKS UPTO PLINTH LEVEL, with **RCC 1:1:2**	CUM	16		
	Rate in Words:				
4	Providing and laying in position REINFORCED CEMENT CONCRETE using graded hard granite stone aggregates of 20mm nominal size obtained from approved quarry including mechanical mixing, vibrating, compaction,	CUM	8		

	finishing, curing, etc; complete all as per specifications but excluding the cost of form works and steel reinforcement. (Rate to include labour for keeping embedment if any, wherever required while casting). Mix ratio is specified is for (cement: M-sand: graded stone aggregates) UPTO FLOOR FIVE LEVEL. In walls (any thickness), including attached pilasters, buttresses, plinth and string courses, fillets, columns, pillars, piers, abutments, posts and struts, etc., with **RCC=1:1:2**				
	Rate in Words:				
5	Providing and laying **Ready Mixed Concrete of M25 grade** machine batched by weight, ma chine mixed as per the design mix standards in the Ready-Mix plant and transported to the place of work. The concrete is made using graded granite stone aggregates of maximum 20mm nominal (downgraded) size obtained from approved quarry including fine aggregates **(M-sand)** conforming to latest IS 383 and cement all as per the design mix proportions conforming to IS 10262 with minimum cement content for durability for moderate exposure conditions, including supplying and providing concrete cover etc., which shall be followed as per latest IS 456 including pumping to all heights, placing, spreading, vibrating, compaction, finishing to required levels, curing etc., complete all as per specifications but excluding cost of formwork and steel reinforcement. Rate to include charges for admixture, if any specified, as per IS 9103, to accelerate/retard setting of concrete, improve workability without impairing strength and durability and labour for keeping embedment if any wherever required while casting. Rate also to include lift charges and scaffolding for all heights / depths from FFL/GL	CUM	15		

	NOTE: (1) Ready Mixed Concrete shall be procured from reputed manufacturers like, Ultratech Concrete Ltd, Lafarge Aggregates & Concrete India P Ltd, ACC Concrete Ltd, Coromandel Concrete, IJM Concrete Products Pvt Ltd, RMC Readymix India Pvt Ltd, RDC Concrete India Pvt Ltd, Vishwas Concrete Pvt Ltd or other reputed manufacturers or contractors own RMC plant, only after obtaining prior approval of the engineer-in-charge. (2) Cement will not be issued by the department for this item. (3) Rate to include the transportation with all leads from RMC plant to the place of work and pumping of concrete to any height and the rate shall be for all leads. (4) Cement concrete delivered at site should be workable and should satisfy all the required standard tests like cube test and slump test etc., as specified in IS456 code of practice. Samples taken at site only will be deciding factory				
	(5) Department will not have any direct contact in matters relating to payment, delivery schedule, quality of concrete etc. It is the responsibility of contractor to ensure proper co-ordination for the timely supply of concrete and approved quality product. (6) Contractor has to make arrangement for proper approach road (for which nothing extra shall be paid for) to enable the vehicle carrying concrete to move freely without any extra cost to the department before ordering the concrete. However existing approach road may be made use of for this purpose. (7) Contractor has to ensure proper strong shuttering / centering to receive the concrete at all heights. (8) Contractor has to indemnify the Department arising out of possible dispute with the manufacturers. (9) The design mix of RMC of the manufacturer/ supplier of RMC has to be obtained well in time and approval of engineer-in-charge to be obtained prior to use. The design mix should be based on latest IS 456 & IS 10262. This approval has to be obtained whenever the design mix is changed. The RMC should be supplied conforming to				

	the approved de sign mix which shall be continuously checked during the progress of work. All the quality checks as per IS stipulations should be scrupulously followed during the concreting. The work shall be carried out at all heights.				
	Rate in Words:				
6	Steel reinforcement for all RCC items including decoiling, cutting, hooking, bending, cranking, fabricating to required shape, placing in position and tying the system with soft drawn annealed GI binding wire of diameter not less than 1.00mm with 2 strands etc; complete all as per specifications at all heights (binding wire will not be measured for payment Thermo-Mechanically Treated (TMT) bars - Fe550	MT	4.5		
	Rate in Words:				
7	Providing rigid and water tight CENTERING AND SHUTTERING using best quality wood/ plywood/ steel forms and centering with steel props, acrotubes etc., including strutting, propping, bracing, staging etc., complete for all RCC items fixed in position as required including labour for careful removal of form work etc., complete all as per specifications at all heights. In horizontal / vertical/ slanting surfaces.				
a	Foundations, footings, bases of columns including pedestals, mass concreting, pavement, RCC floor etc	SQM	25		
	Rate in Words:				
b	Lintels, beams, plinth beams, girders, bressumers and cantilevers, brackets etc.	SQM	100		
	Rate in Words:				
c	Suspended floors, roofs, landings, shelves and their supports, balconies and chajjas	SQM	90		
	Rate in Words:				
d	Columns, pillars, abutments, posts and struts	SQM	80		
	Rate in Words:				
8	Providing and construction Solid Cement Concrete Block masonry in cement mortar 1:6 (cement : coarse river sand) using factory made, load bearing, approved quality, Grade C (4.0), as per IS 2185 (Part 1), density of blocks not less than 1800kg/cum, minimum average	CUM	60		

	compressive strength of units 4.0N/mm² and minimum strength of individual unit is 3.2N/mm², set to level plumb including setting in position, providing scaffolding, curing, raking out joints wherever necessary etc., complete with all leads and all as per specification and direction of engineer-in-charge in SUPERSTRUCTURE UPTO FLOOR FIVE LEVEL.				
	For 200mm thick walls using (400x200x200) mm size blocks				
	Rate in Words:				
9	Plastering 12mm thick with cement mortar specified below, finished smooth with lime neeru, including scaffolding, curing, etc; complete for INTERNAL SURFACES of walls, beam, ribs, sills, jambs, ceiling, etc; complete all as per specifications UPTO FLOOR FIVE LEVEL, mix specified is for cement : fine sand.				
a	NOTE: CM 1:3 OR CM 1:4 is generally applicable for ceilings and RCC surfaces unless otherwise specified: For walls **with CM 1:6**	SQM	275		
	Rate in Words:				
b	For ceiling - **with C.M 1:4**	SQM	75		
	Rate in Words:				
10	WASHED STONE GRIT PLASTER on exterior walls of height up to 10m above ground level in two layers, under layer 12mm cement plaster 1:4 (cement : coarse river sand) furrowing the under layer with scratching too, applying cement slurry on the under layer at 2kg of cement per sqm., top layer 15mm cement plaster 1:0.5:2 (cement : coarse river sand : stone chipping 10mm nominal size) in panels with groove all around as per approved pattern including scrubbing and washing, the top layer with brushes & water to expose the stone chippings, complete as per specification & direction of engineer-in-charge (Payment for providing grooves will be made separately)	SQM	300		
	Rate in Words:				
11	Painting internal plastered surfaces with two or more coats of Premium super acrylic emulsion paint of approved brand and colour (Asian or Berger or equivalent) to give an even shade with required finish over a coat of water thinnable cement primer including cleaning the surfaces, filling the crevices with approved filler,	SQM	300		

	applying TWO or more coats of approved acrylic putty on whole surface and rubbing the surface to achieve desired smooth surface, scaffolding, etc., complete all as per specifications.				
	Rate in Words:				
12	Providing and fixing steel door system made out of standard rolled steel sections. The door frame, shutter frame and diagonal stiffeners for the shutters, styles and rails and for shutters shall be MS angles / Tees. The shutter frame shall be covered with MS sheet (single / double skin) electrically welded. The door frame shall have a base tie made out of 12mm square MS rod embedded in flooring and 3 nos. of 15mmx3.15mm lugs of 100mm long on each side embedded in cement concrete blocks of size 150x100x100mm of 1:3:6 mix (cement: M-sand: hard granite stone aggregate 20mm nominal size) or with anchor fasteners or with fixing clips with bolts and nuts as required.	KG	300		
	The work includes providing approved pivots as required and iron oxidized butt hinges 125mm long, 3 nos. for each shutter conforming to IS 1341-1970 etc., including cutting the steel sections to required lengths, joints mitred and electrically welded, ground and cleaning the surface thoroughly free from rust scales and painted with two coats of synthetic enamel over a coat of red oxide zinc chromate primer, conforming to IS specifications including providing and fixing MS aldrop bolts, MS tower bolts and MS handles, etc., complete all as per specifications, drawings and instructions of engineer-in-charge at all heights.				
	Fully openable (single / double) shutter and using MS sheet covered on single or both sides.				
	Rate in Words:				
13	Forming groove of uniform size in the top layer of washed stone grit plaster as per approved pattern using wooden battens, nailed to the under layer including removal of wooden battens, repair to the edges of panels and finishing the groove complete as per specifications and direction of the engineer-in-charge.	RMT	130		
	20mm wide and 15mm deep groove				
	Rate in Words:				

14	Providing and laying Indian Patent Stone Flooring with cement concrete 1:2:4 (cement: m- sand: graded stone aggregate) using graded granite stone aggregate obtained from approved quarry laid to level or slope in bays not exceeding 3sqm per panel including providing 3mm thick aluminium dividing strips to the full depth of the flooring and finished smooth with float coat of cement at 4.4kg/sqm, curing, etc., complete all as per specifications. 40mm thick (using 20mm nominal size stone aggregate)	SQM	60		
	Rate in Words:				
15	Providing and laying WATER PROOFING TREATMENT OVER RCC ROOF IN THREE COURSES, as specified below, after thoroughly cleaning surface of the roof slab with wire brush, cleaning of dust and foreign matters, raking and cleaning of construction joints if any etc., complete to make the surface suitable for receiving water proofing treatment. FIRST COURSE: The existing covering on slab to be removed and the surface of the RCC slab exposed. Construction joints if any are to be raked and cleaned. A coat of cement slurry at the rate of 4.4kg/sqm mixed with acrylic water proofing compound (as per manufacturers specification) is spread uniformly over the RCC roof area and ensuring that the slurry penetrates into the RCC slab below and fills all micro cracks and all other porous areas. Over this a layer of 15mm thick cement mortar 1:5, mixed with acrylic water proofing compound as per manufacturer's specifications shall be laid to place the second course. SECOND COURSE: A single layer of brick on edge with 15mm wide gaps filled with CM 1:5 mixed with acrylic water compound is laid (i.e., bricks placed vertically on its 75x115mm side or 75x230mm side as the case may be, to suit the required thickness of course), when the bottom layer (first course) is still green and laid to slope of 1 in 60 as per roof drainage scheme using approved well burnt bricks (wear absorption not more than 20%) with minimum thickness of 65mm at outer edge including the top and bottom plastering (first & third course) to get required gradient, laying the bricks with not more than 15mm gap all-round, which	SQM	75		

	shall be properly filled completely and compacted with CM 1:5 mixed with acrylic water proofing compound as per manufacturer's specification using full bricks or bricks cut to required size to lay the course with single layer with gradient said above for adequate drainage.				
	THIRD COURSE: 20mm thick cement mortar 1:4 mixed with acrylic water proofing compound with a layer of chicken mesh 12mmx26g and marked with 300mmx300mm false squares including curing etc., for not less than 7 days, complete all as per specifications and directions of engineer-in-charge. The 20mm thick layer shall be carried out in two layers of 10mm thick with an inter layer of chicken mesh of 12mm x 26g laid in between the two layers of cement mortar.				
	NOTE: The acrylic water proofing compound to be used shall be:				
	a) CHEMSEAL - manufactured by M/s. Overseas Water Proofing Corporation, Mumbai. The proportion of CHEMSEAL shall be 2% by weight of cement OR CONPLAST X 421 IC - integral water proofing compound manufactured by M/s. FOSROC Chemicals (India) Ltd., Bengaluru. The proportion of CONPLAST X 421 IC shall be 130ml per 50kg of cement. OR ROFFE HYPROOF manufactured by M/s. ROFFE Construction Chemicals Pvt. Ltd., liquid integral water proofing compound at 140ml per 50kg of cement OR Equivalent.				
	b) The second course of the treatment shall be laid in single course using full bricks / cut bricks as may be required for laying the course in 1 in 60 slopes.				
	c) The rate to include all labour, material and contingent coats for execution of work in a workman like manner including curing, etc., complete for respective courses.				
	d) The plane horizontal measurements of roof slab only shall be measured for payment.				
	e) The theoretical cement consumption required for the above work will be worked out based on co-efficient for each layer of work as per specification.				
	f) The work shall be got executed through specialised water proofing agency.				

	g) The contractor should finish a guarantee bond in the prescribed format for satisfactory water proofing performance for 10 years.				
	Rate in Words:				
16	Spray painting with paint specified below of approved brand manufacture on old work to give an even shade including surface preparation, etc; complete all as per specifications. with **polyurethane enamel paint** in all shades	SQM	60		
	Rate in Words:				
17	Providing and fixing hollow metal pressed steel louvered ventilators using 60 x 40 x 1.25mm edge folded CR (cold rolled) frames / mullions / transoms with single rebates including providing 12mm square MS guard bars at 120mm c/c welded to CR frames and mullions, providing glass of approved quality as specified below for lovers and fixing with MS channels louvers holders as specified in drawing on one side including providing and fixing 1 / 16" x 24G GI fly mosquito proof wire mesh using MS channel beadings of 10 x 10 x 1.25mm on the other side. The hollow section of the frame shall be filled with PCC 1:3:6 using 20mm aggregate and same welded with 15x3.15mm lugs 100mm long embedded in cement concrete blocks 150 x 100 x 100mm of PCC 1:3:6 mix (cement: coarse river sand: hard stone aggregate 20mm and down gauge). The entire steel works shall be dip phosphated and painted with 2 coats of zinc chromate primer etc., complete all as per specifications, drawings and directions of engineer-in-charge at all heights in all floors. Steel fully glazed louvered ventilator with MS channel louver holders with 3.5mm to 4.0mm thick pin headed glass.	SQM	8		
	Rate in Words:				
18	Providing and fixing Pivoted Steel Windows / Ventilators side hung / central hung / top hung made out of standard rolled steel sections joints mitred and electrically welded with 15 x 3.15mm lugs 100mm long embedded in cement concrete blocks 150 x 100 x 100mm of 1:3:6 mix (cement : coarse river sand : hard stone aggregate 20mm and downgraded) or with wooden plugs and screws or with anchor fasteners or with fixing clips with bolts and	SQM	12		

	nuts as required including providing and fixing selected glazing quality glass panes of specified thickness with standard aluminium beadings of size 10 x 10 x 1mm necessary approved pivots as required and projected hinges, weather bars, etc; in windows/ ventilators including cleaning the surface thoroughly free from rust scales and painted with two coats of ready mixed red oxide zinc chromate non setting paint primer conforming to IS specifications including labour for fixing peg stays and handles complete all as per directions and specifications. (Peg stays and handles will be supplied by the department free of cost).				
	NOTE: Steel sections should conform to IS 7452 and IS 1028. Steel sections to be adopted for standard windows and ventilators shall be F7D for outer and inner frames weighing 1.419kg/m and F4B weighing 2.28 kg/m for central mullions as meeting bar for shutters wherever glazing bars, sub-light, side light, partly fixed and partly hung shutters are required. The steel sections to be adopted shall be as prescribed in IS 7452. The steel sections should be cut to length, joints mitred and electrically welded, grinded in sub-dividing frames of units shall be tenoned and riveted into frames electrically.				
	Steel glazed fully openable windows / ventilators with shutters top hung/ central hung / side hung with 3.5mm to 4.0mm thick plain glass.				
	Rate in Words:				
19	Supplying, fabricating, assembling, hoisting / erecting and fixing in position at all heights and with all leads, structural steel works of welded built-up sections, all as per structural drawings and as per detailed specifications (for materials and workmanship) in the situations described hereinafter including a) cutting of components to required lengths / widths and shapes/profiles, b) smooth machining of edges / faces, c) welding (electric arc welding) at joints of built-up sections/ single sections for required weld lengths and sizes and d) painting all over with two coats of Synthetic enamel paint of approved quality, make and colour/shade over one coat of red oxide zinc				

	chromate primer with surfaces duly prepared to receive painting etc., complete all as directed by the engineer-in-charge.				
	NOTE: The contractor shall submit fabrication shop drawings for work involved based on construction drawings (that may be issued during construction period) for approval by engineer-in-charge. The fabrication work shall start only after approval to the fabrication drawings. Any change required in the fabrication drawings shall be carried out at no extra cost over the quoted rates. Fabrication shall be in a perfectly workmanship like manner and as provided in Section V and VI of IS 800 and IS 7215. Welding shall be carried out by qualified welders. Electrodes for welding, the procedure, selection, test and inspection shall conform to provisions in IS 816, IS 818, IS 822, and IS 833. Erection/hoisting shall commence only after passing of fabricated parts by the engineer-in-charge.				
a	Structural steel works of supports for CABLE TRENCH COVERS / DRAIN COVERS fabricated with single sections of MS Channels, MS angles, tees, flats and other sections	MT	0.10		
	Rate in Words:				
b	Structural steel works of CABLE TRENCH COVERS / DRAIN COVERS with Chequered MS Plates and welded connection / joints	MT	0.75		
	Rate in Words:				
				TOTAL	
				ADD GST	
				GRAND TOTAL	

ANNEXURE -I

List of Approved Makes

Sl. No.	Item Description	Recommended Vendors
1	11KV RMU (3way DAS RMU 2OD+1VL (BESCOM) Outdoor	Approved and tested by BESOM
2	11KV HT metering centre Outdoor	Approved and tested by BESOM
3	11KV Compact RMU (4way RMU 1 in and 3 out)	Siemens/Schneider/ABB/L&T
4	Outdoor Compact Substation/ Package Substation & Dry type Transformer	ABB/Crompton Greaves /Cahor/ Schneider/ Voltamp
5	LT power Switchgear (MCCB/MCB/ACB/Power contactor etc.)	L&T / Schneider / Siemens / ABB /Legrand
6	CT & PT	Kappa Electricals/ Automatic Electric (AE) /Nippen/Neutronics Manufacturing company (NMC)
7	Measuring Instrumentation	Rishabh/ Meco / Elmeasure / Automatic Electric
8	Armoured XLPE power cable (HT & LT)	Finolex/Polycab/KEI/Havells/Torrent
9	PVC insulated copper wires	Finolex/ Havells/ RR/ KEI/ Polycab FRLS-Zero Halogen grade
10	Push buttons & Indicating lamps	L&T/ Schneider/ABB/Siemens
11	Terminal Blocks	Wago & Controls/
12	Conduit – (Test Certificate)	Precision/ Modi/ Prestoplast
13	Glands – (Test Certificate)	Jainson / Comet / Dowells
14	Lugs – (Test Certificate)	Dowells /Jainson / long barrel for Aluminium cables
15	Relays	ABB/Areva/Siemens/L&T/ Schneider/Easun Reyrolle
16	Capacitor – APP Type (Heavy Duty)	EPCOS / Subhodhan / Shreem
17	APFC Panel	Siemens/Schneider / BELUK /ABB/L&T EPCOS/ PROK DV's
18	PLC	Rockwell, Siemens, Allen Bradly
19	HDPE pipe	Dura Line/Carlon/Emtelle
20	Fire extinguisher	Firex or approved by Local Fire Safety Authorities
21	Energy Meter	Siemens, Schneider, PROK DV's, SATEC, SECURE

ANNEXURE -II

APPLICBALE STANDARDS

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian/International standards and shall conform to the regulations of the local statutory authorities.

SL. NO	APPLICABLE STANDARDS (All shall be with latest amendments)	
1	IEC 62271-202-2006	HV switchgear and control gear- HV/LV Pre-fabricated sub-station
2	IEC 62271-200-2006	HV switchgear and control gear-AC Metal Enclosed switchgear and control gear for voltages above 1kV and upto and including 52kV.
3	IEC 60694-2006	Common specifications for high voltage switchgear and control gear standards
4	IEC 62271-102-2003	HV switchgear and control gear-Alternating current disconnections and earthing switches
5	IEC 60265-1-1998	High voltage switches – Part 1: Switches for rated voltages above 1 kV and less than 52 kV
6	IEC 60529-1989	Degrees of protection provided by enclosures (IP Code)
7	IEC 62262-2002	Degrees of protection provided by enclosures for electrical equipment against mechanical impacts (IK Code)
8	IEC 60060-1989	High-voltage test techniques
9	IEC 60947-2007/ IS 13947-1993(Reaffirmed-2004)	Low voltage switchgear and control gear
10	IEC 61439: Part-1&2 :2011	Low-voltage switchgear and control gear assemblies- Type tested and partially type tested assemblies
11	IEC 60076-1993 /: IS 2026	Power & Distribution Transformers

12	IS/IEC: 60076 PART -XI IS: 2026:11:2021	Dry Type Transformer
13	IEC 60255-3-1989	Electrical relays - Part 3: Single input energizing quantity measuring relays with dependent or independent time.
14	IEC 60044-1-1996 /: IS 2705-1992(Reaffirmed-2002)	Current Transformers
15	IEC 60044-2-1997 /: IS 3156-1992 (Reaffirmed-2002)	Voltage Transformers
16	IEC 60376-2005	High-voltage prefabricated switchgear and control gear assemblies - Voltage presence indicating systems
17	IS 2629-1985:	Recommended practice for Hot Dip Galvanizing of Iron & Steel. (Reaffirmed-2006)
18	IS: 16636-2017 / IEC 61921-2017 As applicable	APFC panel at LV side of CSS
19	IS 2633-1986 (Reaffirmed-2006)	Tests for uniformity of zinc coating
20	IS: 2099	Specifications for bushings for AC>1000V
21	IS: 3347	Porcelain transformer bushings for use in normal atmosphere
22	IEC: 60129	Alternating current Disconnector (isolators) and earthing switches
23	IS : 5	Color

ANNEXURE -III

1. Guaranteed Technical Particulars of 800KVA CSS

ENCLOSURES FOR CSS			
Sl. No.	**Description**	**Units**	**As furnished by Bidder**
1.	Application		
2.	Make		
2.	Rated Voltage	kV	
3.	Service Voltage	kV	
4.	System Frequency – Hz	Hz	
5.	Rated Impulse withstand Voltage in Peak	kV	
6.	Rated Power Frequency withstand voltage	KV rms	
7.	Rated LT voltage	Volts	
8.	Degree of Protection for Enclosure 1. Transformer Compartment 2. HV Compartment 3. LV Compartment		
9.	Internal Arc test		
10	Maximum Permissible Temperature for any accessible part of the enclosure	°C	
11.	Thickness of sheet for side and base		
12.	Control wiring		
	a) Insulation type and Voltage grade		
	b) conductor material and size		
	c) wiring identification mark & accessories as per specification		
13.	Ventilation Aperture		
14.	Locking Arrangement		
15.	Over all Dimension of CSS (LxWxH)	mm x mm x mm	

2. Guaranteed Technical Particulars of HT Breaker Sf6 & HT Isolator for RMU

Sl. No.	**Description**	**As furnished by Bidder**
1.	Rated voltage	
2.	Number of Phases	
3.	Breaking Current	

4.	Making Current	
5.	Rated withstand voltage at power frequency of 50Hz	
6.	Rated Impulse withstand voltage	
7.	Operating Mechanism	
	HT Isolator – LILO	
1.	Type	
2.	Rated Ampere	
3.	Rated voltage	
4.	Fault making current	
5.	Number of Poles	
6.	Operating Mechanism	

3. Guaranteed Technical Particulars of Transformer

Sl. No	**Description**	**As furnished by Bidder**
1.	**GENERAL**	
	Application/designation	
	Service	
	Type	
	Installation	
	Degree of protection for transformers with enclosure as per IS:2147	
2.	**RATINGS**	
	Rating	
	Rated primary voltage	
	Rated no load secondary voltage	
	Frequency	
	Number of phases in HV & LV side	
	Vector group	
	Permissible tolerance on impedance	
	System fault current for 1 second duration	
	Type of cooling	
3.	**SYSTEM VOLTAGE**	

	Nominal system voltage (HT & LT)	
	Highest system voltage (HT & LT)	
4.	**INSULATION WITHSTAND VOLTAGE**	
	Impulse (1.2/50 μ-sec. wave)	
	One minute power frequency	
	Class of Insulation	
5.	**TEMPERATURE**	
	Reference Ambient Temperature (Design)	
	Temperature rise by winding resistance at lowest tap (Max)	
	Temperature on enclosure by thermometer (Max)	
6.	**Noise level**	
	Permissible noise level (Max)	
7.	**TAP CHANGING LINKS**	
	Taps required	
	Type	
	Tappings on windings	
	Total tapping range	
	Steps	
	Parallel Operation	
8.	**BUSHINGS/SUPPORT**	
	Voltage class	
	Impulse (1.2/50 μ-sec. wave)	
	One minute power frequency	
	Minimum creepage distance	
9.	**TERMINAL CONNECTIONS**	
	HV line end terminal with HT cable box	
	LV line end terminal	
	Neutral earthing	
10.	Orientation of HT and LT termination Compartments.	

ABBREVIATIONS:

In the 'Item of work/ description of work' column 'unit' column, the various abbreviations shall mean as below.

i. MTR/M/m/Rm/Mtrs shall mean 'Metre' in length or breadth or depth.
ii. SQM/Sqm/SM/sqm/M2 /m2 shall mean 'Square Metre' in area
iii. Cu.m/cu.m/Cum/M3 /m3 shall mean 'Cubic Metre' in volume.
iv. Kg/kg/KG shall mean 'Kilogram' in weight.
v. ACB -Air circuit Breaker
vi. VCB- Vacuum Circuit breaker
vii. LBS- Load Break switch
viii. EDO -Electrically operated Draw-out type
ix. PCC -Power Control Centre.
x. SPDP -Screen Protected Drip Proof
xi. EIC- Engineer in Charge (Raman Research Institute)
xii. TEC- Technical evaluation committee
xiii. RRI- Raman Research Institute
xiv. A, Amps- Ampere

DEFINITIONS:

1. CONTRACT: The 'Contract' means the documents forming the tender and acceptance thereof and the formal agreement executed between the President of India and the Contractor, together with the documents referred to therein including these conditions, the specifications, design, drawings and instructions issued from time to time by the Engineer-in-charge and all these documents taken together shall be deemed to form one contract and shall be complementary to one another.

2. TENDERER/CONTRACTOR: The 'Contractor' means the individual or firm or company, whether incorporated or not, undertaking the work and shall include the legal personal representatives of such individual or the persons composing such firm or the successors of such firm or company and the permitted assignee of such individual or firm or firms or company.

3. MARKET RATE: 'Market Rate' shall be the rate as decided by the Engineer-in-charge on the basis of the cost of materials and labour at the site including applicable taxes, duties and also the transportation charge to where the work is to be executed plus the percentage mentioned in schedule `F' to cover all overheads and profits.

4.TENDERED VALUE: 'Tendered Value' means the value of the entire work as stipulated in the letter of award or work order.

ANNEXURE-IV

Certificate for Local Content

"We (name of manufacturer) hereby confirm in respect of quoted item(s) that Local Content is equal to or more than 50% and come under "Class-I Local Supplier" Category. As being "Class – I Local Supplier", we are eligible for Purchase Preference under "Make in India" Policy vide GOI Order Number P45021/2/2017-PP (B.E.-II) dated 15.06.2017 (subsequently revised vide orders dated 28.05.2018, 29.05.2019, 04.06.2020 and as 16.09.2020)

OR

"We (name of manufacturer) hereby confirm in respect of quoted item(s) that Local Content is more than 20% but less than 50% and come under "Class-II Local Supplier" Category.

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

1.

2.

3.

*Strike out whichever is not applicable

We also understand, false declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rule for which for which a bidder or its successors can be debarred for up two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.

Date:
Seal & Signature of the Tenderer

NOTE:
1. Self-certification that the item offered meets the minimum local content (as above) giving details of the location(s) at which the local value addition is made in case the tenderer wishes to avail the benefits under the make in India policy, if applicable.
2. In cases of procurement for a value in excess of Rs.10 crores, the local supplier shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content to avail the benefits under the make in India Policy, if applicable.

ANNEXURE -V

PROJECT COMMITMENT LETTER

To

Administrative Officer

Raman Research Institute

Sadashivanagar

Bengaluru-80

Sub: UPGRADATION OF 11KV HT & 0.415KV LT ELECTRICAL INSTALLATION

Design, Supply, Transportation, Installation, Testing and Successful Commissioning of 11KV BESCOM 3way RMU and BESCOM approved 11KV 4Way RMU in RRI, HT metering centre, two numbers of 800KVA compact substation with 11KV/0.415KV, Dry type OCTC Transformer & Main Power control centre (PCC) with integration to the existing synchronising panel including construction of LT panel room.

NIT No: L/210/EB/2022-2023 Dated 11.11.2022

Sir,

We hereby confirm and Commit with the detailed technical inputs mentioned in the tender specifications and abide by the provisions/terms and conditions of the contract/Tender

For and on behalf of M/s._____

Address:

Signature

Name

In the capacity of

(DULY AUTHORISED TO SIGN THE BID)

ANNEXURE - VI

AGREEMENT FORM

This agreement is executed on this day ..... of ....., 2022 by and between Raman Research Institute, Bengaluru, a premier research Institute located in Sadashivanagar, Bengaluru, (hereinafter called as the Institute) of the First Part and

_____

(Name of the Contractor)
having its registered office at .....
hereinafter called as the Contractor (which includes its successors, executors and permitted assigns) of the Second Part.

WHEREAS, Raman Research Institute (RRI) has issued Tender No - ..... for the ..... (Name of the tender) ..... and invited bids for this propose.

The RRI has accepted the bid by the contractor for the execution and completion of such works and rectification of any defects therein, at a contract price of Rs. .....

NOW THIS AGREEMENT WITHNESSETH as follows:

1. In this Agreement, words and expression should have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they should be deemed to form and be read and construed as part of this Agreement.

2. In consideration of the payments to be made by RRI to the Contractor as hereinafter mentioned, the Contractor hereby covenants with RRI to execute and complete the works and rectify any defects therein in conformity in all aspects with the provisions of the Contract.

3. RRI hereby covenants to pay the Contractor in consideration of the execution and upon completion of the works and rectifying the defects wherein the Contract Price or such other sum as may become payable under the provisions of the Contract at the given time and in the manner prescribed in the Contract.

4. The following documents are deemed to form and be read and construed as part of this Agreement.

IN WITNESS WHEREOF THE PARTIES ABOVE NAMED HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

SIGNED, SEALED AND DELIVERED	SIGNED, SEALED AND DELIVERED
FOR AND ON BEHALF OF RRI (FIRST PART)	FOR AND ON BEHALF OF THECONTRACTOR (SECOND PART)
NAME: DESIGNATION: ADDRESS:	NAME: DESIGNATION: ADDRESS:

ANNEXURE -VII

Drawings

1. **https://wwws.rri.res.in/procurements/LT-Panel-room.pdf**
2. **https://wwws.rri.res.in/procurements/SLD-for-Transformer-NIT.pdf**