

COLLEGE OF ENGINEERING MUTTATHARA
St. Sebastian Church Road, Near BSF Sector Headquarters, Vallakadavu P.O.
Trivandrum-695 003
Ph- 0471-2500211

TENDER DOCUMENT

**Electrification work for providing computers and installing
10KVA UPS at Computer lab of College of Engineering,
Muttathara**

CONTRACTOR

PRINCIPAL

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FORM OF TENDER

Name of work : **Electrification work for providing computers and installing 10KVA UPS at Computer lab of College of Engineering, Muttathara**

Name of Tenderer : -----

Address : -----

Class of Registration :

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NOTICE INVITING TENDERS FOR EXECUTION OF WORK

Tender No. C-1427/2017/CEM

Dated: 29.10.2018

Sealed competitive tenders are invited by the undersigned from financially sound and well experienced valid Registered 'A/B' class contractors/firms of KPWD/CPWD/Railway for the Electrification work prescribed below up to 1.00 pm on 13.11.2018. Bidders shall submit the tender document fees and EMD through in the Demand draft .payable at Tvm.

1	Name of Work	:	Electrification work for providing computers and installing 10KVA UPS at Computer lab of College of Engineering, Muttathara
2	Estimate PAC	:	Rs.3,48,201/-
3	Nature of work	:	Electrification
4	Time of completion	:	15 (Fifteen) days
5	Cost of Tender Documents	:	Rs.800/- including GST
6	EMD	:	Rs.8,800/-
7	Issue of tender documents	:	To be downloaded from the website www.cemuttathara.org
8	Last date and time of submission of tender	:	13.11.2018 up to 1.00 PM – online submission
9	Date and Time of opening of tender	:	13.11.2018 at 3.00PM

The details of the work, plan, tender conditions and documents can be downloaded and submitted to Principal, College of engineering Muttathara through the Speed post/Person from 30.10.2018. For any further details or clarification, the Assistant Engineer, College of Engineering Muttathara may be contacted. The Principal reserves the right to reject any or all the tenders without assigning any reason therefore and his decision is final and binding.

**Sd/-
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I – GENERAL

Name of Work : **Electrification work for providing computers and installing 10KVA UPS at Computer lab of College of Engineering, Muttathara**

Time of Completion : 15 (Fifteen) days

All communications shall be addressed to the Principal, College of Engineering Muttathara in the following address by post / person

**College of Engineering Muttathara (CAPE)
St. Sebastian Church Road,
Near BSF Sector Headquarters,
Vallakadavu P.O.Trivandrum-695 003
Ph- 0471-2500211**

**Sd/-
Principal**

Thiruvananthapuram
Dated 29.10.2018

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II- DETAILS OF TENDER

Name of Work : Electrification work for providing computers and installing 10KVA UPS at Computer lab of College of Engineering, Muttathara

Competitive tenders quoting percent rate are hereby invited by the Principal, College of Engineering Muttathara for the above-referred work.

1. The contract documents consisting of Technical specification, Bills of Quantities to be duly signed on every page by the bidder shall be submitted to the Principal. The time allowed for the work is 15 (**Fifteen**) days from the date of execution of agreement.
2. The tender shall be accompanied by registration cost of **Rs.800/-**.and Earnest Money deposit for **Rs.8,800/-** .The payment shall be made in the form of Demand draft payable at Trivandrum.
3. The successful tenderer shall furnish a Performance Guarantee (security deposit) calculated at 5 percent of the Contract Value.
4. The Tenderer shall submit his tender only after carefully examining the whole tender documents and the conditions thereof.

This notice, the conditions of tender and the duly completed form of tender will inter alia form part of the agreement to be executed by the tenderer with the Principal.

**Principal
College of Engineering Muttathara**

- Note:*
1. *Detailed notice inviting tender deemed as part of Contract and agreement.*
 2. *Guarantee period of the work is 12 (Twelve) months from the date of completion.*
 3. *Defects if any noticed within the guarantee period from the date of completion will be got rectified by the Contractor at his own cost.*

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III- FORM OF COVERING LETTER

To

**The Principal,
St. Sebastian Church Road,
Near BSF Sector Headquarters,
Vallakadavu P.O. Trivandrum-695 003
Ph- 0471-2500211**

**Sub: Electrification work for providing computers and installing 10KVA UPS
at Computer lab of College of Engineering, Muttathara**

Sir,

1. Having examined the above tender details along with the specifications relating to the above subject work and the general conditions therein referred to, we hereby offer to carry out the work described in the said specification and general conditions for the sums and percentage rates quoted in the tender submitted herewith.
2. I/We hereby undertake to complete the work envisaged in accordance with contract conditions within the time specified in the tender.
3. I/We hereby guarantee the accuracy and correctness of particulars entered into the tender submitted by me/us.

Signature of Tenderer

(Name, Tittle and Position)

Address:

Place:

Date:

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NOTICE INVITING TENDER

Name of work: Electrification work for providing computers and installing 10KVA UPS at Computer lab of College of Engineering, Muttathara

Sealed Percentage rate quoting tenders are invited on behalf of College of Engineering Muttathara (THE OWNER) for the Electrification work for providing computers and installing 10KVA UPS at Computer lab of College of Engineering, Muttathara from eligible Electrical Contractors possessing appropriate class of registration in CPWD/Kerala PWD or Railways for executing this work. The details of contract together with the estimate cost are given under

- 1.01 Owner /Employer - Principal, College of Engineering Muttathara
- Engineer - Assistant Engineer (Electrical), Muttathara
- Site Engineer - Assistant Engineer,
College of Engineering, Muttathara

1.02 The Project contract mainly include the following

SL. No	Description of main construction	Estimate cost
	Electrification work for providing computers and installing 10KVA UPS at Computer lab of College of Engineering, Muttathara	Rs.3,48,201/-

Broad scope and salient features of work

The project is for Electrification work for providing computers and installing 10KVA UPS at Computer lab of College of Engineering, Muttathara

The Electrification work for providing computers and installing 10KVA UPS at Computer lab of the College at ground floor of administrative block .The estimate is prepared based mainly on DSR 2014 with Cost index 46.67% (Trivandrum)

- 1.04** The general information on the project may be found from the bidding document. The information is only indicative. The tenderers must visit the site and familiarize themselves with the site conditions, availability of construction materials, etc., before quoting. The drawings, conditions of contract, schedule of quantities and the specifications may be carefully studied before they offer their prices. No claims for extra compensation over and above the quoted rates will be entertained by THE OWNER on the ground that the tenderer have misjudged site

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conditions, tender conditions or any item of tender. The tender documents will be available from the website of www.cemuttathara.org from 30.10.2018.

1.06 The priced tender documents signed and complete in all respects shall be submitted through the portal www.cemuttathara.org on or before 1.00 pm on 13.11.2018. Any tender received after the due time on this date will be summarily rejected. It may be noted that separate Submission of details, explanatory notes, any relevant documents etc. will not be entrained.

1.7 Tender should be submitted by speed post/Person enclosing the following contents:

1.8

1. **Registration cost may be paid in the form of D.D submitted along with tender document.**
2. **Earnest Money may be paid in the form of D.D .**
3. **Duly signed Tender documents**
4. **Preliminary agreement duly filled and signed in stamp paper worth Rs.200/-**
5. **Duly signed and stamped Price Bid only, without any conditions.**
6. **Schedule of Quantities with percentage quoted duly filled and signed on each page and stamped by the tenderer along with quoted page of tender schedule.**

1.08.

01 Tender will be opened in the presence of tenderers or their authorized representatives who are present at 3.00 pm on 13.11.2018 at College of Engineering muttathara

THE OWNER reserves the right to reject any bid without assigning any reasons.

.02 Subject to THE Owner's right to accept any tender and reject any or all tenders; the work will be awarded to the tenderer whose bid has been determined to be substantially responsive to the tender documents and who has offered the lowest Evaluated Tender Price provided further that the tenderer has the capability and resources to carry out the contract effectively.

.03 Prior to the expiry of the period of validity of the tender THE OWNER will notify the successful tenderers in writing their name the sum which THE OWNER will pay to the contractor in consideration of the execution, completion, operation, defect maintenance and guarantee of the work by the contractor as specified by the contract (hereinafter called the contract price). This letter of acceptance will constitute the formation of a contract.

.04 The tenderer shall make a security deposit as given in clause 1.11 of this notice and furnish the same for the proper fulfillment of the contract and shall execute an agreement for the work in required non-judicial stamp paper in the format given as "Articles of Agreement" within 7 (Seven) days from the date of award of communication (selection notice). Further time of 10 (Ten) days shall be allowed to execute agreement on realizing a fine of 1% of the PAC subject to minimum of Rs.500/- and maximum of Rs.15,000/-. The tenders will be rejected if agreement

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is not executed within 15 (Fifteen) days and work will be awarded to the next lowest tenderer or rearranged as per rules.

- .05 If the tenderer fails to execute the agreement as stated above within the specified period, the earnest money deposit shall be forfeited to THE OWNER and the work will be arranged through the 2nd lowest tenderer or retendered as the case may be.
- 06 Tenders not properly filled, mutilated with incorrect calculations or generally not complying with the conditions are susceptible shall be rejected.
07. The rate quoted as percentage rate will be deemed to include the cost of all materials, labour, hire charges for all machinery, cost of fuel, power, all leads and lifts, taxes, levies, incidental charges all overheads contingencies, profits, etc.
- .08 If the tender is made by an individual, it shall be signed with his full name and his complete address shall be given. If it is made by partnership firm it shall be signed by the authorized signatory with name and seal of the firm. **No price preference will be allowed to any Corporation/Society/firm/individual for the finalization of financial bid. There will not be any allowance to any Corporation /Society/firm/individual for the exemption of the EMD and security deposit mentioned in the tender documents.**

1.9 Instructions to applicant

Tenders in all respect shall be submitted to the Principal, CE, Muttathara by downloading the tender documents from the portal www.cemuttathara.org on or before 13.11.2018 up to 1.00 pm.

- i. No costs incurred by bidders in making this offer in providing clarification on attending discussions or site visits will be reimbursed by the employer or Engineer
- ii. Incomplete offers will be rejected
- iii. The enclosed documents should be filled in completely
- iv. Financial rate, project value of work etc, should be given in Indian Rupees only.
- v. For any clarification the Assistant Engineer, College of Engineering, Muttathara may be contacted.
- vi. If the application is made by a firm in partnership, it should be signed by all the partners of the firm, with their full name and current address or by a partner holding power of attorney for the firm by signing the application in which case a certified copy of the power of attorney shall accompany the application.
- vii. A certified copy of the partnership deed, current address of the firm and the full name and current address of the all the partners of the firm shall also accompany the application.
- viii. If the application is made by a limited company or a Ltd. corporation, it shall be signed duly by authorized person holding the power of attorney for signing the application in which case a certified copy of the power of attorney shall accompany the application of such Ltd. Company or Corporation will be required to furnish satisfactory evidence of its existences before the contract is awarded.

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- ix. The language for submission of bid should be in English/Malayalam.
- x. Copies of original documents defining the constitution of legal status, place of registration and principal place of business of the company of firm or partnership there to constituting the bidder.

1.10 EMD

- .01 Earnest Money Deposit is Rs.8,800/- and shall be submitted in form of Demand Draft along with the tender.
- .02 E.M.D. of the unsuccessful tenders will be refunded by Cheque/DD in original without any interest on finalization of the contract with the successful Tenderer.
- .03 E.M.D. deposited with THE OWNER will be forfeited,
 - i) if a bidder withdraws his bid during the period of validity specified.
 - ii) if the successful bidder fails within the time limit to sign the contract document or fails to furnish the required security deposit.

1.11 Performance guarantee (Security Deposit)

- .01 The successful tenderer on receipt of the letter of acceptance will deposit an amount equal to 5% of the value of contract within 7 days from the date of award of work.
- .02 E.M.D. of the successful tender will be refunded by Cheque without any interest on execution of agreement.
- .04 The SECURITY DEPOSIT will be released without any interest to the contractor after expiry of the defects liability period of **12 (Twelve)** months from the date of completion.

1.12 RETENTION AMOUNT

- .01 In addition to Performance Guarantee, Security deposit for the work shall be collected by deduction from the running/final bill of the contractors @ 2.5% of the gross amount of each running and or final claim till expiry of defect liability period..
- .02 All kinds of deposits of EMD/Performance Security Deposit/Security Deposit/Retention amount will not bear any interest whatsoever.

1.13 All statutory payments in connection with the employment of the workmen for this work will be recovered from the bill

- .02 The contractor is the employer of all the workers engaged for this work and should therefore take all required registrations and pay premium correctly to labour welfare funds constituted by the Union Government and State Governments from time to time.

1.15 All statutory deductions shall be made from the amount eligible to the contractor in each part bill at current rates. The deduction towards the work contract tax

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shall be as per the prevailing rates of State Government Sales Tax Rules. Any tax omitted, to be deducted in any part bill shall be deducted in the subsequent bills/final bill. The above recovery will be altered based on subsequent government orders if any issued.

1.16 PERIOD OF VALIDITY

The tender shall remain valid for acceptance for a period **two week** from the date of opening of the tenders. If any tenderer withdraws his tender before the said period or makes any modifications in terms and conditions of the tender, then *THE OWNER* has the liberty to forfeit the said Earnest Money Deposit.

1.17 INSPECTION OF SITE

Every tenderer must inspect the site of the proposed work and acquaint himself with the site conditions of substrata, approaches, availability of raw materials, geological and weather conditions, etc., before quoting his rates. He must go through all the drawings/plan, specifications and other tender documents. Any further clarifications in the drawings and documents can be had from *THE OWNER* at the above-mentioned address.

1.18 QUANTUM OF WORK

- .01 A schedule of approximate quantities for various items accompanies this tender. It shall be definitely understood that *THE OWNER* do not accept any responsibility for the correctness or completeness of this schedule in respect of items and quantities and this schedule during the execution as necessitated at site is liable to alteration by deletions, deductions or additions at the discretion of *THE OWNER* without affecting the terms of the contract.
- .02 *THE OWNER* reserves the right to increase or decrease the quantum of work at site without assigning any reason.
- .03 Variations in the quantities put to tender will not be the basis of any claim or disputes. The rates agreed by the contractor shall hold good for any amount of variation in the quantities and no claims whatsoever will be entertained on this amount. The contractor shall carry out all works as directed by *THE OWNER* at the same agreed rates.

1.19 ALL INCLUSIVE RATES

The contractor's rate must be firm and include the cost of transportation of material to the site, royalty, all taxes and the fixing or placing in position for which the item of work is intended to be operated. The rates quoted by the contractor shall be firm throughout the contract period and there shall be no upward revision of the rates quoted by the contractor for any reasons whatsoever. It should be clearly understood that any claims for extra Sales Tax, Excise duty, construction tax or any tax or additional tax, etc., shall not be entertained in any case whatsoever once the tenders are opened. No incidental charges will be paid other than the quoted rates for finished items

1.20 INTERPRETING SPECIFICATIONS

- .01 In interpreting the specifications, the following order or decreasing importance shall be followed:

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- a. Specification mentioned in Schedule of Quantities
 - b. Special conditions of contract,
 - c. Unit Rate Specifications and Technical Specifications of CPWD
 - d. Drawings
- .02 Matters not covered by the specifications given in the contract, as a whole shall be covered by the relevant Indian Standard Codes. If such codes on a particular subject have not been framed, the decision of THE OWNER shall be final.
- 1.21 No alterations shall be made by the tenderer in the Notice Inviting Tender, Instructions to the contractors, Contract form, conditions of the contract, special conditions, drawings and specifications and if any such alterations are made or any conditions attached, the tender is liable to be rejected.
- 1.22.**
- .01 The acceptance of a tender rests with the owner/ Authorized Representative of THE OWNER who does not bind himself to accept the lowest tender and reserves to himself the authority to reject any or all the tenders received without assigning any reason(s) whatsoever.
- .02 The owner/authorized representative of THE OWNER reserves the right of accepting the whole or any of the tenders received and the tenderer shall be bound to perform the same at the rates quoted.
- 1.23** The work shall be carried out under the direction and supervision of THE OWNER/ENGINEER or their representative at site. On acceptance of the tender, the contractor shall intimate the name of his accredited representative who would be supervising the construction and would be responsible for taking instructions for carrying out the work.
- 1.24** THE OWNER/Engineer's decision with regard to the quality of the material and workmanship will be final and binding; any material rejected shall be immediately removed by the contractor and replaced by materials as per specifications and standards.
- 1.25 SUB-LETTING**
No part or whole of the contract shall be sublet without the written permission of THE OWNER nor shall transfers be made by the Power of Attorney authorizing others to carry out the work or received payment on behalf of the tenderer.
- 1.26 DEFECTS LIABILITY PERIOD**
Any defect developed within 'Defect Liability Period' of 12 months from the date of completion of work will have to be rectified by the contractor at their own cost failing which the OWNER/Engineer or their representative shall get the work done at the risk and cost of the contractor.
- 1.27 DELAYS IN COMMENCEMENT**
The contractor shall not be entitled to any compensation for any loss suffered by him on account of delays in commencing or executing the work, whatever the

cause for such delays may be including delays in procuring Government Controlled or other materials.

1.28 OCCUPATION IN PART

If THE OWNER wants to occupy areas in part, the contractor shall complete the work of these areas in conjunction with THE OWNER and hand over the same to THE OWNER without affecting any of the clauses of contract agreement.

1.29 The contractor should inspect the source of materials, their quality, quantity and availability. All materials must strictly comply with the relevant B.I.S. specifications.

1.30 The contractor must co-operate and co-ordinate with other contractors involved in other works at the site.

The contractor should note that they shall have to clear the site of vegetation, if any debris, etc. before the commencement of the work. The contractor should also keep the premises clear during the execution for the inspection of the site

1.31 PERIOD OF CONSTRUCTION

Time is the essence of this contract. The construction period shall be 15 **(Fifteen)** days. For the period of completion, the Commencement of the work shall be considered from the date of execution of agreement. The contractor shall draw a detailed schedule of programme in the form of PERT CHART/ BAR CHART on whole work, within one week of award of work and submit to THE OWNER for their approval.

1.32 Handing over the Site

After executing the agreement the contractor or his authorized persons should take over the site from the Assistant Engineer within 5 days so as to commence the work.

1.33 LIQUIDATED DAMAGES

Liquidated Damages will be levied as per KPWD rules.

1.34 CONTRACTOR'S STORE AND SITE OFFICE

Suitable area in the site of work shall be allowed to the contractor at free of cost for constructing temporary structures for storing his tools and plants, materials, site office. However, the structure will be provided by him at his own expense and he will be solely responsible for guarding his property with requisite insurance against theft, fire, etc. The contractor however will have to dismantle the sheds and vacate the land clearing all debris, construction materials etc. at his own expense after completion of work. The responsibility for safe custody of materials at work site and during transit will be vested with the contractor.

1.35. Quality control of work

The contractor shall arrange the quality control test and the quality certificate shall be handover to the Assistant Engineer(Electrical) for confirmation. The

Assistant Engineer (Electrical) should certify the quality of the work done by the contractor while recommending the each payment of the bills.

1.36 MEASUREMENT AND BILLING

- .01 The contractor or his representative shall accompany THE OWNER /Engineer or their representative in taking measurements and shall agree to the measurements taken on spot. All necessary materials shall be supplied by the contractor. The contractor shall then present his bill based upon the agreed and recorded measurements and as per the directions of THE OWNER /Assistant Engineer (Electrical). If the contractor fails to accompany THE OWNER /Engineer's representatives for measurements, then he shall be bound by the measurements taken by THE OWNER /Engineer or their representative.
- .02 Payments towards all bills will be usually made by THE OWNER within 30 (Thirty) days on presentation by the contractor. The interval for submission of two consecutive bill shall be more than 30 (thirty) days
- .03 Period of final measurement shall be maximum of one month from the time of completion of the project.

1.37 EXTRA ITEMS

- .01 Any item of work that do not find a place in the schedule of quantities, in the original tender or in the accepted tender or contract as has been directed by THE OWNER /Engineer to execute is deemed as an extra item of work. All such works that are necessary to be carried out under the direction of THE OWNER /Engineer shall be carried out by the contractor. No such variation will violate the Contract.
- .02 Extra items of work thus carried out by the contractor will be paid at the rates worked out by THE OWNER /Engineer in the following manner.
- .03 In the case of all extra items whether additional, altered or substituted, if accepted rates for identical items are provided for in the contract such rates shall be applicable.
- .04 In the case of extra items whether altered or substituted, for which similar items exists in the contract, the rates shall be derived from the original item by appropriate adjustment of cost of affected components with reference to the departmental estimated rates applied in deriving the rates for such items.
- .05 In the case of extra items, whether additional altered or substituted, for which the rates cannot be derived from similar items in the contract, and only partly from the schedules of rates, the rates for such part of items not covered in the schedule of rates shall be determined by THE OWNER/Engineer on the basis of the prevailing market rates giving due consideration to the analysis of the rate furnished by the contractor with supporting document including contractor's profit and over head. Tender Excess will not be admissible for market rate components.
- .06 In the case of extra item whether additional, altered, substituted, for which the rates cannot be derived either from similar items of work in the contract or from the departmental schedule or rates, the contractor shall within 5 days of the receipt of order to carry out the said extra item of work, communicate to the Engineer the rate which he proposes to claim for the item, supported by analysis

of the rate claimed and THE OWNER shall be within one month thereafter, determines, the rate on the basis of the market rate giving due consideration to the rate claimed by the Contractor. Tender excess will not be admissible in such cases.

1.38 The contractor shall make his own arrangement for water and electricity required for the work. THE OWNER has no responsibility for the supply of either electricity or water for the work.

1.39 INSURANCE

The contractor shall be responsible for the safety of the labour employed by him and he shall be liable to pay necessary compensation in case of accidents as per the workman's compensation Act.

1.40 This Notice Inviting Tender will form part of the tender document and also the agreement executed by the successful tenderer.

**Sd/-
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Place: Thiruvananthapuram

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SUMMARY OF NOTICE INVITING TENDER

Sl. No.	Item	Description
1	Date of submission of tender and time	13.11.2018 at 1.00 p.m
2.	Date of Opening Tender	13.11.2018 at 3.00 p.m.
3.	Firm period of the tender	Two months
4.	Cost of tender / Registration cost	Rs.800/-
5.	EMD of tender	Rs.8,800/-
6.	Security deposit	5% of contract amount (while executing agreement)
7.	Date of Execution of agreement	Within 5 days from the date of acceptance of tender (selection notice)
8.	Period of completion	15 (Fifteen) days
9.	Site handover	Within 2 days after execution of agreement
10.	Date of Completion of work	15 Days from Date of executing agreement
11	Interim payment	One bill
12	Retention	@2.5 % of the gross amount of each running and/or final bill.
13	Release of Security Deposit	On expiry of Defect liability period
14	Final measurement	Within 1 week from the date of completion
15	Defect liability period	12 months from the date of completion
16	Liquidated damages	As per PWD rules
17	Kerala workers welfare fund	1% of bill amount recovered during the payment of the bills
18	I.T	2% for firms and 1% for individuals
19	G.S.T.	As per Govt. Rule

Sd/-
Principal
College of Engineering Muttathara
St. Sebastian Church Road,
Near BSF Sector Headquarters,
Vallakadavu P.O. Trivandrum-695 003
Ph- 0471-2500211

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IV. CONDITIONS OF CONTRACT

- I. The **Contract** means the documents forming the tender and acceptance thereof and the formal agreement executed between the Principal on behalf of College of Engineering Muttathara, St. Sebastian Church Road, Near BSF Sector Headquarters, Vallakadavu P.O. Trivandrum-695 003 with the documents referred to therein including the conditions, the specifications, designs, 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.
- II. In the contract, the following expressions shall, unless the context otherwise requires, have the meanings, hereby respectively assigned to them:-
 - 1) The expression **works or work** shall, unless there be something either in the subject or context repugnant to such construction, be construed and taken to mean the works by or by virtue of the contract, contracted to be executed whether temporary or permanent, and whether original, altered, substituted or additional. The works under the scope is all works upto basement level and all works of superstructure including masonry, concrete, finishing, Electrification, plumbing and sanitary.
 - 2) The **Site** shall mean the land/or other places on, into or through which work is to be executed under the contract or any adjacent land, path or street through which work is to be executed under the contract or any adjacent land, path or street which may be allotted or used for the purpose of carrying out the contract.
 - 3) The **CONTRACTOR** shall mean the individual, firm or company, whether incorporated or not, undertaking the works and shall include the legal personal representative of such individual or the persons composing such firm or company, or the successors of such firm or company and the permitted assignees of such individual, firm or company.
 - 4) The **CONSULTANT** shall mean the individual, firm or company, whether incorporated or not, undertaking the architectural & structural consultancy and supervision and Management of the works and shall include the legal personal representative of such individual or the persons composing such firm or company, or the successors of such firm or company and the permitted assignees of such individual, firm or company
 - 5) The **Engineer-in-charge** means the Project Engineer or any other Engineer of College of Engineering Muttathara who will supervise and be in-charge of the work on behalf of CAPE.
 - 6) **Accepting Authority** shall mean Principal, College of Engineering, Muttathara.
 - 7) **Owner shall mean the Principal, CE, Muttathara.**
 - 8) **Excluded Risk** are risks due to riots (other than those on account of CONTRACTOR's employees), war (whether declared or not) invasion, act of foreign enemies, hostilities, civil war, rebellion revolution, insurrection, military or usurped power, damages from aircraft, acts of God, such as earthquake,

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lightening and unprecedented floods, and other causes over which the CONTRACTOR has no control.

- 9) **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 where the work is to be executed plus 15% to cover, all overheads and contractor's profits. Tender excess *will not be allowed* for Market rate Component
- 10) **Schedule(s)** referred to in these conditions shall mean mainly the relevant DSR 2014 with Cost index 46.67%.
- 11) **Department** means College of Engineering Muttathara which invites tenders.
- xii) **Site Order book** is a book to be maintained by the Contractor at site and produced when demanded by the Engineer in-charge to record any instruction /comments by the Engineer in-charge).
- xiii) Contract value means the value of entire work as stipulated in letter of award.
- xiv) Estimate value means the value of entire work as stipulated in the tender schedule.
3. Where the context so requires, words imparting the singular only also include the plural and vice versa. Any reference to masculine gender shall whenever required include feminine gender and vice versa.
4. Headings and marginal notes to these General Conditions of contract shall not be deemed to form part thereof nor be taken into consideration in the interpretation or construction thereof or of the contract.
5. The work to be carried out under the contract shall, except as otherwise provided in these conditions, includes all labour, materials, tools, plants, equipments and transport which may be required in preparation of and for and in 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 of 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.
6. The CONTRACTOR shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the rates and prices quoted in the schedule of quantities, which rates and prices shall except as otherwise provided cover all his obligation under the contract and all matters and things necessary for the proper completion and maintenance of the works.
7. The several documents forming the part of contract are to be taken as mutually explanatory of one another; detailed drawings being preferred to small scale

drawing, figured dimensions being preferred to scale, special conditions in preference to General conditions.

- 7.1 In the case of discrepancy between the schedule of Quantities, the specifications and/or the Drawings, the following order of preference shall be observed.
- i) Description of Schedule of Quantities.
 - ii) Particular Specification and special condition, if any
 - iii) Drawings.
 - iv) C.P.W.D Specifications
 - v) Indian Standard specifications of B.I.S.
- 7.2 If there are varying or conflicting provisions made in any one document forming part of the contract, the Accepting Authority shall be the deciding authority with regard to the intention of the documents and his decision shall be final and binding on the CONTRACTOR.
- 7.3 Any error in description, quantity or rate in schedule of Quantities or any omission there from shall not vitiate the CONTRACT or release the CONTRACTOR from the execution of the whole or any part of the works comprised therein according to drawings and specifications or from any of his obligations under the contract.
- 7.4 **Commencement and completion of work-** The work shall commence within 3 days from the date of execute of agreement and complete the whole work within **15 days** from the agreement date.
8. **Agreement-** The contractor, on acceptance of his tender by the Accepting Authority, shall sign the agreement within 2 days from the date of award of work and commence the work within 3 days from the date of agreement.
- a) The tender conditions, all the documents including drawings, if any, forming the part of tender as issued at the time of invitation of tender and acceptance thereof together with any correspondence leading thereto.
 - b) Model Rules which are applicable to KPWD for the protection of health, sanitary arrangements for workers employed by CONTRACTOR at site
 - c) CONTRACTOR's Labour Regulations of the KPWD.

MEASUREMENT BOOKS:

Conventional measurement book shall be used for recording the measurements. The Assistant Engineer (Electrical) designated for the charge of **Electrification work for providing computers and installing 10KVA UPS at Computer lab of College of Engineering, Muttathara** will be the custodian of the M-Books. The pages of these measurements books shall be serially numbered and a record of these measurements book shall be maintained in a separate register. The measurements shall be carried forward from the previous recorded measurement as per the existing procedure of Kerala PWD.

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MODE OF MEASUREMENTS :

Measurement of works shall be made as per principles adopted in Kerala PWD and ISI codes for measurement of works. The measurements shall be jointly taken by the CONTRACTOR or his representative and the Engineer-in-charge or his representative ie, Assistant Engineer (Electrical) of **Electrification work for providing computers and installing 10KVA UPS at Computer lab of College of Engineering, Muttathara** and recorded and entered in the M. Books by the Assistant Engineer (Elec). The Engineer-in-charge shall incorporate with signature changes or corrections, as may be done during the checks to the recorded measurements. Cuttings/over writing/insertions in the M.Books are not allowed after final checking.

EXTRA ITEMS:

If any extra item has to be executed at site which may be absolutely necessary for the work and which are not included in BOQ shall be executed on written orders from the Project Director/Assistant Engineer (Electrical) of CAPE. The contractor shall bring to the notice of the concerned official in advance, the requirement of extra item to be executed. The rates shall be derived from parallel items or similar items if possible or shall be derived from the reasonable existing market price plus the cost of labour plus 15 percent for contractor's overheads and profits. The CONTRACTOR shall furnish the rate analysis which supporting statements to the Owner for approval. However the CONTRACTOR shall not delay the work for finalization of the rates of the concerned item. Supplemental agreement for the extra item has to be executed for the same

BILL TO BE SUBMITTED BY THE CONTRACTOR:

Based on the quantities worked out as per the joint measurements recorded the CONTRACTOR shall submit his running and final bill in the appropriate format as followed in PWD. The CONTRACTOR shall submit as many copies of the bills as may be required for the purpose of reference and record. The bill shall be carried forward from the previous running account bill as per the existing procedure.

CONTRACTOR's Superintendence, Supervision, Technical Staff & Employees:

The CONTRACTOR shall provide all necessary superintendence during execution of the work and as long thereafter as may be necessary for proper fulfilling of the obligations under the contract.

The CONTRACTOR shall immediately after receiving letter of acceptance of the tender and before commencement of the work, intimate in writing to the Engineer-in-Charge the name(s), qualifications, experience, age, address(s) and other particulars along with certificates, of the principal technical representative to be in charge of the work and other technical representative(s) who will be supervising the work. The Engineer-in-Charge shall within 3 days of receipt of such communication, intimate in writing his approval or otherwise of such representative(s) to the CONTRACTOR. Any such approval may at any time be withdrawn and in case of such a withdrawal, the CONTRACTOR shall appoint another such representative(s) according to the provisions of this clause. Decision of the tender accepting authority shall be final and binding on the CONTRACTOR in this respect. Such a principal technical representative and

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other technical representative(s) shall be appointed by the CONTRACTOR soon after receipt of the approval from Engineer-in-Charge and shall be available at site before start of work.

All the provisions applicable to the principal technical representative under the Clause will also be applicable to other technical representative(s). The principal technical representative and other technical representative(s) shall be present at the site of work for supervision at all time when any contractual activity is in progress and also present himself /themselves, as required, to the Engineer-in-Charge and/or his designated representative to take instructions. Instructions given to the principal technical representative and other technical representative(s) shall deemed to have the same force as if these for have been given of the CONTRACTOR. The principal technical representative(s) and other representatives shall be actually available fully during all stages of execution of work recording/checking/ test checking of measurement of work and wherever so required by Engineer-in-Charge and shall also note instructions conveyed by the Engineer-in-Charge or his designated representative(s) in the order book and shall affix his/their signature in token of noting down the instructions and in of acceptance of measurements/ checked measurements/test checked measurements. The representative(s) shall not look after other work. Substitutes, duly approved by Engineer-in-Charge of the work in the manner as aforesaid shall be provided for absence of any of the representation for more than two days.

If the Engineer-in-Charge, whose decision in this respect is final and binding on the CONTRACTOR, is convinced that no such technical representation is/are effectively appointed or is/are effectively attending or fulfilling the provision of this clause, a recovery (non-refundable) shall be effected from the CONTRACTOR @ Rs.500/day of his absence and the decision of the Engineer-in-Charge as recorded in the "site order book" and measurements checked/test checked in Measurement books shall be final and binding on the CONTRACTOR. Further if the CONTRACTOR fails to appoint suitable Principal technical representative and other technical representative(s) or if such appointed persons are not effectively present or absent by more than two days without duly approved substitute or do not discharge their responsibility satisfactorily, the Engineer-in-Charge shall have powers to suspend the execution of the work until such date as suitable other representative(s) is/are appointed and the CONTRACTOR shall be held responsible for the delay so caused to the work. The CONTRACTOR should submit a certificate of employment of the technical representatives(s) and shall produce evidence if any time required by the Engineer-in-Charge.

ADDITIONAL CONDITIONS

1. The CONTRACTOR shall make arrangement for obtaining electric connections if required and make necessary payments for the same as per rules
2. Other agencies doing works related with this project will also simultaneously execute the works and the CONTRACTOR shall afford necessary facilities for the same. The CONTRACTOR shall leave such necessary holes, openings etc,

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for laying/burying in the work of pipes, cable, conduits, clamps, boxes and hooks for fan clamps etc. as may be required for other agencies. Conduits for electrical wiring/cables will be laid in a way that they leave enough space for concreting and do not adversely affect the structural members. Nothing extra over the agreement rates shall be paid for the same.

3. (a) The building work will be carried out in the manner complying in all respects with the requirements of relevant bye-laws of the authorities under the jurisdiction of which the work is to be executed or as directed by the Engineer-in-Charge and nothing extra will be paid of this account.

(b) The work of water supply, internal sanitary installations and drainage work etc. shall be carried out as per the existing regulations and the CONTRACTOR shall produce necessary completion certificate from such authorities after completion of the work, if required.

(c) Water tanks, taps, sanitary, water supply and drainage pipes, fitting and accessories should conform to specifications. The CONTRACTOR should engage licensed plumbers for the work and get the materials (fixtures/fittings) tested if required, by the authorities wherever required at his own cost.
4. The CONTRACTOR shall give a performance test of the installation(s) as per standing specification, before the work is finally accepted and nothing extra whatsoever shall be payable to the CONTRACTOR for the test.
5. Any cement slurry added over base surface (or) for continuation of concreting for better bond is deemed to have been built in the items and nothing extra shall be payable or extra cement considered in consumption on this account.
6. The CONTRACTOR shall furnish along with the tender his proposed methodology and programme of construction in comprehensive manner of executing and completing the work within the stipulated period. The programme shall consist of the various components for each part of the work stipulated to be completed and a bar chart may be submitted in this connection.
7. The CONTRACTOR shall take instructions from the Engineer-in-Charge for stacking of materials in any place. No excavated earth or building materials shall be stacked on areas where other buildings, roads, services compound walls are to be constructed.
8. Construction labour shall not be permitted (except staff for watch and ward if permitted) to stay inside the campus. The CONTRACTOR has to arrange for necessary photo identity passes for the labour for entry in to the campus. The labour movement should be restricted to the areas where work is carried out.
9. Royalty at the prevalent rates shall have to be paid by the CONTRACTOR on all the materials, collected by him for the execution of the work direct to the Revenue authority or authorized agent of the State Government concerned.

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10. The CONTRACTOR should construct proper mortar bands of lean mix for flooding with water & proper curing. In case of columns wet gunny bags shall be used for a period of two weeks.
11. Tenderers are advised to study the specifications and drawings before tendering.
12. Sample of all materials, fixtures, fittings like flooring tiles, wall tiles, doors, windows, sanitary fittings, roofing sheets etc, shall be got approved in advance from the Engineer-in-Charge before taking up the work.
13. The contractor should engage at his own cost atleast a diploma holder (Civil Engineering) for the proper execution and supervision of work costing upto 20 Lakh and one Engineering graduate and one diploma holder (Civil) for works costing above 20 Lakh and one Engineering graduate and two diploma holder for Pre-Qualification works and sufficient no. of skilled and unskilled labour according to the tenure of contract.

TESTING OF MATERIAL

The CONTRACTOR shall produce all the materials in advance so that there is sufficient time for testing and approving the material and clearance of the same before use at works. The contractor should arrange for the mandatory tests and the cost of the same has to be borne by him

Pre-cast concrete cobbles for floor: Concrete cobbles to be used in flooring shall be of hard, made out of 1:2:4 mix.

Progress Reports to be submitted by the CONTRACTOR

The CONTRACTOR shall submit weekly progress report of the work in a computerized form. The progress report shall contain the following.

1. Project information giving the broad features of the contract.
2. Introduction, giving a brief scope of the work under the contract and the broad structural or other details.
3. Construction schedule of the various components of the work through bar chart, showing the milestone targeted tasks and up to date progress.
4. Progress chart of the various components of the work through that are planned and achieved for the week as well as cumulative up to month with reasons for deviations, if any, in a tabular format.
5. Plant and machinery statement, indicating those deployed in the work , and their working status.
6. Man power statement, indicating individually the names of all the staff deployed in the work along with their designations.
7. Financial statement, indicating the broad details of all the running account payments received up to date, such as gross value of work done. Advances

taken, recoveries affected, amounts withheld, net payments, details of Cheque payments received, etc.

8. A statement showing the extra and substituted items submitted by the CONTRACTOR and the payments received against them, items pending for sanctions /decisions by the Owner, broad details of the bank guarantees, indicating their validity period, board details of the insurance policies taken by the CONTRACTOR, if any, advances received and adjusted from the department etc.
9. Periodical photographs in colour of the various items / components of the work done up to date to indicate visually the actual progress of the work.
10. Quality assurance and quality control tests conducted during the week with results thereof.
11. Other details asked for by the Engineer in charge.

The CONTRACTOR has to furnish weekly progress report, both physical and financial, as per proforma given below;

PHYSICAL

	Name of Item	Quantity as per Agreement	Quantity executed during the week	Total up to date quantity executed	Anticipated balance quantity

FINANCIAL

Total tendered amount	Amount of work done during the week	Total amount of work done up to date	Anticipated amount of balance work

The CONTRACTOR has to submit the progress report to the Engineer in-charge in triplicate by the first working day of every week as per the above proforma along with photographs of the work done during that week.

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SPECIAL CONDITIONS

1. No plot rent shall be charged for materials stocked in the specified land during the course of construction with the prior approval the engineer provided all such materials are removed after the works are completed.
2. Royalty or charges due for use of private quarries and private land shall be paid by the CONTRACTOR.
3. No labour camps shall be permitted in side the Site. Workers should be made to confine themselves to the work areas and should not wander in to the near by areas / buildings/ forests.
4. If night work is required to be carried out to fulfill the agreed rate of progress, all arrangement shall be made by the CONTRACTOR inclusive of lighting the area, necessary charges has to be paid to the concerned authority for power utilization and necessary safety measures are taken.
5. The works shall be carried as per specifications and as per best Engineering practice.
6. No variations from, additions to and omissions from in the items of work shall vitiate the contract. All such variations, additions, substitutions etc shall be decided as per the terms of the contract agreement.
7. Child Labour is strictly prohibited in the work.
8. **Water and Electricity:**

The Contractor shall have to make his own arrangement at his own cost for adequate supply of water and for electric power that may be required for in connection with the works.
9. The work shall be carried out with least hindrance to the adjoining building and offices and the CONTRACTORS will be responsible for any damages, caused to the existing fixtures, electric fitting, etc. in the course of execution and the CONTRACTOR shall make good any such, damages without any claim for extra.
10. The debris / construction waste and other waste generated from the work spot should not be thrown inside the site. All waste material should be taken out of the site or should be dumped at a place earmarked by the Engineer in charge.
11. All Electrification material should be stored only at places earmarked by the engineer in charge. Materials should not be stored in buildings that are in use. If any material stored in un-authorized location the same shall got removed at the cost of CONTRACTOR.
12. The useful vegetation inside the campus should not be damaged.
13. Drinking water requirement of the labour should be arranged by the CONTRACTOR.

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14. The labours should be instructed neither to misuse any facilities available in the various buildings nor to disturb the classes conducting in the ground floor and first floor.
15. While transporting the materials along the road, spillage of material should be avoided. If any spillage occurs the same should be got cleaned immediately without waiting for any notice from the department.

Any violation of above will attract levy of compensation on the CONTRACTOR.

Sub-Contractor's conditions:

Subcontracting:

It is preferred for the contractor not to engage in sub-contracting or subletting the work to others. In any case or so subcontracting may be allowed prior to the condition that the profile as well as the credibility of the contractor should be approved by the Architect, the Client and the project in-charge.

The client will have no direct financial dealings or commitments with the subcontractor. Moreover the sub-contractor should abide with the technical instructions issued by the Architect/Consultant/Engineer-in-charge. The Principal contractor will completely be responsible for any technical anomalies or deviations in the work executed.

Special conditions for Safety at the Site

1. No workmen below 18 years and above 70 years of age shall be engaged for a job at the site. sick and unhealthy persons should be avoided.
2. All the workmen shall undergo Safety Induction, screening before engaging them on the job. Physical fitness of the person to certain critical jobs like working at height or other dangerous locations to be ensured before engaging the person on work.
3. Smoking is strictly prohibited at the workplace.
4. Sub-contractors shall ensure adequate supervision at workplace. They shall ensure that all persons working under them shall not create any hazard to self or to co-workers. Details of Sub –Contractors engaged shall be intimated to the Project Principal/Engineer-in-charge in writing.
5. Nobody is allowed to work without wearing safety helmet. Chinstrap of safety helmet shall be always on.
6. No one is allowed to work at or more than three meters height without wearing safety belt and anchoring the lanyard of safety belt to firm support preferably at shoulder level.
7. No one is allowed to enter into workplace and work at site without adequate foot protection.

8. Usage of eye protection equipment shall be ensured when workmen are engaged for grinding, chipping, welding and gas-cutting. For other jobs as and when site safety co-coordinator insists eye protection has to be provided.
9. All excavated pits shall be barricaded & barricading to be maintained till the backfilling is done. Safe approach to be ensured into every excavation.
10. Adequate illumination at workplace shall be ensured before starting the job at night.
11. All the dangerous moving parts of the portable / fixed machinery being used shall be adequately guarded.
12. Ladders being used at site shall be adequately secured at bottom and top. Ladders shall not be used as work platforms.
13. Erection zone and dismantling zone shall be barricaded and nobody will be allowed to stand under suspended loads.
14. Horseplay is completely prohibited at workplace. Running at the site is completely prohibited, except in the case of emergency.
15. Material shall not be thrown from the height. The area shall be barricaded if required and one person shall be posted outside the barricading for preventing the tress-passers from entering the area.
16. Other than electricians with red helmet no one is allowed to carry out electrical connections, repairs on electrical equipment or other jobs related thereto.
17. All electrical connections shall be made using 3 or 4 core cables, having a earth wire.
18. Proper Earthing pits at site to be constructed. And the sensitivity must be maintained less than 1 ohm.
19. Main panel boards should have MCB's and RCCB / ELCB's (30 mA sensitivity).
20. Inserting of bare wires for tapping the power from electrical sockets is completely prohibited.
21. All major, minor accidents in the premises and to be recorded and reported to the Engineer- in- charge.
22. Scaffoldings used should be of proper construction. No inferior quality Casuarinas pole / bamboo scaffolding is permitted. It should be inspected by competent person(s) before use/concreting.
23. All tools and tackles shall be inspected before use. Defects to be rectified immediately. No lifting tackle to be used unless it is certified by the competent authority.

24. Good housekeeping to be maintained. Passages shall not be blocked with materials. Materials like bricks shall not be stacked to the dangerous height at workplace.
25. Debris, scrap and other materials to be cleared from time to time from the workplace and at the time of closing of work everyday.
26. Adequate fire fighting equipment shall be made available at workplace and persons are to be trained in fire fighting techniques with the co-ordination of site safety coordinator.
27. All the unsafe conditions, unsafe acts identified by CONTRACTOR, reported by site supervisors and / or safety personnel to be corrected on priority basis.
28. No children shall be allowed to enter the workplace.
29. All the lifting tools and tackles shall be stored properly when not in use.
30. Clamps shall be used on Return cables to ensure proper earthing for welding works.
31. Return cables shall be used for earthing.
32. All the pressure gauges used in gas cutting apparatus shall be in good working condition.
33. Connectors and hose clamps are used for making welding hose connections.
34. Proper warning boards and caution notices to be displayed at required areas inside the site.
35. All underground cables for supplying construction power shall be routed using conduit pipes.
37. Tapping of power by cutting electric cables in between must be avoided. Proper junction boxes must be used.

Workmen's Insurance

Owner shall not be liable for any payment in respect of any damages or compensation payable according to law in respect or in consequence of any accident or injury or loss of life to any workman or other person in the employment of the CONTRACTOR or any sub-contractor. The CONTRACTOR shall insure against such liability with an insurer for sum of the established norms during the entire period till completion of work.

Recovery from the CONTRACTOR

Without prejudice to the other rights of THE OWNER against the CONTRACTOR in respect of such default, HE OWNER shall be entitled to deduct from any sums payable to the CONTRACTOR the amount of any damages, compensation costs, charges and

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other expenses paid by the Owner and which are payable by the CONTRACTOR under this clause.

Delay, Compensation for Delay and Extension of Time

Time is the essence of this contract and CONTRACTOR shall complete the Work in all respects as per the contract within the date/period of completion specified. Should the CONTRACTOR feel that he will not be able to complete the work in time, he may apply for extension of Time to the Owner along with reasons and justifications there to for delays, if any.

If the contractor fails to execute the work within agreed /extended period as per the specification agreed, THE OWNER will arrange the balance through other agencies at risk and cost of the contractor.

If in the opinion and absolute discretion of THE OWNER. whose decision shall be final, conclusive and binding, the work is delayed on account of valid reasons not within the control of the CONTRACTOR; THE OWNER shall make a fair and reasonable Extension of Time for completion of the Contract subject to agreement condition and supplemental agreement for the same to be executed. The CONTRACTOR shall not make any claim for compensation or damage in relation thereto.

Defect Liability Period

The defect liability period shall be 12(**Twelve**) **months** after the date of issue of virtual completion certificate to the CONTRACTOR.

The CONTRACTOR shall be responsible to make good and remedy at his own expense any defects which may appear within the Defects Liability Period arising in the opinion of THE OWNER who shall be the final authority.

In case of default, THE OWNER may employ and pay other persons to amend and make good such defects and expenses consequent thereon or incidental thereto and shall be made good and borne by the CONTRACTOR and shall be recoverable from him.

Arbitration

No arbitration of any disputes on contracts will be allowed under any circumstances.

Law Governing the Contract

The Indian laws shall govern this contract for the time being in force.

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ADDITIONAL CONDITIONS
ADDITIONAL & PARTICULAR SPECIFICATIONS

GENERAL

The quoted rates for various items in the tender shall be inclusive of all the additional conditions and particular specifications and for adherence to all these conditions and specifications, no extra payment shall be made to the contractor. Any infringement and/or breach of these specification and condition(s) etc. shall render the contractor liable to action(s) under various clauses of the contract and such action stipulated in conditions therein.

“A” ADDITIONAL CONDITIONS

1. The Contractor shall maintain safe custody of materials brought to the site. The Contractor shall also employ necessary watch and ward establishment for the work and other purposes as required at his own cost.
2. No payment shall be made to the contractor for any damage caused during the execution of work because of cause(s) not covered. The damage to work will be made good by the contractor at his own cost, and no claim on this account shall be entertained.
3. Some restrictions may be imposed by the security staff etc. on the working and/ or movement of labour, materials etc. and the contractor shall be bound to follow all such restrictions/ instructions and nothing extra shall be payable on this account.
4. The contractor shall comply with proper and legal orders and directions of the local or public authority or municipality and abide by their rules and regulations and pay all fees and charges which he may be liable and nothing extra shall be payable on this account. The work shall be carried out without infringing on any of the local Municipal Bye-Laws.
5. The contractors shall given a performance test of the entire installations as per standard specifications before the work is finally accepted and nothing extra what so ever shall be payable to the contractor for the tests.
6. The rate for every item of work to be done under this contract shall be for all heights, depths, lengths and widths of the structure (except where specially mentioned in the item) and nothing extra will be paid on this account.
7. The contractor shall take all precautions to avoid all accidents by exhibiting necessary caution boards such as day and night boards, speed limit boards and flags, red lights and providing barriers etc. He shall be responsible for all damages and accidents caused due to negligence on his part. No hindrance shall be caused to traffic during the execution of work. No extra payment shall be paid on this account.

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B. ADDITIONAL SPECIFICATIONS

1. GENERAL

- 1.1.1.** Should there be any difference between the specifications mentioned above and the specifications given in the schedule of quantities, the later shall prevail.
 - 1.1.2.** If the specifications for any item are not available in the CPWD Specifications cited above, relevant BIS Specifications should be followed.
 - 1.1.3.** In case BIS Specifications are also not available, the decision of Engineer-in-Charge given in writing based on acceptable good engineering practice and local usage shall be final and binding on the contractor.
 - 1.1.4** Articles classified as first quality by the manufacturer shall be used unless otherwise specified.
- 12.1** In case of any difference noticed between Architectural and Structural drawings, the contractor shall obtain final decision in writing of the Engineer-in-Charge.
- 12.2** In case of any discrepancy in the item given in the schedule of quantities appended with the tender and architectural drawings relating to the relevant item, former shall prevail unless otherwise given in writing by the Engineer-in-Charge
- I.1** For items where so desired, samples shall be prepared before starting the particular items of work for prior approval of the Engineer-in-Charge and no extra payment shall be made on this account.
- I.2** Materials brought at site of work shall not be used in the work before getting satisfactory Mandatory test results. For details, relevant provisions in CPWD specification shall be referred to.
- I.2.1** Wherever it is desired to procure factory-made materials, such factory-made materials shall be procured from reputed and approved manufacturers or through their authorized dealers. The contractor shall obtain the approval from the Engineer-in-Charge of such firms prior to procurement of such factory-made materials. The Engineer-in-charge may, at any stage, inspect such factories/ manufacturing units. The contractor shall have no claim if the factory made materials brought to the site are rejected by the Engineer-in-charge in part or in full due to bad workmanship/ quality etc. even after the inspection of the manufacturing units.
 - I.2.2** The manufactured materials brought at site of work shall, in general, conform to the relevant specifications. The source for supply of the manufactured materials shall be approved by the Engineer-in-charge. The contractor shall have no claim if the manufactured materials brought to the site are rejected by the Engineer-in-charge in part or in full due to bad workmanship/ quality etc.
 - I.2.3** The preference amongst the various alternative materials available shall be as follows.
 - (a)** The materials shall be as per the Brand specified to be used in the work.
 - (b)** If the Brand specified material is not available then the material shall be ISI marked.

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- (c) If ISI marked item is not available then it should be from ISO certified Company.
- (d) If the ISI marked or ISO certified items are not available then the best available items in the market to be procured.

I.2.4 Equivalents for the various materials and the materials of approved make shall be got approved from the Engineer-in-Charge of work in writing before using them on the work.

I.2.5 The contractor shall maintain register for cement, paint and other registers as required by the Engineer-in –charge and those should be signed by the contractor or his authorised agents and the Asst. Engineer in charge of the work.

I.3 **Approval of sample work** of repetitive/ typical nature prior to general execution of work shall be as enumerated hereafter.

I.3.1.1 The work shall be so arranged to be carried out that the requirement for preparation of samples are observed and fulfilled without any detriment to the general progress of work. In other words, this will not be allowed to have any effect on the general progress of work or on any of the terms and conditions of the contract. No claims of any kind whatsoever including the claim of extension of time will be entertained due to the incorporation of this requirement.

2.13. Measurement:- As per KPWD norms.

2.14. Tolerance:- As per KPWD norms

2.15. Rate:- The rate includes the cost of materials and labour involved in all the operations described above.

TECHNICAL SPECIFICATION

SECTION I

General Requirements

1. Scope of Work:

1 General:

The scope of work shall be generally as given in the Tender Schedule and in the drawings for the electrification work. The intention of the specification, Tender Schedule and the drawings is to give finished work of approved and standard quality and all duly tested and commissioned. All minor items of details usually not shown or indicated but necessary for the completion of the system, including testing, commissioning and handing over shall deem to have been included in the work and in the rates quoted by the contractor.

2. The work is divided under following main groups:

- a. The entire internal electrification work shall be with Cu wires in concealed/in open PVC conduits with necessary accessories and switch boxes, light/fan points, power points, etc.
- b. The Supply and Erection of lighting luminaries, ceiling fans, exhaust fans etc.
- c. The complete earthing system including earthing stations, earth conductors, earth bus and their connections.
- d. Providing power supply from sub-station to the sub panels in different locations as indicated in the drawings. The complete installation, testing and commissioning of external lighting within the plot area including lighting poles, their earthing, cabling, control unit and DB, pole terminal boxes, lighting luminaries and lamps etc.

2 Liaison and Co-ordination work:

2.1 All liaison and co-ordination work with KSEB, Electrical Inspectorate or any other statutory body and agency will be contractor's responsibility and statutory expenses towards the same will be met by the owner. This liaison work will include all activities in all stages starting from making application to KSEB and/ or other agencies and up to and including release of required permanent electric connections for this project. The owners will pay the official fees, deposits and such other payments, which are to be paid in the name of the owners.

2.2 After connection of regular supply by KSEB, the installation shall be again checked by the contractor.

2.3 The contractor shall carry out all minor civil works connected with the electrical job. The contractor shall repair and make good the damages caused by him to the civil structure while executing the electrification work. The foundations for the panel board, and distribution pillars, grouting of frames in the wall, erection of D.B./switchboards on the wall etc. are all to be carried out by the contractor.

3. Abbreviations:

The following abbreviations have been used in the specifications, drawings and bill of quantities.

BIS : Bureau of Indian Standards.

SFU : Switch fuse unit.

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ISS : Indian Standard Specifications.
HRC : High Rupturing Capacity.
GI : Galvanized Iron.
MV : Medium Voltage.
LV : Low Voltage.
AMP : Amperes.
KV : Kilo Volts.
CI : Cast Iron.
MCB : Miniature Circuit Breaker.
MCCB: Moulded case circuit breaker.
ACB : Air circuit breaker.
DB : Distribution board.

E : Earth conductor.
Cu : Copper conductor.
AL : Aluminium conductor.
MSB : Main Switch board.
MS : Mild Steel
V : Volts.
KVA : Kilo Volt Ampere
SDF : Switch disconnecter fuse
TPN : Triple pole and Neutral.
SP : Single Pole.
CT : Current transformer.
DG : Diesel generator.

4. Regulations and standards:

The installation shall conform in all respects to Indian Standard code of Practice for Electrical Wiring installation IS 732-1963 and IS 2214-1963. It shall also be in conformity with the current Indian Electricity Rules, Indian Electricity Act. National Electric Code and Regulations of the Local Electrical Supply Authority is so far as these become applicable to the installation. Wherever this specification calls for a higher standard of material and/or workmanship than those required by any of the above regulations then this specification shall take precedence over the said regulations and standard. In general, the materials equipment and workmanship not covered by the above shall conform to the relevant Indian Standards.

5. Approvals and tests:

The contractor shall get approval for the work from KSEB and Electrical Inspectorate. On completion of the work the contractor shall obtain and deliver to the Consultant certificates of final inspection and approval by the local electric supply authority and electrical inspector. The consultant/client have full powers to test the materials or work or arrange to be tested by an independent agency at the electrical contractor's expense in order to prove their soundness and adequacy.

6. Actual route of cables / Conduits etc:

The locations of the DB's, light/fan points, power points and routing of the conduits, wires and cables as shown on the drawings are only indicative. Therefore the actual route and locations may differ from the plans according to the working drawings for civil construction and site conditions.

7. Drilling and cutting:

The contractor shall supply and install at his expense all secondary materials and special fittings found necessary to overcome the interference and to supply the modifications on the route of mains and conduits that are found necessary during the work, to the complete satisfaction of the owner's representative.

CONTRACTOR

PRINCIPAL

Cutting of walls or other parts of the building for the complete and proper installation of the electrical equipments shall be the responsibility of the electrical contractor. However Beams, girders and other principal structural members shall not be cut or drilled. Any damage to finished surfaces shall be made good by repair or replacement at the contractor's expense. The contractor shall possess and make use of necessary tools and equipment for cutting grooves on walls.

8. Material and equipment:

All material and equipment shall conform to the relevant standards and shall be of the approved make and design. Unless otherwise called for, only the best quality materials and equipment shall be used. The materials and equipment shall conform to relevant Indian Standards. The Contractor shall be responsible for the safe custody of all the materials and shall insure them against theft, damage by fire, earthquake etc. A list of items of materials and equipment, together with sample of each shall be submitted to the consultant. All materials of the same kind of service shall be identical and made by the same manufacturer. The Consultant shall approve any deviation to this rule.

9. Voltage:

Except for supplies to specialist equipment, the normal utilization voltages shall be 3 phase, 4 wire, 50 Hz, 415 volt between phases, 240 volt between any phase and neutral, with a solidly earthed neutral.

10. Manufacturers:

Where manufacturers have furnished specific instructions relating to the materials proposed to be used in this job, covering points not specifically mentioned in these documents, these instructions are to be followed.

Where manufacturer's names and/or catalogue numbers are given, this is an indication of the quality, standards and performance required.

11. Rating:

Rating of all items shall be appropriate for the conditions on the particular site on which the item will be used. All the equipment shall be fit for continuous work under the heaviest conditions of site and shall be rated for the following condition.

- Outdoor temperature 45⁰C
- Temperature under shade 40⁰ C

12. Inspection and testing:

The owner's representative reserves the right to request inspection and testing at manufacturer's works at all reasonable times during manufacture of items for this contract. Tests on site of complete works shall demonstrate, among other things.

1. That the equipment installed complies with specification in all particulars and is of the correct rating for the duty and site conditions.
2. That all item operate efficiently and quietly to meet the specified requirements.

3. That all circuits are correctly fused and protected and that protective devices are properly coordinated.
4. That all non-current carrying metal work is properly and safely grounded in accordance with the specifications.

The contractor shall provide all necessary instruments and labour for testing shall make adequate records of test procedures and readings, shall repeat any tests requested by the Consultant/client and shall provide test certificates signed by a properly authorized person. Such test certificates shall cover all works. If tests fail to demonstrate the satisfactory nature of the installation or any part thereof then no claims for the extra cost of modifications, replacements or retesting will be considered. The Consultant/client's decision as to what constitutes a satisfactory test shall be final. The above general requirements as to testing shall be read in conjunction with any particular requirements specified for testing and commissioning.

13. Allowance for future growth:

To allow for future increases in electric load it is desirable that all mains and DB shall be provided with spare capacity / ways. The no. of spare ways shall be discussed and finalized with the clients before placing order these materials.

14. Test certificates:

The contractor shall submit test certificates for all the electrical material/system. These shall be issued by a government recognized inspection office certifying that all equipment, materials, construction and functions are in agreement with the requirements of these specifications and accepted standards.

15. Samples and catalogues:

Before ordering the material necessary for these installations, the contractor shall submit to the Consultant/client for approval a sample of every kind of material such as cables, conductors, conduits, switches, socket outlets, boxes etc. along with the catalogues.

For big items such as switchboards the submission of shop drawings and catalogues shall be enough. After the selection by the Consultant/client the contractor shall arrange inspection and testing at the manufacturers factory or assembly shop for final approval. No material shall be procured prior to the approval of the Consultant.

16. Vendor and shop drawings:

The contractor shall prepare and submit to the consultant/client for his approval two sets of detailed drawings of all distribution boards, switch boards, outlet boxes, special pull boxes, and other like wise materials and equipments to be fabricated by the contractor or other vendor.

Before starting the work, the contractor shall submit to the Consultant for his approval in the prescribed manner, the shop/execution drawings for the entire installation, specially the main connection and junctions, the route of Conduits and cables, no and size of wires to be drawn through the conduits, location of all the outlet points and switch boards and distribution boards and any other information required

by the Consultant/client. The Consultant/client reserves the right to alter or modify these drawings if they are found to be insufficient or not complying with the established technical standards or if they do not offer the most satisfactory performance or accessibility for maintenance.

17. As built drawings:

At the completion of work and before issuance of certificate of virtual completion the contractor shall submit to the consultant/client layout drawing drawn at appropriate scale indicating the complete system “as installed”. These drawings must provide.

1. Run, location and size of conduits and inspection, junction, and pull boxes, along with the location of sockets and switches containing the light and power outlets.
2. Location and details of DB's, main switches, switchgears and other particulars.
3. A complete wiring diagram as installed and scheduled drawings showing all connection in the complete electrical system.
4. Location of all earthing stations, route and size of all earthing conductors, Route and particulars of all cables, cable chambers, RCC pipes etc.

18. Safety of materials:

The contractor shall provide proper and adequate facilities to protect all the materials and equipment including those issued by the owner against damage from any cause whatsoever.

19. Completion certificate by Contractor.

On completion of the electrical installation (or extension to an installation) the contractor countersigned by the supervisor shall furnish a certificate, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local supply authority. The contractor shall be responsible for getting the electrical installation inspected and approved by the local concerned authorities, including electrical inspector.

20. Staff:

The contractor shall employ a competent fully licensed, qualified full time electrical Engineer to direct the work at site, to receive instructions from Consultant/client and to correlate the progress of work in conjunction with all relevant requirements of the supply authority.

SECTION - II
Medium Voltage Distribution System

1. Wiring for lighting and power:

This specification covers, system and method of wiring, definition of point wiring, and supply, installation, connection, testing and commissioning of point wiring for light points, fan points, convenience socket outlet points, power socket outlet points, bell outlet points, etc. Wiring shall be with copper conductor PVC insulated wires drawn in rigid PVC conduits on walls, ceiling, etc. Wiring shall be from meter rooms to distribution boards, from DB to switch boards and from switchboard to outlet points. The method of wiring for this particular work shall be as mentioned under tender schedule.

2. System of wiring:

Medium voltage distribution system shall be applicable for wiring three phase, 4 wire, 415V, 50Hz, AC supply and single phase, 2 wire, 230V, 50Hz, AC supply. Light circuits shall be limited in any one of the three phases.

3 Applicable standards:

- | | | |
|----|--------------------|---|
| 1 | IS: 732 | Code of Practice for Electrical wiring installation (system voltage not exceeding 650 V). |
| 2 | IS: 1646 | Code of Practice for fire safety of buildings (General) Electrical Installation. |
| 3 | IS: 9537 (Part II) | Rigid steel conduits for electrical wiring. |
| 4 | IS: 694 | PVC insulated cables |
| 5 | IS: 1293 | 3 pin plugs and sockets. |
| 6 | IS: 8130 | Conductors for insulated electric cables and flexible cord |
| 7 | IE: Rules | Indian Electricity Act and Rules |
| 8 | IS: 5133 | Boxes for enclosure of electrical accessories Part 1: Steel & CI boxes. |
| 9 | IS: 371 | Ceiling roses (Second revision) |
| 10 | IS: 4615 | Switch socket outlets (non interlocking type) |
| 11 | IS: 3854 | Switches for domestic and similar purposes. |

4. General Requirements:

- 1 Before the conduits are installed the exact route shall be marked at the site for approval and the actual work shall be undertaken only after approval.
- 2 Load balancing of circuits in three-phase installation shall be planned before the commencement of wiring and shall be strictly adhered to.
- 3 Definition of point wiring:

A point shall consist of the branch wiring from the switchboard together with a switch and point control boxes as required, as far as and including the wiring accessories such as ceiling fan box or socket outlet point or suitable termination. A point shall include, in addition, the earth continuity conductor/wire from the switchboard to the earth pin/stud of the outlet/switch box.

5. Scope of work:

The medium voltage distribution system wiring shall be carried out in the under mentioned manner:

- a) Supply, installation, fixing of conduits and necessary accessories, switch boxes, outlet boxes and pull / junction boxes.
- b) Supplying and drawing of wires of required size including earth continuity wire.
- c) Supply, installation and connection of switches, sockets, cover plates, switch plates, concealed fan hook boxes / fan hooks as specified etc.
- d) The point shall be complete with the branch wiring from the switchboards to the outlet point, conduits and casing capping with accessories, control switch, socket outlet boxes, ceiling roses, batten/angle holder, connector etc.

6. Boxes:

6.1 Junction boxes:

All the boxes for junction boxes, pull boxes used in conduit wiring system shall be fabricated from 1.5 mm thick mild sheet steel with two coats of enamel paint of approved shade or powder coated as specified. The boxes shall have smooth external and internal finished surface. Separate screwed earth terminal shall be provided in the box for earthing purpose. All boxes shall have adequate no of knock out holes of required diameter for conduit entry. All PVC junction boxes shall be deep boxes.

The boxes shall be provided with a minimum of four fixing lugs located at the corners for fixing the covers. All fixing lugs shall have tapped holes to take machined brass screws. The boxes shall be sufficiently strong to resist mechanical damage under normal service conditions. Wherever different phase conductors are brought into the same enclosure, phase barriers shall be provided. The boxes shall have removable covers at top and bottom if specified.

6.2 Switch boxes and Outlet boxes:

Switch boxes to receive switches, socket outlets, power outlets, Telephone outlets and fan regulators etc. shall be 16 SWG cadmium plated GI/MS boxes as

manufactured by the switch manufacturer for erection of plate of modular type switches.

The depth of the switchboard boxes shall be 50 mm and the size shall be selected so as to accommodate required number of switches, sockets and fan regulators without overcrowding the box.

6.3 Fan Regulator:

Fan regulators shall be incorporated in the front plate of switchboard and shall form a single unit under one front plate for switches erected on GI boxes.

7 Cables

7.1 All cables / wires used for internal wiring shall be PVC insulated single core stranded conductor (FRLS) as specified and of 1100 volts grade and with copper conductors.

7.2 The conductors shall be plain annealed circular copper conductors. The minimum number and diameter of wires for circular stranded conductor shall be as per relevant IS specifications. The insulation shall be PVC compound complying with the requirements of IS specifications and the thickness of PVC insulation shall be as set out in the relevant standards.

7.3 All wires shall be colour coded as follows.

Single phase	:	Red
Three phase	:	Red, Yellow and Blue
Neutral	:	Black
Earth	:	Green on Green/Yellow (insulated)
Control (if any)	:	Grey

7.4 The wires shall be supplied in sealed coils of 100 Mts length and bear the manufacturers name, trademark, ISI mark, voltage grade etc.

7.5 Bunching of cables:

a. Wires carrying current shall be so bunched in the conduit that the outgoing and return wires are drawn into the same conduit. Wires originating from two different phases shall not be run in the same conduit.

b. The number of insulated wires/cables that may be drawn into the conduits shall be as per the following table. In any case conduits having less than 20 mm dia shall not be used.

c. Bunching of cables in conduits:

d. Max permissible no. of 1 core cables that may be drawn through different conduits:

Cable size (sq.mm)	ts (in mm)			
	20	25	32	40
1.5 (stranding)(22/. 3)	7	15	24	-
2.5 (36/. 3)	5	11	17	-
4.0 (56/. 3)	4	8	13	-
6.0 (2	4	6	7
16.0	-	3	4	6

8. Drawing of conductors:

- 8.1 No wire shall be drawn into any conduit, until all work of any nature that may cause injury to wire is completed. Care shall be taken in pulling the wires so that no damage occurs to the insulation of the wire. Before the wires are drawn into the conduits the conduits shall be thoroughly cleaned of moisture dust and dirt or any other obstruction by forcing compressed air through the conduits. The drawing and joining of copper conductor or wires shall be executed with due regard to the following precautions.
- 8.2 While drawing insulated wires into the conduits, care shall be taken to avoid scratches and kinks, which may cause breakage of conductors. There shall be no sharp bends in the conduit system.
- 8.3 Insulation shall be shaved off for a length of 15 mm at the end of wire like sharpening of a pencil and it shall not be removed by cutting it square or ringing.
- 8.4 Strands of wires shall not be cut for connecting to the terminals. The terminals shall have adequate cross section to take all the strands.
- 8.5 All looped joints shall be soldered and connected through terminal block/connectors. The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less.
- 8.6 Conductors having nominal cross-section area exceeding 2.5sq. mm shall be provided with crimping type cable sockets.
- 8.7 At all bolted terminals, brass flat washer of large area and approved steel spring washers shall be used. Brass Nuts & Bolts shall be used for all connections.
- 8.8 Only certified wiremen and cable jointers shall be employed to do jointing work.
- 8.9 For all internal wiring PVC insulated wires of 1100 volts grade shall be used. The sub-circuit wiring for point shall be carried out in looping system and no joint shall be allowed in the length of the conductors.
- 8.10 General wiring installation shall be as under.
 - a. Sub-main wiring
Wiring from meter room or main panel board to the distribution boards.
 - b. Circuit wiring

Wiring from DB's to point control boxes for lighting fan 6A sockets call bells etc. and from DB to the power sockets in the case of power wiring.

- 8.11 The sub-main wiring shall be either three phase, four wire or single phase, two-wire system. Each sub-main wiring circuit shall also have its own earth continuity wire. The no and size of earth continuity wire shall be as per detailed drawings or as specified.
- 8.12 The circuit wiring shall generally be in single-phase system. However a maximum of 3 to 4 single-phase circuits belonging to the same pole/phase could be installed in the same conduit or raceway Each circuit wiring shall be provided with suitable earth continuity conductor as per standard specifications.
- 8.13 Not more than 10 light points/fan points shall be grouped on the one lighting circuit. The load per circuit shall not exceed 800 watts. The minimum size of conductor for wiring of lighting circuit shall not be less than 1.0 Sq.mm. Power circuit wiring shall not have more than two sockets connected to one circuit.

9. Joints in wiring:

The wiring shall be by looping system, and hence all joints shall be made at main switches, distribution boards, socket outlets, lighting outlets and switch boxes only. No joints shall be made inside conduits and junction boxes. Conductors shall be continuous from outlet. For unavoidable joints due to any reason prior permission shall be obtained before making such connection. Joints by twisting conductors are prohibited.

10. Switches, sockets and accessories:

10.1 Switches(Modular):

- a. Switches shall conform to IS 3854, IS 1293, IS 6538 and IS 4615. Switches shall be single pole, single or two-way as shown on the drawings.
- b. The switches shall be rocker operated with a quite operating mechanism with bounce free snap action mechanism enclosed in an arc resistant chamber. .
- c. Switches at the same location shall be ganged to form a single unit under one cover plate. Where fan regulators are to be provided with the switchboards the same shall be incorporated.

10.2 Sockets(Modular):

- a. The sockets shall conform to IS 1293. Each socket shall be provided with control switch of appropriate rating. The sockets shall be molded type, rated for 250 volts, and either of full 6 Amp or 16 Amp, capacity, as mentioned.
- b. Sockets shall be of three-pin type, the third pin being connected to earth continuity conductor. The socket shall be flush type. The sockets installed in machine room plant room or wet/damp area shall be metal clad weatherproof type. The socket shall have fully sprung socket contacts and solid brass shrouded terminals to ensure positive electrical connections.

- c. If specified, the sockets shall be provided with automatic shutters, which open only when earth pin of the plug inserts in the socket and provided with three pin plug top suitable to the socket and of the same make as socket.
- d. All 6A sockets, 16A switched sockets, DP switches, connector boxes etc. shall be as specified and with the finishing and make same as lighting switches. These shall be erected on the boxes as specified in drawings.

10.3 Lamp holders, Ceiling roses etc.:

Accessories for light outlets such as lamp holders, ceiling roses, etc. shall be white in colour and in conformity with requirements of relevant IS specification. Ceiling roses shall be 3-plate type wherever specified. Angle and batten holder shall be erected on the junction boxes erected on wall/ceiling.

10.4 Installation of switch, socket and accessories:

- a. Connection to be made only after testing the wires for continuity /cross phase etc with the help of a megger.
- b. The switch controlling the light point or fan shall be connected on to the phase wire of the circuit and neutral shall be continuous, having no fuse or switch installed in the line except at the D.B. the third pin of the socket shall be connected to the earth continuity conductor of the circuit.
- c. Outlets shall be terminated into ceiling rose for ceiling mounted points. For other wall light points the outlets shall be connected into an angle holder. For wall plug sockets the conductors may be terminated directly into the switches and sockets.

11. Earthing:

All earthing systems shall be in accordance with IS 3043 code of practice for earthing the type and size of earthing wire shall be as specified separately and in BOQ and drawings.

12. Testing and commissioning of installation:

Before a completed installation is put into service, the testing of the installation shall be done as per IS 732.

12.1 Insulation Resistance:

- a. The insulation resistance shall be measured by applying 500 volt. megger with all fuses in places, circuit breaker and all switches closed.
- b. The insulation resistance of an installation shall be required to have a value greater than one-mega ohms.
- c. The insulation resistance shall be measured between.
 - 1 Earth to phase
 - 2 Earth to Neutral
 - 3 Phase to Neutral

12.2 Earth continuity conductors shall be tested for electrical continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance or earth leakage circuit-breaker, measured from the connection, with the earth electrode to any point in the earth continuity conductor in the completed installation and shall not exceed one ohm.

12.3 Polarity or single pole switches:

- a. A test shall be made to verify that every non-linked, single pole switch is connected to one of the phase of the supply system.
- b. In, a two-wire installation a test shall be made to verify that all non-linked single pole switches have been fitted in the same conductor throughout and such conductor shall be labeled or marked for connection to an outer or phase conductor or to the non-earthed conductor of the supply.
- c. In a three wire or four wire installation a test shall be made to verify that every non-linked single pole switch is fitted in a conductor and which shall be labeled or marked for connection to one of the outer or phase conductor of the supply.

SECTION -III

MCB DB, MCB and RCCB

1. Miniature Circuit Breaker Distribution boards:

- 1.1 Miniature circuit breaker distribution boards shall conform to IS 2675, IS 8623 and shall be suitable for operation on three phase, 4 wire, 415 V, 50 Hz, AC supply or single phase 2 wire 230 V 50 Hz, AC supply.
- 1.2 The MCB distribution board shall be in sheet steel enclosures with removable type cover with additional door for protecting accidental operation.
- 1.3 Enclosure and door shall be made out of CRCA sheet steel and powder coated and of approved shade. The interior shall be off white finish. The DB shall be totally enclosed with dust and vermin proof construction and shall be of domestic pattern. The DB boxes shall be as supplied by the original manufacturer.
- 1.4 Where distribution boards are specified to be complete with an isolator as incomer, the isolator shall be double pole for SP and N distribution boards and 4 pole for TP and N distribution boards.
- 1.5 Where distribution boards are specified to be complete with MCB + ELCB as incomer, the MCB + ELCB shall be double pole for SP and N distribution boards and 4 pole for TP and N distribution boards.
- 1.6 Bus bars shall be tinned copper. The internal connections in the DB shall be by using stranded copper conductor, PVC insulated wire with copper lugs crimped at both ends. Neutral busbar and earth busbars shall also be provided in the enclosure. Neutral busbar shall have equal rating of phase busbars.
- 1.7 Distribution boards shall be provided with circuit identification by means of directory on the front cover. Upon completion of the works, the contractor shall provide and fix accurate framed circuit lists for all distribution boards. These shall consist of Perspex envelopes, fixed securely by an approved method on the inside face of each distribution board front cover into which shall be inserted a neatly typed list of circuits, indicating the number of circuits, phase, cable, size, number of points connected, circuit rating and the loading.
The contractor, shall also provide and fix by means of brass screws tapped into the D.B. cover, labels, with black letter on a white background for all distribution boards, MCB + ELCB, Isolator etc. The engraving on the labels and the inscription on the circuit lists shall be approved by the Consultants before the work is carried out.
- 1.8 All incoming terminals shall be fully shrouded.
- 1.9 The conduit entry plates shall be removable type and shall be provided at top and bottom. All the conduits shall be properly terminated using glands, grips, check nuts, female adapters with bush etc.

- 1.10 Wiring shall be terminated properly using crimping type copper plugs/sockets. Identification ferrules shall be provided on all wires.
- 1.11 Two No. earth terminals shall be provided on each Distribution Board.

Recessed mounted DB shall be erected in the chase/cut portion of the wall. The cutting or the walls shall be done while constructing the wall and shall be of adequate size to comfortably accommodate the DB. The cut portion shall be smoothed and made plain and shall be fine finished. The DB shall be fixed in this chased portion with suitable clamps and bolts. The top cover of the DB cabinet shall be projecting out of the wall surface and free from any obstruction so as to open the same smoothly.

2. Miniature Circuit Breakers:

- 2.1 MCBs shall be manufactured in accordance with IS 8828 having a short circuit breaking capacity category 10000 Amps at both 240 volts 50Hz. and 240/415 V, 50 Hz and complying with the test requirements for both reference calibration temperatures of 20 degree C and 40 degree C. (10kA as per IS/IEC 60898-1-2002(0.5-63A))
- 2.2 All miniature circuit breakers shall be rated to withstand the fault currents of the circuits they protect without causing any interference in any other protective device associated with the distribution system. At the same time the design of the circuit breakers shall be such that, it will protect the circuit for which it is intended and not cause or allow other protective devices to operate when fault conditions apply.
- 2.3 Miniature circuit breakers shall be capable of carrying its full rated current continuously without tripping out.
- 2.4 All the miniature circuit breakers shall be fitted with a magnetic undelayed tripping mechanism.

3. Residual Current Operated Circuit Breakers (RCCB)

- 3.1 RCCBs shall be manufactured in accordance with IS 12640 and IS 8828 having a short circuit breaking and earth fault protection up to 10 KA at both 240 Volts 50 Hz and 240/415 V, 50 Hz and complying with the test requirements as per IS 2640.
- 3.2 All RCCB shall be high sensitive and calibrated rating. This means that a 30 mA sensitivity RCCB should trip when the residual current is in the range of 15 to 30 mA and a 300 mA RCCB should trip when the residual current is in the range of 150 to 300mA.
- 3.3 The RCCBs shall be truly current operated, which means that it shall be totally independent of the main voltage for tripping. RCCB must operate for nominal voltage well below the maximum safe value of 10 volts. RCCB shall interrupt the circuit within 30 millisecond at a leakage current of 30 mA.
- 3.4 RCCB shall be provided with a neutral advance mechanism. RCCB shall be functioning even in the event of failure of neutral and/or any one or two of phase supply conductor. RCCB shall be provided with trip free mechanism ensuring that

the device cannot be reclosed / resent if the fault persists. RCCB shall be functioning even in the case of interchange of load and supply side connections.

3.5 Test button shall be provided to check the correct operation of the unit.

3.6 RCCB shall be designed for a very long life of a minimum of 20,000 operations and shall be capable of withstanding inrush current of 4 to 8 times the rated current. For the proper functioning the RCCB should not require any connection of earthing on the device.

3.7 The device should have high tripping accuracy of less than 5% of rated tripping current. The RCCB shall be provided with clear indication to show whether the tripping is due to current leakage or overload/short circuit.

SECTION - IV

Earthing

1. **Scope:**

This specification covers supply of necessary materials, and erection at site, of complete earthing system including earth pits at the locations indicated, earth conductors from earth pit to the respective equipments, switchgears, pillars etc. and making connections, testing at site, commissioning and handing over.

2. **Applicable Standards:**

The entire work of earthing system, shall confirm to IS 3043, Indian Electricity Act and Rules and relevant regulations.

3. **General requirements:**

- 3.1 The earthing shall generally be carried out in accordance with the requirements of Indian Electricity Rules 1956 as amended from time to time and relevant regulations. Following IE rules are particularly applicable. IE Rule Nos. 32, 51, 61, 62, 67, 69, 88(2) & 90.
- 3.2 All earth connections shall be carefully made, visible for inspection, and the testing of individual earth electrode shall be possible.
- 3.3 All materials, fittings etc. used in earthing shall conform to IS specifications and in the absence of which the approval of competent authority shall be obtained.
- 3.4 The earthing electrode shall be at a minimum distance of 1.5 metres away from the outer face of the building wall. A minimum clearance of twice the depth of the electrode shall be maintained between two earthing stations.
- 3.5 A brick masonry chamber to facilitate easy identification and for carrying out periodical tests and inspection shall be constructed on top of the earth pit.
- 3.6 All metal conduits, trunkings, cable sheaths, HT and MV switchgears, Transformers, distribution boards, meters, light fixtures, fans, and all other metal parts forming part of the work shall be bonded together and connected to earthing network as specified.
- 3.7 Earthing system shall be mechanically robust and the joints shall be capable of retaining low resistance even after passage of fault currents.
- 3.8 Joints shall be soldered, tinned and double rivet. All the joints shall be mechanically, electrically continuous and effective. Joints shall be provided against corrosion.

4. **Earth Electrodes:**

- 4.1 The materials of earth electrode and earth conductors shall be galvanized iron unless specified otherwise in Bill of Quantities, specifications or drawings.
- 4.2 The earth electrodes shall be free from paint, enamel, grease etc.
- 4.3 The earth electrode shall be embedded as far as practicable in a moist soil and below permanent moist level.
- 4.4 The earth electrode shall not be installed in the proximity of a metal fence.

5. Types of earth electrodes:

The earth electrodes shall be either a pipe electrode or plate electrode, the details of which are as given in the following sections of specifications, drawings and BOQ.

6. Pipe electrode:

- 6.1 Pipe electrode shall consist of 2.5 meter long single piece G.I. pipe of min. 40 mm dia, as specified and shall be cut tapered at the bottom. 12mm dia. holes shall be drilled with 75 mm spacing between the holes and in a staggered manner as indicated in IS 3043.
- 6.2 The electrode shall be buried vertically in a specially prepared earth pit of size 35 cm x 35 cm and the earth pit shall be filled with alternate layers of charcoal, salt and fine washed sand for a minimum thickness of 150 mm. A funnel with wire mesh inside shall be fixed to the top of the GI pipe for watering purpose.
- 6.3 A masonry chamber with a cast iron cover hinged to the cast iron frame embedded in the top portion of the masonry shall be constructed on top of the GI pipe to house the funnel and the earth connection. The approximate size of the chamber shall be 300 mm x 300 mm and 300 mm deep.
- 6.4 The earth conductor from electrode shall be taken out of the masonry chamber through a protecting pipe embedded in the masonry.
- 6.5 The top of the masonry chamber shall be 50 mm above the finished ground level.

6.a Plate electrode:

- 6.a1 Plate electrode shall consist of GI or CI Plate of size 1200X1200X12mm as specified.
- 6.a2 The electrode shall be buried vertically in a specially prepared earth pit of size 1500x1500x600mm, earth pit shall be filled with alternate layers of charcoal, and fine washed sand for a minimum thickness of 150 mm upto 150mm above the plate. A funnel with wire mesh inside shall be fixed to the top of the GI pipe for watering purpose.
- 6.a3 A masonry chamber with a cast iron cover hinged to the cast iron frame embedded in the top portion of the masonry shall be constructed on top of the GI pipe to house the funnel and the earth connection. The approximate size of the chamber shall be 450mm x 450 mm and 450 mm deep.
- 6.a4 A test joint shall be provided mounted on the watering pipe below the funnel(the size of strip as per standards in IS 3043) with drilled holes for connecting earth leads, earth interconnection and lead from electrode.
- 6.a5 The earth lead and interconnection shall be based on the fault level calculation and all electrodes shall be interconnected.

7. Earth conductor:

All earthing conductors shall be or high conductivity copper and or GI as specified and shall be protected against mechanical injury or corrosion. The connection of earth continuity conductors or earth bus and earth electrode shall be strong and sound and shall be rigidly fixed to the walls, cable trenches, cable trays or conduits and cables by using suitable clamps made of non-ferrous metals.

8. Testing:

On completion of the entire installation, the earthing network shall be tested for their resistance to earth in accordance with IS 3043. All meters, instruments & about required for the test shall be provided by the contractor. The test results shall be submitted in triplicate to the owners for approval. The following tests shall be conducted.

- a. Earth resistance of electrodes
- b. Impedance of earth continuity conductors.
- c. Effectiveness of earthing.

SECTION - V

HT & LT (1.1 KV Grade) Cables

1. Scope:

This specification covers supply, testing at works, supply at site, installation, termination, jointing, connection, testing at site, commissioning and handing over of 11KV and 1.1 KV grade Cables.

2. System:

The 1.1 KV grade cables are to be used in underground distribution system with normal system voltage of 415 V, 50 Hz, 3 phase, 4 wire system.

3. Applicable standards:

Cables to be supplied under this specifications shall be with Copper or Aluminium conductor as specified in drawing or Bill of Quantities, PVC insulated and PVC sheathed, armored and with an outer PVC protective sheath, heavy duty type and shall conform to.

IS 1554 (Part 1) 1976.	PVC insulated electric cables.
IS 1753:	Aluminium conductors for insulated cables
IS 3961:	Recommended current ratings for cables.
IS 7098(Part 2) 1985:	11kV XLPE cables

4. General requirements:

- 4.1 All cables shall be new without any kinks or visible damage. The manufacturers name, insulating material, conductor size and voltage class shall be marked on surface of the cable at distance not exceeding 1M.
- 4.2 Procurement of cables shall be on the basis of the actual site measurements and the quantities given shall be regarded as a guide. Before procurement of the cables, the contractor shall submit the cable lengths and after approval of the same place orders for the cables.
- 4.3 Cables shall be tested at factory as per IS requirement. The tests shall incorporate routine tests, type tests and acceptance test. The certificate for type test shall be produced by the Contractor.
- 4.4 The cables shall be one of the makes mentioned in the list of approved materials and with ISI mark.
- 4.5 The cables shall be supplied and delivered at site in original cable drums with manufacturer's name, cable size, type and length all clearly indicated on each drum.
- 4.6 The unit rate shall include loading, unloading, transport, storage, handling, unwinding the cable from cable drums and laying in the cable trench or erected on cable trays etc.
- 4.7 The cables shall be laid by skilled and experienced labour.

- 4.8 Where the cable route intersects roads, streets or pathways, RCC spun pipes shall be laid in the trenches to serve as cable ducts. The pipes shall be joined by RCC spun collars. The RCC pipes shall project at least 150 mm on either side of road crossing.
- 4.9 The cable loops shall be kept at both ends of the cable length Minimum 3 metres long loop shall be provided.
- 4.10 The contractor shall take care to see that the cables received at site are apportioned to various locations to ensure maximum utilization and cable joints are avoided. This apportioning shall be got approved before the cables are cut to lengths. Straight joints are permitted only under exceptional circumstances.

5 Storage and loading, unloading of cables:

- 5.1 Cable drums shall not be stored one above the other. Sufficient space between cable drums shall be left for air circulation and the drums shall stand on battens placed directly under the flanges.
- 5.2 Cable drums shall be stored preferably on a plain ground without having any hard stones or any other sharp materials projecting above the ground surface. The drums shall be stored preferably in the shed or otherwise they shall be covered by tarpaulin.
- 5.3 Drums shall be stored and kept in such a way that bottom cable end does not get damaged.
- 5.4 Drums shall be rotated only in the direction marked on the drum.
- 5.5 Loading and unloading shall be done with material handling equipments only.

6 Cable trenches (excavated):

- 6.1 The cable trenches shall be excavated 75 cms below the finished ground level and shall have a minimum width of 350 mm for laying of single cable. When more than one cable are laid in the same trench, the width of the trench shall be increased such that the spacing between the cables is 200 mm and the end cables are at minimum 100 mm from the side of the trench. At the turning of the cable route the trench shall be dug with radius equal to 15 times the cable diameter. For 11kV cables, the trench depth is 1.2mtr.
- 6.2 The trenches shall be cut square with vertical side walls and with uniform depth. Suitable shoring and propping may be done to avoid caving in of trench walls. The floor of the trench shall be rammed and leveled. The bottom of the cable trench shall be prepared with 100 mm sand bed for laying the cables.
- 6.3 The cables shall be laid in trenches over the rollers. After the cable is laid and straightened it shall be covered with sand, and bricks shall be placed on top and at the side of the cable.
- 6.4 Wherever specified, half round RCC pipes shall be placed above the cables.
- 6.5 The cable trench then shall be refilled with excavated materials after removing the stones and other sharp materials and the refilled materials shall be compacted with light ramming.
- 6.6 Approved Cable markers made of Aluminium or CI with 15 cms crown shall be provided along the route of cables at a spacing of 25 - 30 meters and also at both ends of crossings or at the cable turning point. The class, type, No. of cables shall be indicated on markers.
- 6.7 Cable shall be laid in Hume pipes at all road crossings and in GI pipes at the wall entries or at the crossing of the drains/gutters.

7 Cable Termination. :

- 7.1 All cable terminations shall have tinned copper/aluminium compression lugs.
- 7.2 Cable termination shall be done in cable end box or in terminal box or in pillars etc. The end terminations shall be insulated with a minimum of six half lapped layers of PVC tape.
- 7.3 Cable terminations are to be made with flange type brass cable glands so as to grip inner and outer PVC sheaths and also the cable armour. Cable gland shall be bonded to the earth.
- 7.4 The cable conductor ends are to be connected by crimping tinned heavy duty copper lugs. Hydraulic crimping tool shall be used.
- 7.5 Every connection at a cable termination shall be mechanically and electrically sound and protected against mechanical damage and any vibration liable to occur shall not impose any harmful mechanical damage to the cable conductor.

SECTION - VI

Medium Voltage Distribution Panel Boards

1 Scope:

This section shall cover supply, assembly, installation, connection, testing and commissioning of medium voltage distribution panel boards as described in this specifications, drawings and schedule of quantities.

2 System:

All the medium voltage distribution panel boards shall be suitable for operation on three phase, 4 wire or single phase, 2 wire with normal system voltage of 415.240 volts, 50 Hz, A.C. supply with solidly grounded neutral system.

3 Weather condition at site:

The panel boards shall be suitable for continuous operation and designed to withstand heaviest conditions at site, which is a coastal area.

- a) Temperature range: 40 to 45° C
- b) Relative humidity : 50 to 100%
- c) Weather: Dusty

4 Applicable IS Standards:

The panel boards to be supplied under this specification shall confirm to latest editions of relevant Indian Standards and Indian Electricity rules and regulations. The following Indian Standards shall be complied with.

IS 4237 : General requirements for switch gear and control gear for voltage not exceeding 1000 V.

IS 2208 : HRC cartridge fuse links upto 610 V.

IS 2705 : Current transformers

IS 1248 : Electrical Indicating Instruments.

IS 375 : Switch gear bus-bars, main connection and auxiliary wiring, marking and arrangement for.

IS 2147 : Degree of protection provided by enclosures for low voltage switch gear and control gear.

IS 2675 : Enclosed distribution fuse boards and cutouts.

IS 2557 : Danger notice plates.

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5 General

5.1 Shop drawing:

Prior to fabrication of the panel boards, the contractor shall submit for the approval of the Engineer in charge the shop /vendor drawing and design calculations indicating type, size, short circuit rating of all the electrical components used, busbar size, internal wiring size, panel board dimension, colour, mounting detail etc. The contractor shall submit manufacturer's catalogues of the electrical components installed in the panel boards.

5.2 Inspection:

At all reasonable times during production and prior to transport of the panel boards to site, the contractor shall arrange and provide all the facilities at manufacturer's plant for inspection and testing and any state inspection agreed upon.

5.3 Test certificates:

Testing of panel boards shall be carried out at factory or at site as specified in Indian Standards in the presence of Engineer in charge. The test results shall be recorded on prescribed forms. The test certificates for the test carried out at factory or at site shall be submitted in duplicate to the Engineer in charge for approval.

6 Cubicle type panel boards:

6.1 Construction:

6.1.1 Structure:

The panel boards shall be metal enclosed sheet cubical, compartmentalized suitable for indoor or outdoor installation having dead front, floor mounting type. All M.S. sheets used in the construction of panel boards shall be 14 SWG thick for main panel and 16SWG for other panels unless specified otherwise in the item and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet steel shall be seam welded, all welding slag ground off and welding pits wiped smooth with plumber metal.

The panel boards shall be totally enclosed, completely dust and warm proof. Gaskets between all adjacent units and beneath all covers shall be provided to render the joints dust proof. All doors and covers shall be lockable and fully gasketed with foam rubber or neoprene rubber strips.

All panel and covers shall be properly fitted and secured with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with bolt and nuts. Self-threading screws shall not be used in the construction of panel boards. Suitable base channels (min size 75 mm x 75 mm x 5 mm thick) shall be provided at the bottom. A Clearance of 300 mm between the floor of the panel board and the bottom of the lower most units shall be provided. Panel boards, if necessary shall be preferable arranged in multitier formation. The panel boards shall be of adequate size with a provision of spare space (as jointly decided with EIC) to accommodate possible future additional switchgear. The size of the panel boards shall be designed in such a way that the internal space is sufficient for hot air movement, and the electrical component does not attain temperature more than 40

degree Celsius. Opening for natural ventilation shall be provided and shall have screens or grills made of brass or stainless steel wire mesh. Silica gel bags shall be placed at the bottom of every compartment. This requirement is in addition to space heater.

The panel boards shall be provided with removable sheet steel plates at top and bottom with knockout holes of appropriate size and number in conformity with the number, and size of incoming and outgoing conduits /cables.

The panel boards shall be designed to ensure maximum safety during operation, inspection, connection of cables, maintenance and repairs etc. with busbar system energised. Means shall be provided to prevent shorting of power and /or control terminals due to accidental drop of maintenance tools etc. inside the panel board. Partitions between feeder compartments, busbar chamber, cable alleys, vertical panels etc. shall be provided to take care of this aspect. The panel boards shall be sufficiently rigid to support the equipment without distortion under normal and short circuit condition; they shall be suitably braced for short circuit duty.

For buses and cables, access shall be limited from front and top only. All other equipment shall be mounted on the front side, (unless specified otherwise for any specific panel) and shall be accessible from the front. All joints and connections shall be made by cadmium plated high tensile steel bolts nuts and washers secured against loosening. The erection switchboards shall be in conformity with IE 51 (1) c

It shall be possible to insert any new cable and to connect all load side wiring with the busbar energised, without any special precautions. Opening of the busbar chamber shall be possible with special tools only. Indication lamps and meters shall not be fitted on the door of the switches or busbar chamber cover.

6.1.2 Protection class:

All the outdoor panel boards shall have protection class of IP 55 The complete board shall be double jacketed with insulation material to withstand outdoor temperature. All the indoor panel boards shall have protection class IP 52

6.1.3 Circuit compartments:

Each switch fuse units and meters shall be housed in a separate compartment and shall be enclosed on all sides. Sheet steel hinged lockable door shall be duly inter locked with breaker/switch fuse units in “ON” and “OFF” position. However it shall be possible to bypass this interlock for inspection purpose.

6.1.4 Instrument compartment:

Separate and adequate compartment shall be provided for accommodating instruments, indicating lamps, control contactors /relays, and control fuses etc. These components shall be accessible for testing and maintenance without any danger of accidental contact with live parts of the circuit breaker/switch fuse units, busbar and connections.

6.1.5 Busbar:

The busbars shall be of three-phase four wire system with separate neutral and earth bar. The busbar and interconnection between busbars and various components shall be with high conductivity, hard drawn, electrolytic copper strips.

The busbars shall be of rectangular cross section designed to withstand full load current for phase busbars and half rated current for neutral busbars and shall be extensible on either side. The busbar shall have uniform cross-section through out the length. The rating of the busbars shall be as specified in BOQ and/or drawings.

The busbars and interconnections shall be insulated with color-coded insulation tapes/covers. The busbars shall be supported on unbreakable, non-hygroscopic insulated supports at sufficiently close intervals to prevent sagging and shall effectively withstand electromagnetic stresses in the event of short circuit. The busbars shall be housed in a separate compartment. The busbar shall be isolated with 3 mm thick hylam sheet to avoid any accidental contact. All bus bar connection shall be done by drilling holes in busbars & connecting by chromium plated brass bolt and nuts. Additional cross section of bus bars shall be provided in all distribution boards to cover up the holes drilled in the busbars. Spring and flat washers shall be used for tightening the bolts. All interconnections between busbars and circuit breakers/switches and between circuit breakers/switches and cable terminals shall be through solid copper strips of proper size to carry full rated current. These strips shall be insulated with insulating tapes/covers.

6.1.6 Terminals:

The outgoing terminals and neutral link shall be brought out to a cable alley suitably located and accessible from the panel front. The current transformers for instruments metering shall be mounted on the terminal blocks. No direct connection of incoming or outgoing cables to internal components of the panel board is permitted. Only one conductor may be connected in one terminal. Adequate no of spare terminals of required size shall be left in each compartment.

6.1.7 Wireways:

A horizontal wire way with screwed covers shall be provided at the top to take interconnecting control wiring between different vertical sections.

6.1.8 Cable compartments:

Cable compartments of adequate size shall be provided for easy termination of all incoming and outgoing cables entering from bottom or top. Adequate proper supports shall be provided in the cable compartments to support cables. All outgoing and incoming feeder terminals shall be brought out to terminal blocks in the cable compartment.

6.1.9 Earthing:

Copper earth bars shall be provided for the entire length of the panel. Size of the earth busbars, unless specified otherwise in BOQ, shall be 25mm x 3mm horizontally and 25 mm x 3mm vertically in cable alleys etc. Provision shall be made for connection from this horizontal earth bar to the earth pit on both side of panel board. The earth continuity conductor of each incoming and outgoing feeder shall be connected to the vertical earth bar.

All non-current carrying parts and the framework of panel board shall be connected to this earth bar. All doors and movable parts shall be connected to earth bus with flexible copper connections. Armour of the cable shall be properly connected with earthing clamp, and the clamp shall be bonded with the earth bar.

6.1.10 Danger notice plates:

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Danger notice plates with symbol as per IS shall be provided on panel boards.

6.1.11 Fuse puller etc:

One set of fuse puller (for various amps of fuses), panel keys and special tools etc. shall be supplied with each panel board.

6.2 Indicating lamps

Panel mounting type low power consumption solid state lamps suitable for specified voltage shall be used Lamps shall be provided with suitable current limiting resistors. Lamps shall be provided with translucent lamp covers to diffuse light Lamps shall be provided with bayonet cap bulbs.

6.3 Measuring instruments:

All measuring instruments shall be square pattern moving from 90 deg. scale, 96mm x 96mm, flush mounting type. Instrument shall be of accuracy class 1 as per IS 1248 Ammeters for motor and other feeders shall be graduated for full load current of motor with a compressed scale at the end for at least 6 times full load current. The KW meter and PF meter shall be suitable to measure unbalance loads on 3-phase 4 wire system PF meter shall be in 0.5-1- 0.5 range.

6.4 Installation:

The panel boards shall be installed at the location as indicated in the drawings. The contractor shall submit for approval a shop drawing indicating room size, panel size and method of installation prior to installation.

The cubicle type panel board shall be installed on suitable foundation. Foundation shall be as per the dimensions supplied by the panel manufacturer. The foundation shall be flat and level. Suitable grouting holes shall be provided in the foundation. Suitable MS base channel shall be embedded in foundation on which the panel can be directly installed. If the panel is provided with an angle iron pedestal or base plate the same shall be grouted firmly in the floor. The panel boards shall be properly aligned and erected in plumb and bolted to the foundation by bolt parallel to the walls.

After installation of the panel boards, various components of the boards shall be checked and be put in working order. The cables laid through cable trench or on cable trays/racks etc shall be terminated on the bottom plate or top plate as the case may be by using Siemens type brass compression glands. The individual cables shall then be led through the panels to the required feeder compartments for necessary terminations. The cables shall be clamped to the supporting arrangement. The switchboard earth bus shall be connected to the local earth grid. Connection of cables shall be by crimping type Cu /Al lugs using hand operated or hydraulic crimping tool as per cable sizes.

6.5 Testing:

1) Testing at factory:

Panel boards shall be inspected at factory at pre-assembly stage and any modifications or changes as suggested shall be incorporated. The panel boards shall be again inspected and tested at the factory after assembly of all components and completion of all inter-

connections and wiring. The tests shall include all routine and type tests as per relevant ISS.

2) Testing and pre-commissioning checks at site:

Panels shall be commissioned only after the successful completion of the following tests. The tests shall be carried out in the presence of Engineer in charge.

6.6 Precommissioning checks

- 1) Check all panels are aligned in line and property erected in plumb.
- 2) All withdrawable portions shall be capable of smooth extraction and isolation
- 3) All main and auxiliary bus bar connections shall be checked and tightened.
- 4) All wiring terminations and bus bar joints shall be checked and tightened.
- 5) Wiring shall be checked to ensure that it is according to the drawing.
- 6) Before fitting the covers, all chambers, compartments, cable alleys etc. shall be checked for complete cleanliness and removal of foreign matter if any, particularly the tools used for erection, cut pieces of cable armour etc. Covers shall be properly fixed with all fixing screws in places.
- 7) All mechanical interlocks shall be checked and all fuses and links shall be inserted.
- 8) Earthing connections shall be checked.
- 9) Operational checks on all circuit breakers or switchgear shall be carried out, both mechanically and electrically to check that correct indications are provided for closed and open positions.
- 10) The panel boards will be, if required, subjected to Inspectorate inspection, checking and testing at the site and the contractor shall arrange to provide Inspectorate seals wherever required.
- 11) The panels shall be checked to ensure that moisture ingress has not taken place during transit and storage.

APPROVED MAKE OF MATERIAL FOR THE WORK

Sl.no	Items	Makes preferred
1.	LT Switches/SDF and contactors	L&T / C&S /Legrand /Seimens
2.	PVC Wires	Havells/RR Kabel/Finolex/V guard
3.	Distribution Boards	Legrand/Havells/Seimens
4.	MCCB	L&T/LEGRAND /C&S/Seimens, IndoAsian
5.	MCB & ELCB	L&T/ LEGRAND/ Gold Plus/Havells/Seimens,IndoAsian
6.	PVC Conduits	Precision/Circle Arc/Balco/Koncoal
7.	MS Conduits and accessories	BEC or Other ISI branded Products.
8.	Switches/ Modular type	Crabtree/MK/Legrand Arteor/Krest/Kraze
9.	Metal Clad sockets	Crompton/ Hensel/ Legrand/Mennekes/IndoAsian
10.	Crimping Sockets	Dowells/Jainson
11.	Ceiling Fan	Crompton/Bajaj/Havells(5 star rated)
12.	Exhaust fan	Crompton/Bajaj/Kaithan/Almonard.
13.	Light Fittings	Philips/Bajaj/Wipro/Crompton/IndoAsian
14.	LT Armoured Cables	Finolex/Vguard/Gloster/ Havells
15.	Transformer	Intrans/Resitech/Unipower
16.	Generator	Cummins/Kirloskar/Mahindra/Cooper/Perkins/FG Wilson
17.	APFC Panel	Sprague capacitor with Beleauk relay
18.	LED light fittings	Definity,Inventor,Aei,Crompton,Philips,Stan LED,Unirans,Lighting science, IndoAsian

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TO BE TYPED IN RS. 200/- KERALA STAMP PAPER

FORM OF PRELIMINARY AGREEMENT

Preliminary agreement entered into on this..... day
of.....Two thousand and eighteen between
Principal, College of Engineering Muttathara (Hereinafter called the Client)
and M/s.....

(Hereinafter called the 'Contractor') of the other part for the execution of the agreement
as well as for the execution of the work of "Electrification work for providing computers and
installing 10KVA UPS at Computer lab of College of Engineering, Muttathara ". WHEREAS,
The Principal, College of Engineering Muttathara invited tenders for work of
"Electrification work for providing computers and installing 10KVA UPS at Computer lab of
College of Engineering, Muttathara " vide notification No.....

Before commencing work or within 15 days after the date when the acceptance of
the tender has been intimated to him, the tenderer shall deposit a sum sufficient to make
up the balance of 5 percent of the probable value of contract which together with the
amount of earnest money deposit shall be treated as security for the proper fulfillment of
the same and shall execute an agreement for the work. If he fails to do this or in the case
of contracts maintain a specified rate of progress to be specified in each case in the tender
schedule, the earnest money and security deposit shall be forfeited to CAPE and fresh
tenders shall be called for or the matter otherwise deposited off. It, as a result of such
measures due to the default of the tenderer pay the requisite deposit, sign contracts or
take possession of the work, any loss to the client, results the same will be recovered
from him as arrears of revenue, but should it be a saving to CAPE, the original Contractor
shall have no claim whatever to the difference. Recoveries on this or any other account
will be made from the sum that may be due to the contractor on this or any other
subsisting contracts or under the Revenue Recovery Act, or otherwise the client may
decide.

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NOW THEREFORE THESE PRESENTS WITNESS and it is mutually agrees as follows: -

1. The terms and conditions for the said contract having been stipulated in the said tender form to which the contractor agreed a copy of which is hereto appended which forms part of this agreement, it is agreed that the terms and conditions stipulated therein shall bind the parties to this agreement except to the extent to which they are abrogated or altered by express terms and conditions herein agreed to and in which respect the express provisions herein shall supersede those of the said tender form.
2. The contractor hereby agreed and undertake to perform and fulfill all the operations and obligations connected with the execution of the said contract work viz. - work of “Electrification work for providing computers and installing 10KVA UPS at Computer lab of College of Engineering, Muttathara ” if awarded, in favour of the contractor.
3. If the contractor does not come forward to execute the original agreement after the said work is awarded and selection notice issued in his favour or commits breach of any of the conditions of the contract as stipulated in the tender as quoted above within the period stipulated therein, the client may re-arrange the work otherwise or get it done by the Company at the risk and cost of the Contractor and the loss so sustained by the client can be realized from the Contractor under the Revenue Recovery Act as if arrears of land revenue as assessed, quantified and fixed by an adjudicating authority authorized by client in this behalf taking into consideration the prevailing rates and after giving arrears due not to the contractor. The decisions taken by such authority, Officer, or officers shall be final and conclusive and shall be binding on the contractor
3. The contractor further agrees that any amount found due to the client under or by virtue of this agreement shall be recoverable from the contractor from his EMD and his properties, movable or immovable as arrears of land revenue under the provisions

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of the Revenue Recovery Act for the time being in force or in any other manner as the client may deem fit in this regard.

IN WITNESS WHEREOF Sri....., Principal, College of Engineering Muttathara for and on behalf of College of Engineering Muttathara and Sri the contractor has set their hands on the day and year first above written.

Signed by..... () in the presence of witnesses:-

- 1.
- 2.

Signed and delivered by Sri. the Contractor in the presence of witnesses:-

- 1.
- 2.

TENDER SCHEDULE

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Tender Schedule for Electrification work for providing computers and installing 10KVA UPS at Computer lab of College of Engineering, Muttathara

Sl.No	Description of item	Unit	Qty	Rate	Amount
1	Supplying and fixing 4 way prewired vertical type TP&N MCB distribution board of steel sheet for 415 Volts on surface/recess complete with loose wire box of sheet steel, dust protected, duly powder painted, inclusive of 200 Amps tinned copper bus bar, common neutral link, earth bar din bar for mounting MCB's terminal connectors for all incoming and out going circuits, duly prewired with adequate size of FRLS PVC insulated copper conductor up to the terminal connector/neutral link, earthing etc, as required (But without MCB/RCCB/Isolator) (Note: Prewired vertical type MCB TP DB is normally used where 3 phase outlets are required)		1	11588	11588
2	Supplying and fixing following way single pole and neutral sheet steel, MCB distribution board, 240 volts in surface/recess complete with tinned copper bus bar, neutral bus bar earth bar dinbar, inter connections powder painted including earthing etc. as required (But without MCB/RCCB/Isolator)				
a)	2 + 12 way / 14 way double door	Each	3	1971	5913
3	Supplying and fixing 63A, 4 pole, 415 volts, Isolator in the existing MCB DB complete with connections, testing and commissioning etc. as required.	Each	1	983	983
4	Supplying and fixing 63A, double pole, 240 volts, Isolator in the existing MCB DB complete with connections, testing and commissioning etc. as required.	Each	1	367	367
5	Supplying and fixing following ratings 240/415 volts 'C' curve, miniature circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required.				
a)	Single pole 6/10/16A	Each	23	247	5681
b)	Duble pole 32A	Each	4	673	2692
c)	Duble pole 25A	Each	2	673	1346
d)	Triple pole 32A	Each	3	1021	3063
6	Supplying, laying and clamping of 1 no.PVC insulated and PVC sheathed armoured aluminium power cable, 1.1 KV grade of the following size using clamps noted along with the cables, spacing of clamps not exceeding 60 cms, making good the damages, colour washing etc. as required.				
a)	4 x 16 sq.mm with factory made clamp	M	50	231	11550
b)	2 x 6 sq.mm with factory made clamp	M	45	157	7065

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7	Supply and making end termination with brass compression gland and aluminium legs for following size of PVC insulated and PVC sheathed/XLPE aluminium conductor cable of 1.1 KV grade as required.				
a)	4 x 16 sq.mm cable	Each	2	359	718
b)	2 x 6 sq.mm cable	Each	4	216	864
8	Earthing with G.I earth pipe 4.5 meter long, 40 mm dia including accessories and providing masonry enclosure with cover plate having locking arrangements and watering pipe etc. with charcoal/coke and salt as required.	Each	2	5758	11516
9	Supply and drawing bare earthing conductors of the following sizes along with wiring cables and giving connection as required.				
a)	3.15 mm copper conductor (10 SWG)	M	60	62	3720
b)	4.00 mm copper conductor (8 SWG)	M	50	97	4850
10	Supply and fixing of following sizes of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit as required.				
a)	20 mm	M	50	78	3900
b)	25 mm	M	10	95	950
11	Wiring for circuit/submain wiring along with earth wire with the following sizes of FRLS PVC insulated copper conductor, single core cable in surface/recessed medium class PVC conduit as required.				
a)	2x2.5 sq.mm + 1x2.5 sq.mm earth wire	M	800	192	153600
b)	2x1.5 sq.mm + 1x1.5 sq.mm earth wire	M	400	156	62400
12	Supplying and drawing following sizes of FRLS PVC insulated copper conductor, single core cable in the existing surface/recessed /PVC conduit as required.				
a)	4x6 sq.mm	M	10	311	3110
b)	3x4 sq.mm	M	10	160	1600
13	Wiring for light point/fan point/exhaust fan point / call bell point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable in surface/recessed medium class PVC conduit with modular plate, suitable G.I Box and earthing the point with 1.5 sq.mm PRLS PVC insulated copper conductor single core cable etc. as required.	Point	1	858	858
14	Supply, conveyance, installation, testing and commissioning of the following sizes of exhaust fan in the existing opening. Fixing necessary bolts and nuts, making good the damages etc. as required including giving connectons with required length of 24/0.20 mm PVC insulated and PVC sheathed 3 core round copper conductor flex wire conforming to relevant ISS				
	300/305 mm, single phase light duty exhaust fan in metal frame	Each	1	1828	1828

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15	Supplying and fixing suitable size surface box with modular plate and cover in front on surface, including providing and fixing 3 nos. of 3 pin 5/6 Amps modular socket outlet and 2 nos. of 5/6 amps modular switch, connections etc. as required.	Each	3	818	2454
16	Supplying and fixing suitable size surface box with modular plate and cover in front on surface, including providing and fixing 2 nos. of 3 pin 5/6 Amps modular socket outlet and 2 nos. of 5/6 amps modular switch, connections etc. as required.	Each	64	678	43392
17	Supplying and fixing suitable size GI box with modular plate and cover in front on surface or in recess, including providing and fixing 6 pin 5/6 & 15/16 amps modular socket out let and 15/16 Amps modular switch, connections etc. as required.	Each	1	579	579
18	Supplying and fixing 4 pole 40A isolator with enclosure	Each	1	1320	1320
19	Changes for cutting holes suitable for accommodating exhaust fans of sizes upto 305 mm sweep including plastering, colour washing etc. as required.	Each	1	294	294
				Total	348201.00
(Rupees Three lakh forty eight thousand two hundred and one only)					

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**Name of work: Electrification work for providing computers and installing
10KVA UPS at Computer lab of College of Engineering,
Muttathara**

QUOTED RATE OF THE CONTRACTOR

I/We agree to undertake to execute the work

1. At Estimate rate

2. _____ % below
estimate rates

3. _____ % above
estimate rates

Note: Score out which is not applicable

The rates may be quoted in words and figures

Signature of Tenderer

Date

**(Name, Title and position)
Address**

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