THE INSTITUTE OF COST ACCOUNTANTS OF INDIA (ICAI)

TENDER DOCUMENTS

FOR

ELECTRICAL WORKS AT

THE INSTITUTE of COST ACCOUNTANTS of INDIA (ICAI),

12, SUDDER STREET,

KOLKATA – 700 016

CONSULTANT

PARTHA DAS & ASSOCIATES

AE – 377, SECTOR-I, SALT LAKE CITY, KOLKATA- 700 064

SECTION – I

GENERAL INSTRUCTIONS

ELECTRICAL WORKS AT
AUDITORIUM IN THE INSTITUTE OF COST ACCOUNTANTS OF INDIA (ICAI),
12, SUDDER STREET, KOLKATA – 700 016

GENERAL INDEX

INSTITUTE of COST ACCOUNTANTS of INDIA (ICAI)

12, SUDDER STREET, KOLKATA – 700 016

TENDER NOTICE

Sealed tenders are invited of behalf of the Institute of Cost Accountants of India , 12, Sudder Street, Kolkata – 700 016

in the prescribed form from reputed, bonafide and resourceful contractors for Electrical works at Institute of Cost Accountants of India , 12, Sudder Street, Kolkata – 700 016.

Sl. No.	Tender No.	Name of Work	Estimated Cost (Rs.)	Completion time in months	Earnest Money (Rs.)
1.		Electrical works at Institute of Cost Accountants of India , 12, Sudder Street, Kolkata – 700 016	11,27,920.00	1	22,560.00

Earnest Money will be accepted in the form of Bank Draft drawn in favour of Institute of Cost Accountants of India payable at Kolkata. No interest will be paid in this amount of earnest money deposited by the tenderer.

Tender papers and other details will be available from 11/04/2013 to 23/04/2013.

{Pre-bid discussion will be held at the office of the Architect, AE-377, Sector – 1, (Ground floor), Salt Lake City, Kolkata 700 064 at 11 a.m. – 3 p.m. on 17/04/2013 for clarification, if any, required for quoting the price by the tenderers.}

Tender will have to be submitted in two parts: Cover-I & Cover-II separately sealed and superscribed with the name of work in the Tender Box of the Institute at 12, Sudder Street, Kolkata – 700 016.

Cover-I shall contain Earnest Money, covering letter and conditions, if any, stipulated by the tenderer together with credentials to establish experience of similar works in the last 5 years.

Cover-II shall contain the complete tender document duly filled and signed with stamp in all pages in duplicate. No condition stipulated in Cover-II other than general rebates shall be accepted.

Tenders in Cover-I & Cover-II shall again be put in a separate sealed cover. This will be received upto 3 p.m. on 24/04/2013. Cover-I will be opened at 4.30 p.m in the office of the Institute of Cost Accountants of India , 12, Sudder Street, Kolkata – 700 016 on the same date in presence of the contractors or their authorized representatives who may like to be present. Time and date of opening of Cover-II of tender will be intimated thereafter. The Institute of Cost Accountants of India reserves the right to reject any or all of the tenders received without assigning any reason thereof.

The Institute of Cost Accountants of India retains right to cancel any of the items at a later date after the contract is awarded.

INSTRUCTIONS TO TENDERER

1. Sealed Tenders are hereby invited of behalf of the Institute of Cost Accountants of India , 12, Sudder Street, Kolkata – 700 016 for Electrical work at Institute of Cost Accountants of India , 12, Sudder Street, Kolkata – 700 016. Estimated cost of work is Rs. 11,27,920.00 (Rupees eleven lakh twenty seven thousand nine hundred twenty only.)

2. Contract documents consisting of the plans, complete specifications, the schedule of quantities of the various classes of works to be done, and the set of conditions of contract may be downloaded from the

3. The site for the work is available to the Contractor in its present conditions. No space other than the above site can be made available to the contractor for site office, labour camps, storage etc.

4. Tender to be submitted on the printed form issued by the authority of the Institute of Cost Accountants of India , 12, Sudder Street, Kolkata – 700 016

5. Sealed tenders on the prescribed form are to be addressed to the Institute of Cost Accountants of India , 12, Sudder Street, Kolkata – 700 016 in two separate sealed covers containing the documents as under:

Cover – I	:	Earnest money, valid Income Tax and Sales Tax Clearance Certificates and other stipulation, if any together with credentials to establish experience of similar works in the last 5 years.
Cover – II	:	The priced tender papers along with Conditions of Contract, Technical Specifications (in duplicate). Any condition stipulated in Cover-II (Priced tender paper) will not be accepted.

The Cover I will be opened at about 4.30 P.M. on 24/04/2013 in presence of tenderers. The tenderers shall depute their authorised representative/s to be present at the time of opening. Tender without earnest money in proper form will be rejected.

The Cover II : Time and date of opening of Cover-II of tender will be intimated after opening Cover I.

6. The time allowed for the commencement of the work will be within fourteen days after date of written orders.

7. The contractors should quote in figures as well as in words the rate, and amount tendered by them. The amount for each item should be worked out and the total amount for sub section shall be given.

8. All corrections shall be attested by the initials of the tenderers with the seal of the firm. In case any discrepancy/difference is found on checking between rates quoted by the contractor in words and figures or in the amount worked out by him, the following procedure shall be followed:

   a) The rates quoted in words is final and the corresponding amount will be considered for evaluation.
   b) The decision of the Institute of Cost Accountants of India in resolving any ambiguity regarding the rates quoted will be final.
   c) Amendments as mentioned above shall be based on the tender marked “original” only.

9. All writing should be in English and legible.

10. Earnest money, amounting to Rs. 22,560.00 in the form of Bank Draft drawn in favour of Institute of Cost Accountants of India payable at Kolkata. No interest will be paid in this amount of earnest money deposited by the tenderer.

11. The acceptance of a tender will rest with the competent authority of Institute of Cost Accountants of India who does not bind themselves to accept the lowest tender, and reserves to themselves the authority to reject any or all of the tenders received without the assignment of a reason. All tenders in which any of the prescribed conditions are not fulfilled or are incomplete in any respect are liable to be rejected.

The Owner reserves the right to accept the tender in full or in part and the tenderer shall have no claim for revision of rates or other conditions if his tender is accepted in parts.

12. Canvassing in connection with tenders is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection.

13. **Deleted**

14. On acceptance of the tender, the name of the accredited representative(s) of the contractor who would be responsible for taking instructions from the Owner/Consultant shall be communicated to the Employer.

15. Special care should be taken to write the rates in figures as well as in words and the amounts in figures only. The total amount should be written both in figures and in words. In case of figures, the words 'Rs.' should be written before the figure of rupees and words 'P' after the decimal figures.

16. The owner does not bind itself to accept the lowest or any tender and reserves to itself the right of accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at the rate quoted.

17. Sales tax or any other tax on material or on finished works like work's contract tax, Turnover Tax, etc. in respect of this contract shall be payable by the contractor and the owner will not entertain any claim whatsoever in this respect. All taxes, duties, cess etc. should be included in their rates. Any tax, cess etc. levied during the pendency of the contract, the same shall be borne by the contractor and no claim whatsoever in this regard will be entertained. **Service tax shall be paid separately by the Owner as per prevailing norms during the payment.**

18. **Deleted**

19. The tender for works shall remain open for acceptance for a period of 90 days from the date of opening of tenders. If any tenderer withdraws his tender before the said period, then the owner shall be at liberty to forfeit Earnest Money paid along with the tender.

20. It will be obligatory on the part of the tenderer to tender and sign the tender documents in totality and the successful tenderer will have to enter into an agreement for the tendered work with the competent authority.

21. The appointed contractor must co-operate with other agencies appointed by the owner who will be working at the same site for different work for timely completion of the work.

22. The notification of award of contract will be made in writing to the successful tenderer by the owner.

Convener, Purchase Committee

_____

For Institute of Cost Accountants of India

FORM OF TENDER (To be filled up by the Tenderer)

To,
The Institute of Cost Accountants of India,
12, Sudder Street,
Kolkata – 700 016

Dear Sir,

Re.: Electrical work in Institute of Cost Accountants of India,
12, Sudder Street, Kolkata – 700 016

1. I/We refer to the tender notice issued by the Institute of Cost Accountants of India in connection with the above.
2, I/We do hereby offer to perform, provide, execute, complete and maintain the works in conformity with the drawings, conditions of contract, specifications, bill of quantities for the sum of Rs. 11,27,920.00 at the respective rates quoted in the bill of quantities.
3. I/We have satisfied myself/ourselves as to the site conditions, examined the drawings and all aspects of the tender conditions, subject to above, I/We do hereby agree & quote accordingly.
   a) Abide by and fulfil all the terms and provisions of the said conditions annexed hereto;
   b) Complete the works within the stipulated time as per the tender provision in two or three shifts if considered necessary by the Employer/Consultant at no extra cost to the Employer.
4. I/We have deposited the earnest money of Rs. 22,560.00 (Rupees twenty two thousand five hundred sixty only) in the form of Bank Draft, I/we note, will not bear any interest and is liable for forfeiture:

   i) If our offer is withdrawn within the validity period of acceptance.
   or
   ii) If the Contract is not executed within 15 days from the date of receipt of the letter of acceptance.
   or
   iii) If the work is not commenced within 14 days after issue of work order.
5. I/We understand that you are not bound to accept the lowest or any tender you receive.
6. Name of Partners/Directors of our Firm:
   i)
   ii)
   iii)

Yours faithfully

Signature _____

Designation _____

Name of Partner/Director of the firm authorised to sign or Name of person having power of attorney to sign the contract, (Certified true copy of the power of attorney should be attached)

Signature and address of witness :

a) Signature _____
Name _____
Address _____

b) Signature _____
Name _____
Address _____

DRAFT ARTICLES OF AGREEMENT

ARTICLES OF AGREEMENT made the __ day of _____ Two Thousand and _____between the Institute of Cost Accountants of Indi , having its Office at Institute of Cost Accountants of India , 12, Sudder Street, Kolkata – 700 016 (hereinafter called "the Owner") of the one part and _____ (hereinafter called "the Contractor") of the other part.

WHEREAS the Owner is desirous of executing the Electrical work at Institute of Cost Accountants of India , 12, Sudder Street, Kolkata – 700 016 and has caused drawings and specifications describing the works to be prepared by M/s. Partha Das & Associates, AE-377, Sector-I, Salt Lake City, Kolkata – 700 064 .

AND WHEREAS the said DRAWINGS numbered _____ to the Specifications and the Schedule of items and quantities have been signed by and on behalf of the parties hereto.

AND WHEREAS the contractor has agreed to execute upon and subject to the conditions set forth herein and Schedule of Items and quantities, General Conditions of Contract, specifications and all correspondences exchanged by or between the parties from the submission of tender till the award of work, both letters inclusive, (all of which are collectively hereinafter referred to as 'the said conditions) the works shown upon the said drawings and/or described in the said specification and included in the schedule of items and quantities at the respective rates therein set forth amounting to the sum as therein arrived at or such other sum as shall become payable thereunder (hereinafter referred to as ""he said contract amount").

NOW IT IS HEREBY AGREED AS FOLLOWS:

1. In consideration of the said contract amount to be paid at the times in the manner set forth in the said conditions, the contractor shall upon and subject to the said conditions execute and complete the work shown upon the said drawings and described in the said specifications and the schedule of items and quantities.

2. The Owner shall pay the contractor the said contract amount, or such other sum as shall become payable, at the times and in the manner specified in the said conditions.

3. The project Consultant in the said conditions shall mean the said M/s. Partha Das & Associates, AE-377, Sector-I, Salt Lake City, Kolkata – 700 064 or, in the event of their ceasing to be the Consultant for the purpose of this contract for whatever reason, such other person or persons as shall be nominated for that purpose by the Owner, provided always that no person subsequently appointed to be Consultant under this contract shall be entitled to disregard or over rule any previous decision or approval or direction given or expressed in writing by the Consultant for any time being.

4. The said conditions and Appendices thereto shall be read and considered as forming part of this Agreement, and the parties hereto shall respectively abide by, submit themselves to the said conditions and perform the agreements on their part respectively in the said conditions contained.

5. The plans, agreements and documents mentioned herein shall form the basis of this contract.

6. This contract is neither a fixed Lump Sum contract nor a piece work contract but is a contract to carry out the work in respect of the Electrical work at Institute of Cost Accountants of India , 12, Sudder Street, Kolkata – 700 016 as per the scope described and to be paid for according to actual measured quantities at the rates contained in the Schedule of Rates and Probable quantities or as provided in the said conditions.

7. The Owner reserves to itself the right of altering the drawings and nature of the work by adding to or omitting any items of work or having portions of the same carried out without prejudice to this contract.

8. Time shall be considered as the essence of this contract and the contractor hereby agrees to commence the work on the day on which he is instructed to take possession of the site or from fourteenth day after the date of issue of formal work order as provided for in the said conditions whichever is later and to complete the entire work within 1 month subject nevertheless to the provisions for extension of time.

9. All payments by the Owner under this contract will be made only at Kolkata.

10. Any dispute arising under this Agreement shall be referred to arbitration in accordance with the stipulation laid down in the general conditions of contract.

11. That the several parts of this contract have been read by the contractor and fully understood by the contractor.

IN WITNESS WHEREOF the Owner and the Contractor has set their respective hands to these presents and two duplicates hereof the day and year first herein above written.

If the contractor is a Partnership or an Individual.

IN WITNESS WHEREOF the Owner has set Its hands to these presents through its duly authorised official and the contractor has caused its common seal to be affixed hereunto and the said two duplicates/has caused these presents and the said two duplicate hereof to be executed on its behalf, the day and year first hereinabove written.

If the Contractor is a Company.

Signature clause:

SIGNED AND DELIVERED
by the hand of Shri _____
(Name and Designation)
In the presence of

(1) _____
Address _____

(2) _____
Address _____

Witness

SIGNED AND DELIVERED BY _____
_____
in the presence of

If the party is a partnership firm or an individual should be signed by all or on behalf of all the partners.

(1) _____
Address _____

(2) _____
Address _____

Witness

The COMMON SEAL OF _____
Was hereinto affixed pursuant to the resolutions passed by Its Board of Directors at the meeting held on

If the contractor signs under its common seal, the signature clause should tally with the sealings clause in the Articles of Association

(1) _____

(2) _____

Directors who have signed this presence in token thereof in the presence of

If the contractor is signed by the hand of power of attorney whether a company or individual.

(1) _____

(2) _____

CONDITIONS OF CONTRACT

Except where provided for in the description of the individual items in the schedule of quantities and in the specifications and conditions laid down hereinafter and in the Drawings, the work shall be carried out as per standard specifications and under the direction of Owner/Consultant.

1. Interpretation

In construing these conditions, the specifications the schedule of quantities, tender and Agreement, the following words shall have the meaning herein assigned to them except where the subject context otherwise requires:

i) "Owner"/ "Employer" / : Shall mean competent authority of Institute of Cost Accountants of India , 12, Sudder Street, Kolkata – 700 016 and shall include their assignees and successors and administrators

ii) Architect / Consultant : The terms Architect / Consultant shall mean M/s Partha Das & Associates, AE-377, Sector-I, Salt Lake City, Kolkata – 700 064 or in the event of their ceasing to be the Consultant for the purpose of this contract such other person/s as the Owner shall nominate for the purpose.

iii) "Contractor": Shall mean Messrs _____ and shall include their assignees and/or successors his/their heirs and administrators.

iv) Site : The site shall mean the site where the works are to be executed as shown within boundary in border on the site plan including any building and erections thereon allotted by the Owner for the contractor's use.

v) "The Contract" : This Contract shall mean the Tender Notices, Instructions to tenders, Conditions of Contract, Special Conditions of Contract, Safety Code, Form of Tender, Technical Specifications, Schedule of Quantities to be supplied by the University, the specification, schedule of quantities and rates and the drawings attached hereto and signed.

vi) "Notice in Writing" : Or written notice shall mean a notices in written, typed or printed characters sent (unless delivered personally or otherwise proved to have been received) by registered post to the last known business address or registered office of the addressee and shall be deemed to have been received when in the ordinary course of post it would have been delivered.

vii) "Act of Insolvency" shall mean any act as such as defined by the Presidency Towns Insolvency Act, 1909 or in Provincial Insolvency Act, 1920 or any amendments of the said Acts.

viii) Drawings : The work is to be carried out in accordance with drawings, specifications, the schedule of quantities. A set of drawings is provided with the tender to give the general idea about the total construction.
All drawings relating work given to the contractor together with a copy of schedule of quantities are to be kept at site and the Owner/Consultant shall be given access to such drawings or schedule of quantities whenever necessary.
In case any detailed Drawings are necessary contractor shall prepare such detailed drawings and/or dimensional sketches there or and have it conformed by the Owner/Consultant prior to taking up such work.

ix) "The Schedule of Quantities" shall mean the schedule of quantities as specified and forming part of this contract.

x) "Priced Schedule of Quantities" shall means the schedule of quantities duly priced with the accepted quoted rates of the contractor.

2. Scope

The work consists of Air Conditioning work at Auditorium in Institute of Cost Accountants of India , 12, Sudder Street, Kolkata – 700 016 in accordance with the 'drawings' and 'schedule of quantities". The General Building, works are within the scope of this tender. It includes furnishing all materials, labour, tools and equipment and management necessary for the incidental to the construction and completion of the work. All works, during its progress and upon completion, shall conform to the lines, elevations and grades as shown on the drawings furnished by the Owner/Consultant. Should any detail essential for efficient completion of the work be omitted from the drawings and specifications it shall be the responsibility of the contractor to inform the Owner/Consultant and to furnish and install such detail with Owner's/Consultant's concurrence, so that upon completion of the proposed work the same will be acceptable and ready for use.

Owner/Consultant may in their absolute discretion issue further drawings and/or written instructions, details, directions and explanations, which are, hereafter collectively referred to as "The Owner's/Consultant's instructions" in regard to :

a) The variation or modification of the design quality or quantity of works or the addition or omission or substitution of any work.
b) Any discrepancy in the drawings or between the schedule of quantities and/or drawings and/or specification.
c) The removal from the site of any defective material brought thereon by the contractor and the substitution of any other material thereof.
d) The demolition removal and/or re-execution of any work executed by the contractor/s**.**
e) The dismissal from the work of any persons employed thereupon.
f) The opening up for inspection of any work covered up.
g) The rectification and making good of any defects under clauses hereinafter mentioned and those arising during the maintenance period (retention period).

The contractor shall forthwith comply with and duly execute any work comprised in such Owner's/Consultant' instructions, provided always that verbal instructions, directions and explanations given to the contractor's or his representative upon the works by the Owner/Consultant shall if involving a variation be confirmed in writing to the contractor/s within seven days. No work for which rates are not specifically mentioned in the priced schedule of quantities, shall be taken up without written permission of the Owner/Consultant. Rates of items not mentioned in the priced schedule of quantities shall be fixed by the Owner in consultation with the Consultant.

The contractor shall set up a field laboratory with necessary equipments for day to day testing of materials like grading of coarse and fine aggregates, silt content and bulkage of sand crushing strength of concrete etc.

Regarding all factory made products for which ISI marked products are available, only products bearing ISI marking shall be used in the work. Other products should be supplied as per the brand name mentioned in the Technical Specifications.

3. Drawings, Specifications and deviations

The drawings and specifications lay down minimum standards of equipment and workmanship. Should the tenderer wish to depart from the provisions of the specifications and drawings either on account of manufacturing practice or for any other reasons, he should clearly draw attention in his tender to the proposed points of departures and submit such complete information, Drawings and specifications will enable the merits of the deviations to be fully appreciated. In the absence of any such deviation list, it will be deemed that the tenderer is fully satisfied with the intents of the specifications and the drawings and their compliance with the statutory provisions and local codes. All deviations or departures not brought out to the notice shall be disregarded.

4. Tools and Spare parts

All the tools and tackles, scaffolding and staging required for erection and assembly of the installation covered by the contract shall be obtained by the contractor himself and shall meet the EHS requirement. All other material such as foundation bolts, nuts etc, required for the installation of the plant shall be supplied and included in the contract.

Tenderer shall include spares recommended by him for two years operation for each type of equipment covered by the specification.

5. Working and Construction drawings

The contractor shall prepare shop drawings and all work shall be according to approved working drawings. Shop drawings shall give all dimensions and shall incorporate the requirements of the owner/PROJECT MANAGERS. Approval of drawings does not relieve the contractor of his responsibility to meet the intents of the specifications. All such drawings for approval shall be submitted in 6 copies for Owner/ PROJECT MANAGERS team. In addition, the contractor shall submit manufacturer's details and get them approved before ordering. This has to be done whether the materials / equipment are one of the approved makes or not.

6. Testing and Inspection

The contractor shall carry out tests on different equipment and system in total as specified in various sections of the tender in the presence of Owner/ PROJECT MANAGERS in order to enable them to determine whether the plant, equipment and installation in general comply with the specifications. All equipment shall be tested after carrying out the necessary adjustments and balancing to establish equipment ratings and all other design conditions. The test data shall be submitted in Acceptance Test Form. Test certificates of all equipments and materials supplied will have to be submitted. A Xerox copy of the certificate to be enclosed with the delivery Challan and the original to be submitted along with the O&M manual.

The contractor should make arrangements for the testing of all the products supplied. He should provide the necessary calibrated instruments, facilities for caring out the tests such as access, ladder, man power, electrical power wiring etc., If the consultants decides to carry out any lab tests, the necessary cost of testing, transmission of samples etc., should be arranged by the tenderer.

7. Power supply

Power will be made available at 415 V 3 ph / 230 V single ph, 4 wire, 50 HZ earthed neutral system and all equipment shall be suitable for the above power supply with variation of + / -10 %. All equipment shall operate at this voltage and any equipment operating at other than this Power supply shall be provided with necessary transformer.

8. Prices

The quoted prices and unit rates shall include for the following conforming to and meeting the intents of the specifications and drawings.

a. All equipment and accessories and materials which shall be new and of specified maker quality, or if not specified, then of the best quality conforming to IS and ISI stamped unless otherwise permitted by the Employer.

b. Transport from the place or places of manufactures to the places of installation, loading and unloading, store and safe custody.

c. Any and all taxes and duties applicable at the time of award of contract by way of Letter of Intent/Work order.

d. Comprehensive Insurance against loss of materials during transit, erection and testing till the equipment/installation is commissioned and handed over.

e. Workmen's compensation for personnel deployed by the tenderer during erection and commissioning.

f. Third party liability arising out of action or lack of action of the tenderer or his representatives.

g. Special tools required for erection, operation and maintenance of the equipment, scaffolding and ladders as required.

h. Erection, testing and commissioning based on the site conditions & facilities specified under "Tenderer Basis".

i. Obtaining approvals from all statutory bodies and authorities wherever applicable before and/or after execution of the work.

j. Making 'as-built' drawings and clearance of site as specified.

k. All other items and services as pertinent to and meeting the intents of the tender documents Including drawings.

The prices shall be firm till the entire installation is handed over and shall be free from any fluctuation in the cost of raw materials and labour. Rates expressed in words shall prevail over rates expressed in figures.

The quoted rates shall be self sustaining and shall remain valid for any increase or decrease in quantity. Items with quantity given as Rate only shall also be quoted by the Vendor. Vendor shall supply the item at the quoted rate if required by Client.

9. Taxes & Duties

The unit rates and the total price shall include any and taxes and duties prevailing and updated as on the date of award of tender.
The variation (increase/decrease) in the statutory taxes and duties shall reimbursed/recovered by the Employer but the reimbursement/recovery shall be applicable only to the extent of statutory variation imposed by the government after the date of award of work. All such variation will be adjusted in prices both for increase or decrease. If taxes/duties vary between date of submission and date of final award it is the Contractor's responsibility to bring this variation to the notice of the Employer afterwards against proof of such payment. The tenderers shall indicate the quantum of all taxes, duties and octroi included in their offer.

Any statutory variation and new levies beyond the contracted delivery and completion periods shall be borne by the Contractor in all case of delay on their part in delivery of equipment and completion of the installation.

10. Completion Period

The period of completion for the work is 1 month. It shall be reckoned from the date of the Letter Of Intent/award of work. This period of completion shall strictly be adhered to. Time shall be considered as the essence of this contract. The Contractor on the instructions of the Employer shall give priority to areas which need immediate attention.

Before awarding the work the Contractor shall prepare and submit to the Employer within 7 days detailed time schedule in the form of bar chart for the completion of the work to suit the overall completion of the work specified in this tender. On acceptance of this time schedule by the Employer it shall from part of the contract. Contractor shall also prepare bar chart indicating detailed time schedule for the supply of material to site.

All materials and equipment shall be delivered according to the BAR CHART agreed . This will ensure availability of materials and equipment, even if the installation is delayed. Contract shall also prepare and submit weekly staff strength projection to the Engineer-in-charge. Daily staff list strength along with the area in which the Contractor is working must be submitted every morning to the Engineer-in-charge.

11. Extension Time

In case the physical progress of work is delayed as compared to the time schedule referred to above due to reasons which are beyond the control of the Contractor or due to force majeure conditions, or due to delays owing to other agencies, the Contractor shall apply in writing for extension for the time of completion of the work, stating clearly the reasons for the delay, period of delay and the extension of time desired. The Employer on satisfying himself that the reasons for delay are really beyond the control to the Contractor may grant extension of time for the completion of work. The Employer may reject this request if not satisfied with progress of work or if not satisfied with reasons for delay.

12. Liquidated Damages

In the event of the Contractor's failure to complete any part of the work within the scheduled period of completion or within the authorized extension granted for the completion, the Contractor shall be liable to pay to the Employer liquidated damages

13. Terms of Payment

The tender rates shall be based only on the stipulated terms of payment. The tenderers may indicate modified terms of payment, at the same time indicating the percentage impact on the basic price quoted as per the stipulated terms of payment. However, modifications in terms of payment should be avoided.

14. Certification of Payment

The Contractor shall be paid by the Employer from time to time by instalments of running bills under Interim Certificates to be issued by the Employer or Consultant to the Contractor on account of the works executed. When in the opinion of the Employer/Consultant work to the appropriate value named as "Value of Work for Interim Certificates" (or less at the reasonable discretion of Employer/Consultant) has been executed in accordance with this contract, subject however to a retention of the percentage of such value named towards security deposit until the total amount retained shall reach the sum named in the Appendix as security deposit after which the instalments shall be up to the full value of the work subsequently so executed and fixed in the building.

The Employer may at his discretion include in the Interim Certificate such amount as he may consider proper for use in the works. And when the works have been virtually completed and the Employer/Consultant shall have certified in writing that they have been completed, the Contractor shall be paid by the Employer in accordance with the terms of payment in Appendix hereto. No certificate of Architect/Consultant shall by itself be conclusive evidence, that any works or materials to which it relates are in accordance with the contract, neither will the Contractor have a claim for any amounts which may have been certified as interim and paid by the Employer and which might subsequently be discovered as not payable and in this respect the Consultant's decision shall be final and binding.

The Employer/Consultant shall have the power to withhold any certificate if the works or any parts thereof are not being carried out to his satisfaction. The Employer/Consultant may issue certificates or make any correction in any previous certificate which shall have been issued to him. No certificate of payment shall be issued by the Employer/Consultant if the Contractor fails to insure the works and keep them insured till the issue of the final certificate. The final certificate shall not be issued till the 'As –Built'
Drawings and completion documentation along with all Government approvals (if required) are submitted by the Contractor and the site is cleared.

15. Performance Guarantee and Defect Liability

The performance guarantee of all equipment and Defects Liability shall be as below

a) Performance Guarantee

All equipment and the entire installation shall be guaranteed to yield the specified ratings and design conditions plus / minus 3% tolerance. Any equipment found short of the specified ratings by more than the allowable tolerance as determined by the test readings shall be rejected and replacement shall be given within 5 working days of rejection.

b) Defects Liability

All equipment and the entire installation shall be guaranteed against defective materials and workmanship for a period of 12 months reckoned after the plant is commissioned and handed over to the clients along with the 4 sets of completion documents. In case the testing of the plant is delayed for any reason attributable to the clients, then the defects liability shall be extended for a minimum period of 6 months from the date the test readings are accepted.

During the defects liability period, the contractor shall rectify, repair or replace defective parts and components free of cost except in the cast of those, which are due to normal wear and tear.

c) Repairs / replacement of parts during guarantee

Any defects or other faults which may appear within defect liability / guarantee period of twelve months from the date of handing over the plant in a satisfactory working conditions to the Client (except for normal wear and tear) arising in the plant from material or workmanship not in accordance with the contract specification will be rectified by the contractors free of cost & nothing shall be paid extra on any account.

d) Testing

All testing instruments, Ammeter, Voltmeter, Earth Resistance testing tools, Megger, measuring steel tapes, tools, scaffolding and ladders etc., that may be required for taking measurements & Performing testing of the system and to satisfy the local Electrical authority shall be arranged by contractor at his own cost.

All types of routine and other tests shall be carried out at the works of the Contractor or the manufacturers of the components. The Client shall be free to witness any or all tests, if they so desired. The Contractor has to inform to the Client before dispatch of any material / equipment.

On the completion of the installation the Contractor shall arrange to carry out various initial tests as detailed below, in the presence of and to the complete satisfaction of the Consultants or his representative / Engineer-In-charge, any defect or short-coming found during the tests shall be speedily rectified or made good by the Contractor at his own expenses. The initial tests shall include, but, not be limited to the following:

a) To operate and check proper functioning of all electrically operated components.

b) To test and check the proper functioning of electrical gears, safety and other controls to ensure their proper functioning.

c) To check the systems against control setting and all such other tests which are essential for smooth functioning of the plant.

d) Contractor shall have to submit the capacity test of all equipment at site.

e) On the satisfactory completion of all 'Initial' tests the system shall be considered **'Virtually Complete'** for the purpose of taking over by the Client.

f) Contractor shall abide by the local Electricity rules and arrange for any type of electrical certification from local electrical authority / Govt. Department before the virtual Completion certificate.

g) Contractor Shall depute a licensed HT & LT Supervisor at site for Checking and certification of the system during & after Testing.

h) The Valid Licence copy of HT & LT inspector / Supervisor to be submitted to client along with the techno commercial offer.

e) **As built drawings**

After completion of work and before issuance of certificate of virtual completion the contractor shall submit four (04) sets to the Engineer-in-charge, layout drawing drawn at appropriate scale indicating
e complete Electrical system "as installed".

f) **Instruction / maintenance manual**

The Contractor shall prepare and produce instruction, operation and maintenance manuals in English for use, operation and the maintenance of the supplied equipment and installations, and submit to the Engineer-in-charge in (04) Four copies at the time of handing over. The manual shall generally consist of the following:

a) Description of the Project.

b) Operating instructions.

c) Maintenance instructions including procedures for preventive maintenance.

d) Manufacturers catalogues.

e) Spare parts list.

f) Trouble shooting charts.

g) Drawings.

h) Type and routine test certificates of major items.

i) One (1) set of reproducible 'as built' drawings.

16. Extra Items

The Contractor shall carry out all extra items of work incident on the job and the rates for all extra items as far as possible shall be derived from the rate of similar items in the tender. Where such rates not derivable from the tendered rates the following shall apply:

i) Official price less discounts given by the company for the materials procured and cost of actual labour involved at site plus a margin for supervision over heads, transportation and profits etc.

ii) In all cases the Contractor shall furnish detailed rate analysis long with necessary vouchers as and when asked by the Employer/Consultant. The decision of the Employer/Consultant on the validity of such claims and rates payable for such works shall be final and binding on the Contractor.

17. Site Clearance

On completion of the work the Contractor shall expeditiously arrange to clear the site of all temporary structures put up by him and all materials, tools, plant, machinery etc. brought by him for the construction work The final bill shall not be certified for payment unless the site is cleared to the satisfaction of the Employer/Architect/Consultant and 'as-built' drawings are submitted by the Contractor with all the test certificates.

During the construction period the site shall be maintained clean on a daily basis by the Contractor. However if the site is not kept clean by the Contractor the Employer reserves the right to engage independent gangs and debit the cost of such cleaning to the Contractor in proportion to their contract value.

18. Settlement of Disputes

All disputes and differences arising out of, in connection with the contract whether during the progress of work or after completion shall be referred to and settled by Arbitration by the Employer who shall nominate the concerned Consultant for hearing and settlement of dispute.

19. Jurisdiction

All matters arising out of, in any way connected with this agreement shall be deemed to have arisen in Kolkata, West Bengal and only the courts in Kolkata, West Bengal shall have jurisdiction to determine the same.

20. Termination of Contract

Failure by Contractor to comply with Consultants Instructions:

If the Contractor after receipt of written notice from the Employer/Consultant requiring compliance within seven days fails to comply with such further drawings and/or Employer/Consultant's instruction, the Employer may employ and pay other persons to execute any such work whatsoever that may be necessary to give effect thereto, and all costs incurred in connection therewith shall be recoverable from the Contractor as a debt or may be deducted by them from any money due to the Contractor.

Termination of Contractor by the Employer:

If the Contractor being an individual or a firm commits any "Act of Insolvency", or shall be adjudged an insolvent, or being an Incorporated Company shall have an order for compulsory winding up made against it or pass an effective resolution for winding up, voluntarily or subject to the supervision of the Court and the Official Assignees or the Liquidator in such acts of insolvency or winding up, as the case may be, shall within seven days after notice to him requiring him to do so, to show

to the reasonable satisfaction of the Consultant that he is able to carry out and fulfil the Contract and to give security therefore, if so required by the Consultants.

Or if the Contractor (whether an individual, firm or incorporated company) shall suffer execution or other processes of court attaching property to be issued against the Contractor.

Or shall suffer any payment under this Contractor to be attached by or on behalf of any of the creditors of Contractor.

Or shall assign or sublet this Contract without the consent in writing of the Employer first hand obtained.

Or shall charge or encumber this Contract or any payments or which may become due to the Contractor there under.

Or if the Consultant shall certify in writing to the Employer that the Contractor:
i) has abandoned the Contract, or
ii) has failed to commence the works, or has without any lawful excuse under these conditions suspended the progress of the works for seven days after receiving from the Employer notice to proceed, or
iii) has failed to proceed with the works with such due diligence and failed to make such due progress as would enable the works to be completed within the agreed upon, or
iv) has failed to remove materials from the site or to pull down and replace work for seven days after receiving from the Employer written notice that the said materials works were condemned and rejected by the Employer under these conditions, or
v) has neglected or failed persistently to observe and perform all or any of the acts, matters or things by this contract to be observed performed by the Contractor for seven days after written notice shall have been given to the Contractor requiring the Contractor to observe or perform the same.
Then and in any of the said cases the Employer may, not withstanding any previous waiver, after giving
seven days notice in writing to the Contractor, determine the contract, but without thereby affecting the power of the Employer/Consultant or the obligations and liabilities of the Contractor, the whole of which shall continue in force as full, as if the contract had not been so determined, and as if the works subsequently executed had been executed by or on behalf of the Contractor. And further, the Employer by his agents or servants may enter upon and take possession of the works and all plant, tools, scaffolding, shade machinery, and other power utensils and materials lying upon the premises of the adjoining lands or roads, and use the same as his own property or may employ the same by means of his own servants and workmen in carrying on and completing the works or by employ any other Contractor or other person or persons to complete the works, and the Contractor shall not in any way interrupt or do any act matter or thing to prevent or hinder such other Contractor or other persons or persons employed for completing and furnishing or using the materials and plant for the works, when the works shall be completed or as soon thereafter as convenient the Employer shall give a notice in writing to the Contractor to remove his surplus materials and plant, and should be Contractor fail to do so within a period of fourteen days receipt thereof by him, the Employer may sell the same by public auction, and give credit to the Contractor for the net amount realized. The Employer shall thereafter ascertain and certify in writing/typed under his hand what (if anything) shall be due or payable to, or by the Employer, for the value of the said plant and materials so taken possession of by the Employer and the expenses or loss which the Employer shall have been put to in procuring the works to be complete, and the amount, if any, owing to the Contractor and the paid by the Employer, as the case may be, and the Certificate of the Employer shall be final and conclusive between the parties.

21. Calibration of instruments and meters

Instruments required for testing shall be furnished by the contractor for testing with initial requirements of all consumables. All the instruments, meters etc to be used at site and on the system shall have a valid calibration certificate issued by the competent authority. The contractor shall maintain and make available all such calibration certificates.

22. Handing over requirements

The system shall be handed over after satisfactory testing along with following documents.

1. Detailed equipment data in the approved proforma
2. Manufacture’s maintenance and operating instructions
3. Set of as built drawings, layouts, piping, ducting, cable routing, cable schedules etc
4. Approved test readings of all equipment and installations
5. Inspection certificates

6. Certificates of approval from statutory or Local Authorities for the operation and maintenance of the installations, wherever such approval or certification is required. This shall include Application filed along with enclosures and receipts of fees paid and deposits made.

7. List of recommended spares

8. Certificate from the contractor that he has cleared the site of all debris and litter caused by him with out violating the EHS norms during the construction. However, contractor has also to periodically clear the site from all the debris which is generated from his part of scope.

9. Undertaking that all the materials supplied by him at site are fully tax paid and shall produce all documentation for satisfaction of Owner / PROJECT MANAGERS or taxation authorities.

10. Obtaining Necessary Approval / final clearances from Local Electricity authority / WBSEDCL .

Submission of the above documentation shall form a precondition for final acceptance of the plant and installation and final payments.

23. Statutory approvals inspection

The contractor shall be fully responsible for meeting all the statutory obligations and local inspectorates wherever applicable to the works carried out by them. The contractor should prepare all working drawings and obtain approval of competent authorities and also have the equipment and installation inspected and got approved. All the original receipts of official fees paid and deposits made against the demand in writing from the appropriate authority shall be submitted to the Owner.

24. Care of works

From the commencement to the completion of the works, the Contractor shall take full responsibility for the care thereof and of all Temporary works and in the case any damage, loss or injury shall happen to the works or to any part thereof or to any Temporary works from any cause whatsoever, save and except the "Excepted Risks" shall at his own cost, repair and make good the same, so that at completion, the Permanent works shall be in good order and condition and in conformity in every respect with the requirements, of the contract and the Employer's / Consultant's instructions.

In the event of any such damage, loss or injury happening from any of the excepted risks, the Contractor shall if and to the extent required by the Consultant, repair and make good the same as aforesaid at the cost of the Employer, subject always to the provisions of Clause 2.26 below

The Contractor is also liable for any damage caused to the works occasioned by him in the course of any operations carried out by him for the purpose of complying with his obligations under Clause 2.2.

25. Insurance, failure to insure

Without limiting his obligations and responsibilities , the Contractor shall provide necessary Insurance in terms approved by the Employer, to cover the following in the joint names of the Employer and the Contractor and a copy/copies of the policy/policies shall be furnished to the Employer within one month from the award of the Contract.

a) Contractor all Risk Insurance Policy covering loss or damage due to Fire, lightning, collapse, defective workmanship and/or materials, flood, storm, theft, burglary, malicious damage, subsidence riots etc.

b) Third Party Liability;

c) Workmen's Compensation in accordance with latest revised statutory provision;

d) Contractors tools, tackles and machinery;

e) All Risks to materials during transit;

Any other Insurance required for fully indemnifying the Employer from any claim that may arise on account of the Contractors' operations at site.

Employer should be indemnified against any loss / damage due to default of the contractor in complying with any statutory regulations.

In case of failure of the contractor and in event of insistence from statutory lobby, the employer has all the right to pay the dues to the concerned authorities and the same will be recovered from the bills of the contractor.

Display of minimum wages shall be arranged by the contractor.

ii) If within a reasonable time from the commencement of the works the Contractor shall fail to effect and keep in force the Insurance referred to under Clause 2.21 (i) or any other Insurance he may be required to effect under the terms of the contract, then the Employer may effect and keep in force any such Insurance and pay such premium or premiums as may be necessary for that purpose and deduct the same from time to time from the monies due or which may become due to the Contractor in the manner laid down in Clause 2.27 hereinafter.

Labour and general laws

(i) The Contractor shall employ labour in sufficient numbers either directly or through approved sub-Contractors to maintain the required rate of progress and quality to ensure workmanship of the degree specified in the contract and to the satisfaction of the Employer/ PMC/Architect/Consultant.

(ii) The Contractor shall provide pure drinking or potable water facilities to the workers.

(iii) The Contractor shall pay fair and reasonable wages to workmen, employed by him in the contract undertaken by him. In the event of any dispute arising between the Contractor and his workmen on the ground that the wages paid are not fair and reasonable, the dispute shall be referred without delay to the Employer who shall decide the same. The decision shall not in any way affect the conditions in the contract regarding the payment to be made by the Employer at the accepted Tender Rates.

(iv) a) The Contractor shall comply with provisions of the Payment of Wages Act 1936, Minimum Wages Act, 1948, Employees Liability Act, 1938, Workmen Compensation Act, 1923, Industrial Disputes Act, 1947, the Contract Labour Regulation and Abolition Act, 1970, or any modifications thereof or any other law relating thereto and rules made there under from time to time.

Employees State Insurance (ESI) & Provident Fund (P.F)

- The contractor should register the list of all labours worked at site in ESI local dispensary and the document shall be submit to the clients before execution of the works at site. The rate quoted shall include all the taxes and incidental charges for the same.

- Along with the R.A.bills the contractor shall submit the wages register showing the P.F. deductions of the labours to the client.

(v) The Contractor shall indemnify the Employer against any payment to be made under the Acts for the observance of the Regulations aforesaid without prejudice to his right to claim indemnity from his sub-Contractors.

(vi) The Contractor shall be responsible for and shall pay any compensation to his own workmen under the Workmen Compensation Act 1923 (VIII) of 1923, (hereinafter called "the said Act") for injuries caused to the workmen. If such compensation is paid by the Employer as Principal under Sub-section (i) of Section 12 of the said Act on behalf of the Contractor, it shall be recoverable by the Employer from the Contractor under Sub-section (2) of the said section. Such compensation shall be recovered in the manner laid down in Clause 2.25 above.

(vii) The Contractor shall be responsible for and shall pay the expense for providing medical aid to any workman who may suffer a bodily injury as a result of an accident.

If such expenses are incurred by the Employer, the same shall be recoverable from the Contractor forthwith and be deducted without prejudice to any other remedy by the Employer from any amount due or that may become due to the Contractor.

viii) The Contractor shall provide all personal safety equipment and first aid and apparatus for the persons employed on the site and maintain the same in good condition suitable for immediate use at any time.

26. Nuisance

(i) The Contractor shall not at any time, do, cause or permit any nuisance on the site or do anything which shall cause unnecessary disturbance or inconvenience to Employers, tenants, or occupants of other properties near the site of work and to the public generally.

(ii) The Contractor shall indemnify the Employer in respect of all claims, demands, proceedings, damages, costs, charges and expenses whatsoever arising out of or in relation to any such nuisance in so far as the Contractor is responsible thereof.

27. Clerk of works

(i) The term "Clerk of Works" shall mean the person appointed by the Consultant and acting under the orders of the Consultant/Employer. The Contractor shall afford the Clerk of Works every facility and assistance for inspecting the works and materials. Neither the Clerk of Works or any representative of the Employer/Consultant shall have the power to set out works or to revoke, alter, enlarge or relax any requirements of the Contractor or sanction any day work, additions, alterations, deviations or omissions or any extra work whatever except in so far as such authority may be specially conferred by a written order of the Employer / Consultant.

(ii) The Clerk of Works or any representative of the Consultant shall have power to give notice to the Contractor or to his representative of non-approval of any work or materials whatsoever and such work shall be suspended or the use of such materials shall be discontinued until the decision of the PMC/Architect/Consultant is obtained. The work will from time to time be inspected by the Consultant, the Clerk of Works or the Consultant's representative but such examination shall not in any way exonerate the Contractor from the obligation to remedy any defects which may be found to exist at any stage of the works or after the same is completed.

(iii) The employer is entitled to deploy any third party for quality audit or project management. The contractor should extend all co-operations in performing the duties.

28. Failure by Contractor of complying with PMC/Architect/Consultant instructions

If the Contractor after receipts of written notice from the Employer / Consultant requiring compliance within five days fails to comply with such further drawings and/or Employer's / Consultant's instructions, the Employer may employ and pay other persons to execute any such work whatsoever that may be necessary to give effect thereto, and all cost incurred in connection therewith, plus 50% as penalty shall be recoverable from the Contractor by the Employer on the Certificate of the Consultant as a debt or may be deduction by him from any moneys due or to become due to the Contractor.

29. Measurement

(i) Measurements shall be as per latest edition of IS: 1200.

(ii) The Contractor will himself undertake the quantity surveying work. In case he fails to submit his bills in proper order, the Employer reserves for himself the right to employ an expert at the cost of the Contractor if the bills submitted by the Contractor show inaccuracies frequently, indicating that the Contractor is not capable of taking the required measurements and submitting a proper bill. The Contractor (or the expert) will make the measurement on the basis of drawings in as far as it is practicable. The billing procedure and formats shall be as approved by the Employer / Consultant.

30. Declaration

I/We have inspected the site of works and have made me/us fully acquainted with the local conditions in and around the sites of works. I/We hereby declare that I/We have gone through the conditions laid down in the Notice Inviting Tender, General Conditions of Contract, Technical Specifications and understood the same I/We quoted our rates in the schedule of quantities attached with the tender documents.

I/We shall also uniformly maintain such progress with the work, as may be directed by the Owner/Consultant to ensure completion of same within the target date as mentioned in the tender document.

_____

Witness: Signature of Tenderer

Address _____

_____

Date

SPECIAL CONDITIONS OF CONTRACT

1.0 Errors, Omissions and Discrepancies

In case of errors, omissions and/or disagreement between written and scaled dimensions on the drawings or between the drawings and specifications etc. the following order shall apply:

i) Between scaled and written dimension (or description) on a drawing, the latter shall be adopted.
ii) Between the written or shown description or dimensions in the drawings and the corresponding one in the specification the former shall be taken as correct.
iii) Between written description of the item in the specifications and descriptions in bill of quantities of the same item, the latter shall be adopted.
iv) In case of difference between rates written in figures and words, the rate in words shall prevail.
v) Between the duplicate/subsequent copies of the tender shall be taken as correct.

2.0 Ownership of drawings

All drawings, specifications and copies thereof furnished by the Institute of Cost Accountants of India, through its Consultant are the properties of the Institute of Cost Accountants of India. They are not to be used on other work.

3.0 Remedy on Contractor's failure to insure

If the contractor fails to effect and keep in force the insurance referred to above or any other insurance which he may be required to effect under the terms of contract, then and in any such case Institute of Cost Accountants of India, may effect and keep in force any such insurance and any such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by the Institute of Cost Accountants of India, as aforesaid from any amount due or which may become due to the contractor, or recover the same as debt from the contractor.

Without prejudice to the other rights of the Institute of Cost Accountants of India, against contractors, in respect of such default, the employer shall be entitled to deduct from any sums payable to the contractor the amount of any damages, costs, charges, and other expenses paid by the Institute of Cost Accountants of India, and which are payable by the contractors under this clause. The contractor shall upon settlement by the insurer of any claim made against the insurer pursuant to a policy taken under this clause, proceed with the diligence to rebuild or repair the works destroyed or damaged. In this event all the monies received from the insurer in respect of such damage shall be paid to the contractor and the contractor shall not be entitled to any further payment in respect of the expenditure incurred for rebuilding or repairing of the materials or goods destroyed or damaged.

4.0 Time for completion

Time is the essence of the contract and shall be strictly observed by the contractor. The entire work shall be completed within a period 1 month from the date of commencement. If required in the contract or as directed by the Consultant/ Owner, the contractor shall complete certain portions of work before completion of the entire work. However the completion date shall be reckoned as the date by which the whole work is completed as per the terms of the contract. Contractor shall submit a detail bar chart of work programme keeping the stipulated time of completion of work as mentioned above for approval of Owner /Consultant showing the supply and installation of various activities of the work. The contractor shall proceed with work as per approved bar chart.

5.0 Deleted

6.0 Accidents

The contractor shall immediately on occurrence of any accident at or about the site or in connection with the execution of the work report such accident to the Owner /Consultant. The contractor shall also report immediately to the competent authority whenever such report is required to be lodged by the law and take appropriate actions thereof.

7.0 Site Order Book

A site order book shall be maintained at site for the purpose of quick communication between the Owner /Consultant. Any communication relating to the works may be conveyed through records in the site order book and signed by the Owner /Consultant/Site Engineer. Such a communication from one party to the other shall be

deemed to have been adequately served in terms of contract. Each site order book shall have machine numbered pages in triplicate and shall be carefully maintained and preserved by the contractor and shall be made available to the Owner /Consultant as and when demanded. Any instruction which the Owner /Consultant may like to issue to the contractor or the contractor may like to bring to the Owner /Consultants two copies of such instructions shall be taken from the site order book and one copy will be handed over to the party against proper acknowledgement and the second copy will be retained for their record.

8.0 Site Meetings

Site meetings will be held to review the progress and quality evaluation. The contractor shall depute a senior representative along with the site representative and other staff of approved sub-contractors and suppliers as required to the site meetings and ensure all follow up actions. Any additional review meetings shall be held if required by the Consultant/ Owner

9.0 Excise Duty, Taxes, Levies etc.

The contractor shall pay and be responsible for payment of all taxes, including VAT as applicable, duties, levies, royalties, fees, cess or charges in respect of the works including but not limited to sales tax, VAT, works contract tax, excise duty, and octroi, payable in respect of materials, equipment, plant and other things required for the contractor. All of the aforesaid taxes, duties, levies, fees and charges shall be to the contractor's account and the Institute of Cost Accountants of India shall not be required to pay any additional or extra amount on this account. Variation of taxes, duties, fees, levies etc. if any, till completion of work shall be deemed to be included in the quoted rates and no extra amount on this account will in any case be entertained. If a new tax or duty or levy or cess or royalty or octroi is imposed under as statue or law during the currency of contract the same shall be borne by the contractor.

10.0 Idle Labour

Whatever the reasons may be, no claim for idle labour, additional establishment cost of hire and labour charges of tools and plants would be entertained under any circumstances.

Contractor or his authorized sub-contractors for electrical and sanitary & plumbing works should have valid license (if applicable) for carrying out such works from the concerned statutory/local bodies/authorities.

Witness: _____ Signature of Tenderer

Address Address

Date Date

APPENDIX

Name of Work	:	Electrical work
Location	:	Institute of Cost Accountants of India, 12, Sudder Street, Kolkata – 700 016
Scope of work	:	As above and further detailed in the General Conditions of Contact.
Defect Liability Period	:	12 months.
Date of Commencement	:	14 days from the date of issue of work order or the date on which the contractor is instructed to take possession of the site, which-ever is earlier.
Date/time of completion	:	1 month
Liquidated Damages	:	0.5% of the accepted tender amount per week of delay subject to a ceiling 5% of the accepted contracted sum.
Earnest Money Deposit (EMD)	:	Rs. 22,560.00 in the form of Bank Draft drawn in favour of Institute of Cost Accountants of India payable at Kolkata
Total Retention Money	:	Not to exceed 10% of the value of work (including EMD)
Release of Retention Money	:	50% after virtual completion and balance 50% after expiry of the defects liability period.
Period for honouring Certificates	:	15 days for Interim Certificates and three weeks for the final certificate from the date of certification.
Interest for delayed payment	:	Nil

TECHNICAL SPECIFICATIONS
FOR ELECTRICAL INSTALLATION

PROJECT: PROPOSED COMMUNITY HALL IN ICAI AT KOLKATA

MEP CONSULTANTS: - AIRTECH CONSULTANCY SERVICES.
CG-145, Sector II, Salt Lake City
KOLKATA – 700 091
Ph: 098369-01108
EMAIL: acs65555@gmail.com
airtech_consultancy@ yahoo.co.in

➢ GENERAL SPECIFICATION OF CABLE

A. M.V. CABLES

SCOPE OF WORK:

This section covers the supply, installation storing, laying, fixing, jointing / termination, testing and commissioning of Medium Voltage XLPE insulated PVC Sheathed armoured aluminium/ copper conductor cables laid in built up trenches, directly buried underground, on cable trays, in pipes, clamped directly to wall or structures etc. as called for in the drawing. The contractor shall provide all materials, labour, equipments, scaffoldings etc., as required for the completion of M.V. Cables, Cable Trays etc., as called for.

STANDARDS APPLICABLE

The following standards and rules shall be applicable.

IS 8130-84 Class II, Conductors for insulated electric cables.

IS 7098(II)/ 85 Cross linked polyethylene insulated PVC sheathed cables.

The individual cores shall have continuous numbering of the core all along its length and also be provided with identification ferrules at both ends. Individual control cables shall have 20% spare cores.

FRLS cables shall be used for fire protection system controls to prevent flame propagation, smoke reduction and to avoid toxic gas emission in the event of a fire. FRLS compound shall be tested rigorously for oxygen index as per ASTM D2863, acid gas generation to IEC 754-1, smoke density to ASTM D 2843 and flammability to SS 424 1475 class F3, IEEE 383 and IEC 332-1.

Manufacturer's name, ISI Mark, cable size and type shall be clearly embossed at regular intervals on all cables.

TYPE AND QUALITY

Medium voltage cables shall be circular, multicore aluminium conductor, XLPE insulated, PVC sheathed and steel wire armoured or steel tape armoured construction or unarmoured. The conductors of cable shall be stranded. Sector shaped stranded conductors shall be used for cables of 50 sq.mm size and above.

M.V power cables shall have 3, 3.5 or 4 cores, as required and shall have conductors made from electrical purity aluminium conductors conforming to IS: 8130 - 84.

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Armouring of galvanised round steel wires or galvanised flat steel strips shall be provided over the inner sheath.

Outer sheath of PVC shall be extruded over the armouring.

Unless otherwise specified, all control cables shall be multicore,1100V grade XLPE insulated, armoured and overall PVC sheathed with stranded copper conductors of 2.5 sq.mm, conforming to IS 7098 (PT-1)/ IS 8130 Class 1. Cores shall be identified by colour scheme of XLPE insulation.

RATING:

The cables shall be rated for a voltage of 650/1100 Volts.

Core Identifications:

Cores shall be provided with the following colour scheme of PVC insulation:

1. Single Core : Green yellow for earthing.
2. Two Cores : Red and Black, Blue & Black, Yellow & Black.
3. Three Cores : Red, Yellow & Blue
4. Four Core : Red, Yellow, Blue & Black

INSPECTION:

All cables shall be tested inspected at manufacturer's works. However upon receipt at site, cables shall be checked for physical damages during transit.

JOINTS IN CABLES:

The contractor shall take care to see that all the cables received at site are apportioned to various locations in such a manner as to ensure maximum utilisation and avoidance of straight cable jointing. This apportioning shall be got approved by the Construction Manager before the cables are cut to lengths.

Where straight joints in cable are unavoidable, the use and location of such straight joints shall be got approved by Construction Manager.

JOINTING BOXES FOR CABLES:

Cable joint boxes shall be of appropriate size, suitable for XLPE insulated armoured cables of particular voltage rating.

JOINTING CABLES:

All cable joints shall be made in suitable, approved cable joint boxes, jointing of cables in the joint boxes and the filling in of compound shall be done in accordance with manufacturer's instructions and in an approved manner. All straight joints shall be done in epoxy mould boxes with epoxy resin only of makes/types as indicated in the list of approved makes. All terminal leads of conductors shall be heavy soldered upto at least 50mm length.

All cables shall be joined colour to colour and tested for continuity and insulation resistance before jointing commences. The seals of cables shall not be removed until preparations for jointing are completed. Joints shall be finished on the same day as commenced and sufficient protection from the weather shall be arranged. The conductors shall be efficiently insulated with high voltage insulating tape and by using spreaders of approved size and pattern. The joints shall be completely filled with epoxy compound and taped so as to ensure that the box is properly filled.

Epoxy compound shall be filled as follows :

Equal quantities of resin and hardener shall be mixed thoroughly by hand until the mixture is free from white patches and has uniform colour. No water, oil or any other liquid shall be added to the mixture to make it soft as is will affect the properties of the compound. The mixture shall be used within 30-40 minutes of mixing. The on which epoxy compound is to be used, shall be free from dust, rust, oil, grease and shall be dry. The joint neither be disturbed nor moved till the epoxy compound is completely hardened. A smooth surface can be made by rubbing a damp cloth smoothly on the compound before it sets. The joints shall be painted after they have completely hardened.

Alternatively, ready mix of epoxy cable jointing compound may also be used. In all cases manufacturer’s recommendations shall be strictly adhered to.

CABLE MARKERS

All underground cables and cable joints shall be marked on the surface by markers generally manufactured and tested to the requirements of relevant Bureau of Indian Standards. Approved CI cable markers shall be provided at every 30m along the route of the cables and at both ends of road crossing, indicating cable joints and cables as applicable. Special CI markers shall be provided at all buried cable joints indicating "Electrical Cable Joints". CI plates duly engraved with the size of the cable and the place it serves shall be tied to the cable at regular intervals of 5m for easy identification of cables.

TERMINATION OF CABLES

Cable termination shall be done in terminal box or cable end box or distribution boards, or apparatus/ equipments. Terminations are to be made with mechanical and glands be tinned/nickel plated, anti corrosive, three piece improved pattern which is to grip inner and outer PVC sheaths as well as the armour of the cable. The cable ends or the core conductor are to be connected by solder less lugs or sockets using crimping tool of approved make for all cables.

All terminations of cable conductors and base conductors shall be mechanically and electrically sound and shall comply with the requirements of IEE regulations.

The connectors or connecting sockets are to have such dimensions so as to limit temperature rise.

When required the water tightness of the terminal boxes may be obtained by filling with a compound preferably plastic flame-retarding and non-dripping type within the normal range of temperatures.
When the cable is cut during the course of installation, the open ends are to be sealed immediately by means of self-adhesive non-hygroscopic tape over a wax water seal to make an air and watertight joint.

INSTALLATION OF CABLES

Cable shall be laid in a manner as indicated on the drawings. Generally cables are laid in the following manner.

i. In the underground masonry trench.
ii. On the cable tray/or on cable ladders.
iii. Buried underground.
iv. Through pipe sleeves.

Various installation methods are discussed in the following paragraphs.

Cables shall be laid by skilled and experienced workmen using adequate rollers to minimize stretching of the cable. The cable drums shall be placed on jacks before unwinding the cable. The cable drums shall be rotated in the direction as indicated by the manufacturer. Care shall be exercised in laying cables to avoid forming kinks. The drums shall be unrolled and cables run over wooden rollers, placed at intervals not exceeding two (2) meters.

GENERAL

All cables shall be adequately protected against any risk of mechanical damage to which they may be liable in normal conditions of service.

When cables pass through holes in metal work, precautions shall be taken to prevent abrasion of the cables on any sharp edges.

In every vertical cable ladder, channel, duct, trunking or cable trench containing cables and exceeding three meters in length, internal barriers shall be provided so as to prevent the air at the top of the unit from attaining an excessively high temperature. In every vertical cable shaft, cable trench or any passage of cable through wall, ceiling, floor barriers against spread of fire and smoke shall be provided for compliance with IEE regulations.

Where Cable passes through walls, ceiling, floor, it shall run through sleeves of PVC pipes or hume pipes of adequate diameter. After pulling the cable through sleeves, both the ends of the sleeves shall be sealed water tight with fire-resistant material to prevent spread of fire and seepage of water.

Generally along each cable route either in trench or in cable trays/ladders or in pipe separate Two Nos. Of earth strips/wires shall run exposed.

Where an installation comprises medium voltage cables as well as extra low voltage circuits, precaution shall be taken in accordance with IEE regulations and shall be physically separated by minimum of 300mm distance.

Metal sheaths and armour of all cables, metal conduits, ducts, Trunking, and bare earth continuity conductors associated with such cables, which might otherwise come into fortuitous contact with other fixed metal work shall be effectively bonded there to earth so as to prevent appreciable potential difference at such possible points of contact.

If it is necessary to install cables in a situation where flammable and/or explosive dust, flammable volatile liquid/vapour/gas is likely to be present or where explosive materials are handled or stored, the cabling shall be as per IEE regulations.

TESTING

Prior to laying cables, and prior to energizing the cables, following tests shall be carried out:-

A. Insulation Resistance test between phases and phase to neutral and phase to earth.

B. Continuity test of all the phases, neutral and earth continuity conductor.

C. Sheathing continuity test

D. Earth resistance test of all the phases and neutral.

All tests shall be carried out in accordance with relevant Indian Standard Code of practice and Indian Electricity Rules. The Contractor shall provide necessary instruments, equipments and labour for conducting the above test and shall bear all expenses in connection with such tests. All tests shall be carried out in the presence of the Construction Manager and results shall be recorded in the prescribed forms.

STORING:

All the cables shall be supplied in drums. On receipt of cables at site, the cables shall be inspected and stored in drums with flanges of the cable drum in vertical position. The end of the cable shall be sealed for water tightness.

MEASUREMENT

Mode of measurement is as follows:

All power cables including fixing accessories as described in specifications and SOQ are measured in linear metre (Rm).

Power cable terminations are measured in Number (No)

Control cables including terminations are measured in linear metres (Rm)

Cable trays and conduit/pipes are measured in linear metres (Rm).

B. **WIRING SYSTEM**

SCOPE:

1.1 The scope of work under this section generally covers internal wiring for lights, fans, exhaust fans, call bells, fan coil units, geysers, power sockets etc., The contractor shall provide all materials, labour, equipment, scaffoldings, etc., as required for the completion of wiring installation called for. The wiring shall generally be done using PVC insulated copper conductor wires in PVC/M.S./G.I conduit as called for including providing switches, sockets, plug tops, fan regulators, outlet boxes etc.,

1.2 **STANDARDS APPLICABLE**

1.2.1 The applicable standards for above work shall be as listed below:

IS: 732	Code of practice for electrical wiring installation (System voltage not exceeding 650V).
IS: 1646	Code of practice for fire safety of buildings (General Electrical installation).
IS: 2667	Fittings for rigid steel conduits for electrical wiring.
IS: 3480	Flexible steel conduits for Electrical wiring.
IS : 3837	Accessories for rigid steel conduit for electrical wiring.
IS : 694	PVC insulated cables.
IS : 2509	Rigid - non-metallic conduits for electrical wiring.
IS : 6946	Flexible (Pliable) non-metallic conduits for electrical installation.
IS : 1293	3 Pin plugs and sockets.
IS : 8130	Specifications for conduits for electrical installation.
IS : 3854	Switches for domestic purpose.
IS : 3415	Fittings for rigid non-metallic conduits.
IS : 4648	Guide for electrical layout in residential building.
IS : 9537	Conduits for electrical installation.
IS : 302	General and safety requirements for household and similar electrical appliances.
IS : 3043	Code of practice for earthing.
IS : 5216	Guide for safety procedures and practices in electrical work.
	Indian Electricity Act and Rules.

Regulations for the electrical equipment in buildings issued by the Bombay Regional Council of Insurance association of India, EB.

All standards and codes mean the latest.

1.3 POINT WIRING FOR LIGHTS, FANS, EXHAUST FANS & 6A CONVENIENCE SOCKETS

1.3.1 A point wiring shall consist of the branch wiring from the distribution board together with a switch/fan regulator as required, including providing conduit and accessories, the ceiling rose or pendant holder or a swan holder, or ceiling fan hook box or socket etc., with suitable termination. Point wiring shall include, in addition, the earth continuity conductor/wire from the distribution board to the earth pin/stud of the outlet/switch box and to the outlet points.

The point wiring shall be carried out in the under mentioned manner:

a) Supply, installation, fixing of conduits and GI pull wire with necessary accessories, junction/pull/inspection/switch boxes and outlet boxes/Fan hook box etc. Switches, switch plates and switch boxes are not required for the lights which are controlled directly from the MCB DB's.

b) Supplying and drawing of wires of required size including earth continuity PVC insulated wire.

c) Supply, installation and connection of flush type switches, sockets, cover plates, switch plates, and fixing fan regulator, lamp holder, ceiling rose etc.,

d) The point shall be complete with the branch wiring from the distribution board to the outlet point, through switch board, conduit with accessories, junction, pull, inspection boxes, control switch, socket, outlets boxes, ceiling roses, lamp holder, connector, extension cord wire, flexible conduits etc.,

1.3.2 POINT RATE

For purposes of measurements and payments the rate for point wiring for lights/fans etc., is divided into two parts.

a) Circuit Main

b) Point Wiring.

a) Circuit Main for Light/Fan Point

The circuit main for lights/fan/6A sockets (where 6A sockets connected to light circuit) shall include the wiring from the MCB distribution boards' upto the first switch/light point/fan point. This is measured in linear meter. The scope of work under this section shall include

i) Supply and wiring in concealed/surface conduit from DB's to first switch/light/fan point.

ii) Providing and installing PVC insulated copper conductor earth wire.

iii) Providing and installing GI fish wire (pull wire) in the conduit.

iv) Termination of wires in DB's and switches using proper tinned copper lugs of crimping type.

v) Providing and installing necessary pull/junction boxes where necessary.

b) Point Wiring

The rate for point shall include supply, installation, and connection, testing and commissioning of point wiring in conduit. The points shall be measured in No/sets for the set/group of lights controlled as mentioned in BOQ.

The exact scope of work included in the point wiring for the purposes of measurement is enumerated as stated below:-

i) Wiring starting from the first switch/light/fan point, where the circuit main is terminated to the various lights/fans/sockets (where 6A sockets connected to light circuit loop), and then looping between the switches/lights/fans/6A sockets etc.

ii) Providing and installing all necessary switches, switch plates, sockets, pull/junction/fan hook boxes etc. as called for.

iii) Providing and installing insulated earth continuity wire in each conduit along with the wiring system.

iv) Providing and installing G.I. fish wire (pull wire) in the conduits.

v) Providing and installing ceiling roses, lamp holders where necessary.

vi) Providing and installing PVC insulated, PVC sheathed flexible three cores 1.5 sq.mm extension cords including flexible conduits from light/fan outlet points mounted at ceiling point to the light/fan outlet.

Wiring for 6A Sockets, 16A Power Sockets for Equipment Wiring Except where 6A sockets connected to the lighting loop which are measured in Number of points, the measurement for wiring of 6A/16A sockets and wiring for power outlets is done as follows :

i) Length of circuit wire including conduit, accessories and earth wire for power wiring is measured together in linear metre.

ii) The socket outlet with outlet box is measured in Numbers.

1.4.0 **SYSTEM OF WIRING**

1.4.1 Unless otherwise mentioned on the drawings, the system of internal wiring shall be as follows:

The system of wiring shall consist of single core, PVC insulated, 650/1100 Volt grade, stranded copper conductor wires/cables laid through concealed or exposed PVC/GI/MS conduits as mentioned elsewhere or as directed by owner/consultant.

1.4.2 GENERAL:

Prior to laying and fixing of conduits and light outlet boxes, contractor shall carefully examine the layout drawings and prepare detailed shop drawings, indicating the exact location of light outlets, with distances marked, conduit routing, with sizes, number of wires run in each conduit, control switch location etc., The contractor shall obtain the approval of all shop drawings by the owner/consultant prior to the installation of conduits. Any discrepancy noticed in the design drawings shall be brought to the notice of the owner/consultant. Any suggestions or modification suggested by the contractor shall have approval of Client/ Consultant before execution.

1.4.3 Type of Installation

Unless otherwise specified all conduits for surface wiring shall be heavy guage rigid GI/MS conduits and all concealed installation including conduits running above false ceiling shall be heavy guage rigid PVC.

All conduits buried in grade or in damp wet areas shall be heavy gauge G.I. conduits.

a) Concealed Wiring shall be done using PVC conduits in the following areas

i) Staircase area lighting.

ii) Wiring inside offices.

iii) Wiring in the false ceiling area

iv) All other areas where surface conduit is not specifically mentioned.

b) Surface Wiring shall be done using Heavy Gauge G.I/Black Enamelled M.S. Conduit.

i) Wiring installation in the electrical sub-station room, D.G.room.

ii) Pump room, sewage treatment plant room.

iii) Ventilation fan room, AHU room, and electrical room.

c) Conduit Installation in False Ceiling Area

The PVC conduits shall run exposed using above false ceiling.

1.5 **MATERIALS:**

1.5.1 CONDUITS

Type of Conduit

All conduits for fire alarm system irrespective of surface or concealed shall be of G.I/M.S.

Generally concealed electrical wiring installation shall be in PVC conduits and surface wiring in G.I/M.S. conduits.

a) **PVC CONDUITS:**

Non-metallic conduits and accessories shall conform to IS 9537 (part 3) - 1983, IS 2509 & IS 3419 and each conduit shall bear the ISI Mark. PVC conduits shall be of the black, round, heavy gauge polyvinyl chloride (PVC). The conduit shall be plain end type as specified in IS 2509-1973/IS 2537-1983. The conduit internal surface shall be smooth. Only approved quality factory made bends/accessories shall be used. Minimum size of conduits shall be 20mm diameter. PVC conduits shall be rigid un plasticised, heavy gauge having minimum wall thickness of 2.0mm upto 25mm diameter conduit and 2.5mm wall thickness for all sizes above 25mm diameter.

1.5.3 **CONDUIT ACCESSORIES**

PVC CONDUIT BENDS & COLLARS

The PVC conduit bends & collars shall be of heavy duty and preferably of the same make as of conduit. This shall conform to IS 9537/1983 Part III with ISI Mark where necessary bends or diversion may be achieved by means of using bends and or circular inspection boxes with adequate and suitable inlet and outlet termination. In case of recessed installation system. The bends shall be properly secured & flush with the finished wall surface. Elbows shall not be used. No bends shall have radius less than 2 1/2 times the outside diameter of the conduit.

PVC/INSPECTION/JUNCTION/PULL BOXES

The Inspection/pull box/junction box, where used, with relevant PVC conduit installation shall be of heavy gauge PVC and conform to IS specification and shall match with the conduit sizes. The box shall be round/square rectangular with conduit stub projection for termination of conduit. The box shall be of minimum 50mm deep and the size of box shall be suitable to pull/make necessary joints of wires inside the boxes. Extra deep boxes are preferred. The boxes shall have flush type cover. The colour of plate shall match the colour of paint of the surface where installed. The boxes shall have concealed screwed socket for fixing the ceiling rose.

1.5.4 **SWITCH OUTLET & SOCKET OUTLET BOXES**

CONCEALED TYPE OUTLET BOXES

The concealed outlet boxes for switches, sockets, power outlets, telephone outlet, fan regulator etc., shall be of standard factory made and to match the exact requirement of combination of outlets. The boxes shall be fabricated out of heavy gauge CRCA cold rolled carbon alloy sheet steel with zinc plating (G.I). The size of boxes shall match the type of outlet/switch plate to be mounted on the box. Adequate No. and size of knockout holes shall be provided to terminate the conduits in the box. These boxes shall be of standard factory made product and of same make as of switch plates and sockets. Separate screwed earth terminal shall be provided in the box for earthing.

The outlet box shall be of minimum depth of 50mm.Boxes shall be suitable for grid mounting type of accessories. Long screw shall be provided to take care of the extra plaster thickness to mount the switch plates. Provision shall be made in the box and switch plate to have the minor adjustment of alignment of switch plate to plumb level.

SURFACE TYPE BOXES

The boxes for mounting switches, sockets and other wiring devices shall be either moulded plastic or heavy gauge CRCA sheet steel painted to match the colour of wall. The box shall be suitable to terminate the G.I/M.S. Surface conduit into the box. The size and shape of box shall match the exact type and combination of switch plates, receptacles and wiring devices. Deep boxes shall be used to facilitate easy termination of conduit and wires/cables. Separate screwed earth terminal shall be provided in the box for earthing.

LIGHT OUTLET BOXES:

For concealed PVC conduit installation the light outlet box shall be of PVC round/square with knock-out holes. Conduit projection shall be suitable to terminate the conduit to the box. The box shall be made of heavy gauge PVC and the sample to have the approval of Construction Manager before use. The boxes shall have concealed screwed socket to fix the ceiling rose. The boxes shall be minimum 50mm deep.

For surface conduit installation the light outlet box shall be of G.I/black enamelled M.S. boxes. The boxes shall have threaded stub projection having internal threading to terminate the conduits of different sizes. The boxes shall have concealed screwed socket for fixing the ceiling rose. The boxes shall be minimum 50mm deep.

CEILING FAN HOOK BOXES:

The ceiling fan hook box shall be fabricated of 2mm thick G.I/M.S. With adequately sized G.I/M.S. rod/hook to fix the ceiling fan. The hook shall be concealed within the fan hook box. The side extensions of rod shall be sufficiently long to provide adequate anchorage in the concrete. The size of the box shall be such that it should be totally covered by the plastic canopy of the ceiling fan. The box shall have anticorrosive primer coating.

SWITCHES

Switches shall conform to IS: 3854, and IS: 4615. Switches shall be single pole, single or two way as shown on the drawings. They shall be of the molded type rated for 250V, 5/15A. They shall be provided with insulated dollies and covers.

The switches shall be rocker operated with a quiet operating mechanism with bounce-free, snap acting mechanism in an arc resistant chamber. The switches shall have pure silver and silver cadmium contacts. The switches shall be of approved make as indicated in the `List of Approved Makes'. Switches installed outdoors shall be industrial, metal clad type, and shall be provided in weather-proof enclosure, complete with weather proof gasketed covers.

COVER PLATES FOR SWITCHES & OUTLETS

Switches/sockets/wiring devices plates shall be of the same make as of switches/sockets/wiring devices. These shall be of best quality. Moulded plastic grid mounting type device plates/frames shall be used and these shall match with the type of switches/sockets and boxes.

COVER PLATES FOR INSPECTION/JUNCTION/PULL BOXES

The cover plate for PVC boxes shall be with minimum 3mm thick Perspex / formica sheet cover and for the G.I/M.S. boxes, shall be of G.I/black enamelled M.S. Plates. The shape of the plate shall match with that of the box.

RECEPTACLES

The sockets shall conform to IS 1293. Each socket shall be provided with control switch of appropriate rating. The sockets shall be moulded type rated for 250 volts and of 6 A or 16 A capacity as mentioned on the drawings. The 16 Amps sockets shall be multi pin (6 pin) automatic shutter type suitable for plugging 6 /16 A plugs. The shutter shall open when the earth pin of the plug is inserted in the socket. Where called for, the 16A socket shall have indicating lamp. The socket outlets and switches shall be of grid mounting type. Where called for sockets shall be provided with three pin plug top suitable to the socket and of the same make as of socket. The plug shall conform to IS 6538. The socket outlets installed outside the building/open to sky or in damp/wet areas shall of weather-proof, water-tight type.

INDUSTRIAL TYPE SOCKETS

The socket outlets single phase or three phase installed in electrical room, D.G room etc., shall be three pin or 5 pin industrial type with MCB (1 phase or 3 phase) control. The socket and MCBs shall be mounted in a sheet steel enclosure and shall be standard factory made product.

CONDUCTORS:

All FRLS PVC INSULATED copper conductor wires shall conform in all respects to standards as listed under sub-head 'Regulations and Standards' and shall be of 650/1100V Grade.

FRLS WIRES (FOR LIGHT & SMALL POWER WIRING)

The **FRLS** PVC insulated cables shall conform to IS : 694/1990. For all internal wiring FRLS cables of 650/1100V grade, single core shall be used. The wires shall have the approval of Tariff Advisory Committee.

The conductors shall be plain, circular stranded annealed copper conductors complying with BS : 6360.

The minimum number and diameter of wires for circular stranded conductor shall meet the requirements set out in the relevant British Standards.

The cores of all cables shall be identified by colours in accordance with the following sequence.

Single phase	-	Red
Three phase	-	Red, Yellow, Blue
Neutral	-	Black
Earth	-	Green or Green/Yellow.

A means of identifying the manufacturer shall be provided throughout the length of cable.

Unless otherwise specified in the drawings, the sizes of the cables/wires used for internal wiring shall be as follows :

In case of circuit wiring for lights, exhaust fans, ceiling fans, bells, convenience socket outlet points:-

2.5 Sq.mm - For Lights/fans/6A socket wiring from DB's upto the outlet points including control wiring where the circuit length from the DB's to 1st outlet is less than 40 m.

In case of power socket outlet circuit.

6.0 Sq.mm - From DB's 20/32 A Industrial type sockets.

4.0 Sq.mm - From DBs to 16 A sockets.

The earth continuity conductor size as indicated in the drawing/BOQ shall be drawn through conduit along with other circuit cables/wires. The size of the earth continuity conductor shall be as follows:-

UNLESS OTHERWISE SPECIFIED MINIMUM SIZE OF EARTH CONTINUITY CONDUCTOR WIRES NOT FORMING PART OF THE SAME CABLE AS THE ASSOCIATED CIRCUIT CONDUCTOR.

Nominal cross sectional area of largest associated copper circuit conductor in sq.mm	Nominal cross sectional area of earth continuity conductor in sq.mm (PVC insulated green colour wire)
1.5	2.5
2.5	2.5
4.0	2.5
6.0	4.0
10.0	6.0
16.0	6.0
25.0	10.0
35.0	10.0
50.0	10.0

Separate circuits shall run for each water heater, pantry/kitchen equipment, window air conditioner, and similar outlets at locations as shown on drawings.

1.6 INSTALLATION OF CONDUIT

1.6.1 CONCEALED CONDUIT SYSTEM

Unless otherwise Specified, all wiring shall be in heavy gauge rigid PVC conduit embedded in wall, or ceiling and concealed in the false ceiling. The size of the conduit shall be selected in conformity with I.S. code and as specified in the table given below. Factory made conduit bends and accessories shall be used. PVC Conduit shall be jointed using Solvent Cement as recommended by the conduit supplier. The conduit in ceiling slab shall be straight as far as possible. Before the conduits are laid in the ceiling, the position of the outlet points, controls, junction boxes shall be set out clearly as per the dimensions and to minimise off-sets and bends. Before the reinforcement rods are kept in position electrical contractor shall mark in paint the position of outlet points and conduit drop on the shuttering. When the outlet boxes are kept in position and before pouring the concrete, all outlet boxes shall be filled with paper to avoid entry of concrete into the box. Conduits in ceiling shall be bonded to the reinforcement rods with G.I. bonding wire at intervals not more than 1000mm, to secure them in position. PVC deep light outlet / pull boxes shall be provided as required. The conduit in ceiling slab shall be laid above the first layer of reinforcement rods to avoid cracks in the ceiling surface. In general the conduit shall not be laid directly on the shuttering surface to avoid cracks in the ceiling surface.

Conduits concealed in the wall shall be secured rigidly by means of steel hooks / staples at min. 750 mm intervals. Before conduit is concealed in the walls, all chases, grooves shall be neatly made to proper required dimensions using electrically operated groove cutting tools to accommodate number of conduits. The outlet boxes for control switches, inspection and draw boxes shall be fixed as and when conduits are being fixed. The recessing of conduits in walls shall be so arranged as to

allow atleast 12mm plaster cover on the same. All grooves, chases etc. shall be refilled with 1:4 cement mortar and finished upto wall surface before plastering of walls is taken up by the general civil contractor. Horizontal chases in walls are not allowed. Where unavoidable, prior permission of owner/consultant shall be obtained before making any chasing. Where conduits pass through expansion joints in the building, adequate expansion fitting or other approved devices shall be used to take care of the relative movement. Whenever the conduits terminate into control boxes, distribution boards etc. conduits shall be rigidly connected to the boxes/boards with check nuts on either side of the entry. After conduits, junction boxes, outlet boxes etc. are fixed in position, their outlets shall be properly plugged with PVC stoppers or any other suitable materials, so that water, mortar, vermin or any other foreign materials do not enter into the conduit system. All conduit ends terminating into an outlet shall be provided with bushes of PVC or rubber after the conduit ends are properly filed to remove burrs and sharp edges.

Necessary G.I. pull wires shall be inserted into the conduit for drawing wires before concreting. Insulated earth wires shall be run in each conduit originating from the panel board upto the Light, Socket and Switch boxes. If the Electrical Contractor forgets to install any conduit/boxes etc., before the plastering/painting work is done by other agencies, he may be permitted to install the same with prior permission of owners/ consultant and he shall be liable to make good the wall, floor, ceiling etc. at his own cost.

Conduits shall be so arranged as to facilitate easy drawing of wires through them. Entire conduit layout shall be done in such a way as to avoid additional junction boxes other than light points. The wiring shall be done in a looping manner. All the looping shall be done in either switch boxes or outlet boxes. Joints in junction or pull boxes are strictly not allowed. Where conduits cross building expansion joints, adequate expansion fittings or other approved devices shall be used to take care of any relative movement.

All conduits shall be installed so as to avoid touching of steam and hot water pipes.

Conduits shall be installed in such a way that the junction and pull boxes shall always be accessible for repairs and maintenance work. The location of junction/pull boxes shall be marked on the shop drawings and approved by the owner/consultant.

A minimum separation of 200mm shall be maintained between electrical conduits and hot water lines in the building.

No run of conduit shall exceed ten meters between adjacent draw-in points nor shall it contain more than two right angle bends, or other deviation from the straight line.

Caution shall be exercised in using the PVC conduits in locations where ambient temperature is 50 degree celsius or above. Use of PVC conduits in places where ambient temperature is more than 60 degree C is prohibited. The entire conduit system including boxes shall be thoroughly cleaned after completion of installations and before drawing of wires. Conduit system shall be erect and straight as far as possible. Traps where water may accumulate from condensation are to be avoided and if unavoidable, suitable provision for draining the water shall be made.

All jointing methods shall be subject to the approval of the owner/consultant. Separate conduits shall be provided for the following system.

- Lighting wiring
- 16 Amp power outlets.
- 6 Amp outlets and lighting system.
- 24 Volt supply system.
- Telephone/intercom system,
- Fire Alarm system,
- Computer data cabling system.
- Equipment wiring.

CONDUIT JOINTS

Conduits shall be joined by means of plain couplers. Where there are long runs of straight conduits, pull/inspection boxes shall be provided at intervals, as approved by the owner/consultant/construction manager. The conduits shall be thoroughly cleaned before making the joints. In case of plain coupler joints, proper jointing material like a vinyl solvent cement (gray in color) or any material as recommended by the manufacturer shall be used.

BENDS IN CONDUIT

Wherever necessary, long bends or diversions may be achieved by bending the conduits or by employing normal bends. No bends shall have radius less than 2.5 times outside diameter of the conduit. Heat may be used to soften the PVC conduit for bending, but while applying heat to the conduit, the conduit shall be filled with sand to avoid any damage to the conduit. Kinks in the conduit bends shall not be acceptable.

BUNCHING OF CABLES

Cables of AC supply of different phases shall be bunched in separate conduits. The number of insulated wires/cables that may be drawn into the conduits shall be as per the following table. In this table, the space factor does not exceed 40%. However, in any case conduits having less than 20mm diameter shall not be used.

MAXIMUM PERMISSIBLE NUMBER OF 650 VOLT GRADE SINGLE CORE WIRES THAT MAY BE DRAWN IN TO RIGID PVC CONDUITS.

CABLE SIZE IN Sqmm	SIZE OF CONDUITS (mm) (MAX NO. OF WIRES)				
	20	25	32	40	50
1.5	4	8	14	-	-
2.5	4	6	10	-	-
4.0	3	4	8	12	-
6.0	2	4	6	8	-
10.0	1	3	5	10	-
16.0	0	2	4	5	12

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.

WIRING :

All final branch circuits for lighting and appliances shall be single conductor cables run inside conduits. Branch circuit conductor sizes shall be as shown in the load analysis of drawing and conforming to the requirements of the I.E. Regulations and I.S. Code.

Home runs indicated on the drawings for the final branch circuits shall be kept in a separate conduit upto the panel board via switches wherever called for. No other wiring shall be bunched in the conduit unless the other circuit main of same phase runs in the same conduit.

For each lot of wire supply, Contractor shall supply a certificate issued by the Manufacturer stating its origin, date of manufacture, constitution and standards to which it complies and the test certificates.

Looping system of wiring shall be used. Wires shall not be jointed inside the conduit or pull boxes. Where joints are unavoidable, they shall be made through approved mechanical connectors with prior permission of owner/consultant.

Control switches shall be connected in the phase conductors only and shall be 'ON' when knob is down. Switches shall be fixed in galvanised steel boxes. Chromium plated screws shall be used.

Power wiring shall be distinctly separate from lighting wiring.

Each circuit phase wire from the distribution boards should be followed with a separate neutral wire of the same size as the circuit wire.

BUNCHING OF WIRES:

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

DRAWING CONDUCTORS:

The drawing and jointing of FRLS PVC insulated copper conductor wires and cables shall be executed with due regard to the following precautions. While drawing wires through conduits, care shall be taken to avoid scratches and kinks which cause breakage of conductors. There shall be no sharp bends.

Insulation shall be shaved off like sharpening of a pencil and it shall not be removed by cutting it square.

FRLS PVC insulated copper conductor wire ends shall be soldered (at least 20 mm length)
Strands of wires shall not be cut for connecting terminals. The terminals shall have sufficient cross sectional area to take all strands and shall be soldered. Connecting brass screws shall have flat ends. All looped joints shall be soldered and connected through block/connectors. The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less. Conductors of all sizes shall always be terminated using cable sockets. At all bolted terminals, brass flat washers of large area and approved steel spring washers shall be used. Brass nuts and bolts shall be used for all connections.

Only certified wiremen and cable jointers shall be employed to do jointing work. All wires and cables shall bear the manufacturer's label and shall be brought to site in original packing. For all internal wiring, PVC insulated wires of 650/1100 volts grade shall be used. The sub-circuit wiring for point shall be carried out in loop system and no joints shall be allowed in the length of the conductors. If the use of joint connections is unavoidable due to any specific reason, prior permission, in writing, shall be obtained from the owner/consultant. 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 wire. Before the wires are drawn into the conduits, the conduits shall be thoroughly cleaned of moisture, dust, dirt or any other obstruction by forcing compressed air through the conduits. The minimum size of PVC insulated conductor wires for all sub-circuit wiring for light points shall be 2.5 sq.mm.

JOINTS:

All joints shall be made at main switches, distribution boards, socket outlets, lighting outlets and switch boxes only. No joints shall be made in conduits and in junction boxes. Conductors shall be continuous from outlet to outlet.

MAINS AND SUB-MAINS:

Mains and sub-mains cables or wires where called for shall be of the rated capacity and of approved make. Every main and sub-main wire shall be drawn through an independent adequate size conduit. An independent earth wire of proper rating shall be provided for every single phase sub-main. For every 3-phase sub-main, 2 nos. earth wires of proper rating shall be provided along with the sub- main. The earth wires shall be drawn inside the conduits along with the circuit main. Where mains and sub-mains cables are connected to switchgear, sufficient extra lengths of cables shall be provided to facilitate easy connections and maintenance.

LOAD BALANCING:

Load balancing of circuits in three phase installation shall be planned before the commencement of wiring and shall be strictly adhered to.

COLOUR CODE OF CONDUCTORS:

Colour code shall be maintained for the entire wiring installation: red, yellow, blue for three phases, black for neutral, green/yellow green for earthing.

The control wire from light control switches to the light/fan points shall be the same colour as that of the phase/circuit wires feeding that particular loop.

EARTHING

All earthing system shall be in accordance with IS 3043 - 1985 Code of practice for Earthing.

The type and size of earthing wire shall be as specified under the heading of cables.

Each conduit originating from the DB to various outlets shall have one earth wire (PVC insulated green colour wire).

TESTING OF INSTALLATION

Before a completed installation is put into service, the following tests shall be complied with:

INSULATION RESISTANCE

The insulation resistance shall be measured by applying 500 Volt megger with all fuses in place, circuit breaker and all switches closed.

The insulation resistance in mega ohms of an installation measured shall not be less than 50 mega ohms divided by the number of points in the circuit.

The insulation resistance shall be measured between

Earth to Phase
Earth to Neutral
Phase to Neutral

EARTH CONTINUITY PATH

The 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.

POLARITY OF SINGLE POLE SWITCHES

A test shall be made to verify that every non-linked, single pole switch is connected to one of the phases of the supply system.

COMPLETION CERTIFICATES

All the above tests shall be carried out in presence of Construction Manager and the results shall be recorded in prescribed forms. Any default during the testing shall be immediately rectified and that section of the installation shall be retested. The completed test result forms shall be submitted to the owner/consultant.

On completion of an electric installation a certificate shall be furnished by the contractor, countersigned by the certified supervisor under whose direct supervision the installation was carried out. This certificate shall be in a prescribed form as required by the local electric supply authority.

MEASUREMENTS

Mode of measurement is as follows :

For purposes of measurement the point wiring for lights/fans/6A sockets (where 6A sockets are connected to lighting circuit loop) is divided into two parts.

a) Point Wiring

b) Circuit Main

a) **POINT WIRING**

The wiring for light/fan/6A socket (where 6A sockets are connected to lighting circuit loop) point starting from first light/switch/fan and looping between switches/ fans/sockets etc., shall be measured either in `Number' or `Set'.

One light/fan point controlled by one switch is measured in Number (No.)

Set of Two or more light points controlled by one switch is measured in `Sets'.

Where set of light points wired and controlled directly from MCB DB shall be measured in `Sets'. The rate for this item shall not include the cost of switch & switch box.

6A socket wiring where connected to the lighting circuit loop is measured in Number (No.)

b) **CIRCUIT MAIN**

The length of circuit main including conduit starting from MCB DB to first switch/light/fan shall be measured separately in `Linear Metres' (Rm). (Further wiring is measured in point wiring).

CIRCUIT MAIN FOR WIRING 6A SOCKETS, 16A SOCKETS AND POWER OUTLETS SHALL BE MEASURED AS UNDER

Length of circuit wire including conduit starting from MCB DB to outlets and looping between outlets shall be measured in linear metres (Rm).

The commercial type socket outlet with outlet box and cover plate shall be measured in numbers (No.)

The Industrial type socket outlet including MCB, plug top, outlet box and cover plate shall be measured in numbers (No.)

The plug tops where called for shall be measured in numbers (No.)

C. <u>LIGHT FITTINGS AND ACCESSORIES</u>:

<u>SCOPE</u>

Scope of work under this section shall include inspection at suppliers/manufacturer's premises, appropriate, receiving at site, safe storage, transportation from point of storage to point of erection and erection of light fittings, fixtures and accessories including all necessary supports, brackets, down rods and painting as required. The contractor shall supply all materials and accessories (other than those supplied by the owner), labour, tools, transportation, scaffolding etc., required for the completion of above work in all respects.

STANDARDS APPLICABLE:

The lighting and their associated accessories such as lamps, reflectors, housings, ballasts etc., shall comply with the latest applicable standards, more specifically the following :

Electric light fittings General and safety requirements	- IS - 1913.
Industrial lighting fittings with metal reflectors	- IS - 1777
Decorative lighting outposts	- IS - 5077
Flood Lights	IS - 1947
Luminaries for street lighting	IS - 2149
Bayonet lamp holders	IS - 1258
Bi-pin lamp holders for tubular fluorescent lamps	IS - 3323
Ballasts for use in fluorescent light fittings	IS - 1534
Starters for fluorescent lamp	IS - 2215
Ballast for HP MV lamps	IS - 6616
Capacitors for use in fluorescent, HPMV & LP sodium Vapour lamps circuits	IS - 2215
Tubular Fluorescent lamps	IS - 2418 (Part I)
High pressure mercury vapour lamps	- IS - 2183
Tungsten filament general electric lamps	IS - 418
High pressure sodium vapour lamps	IS - 9974 (Part -I)

Light Fittings - General Requirements :

a) Fittings shall be designed for continuous trouble free operation under atmospheric conditions, reduction in lamp life or without deterioration of materials and internal wiring. Outdoor fittings shall be weather - proof and rain proof.

b) Fittings shall be so designed as to facilitate easy maintenance including cleaning, replacement of lamps/starters etc.

c) All fittings shall be supplied complete with lamps. All mercury vapour and sodium vapour lamp fittings shall be complete with accessories like ballasts, power factor improvement capacitors, starters, etc. Out door type fittings shall be provided with weather proof boxes.

d) Fluorescent lamp fittings shall be complete with all accessories like ballasts, power factor improvement capacitors, starters capacitors for correction of stroboscopic effect.

e) Each fitting shall have a terminal block suitable for loop-out connection by 1100 V PVC insulated copper conductor wires upto 4 sq.mm. the internal wiring should be completed by the manufacturer by means of standard copper wire and terminated on the terminal block.

f) All hardware used in the fitting shall be suitably plated or anodised and passivity for use in industrial plants.

g) Earthing of each light fitting shall be provided with an earthing terminal. All metal or metal enclosed parts of the housing shall be bonded and connected to the earth terminal so as to ensure satisfactory earthing continuity throughout the fixture.

h) Painting/Finish All surfaces of the fittings shall be thoroughly cleaned and degreased and the fittings shall be free from scale, rust, sharp-edges, and burrs.

i) The housing shall be stove-enamelled or anodised as required. The surface shall be scratch resistant and shall show no sign of cracking or flaking when bent through 90 deg. over 12 mm dia mandrel.

DECORATIVE TYPE FITTINGS

Decorative fluorescent fittings shall be provided with mounting/housing channel cum reflectors of CRCA sheet steel. Stove enamelled diffusers or louvers shall be translucent white polystyrene.

ACCESSORIES FOR LIGHT FITTINGS REFLECTORS:

The reflectors shall be made of CRCA sheet steel/aluminium/silvered glass/Chromium plated sheet copper as required. The thickness of reflectors shall be as per relevant standards. Reflectors made of steel shall have stove enamelled/vitreous enamelled/epoxy coating finish. Aluminium used for reflectors shall be anodised/epoxy stove enamelled/mirror polished. The finish for the reflector shall be as specified. The reflectors shall be free from scratches blisters and shall have a smooth and glossy surface having no premium light reflecting coefficient .Reflectors shall be readily removable from the housing for cleaning and maintenance without use of tools.

LAMP/STARTERS HOLDERS:

Lamp holders shall have low contact resistance, shall be resistant to wear.They shall hold lamps in position under normal conditions of shock and vibration prevalent in an industrial atmosphere. Lamp holders for fluorescent lamps shall be of spring loaded BI-pin rotar type. Live parts of the lamp holder shall not be exposed during insertion or removal of the lamp or after the lamp has been taken out.

Lamp holders for incandescent and mercury vapour lamps shall be bayonet type upto 100 W and Edison screw type for higher wattage. Starter holders for fluorescent lamps shall be so designed that they are mechanically robust and shall be capable of withstanding shocks during transit, installation and use.

BALLASTS:

The ballasts shall be designed for long life and low power loss. They shall be mounted using self-locking, anti -vibration fixtures and shall be easy to remove without demounting the fittings. The enclosures shall be dust tight and non-combustible. Ballasts shall be inductive, heavy duty type,filled with thermosetting, insulating, moisture repellent polyester compound filled under pressure or vacuum. Ballasts shall be provided with taps to set the voltage. The ballast wiring shall be of copper and they shall be free from dust.

Separate ballast shall be provided in case of multi lamp fittings, except in case of 2 x 20 W fittings. Starters shall have bi-metal electrodes of high mechanical strength. Starters shall be replaceable without disturbing the reflector of lamps and without use of any tool. Starters shall have brass contacts and radio interference suppression capacitor.

CAPACITORS:

The Capacitors shall have a constant value of capacitance and shall be connected across the supply of individual lamp circuits. The capacitor shall have a value of capacitance so as to correct the power factor of its corresponding lamp circuit to 0.95 lag or better. Capacitor shall be hermetically sealed preferably in a metal enclosure to prevent seepage of impregnate and ingress of moisture.

LAMPS:

Fluorescent lamps shall be "day-light colour" type unless otherwise specified and shall be provided with features to avoid blackening of lamp ends. Mercury vapour lamps shall be of high pressure, colour corrected type. Lamps shall be capable of withstanding vibrations prevalent in an industrial atmosphere, the filament/electrodes shall not break under such circumstances.

PL Lamps shall be energy effective compact single ended light sources in 9 to 11W ratings consisting of two narrow glass tubes welded together. The lamp shall be complete with integral glow switch starter and capacitor and two pin electrical connection The lamp shall be colour rendered to give warm colour impression. The compact lamp shall have a long life and shall be energy efficient.

INSTALLATION:

The light fixtures and fittings shall be assembled and installed in position complete and ready for service, in accordance with details, drawings, manufacturer's instructions and to the satisfaction of the Construction Manager. Pendent fixtures specified with overall stem lengths are subject to change and shall be checked with conditions on the job and installed as directed. All suspended fixtures shall be mounted rigid and fixed in position in accordance with drawings, instructions and the approval of the Construction Manager. Fixtures shall be suspended true to alignment, plumb, level and capable of resisting all lateral and vertical forces and shall be fixed as required.

All suspended light fixtures, fans etc, shall be provided with concealed suspension arrangement in the concrete slab/roof members. It is the duty of the Contractor to make these provisions at the appropriate stage of construction. Exhaust fans shall be fixed at location shown on drawings. They shall be wired to a plug socket outlet at a convenient location near the fan. All switch and outlet boxes, for fans and light fittings shall be bonded to earth. The recessed type fixtures shall not be supported into the false ceiling frame work. This shall have independent support from the socket of ceiling using G.I.conduit down rods/chromium plated steel chain with provision for adjusting the level of fitting. Wires shall be connected to all fixtures through connector blocks. Wires brought out from junction boxes shall be encased in flexible pipes for connecting to fixtures concealed in suspended ceiling. The flexible pipes shall be check-nut to the junction box with a brass bush and double check nut at the fixture and flexible pipes, wherever used shall be of make and quality approved by the Construction Manager/Architect.

MEASUREMENT

Installation of light fittings with all associated works including fixing accessories is measured in numbers (No) Supply and installation of down rods and C.P. Chain with associated works as per BOQ and specifications are measured in linear metre (Rm)

-: LIST OF APPROVED MAKE :-

1	LIGHTNING ARRESTERS	ERICO /ELPRO / INDELEC/ ABB
2	LV BOARDS,	Electro Allied Product/ LEGRAND
3	Distribution Board	ABB / Siemens / Legrand
4	MOULDED CASE CIRCUIT BREAKERS	ABB / SCHNEIDER / L&T / Legrand
5	MINIATURE CIRCUIT BREAKERS	LEGRAND / SCHNEIDER/ ABB/ SIEMENS
6	RESIDUAL CURRENT CIRCUIT BREAKERS (RCCB)	LEGRAND / SCHNEIDER/ ABB/ SIEMENS
7	PUSH BUTTONS	SIEMENS / VAISHNAV / RISHAB
8	RELAYS	ABB / GE/ SIEMENS/ L& T/ALSTOM
9	TIMERS	LEGRAND / SCHNEIDER / SIEMENS/ ABB
10	INDICATING LAMPS	SIEMENS / VAISHNAV / RISHAB
11	MCB DISTRIBUTION BOARDS	LEGRAND / SCHNEIDER/ SIEMENS/ ABB
12	DIGITAL MEASURING INSTRUMENTS	ENERCON / L&T/ HPL/ CONVERGE
13	DIGITAL KILO WATT HOUR METERS	L&T / ENERCON/ HPL/ CONVERGE
14	LIGHT FIXTURES & LAMPS (INDUSTRIAL, COMMERCIAL & DECORATIVE)	
14.1	INTERNAL	PHILIPS / Wipro /THORN/ K-LITE
14.2	EXTERNAL	PHILIPS / K-LITE / SCREDER
14.3	LED Light (Crey / Nichita with power LED)	Philips / Mark Signage
15	HT & LT CABLES (POWER & CONTROL)	POLYCAB / NICCO/ GLOSTER / HAVELS
16	TELEPHONE CABLES	
16.1	CAT5E & CAT6 GRADE	AVAYA(LUSCENT) / AMP/ MOLEX/ LEGRAND/ FINOLEX
17	PVC INSULATED COPPER WIRES	FINOLEX (FRLS) / MESCAB / RR KABEL/ LAPP/ POLYCAB
18	PVC RIGID CONDUITS	VIP / UNIVERSAL/ KINJAL/HARSH/ PRECISION

19	MS CONDUITS	SUPREME / BHARAT/ ECON
20	CRIMPING TYPE LUGS	DOWELLS / 3D / BRACO
21	HT CABLE SEALING KITS	REYCHEM
22	CABLE GLANDS	BRACO/ COMET/ DOWELLS
23	INDUSTRIAL SOCKETS IN SHEETSTEEL ENCLOSURE WITH MCB	LEGRAND/ CLIPSAL/ HENKEL/CROMPTON
24	CEILING ROSE	ANCHOR / LISHA
25	LIGHTING & POWER CONTROL SWITCHES, RECEPTACLES	ANCHOR ROMA (TRESA) / MK (WRAPAROUND) / CRABTREE/ ABB/ SIEMENS/ LEGRAND/ CLIPSAL
26	CEILING FANS & EXHAUST FANS	CROMPTON / BAJAJ/ EPC/ HAVELLS
27	TERMINALS	ELMEX / CONNECTWELL / WAGO
28	CHANGE OVER SWITCHES	HPL/ C& S/ GE
29	PUBLIC ADDRESS SYSTEM & SPEAKERS	PHILIPS / AHUJA / SONODYNE / ONKYO
30	TELEPHONE SYSTEM & EXCHANGE	TATA TELECOM / SIEMENS / LUCENT
31	CABLE TRAYS	LOCAL MAKE/ CITY STEELEDGE
32	SYNTHETIC PVC MATS	SUNTEX ENTERPRISES
33	AVIATION LIGHT	BINAY OPTO ELECTRONICS / PHILIPS/K-LITE

ELECTRICAL BILL OF MATERIALS FOR COMMUNITY HALL @ ICAI								
SL.NO.	DESCRIPTION	UNIT	QTY	UNIT RATE OF		TOTAL AMOUNT OF		GRAND TOTAL
				SUPPLY	INSTALLATION	SUPPLY	INSTALLATION	S+I
1.0	**WIRING SYSTEM**							
	Provide all materials, accessories, labour etc. for wiring for lights, ceiling fans, exhaust fans, 6A Sockets using 1.5 sq mm . and looping in 6a and 6/16 A socket or 2 TO 4 nos. 6 or 6/16 Amp socket using 2.5 sq.mm. PVC insulated stranded copper conductor wires of 660V grade drawing through heavy gauge rigid PVC conduit with 2mm wall thickness including supply and laying of conduits and its accessories above false ceiling using PVC pull/junction boxes, light outlet boxes, G.I. Switch outlet boxes,switch plates, 6A switched socket etc. including testing and commissioning complete. The rate for point wiring shall include wiring from first switch point and then looping between the points and also include the cost of providing 1no. insulated copper conductor wire (for earthing) to connect all lights, switches sockets etc.**(CASE-1:-FIRST LIGHT/FAN POINT FROM MCB OR SWITCH BOARD IS WITHIN AVG. 5 MTR. AND THE SUBSEQUENT POINTS ARE WITHIN AVG. 5 MTR.)**							
	NOTE :- ALL WIRES SHALL BE FRLS							
1.1	One(1) light point controlled by a 6A modular Switch	Nos.	5	420.00	140.00	2100.00	700.00	2800.00
1.2	One(1) light point controlled by a 6A MCB	Nos.	13	420.00	140.00	5460.00	1820.00	7280.00
1.3	Two(2) light point controlled by a 6A modular Switch	Nos.	24	670.00	220.00	16080.00	5280.00	21360.00
1.4	Two(2) light point controlled by a 6A MCB	Nos.	7	670.00	220.00	4690.00	1540.00	6230.00
1.5	Five (5) light point controlled by a 6A MCB	Nos.	2	1420.00	660.00	2840.00	1320.00	4160.00
1.6	Six (6) light point controlled by a 6A MCB	Nos.	2	1670.00	740.00	3340.00	1480.00	4820.00
2.0	**LIGHTING CIRCUIT MAIN**							
	Providing all materials, accessories and labour for wiring with conduits and accessories for light / fan circuit main using PVC insulated stranded copper conductor wires of 650V grade drawn through heavy gauge rigid PVC conduit using necessary conduit accessories, PVC pull / junction boxes, G.I fish wire etc. The rate shall include the cost of providing PVC insulated stranded copper conductor earth wire in each conduit along with other circuit main wires. **The circuit main shall be measured in running meter from respective DB TO Switch Board, Switch Board to Switch Board and looping between the switches** (further onwards, it shall be deemed to be included in point wiring).							
2.1	3 x1.5sqmm FRLS wires in 20/25 mm dia PVC conduit.	Rmt	180	85.00	18.00	15300.00	3240.00	18540.00
3.0	**POWER CIRCUIT MAIN**							
3.1	3 x 2.5sqmm FRLS wires in 20 /25 mm dia PVC conduit.	Rmt	250	125.00	25.00	31250.00	6250.00	37500.00
4.0	**MAIN ELECTRICAL PANEL TO DB AND AC SUPPLY MAIN**							
4.1	2C X4 sqmm "AL." ARM. XLPE CABLE	Rmt	20	205.00	75.00	4100.00	1500.00	5600.00
4.2	4C X4 sqmm "AL." ARM. XLPE CABLE	Rmt	40	315.00	100.00	12600.00	4000.00	16600.00
4.3	3.5C X35 sqmm "AL." ARM. XLPE CABLE	Rmt	75	1700.00	250.00	127500.00	18750.00	146250.00
5.0	**POWER RECEPTACLES**							
5.1	Supply and installation of 6A, 5 pin, shuttered switched socket outlet with G.I or moulded plastic outlet box and moulded plastic cover plate as required including the termination of wires.	Nos.	48	330.00	120.00	15840.00	5760.00	21600.00

5.2	Supply and installation of 6/16A, 5pin, and combination type shuttered switched socket outlet with indicator lamp and G.I or moulded plastic outlet with indicator lamp and G.I or moulded plastic cover plate as required including the termination of wires.	Nos.	5	420.00	150.00	2100.00	750.00	2850.00
5.0	**Supply and installation of Main Distribution Panel including Fixing on Wall with Bracket/Frame as required including the termination of wires.**							
5.1	**MAIN ELECTRICAL DISTRIBUTION PANEL**							
	One(1) - Incomer having							
	One(1) - 250A,4P ,35kA, MCCB							
	Three(3) - Phase indicating lamps with MCB							
	One (1) - Digital multi data meter capable of reading, Voltage, Current, Power Factor, Frequency, kilowatt hours, Cl1.0, flush mounting.							
	Three (3)- 250/5A, 15VA, Cl 1.0, CTs							
	One(1)-3 Phase-4 Wire,50 Hz 415 V,300A ,35kA , AL Bus Bar.							
	Outgoing Feeders:							
	One (1)-Out going feeder having (For Main Hall Area DB)							
	One(1) -25A, 4P, 10kA, MCB							
	One (1)-Out going feeder having (For Stage Area DB)							
	One(1) -25A, 4P, 10kA, MCB							
	One (1)-Out going feeder having (For Club Area DB)							
	One(1) -25A, SPN, 10kA, MCB							
	One (1)-Out going feeder having (For AC Chillar)							
	One(1) -100A, 4P, 18kA, MCCB							
	One (1)-Out going feeder having (For AHU of Community Hall)							
	One(1) -100A, 4P, 18kA, MCCB							
	One (1)-Out going feeder having (For Spare)							
	One(1) -100A, 4P, 18kA, MCCB							
	One (1)-Out going feeder having (For Spare)							
	One(1) -25A, 4P, 10kA, MCB							
	One (1)-Out going feeder having (For Spare)							
	One(1) -25A, SPN, 10kA, MCB							
	DB as above	No.	1	175000.00	6000.00	175000.00	6000.00	181000.00
5.2	**6 Way TPN DB (HALL AREA DB)**							
	One(1) - Incomer having							
	One(1) -25A, 4P, 10kA, MCB							
	One(1) - 3Ø-4Wire,415V,40A,10kA,Cu. Busbar							
	Outgoing Feeders:							
	Six(6)-Out going feeders each having							
	One(1) -6A, SP, 10kA, MCB							
	Two (2)-Out going feeders each having							
	One(1) -10A, SP, 10kA, MCB							
	Six(6)-Out going feeders each having							
	One(1) -16A, SP, 10kA, MCB							
	DB as above	No.	1	3300.00	1200.00	3300.00	1200.00	4500.00
5.2	**8 Way TPN DB (STAGE AREA DB)**							
	One(1) - Incomer having							
	One(1) -25A, 4P, 10kA, MCB							

	One(1) - 3Ø-4Wire,415V,40A,10kA,Cu. Busbar							
	Outgoing Feeders:							
	Thirteen(13)-Out going feeders each having							
	One(1) -6A, SP, 10kA, MCB							
	Six(6)-Out going feeders each having							
	One(1) -16A, SP, 10kA, MCB							
	DB as above	No.	1	4000.00	1400.00	4000.00	1400.00	5400.00
5.2	**12 Way SPN DB (CLUB AREA DB)**							
	One(1) - Incomer having							
	One(1) -25A, SPN, 10kA, MCB							
	One(1) - 1Ø-2Wire,240V,40A,10kA,Cu. Busbar							
	Outgoing Feeders:							
	Seven(7)-Out going feeders each having							
	One(1) -6A, SP, 10kA, MCB							
	Four(4)-Out going feeders each having							
	One(1) -16A, SP, 10kA, MCB							
	DB as above	No.	1	1700.00	500.00	1700.00	500.00	2200.00
6.0	**LIGHT FIXTURES**							
	Supply, installation, testing and commissioning of following type of light fixtures as per drawings and specifications with all other accessories such as supporting rods / frames, anchor fasteners, necessary hardware etc. The rate shall include for installing the fittings along with transformers where required, lamps, diffuser, chokes, starter, power factor improvement capacitors, wires, down rods etc., complete with all accessories to complete the installation as required.							
6.1	1x150 Watt DE MH Lamp with TG K-LITE make or equivalent suitable for 240V	Nos.	10	2150.00	135.00	21500.00	1350.00	22850.00
6.2	2x11 Watt CFL Round neck Transulent with battery backup system K-LITE make or equivalent suitable for 240 V	Nos.	5	6730.00	135.00	33650.00	675.00	34325.00
6.3	12V 2X50 W (QR111) LAMP with 2 nos. of external 12V 50kva Transformer K-LITE make or equivalent suitable for 240 V	Nos.	16	4360.00	135.00	69760.00	2160.00	71920.00
6.4	32071 Ceiling Lamp white 1x22W PHILIPS make or equivalent suitable for 240 V	Nos.	40	9300.00	135.00	372000.00	5400.00	377400.00
6.5	FBH145/118L 1XPL-C 18W Ceiling Light PHILIPS make or equivalent suitable for 240 V	Nos.	24	1600.00	135.00	38400.00	3240.00	41640.00
6.6	FBH225 2XPL-C/2P18W IC GR Ceiling Light PHILIPS make or equivalent suitable for 240 V	Nos.	12	1900.00	135.00	22800.00	1620.00	24420.00
6.7	17105 Wall Lantern Grey 1x24W PHILIPS make or equivalent suitable for 240V	Nos.	5	2500.00	135.00	12500.00	675.00	13175.00
	MISCLLENEOUS ITEMS							
7.0	Supply & Installation of 48" Sweep Ceiling fan with Electronic regulator complete with accessories and fan) box etc.(HAVELLS MAKE)	Nos.	1	2000.00	200.00	2000.00	200.00	2200.00
8.0	Supply & Installation of 48" Sweep Wall fan with Electronic regulator complete with accessories and fan box etc.(HAVELLS MAKE)	Nos.	15	2000.00	200.00	30000.00	3000.00	33000.00
9.0	Supply & Installation of 12" Sweep Exhaust fan with Electronic regulator complete with accessories and fan box etc.(HAVELLS MAKE)	Nos.	2	1500.00	150.00	3000.00	300.00	3300.00
10.0	**TOTAL LABOUR COST REQUIREMENT FOR REMOVING OF ALL EXISTING ELECTRICAL EQUIPMENTS LIKE WIRES,LIGHTS,AC AND OTHER ACCESSORIES**							15000.00
	TOTAL CARRIED OVER SUMMARY							**1127920.00**

THE INSTITUTE OF COST ACCOUNTANTS OF INDIA (ICAI)
12, Sudder Street, Kolkata– 700 016

General summary

Item No.	Description of work	Amount Rs. P.
1.	Electrical works	11,27,920.00

Rupees eleven lakh twenty seven thousand nine hundred twenty only.

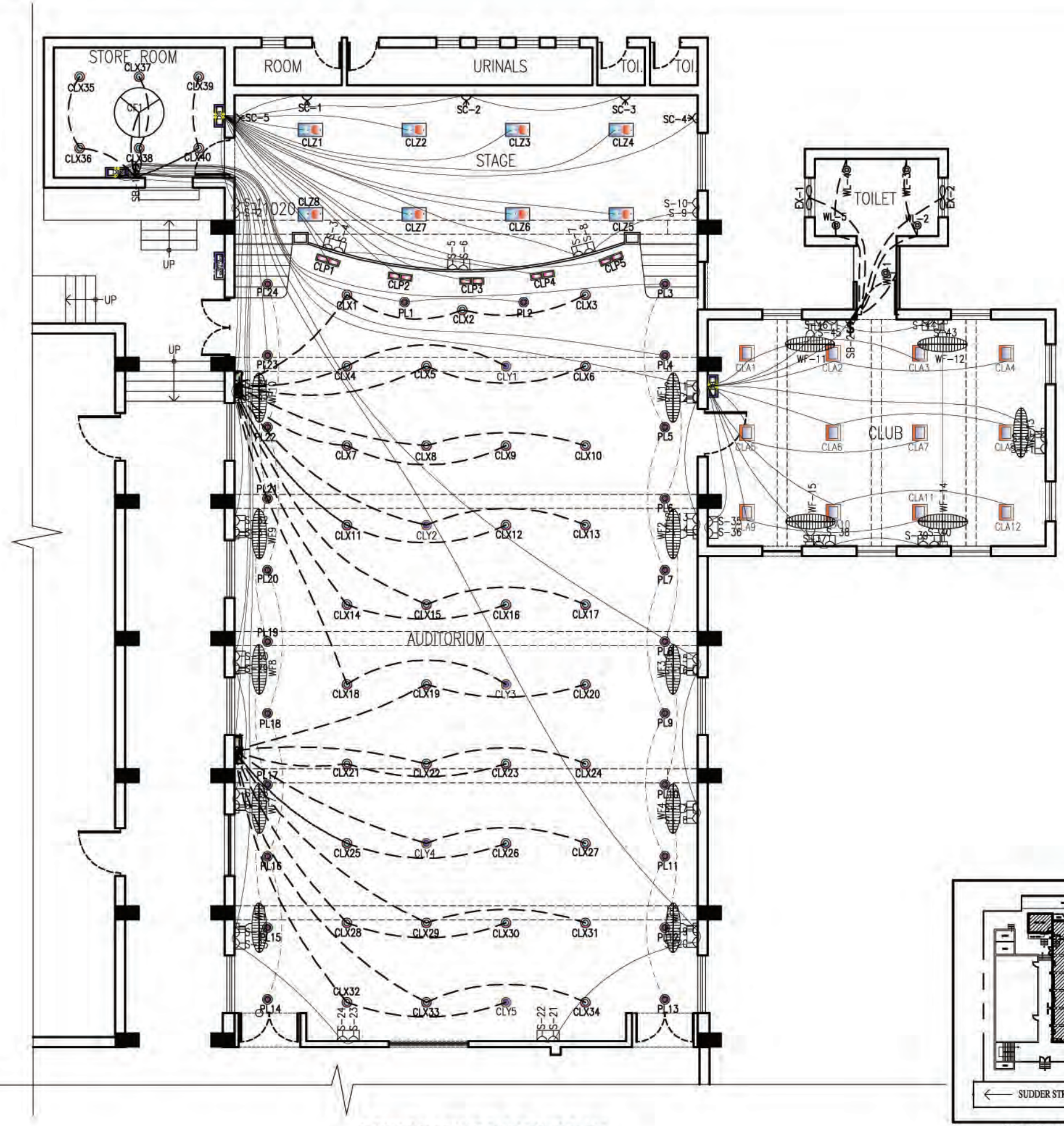
TENDER - PRICE BID

I / We agree to carry out the work mentioned in the tender at par* / _____% (_____percent) above* / _____% (_____ percent) below* the rates shown in the specified price schedule of probable items with approximate quantities.

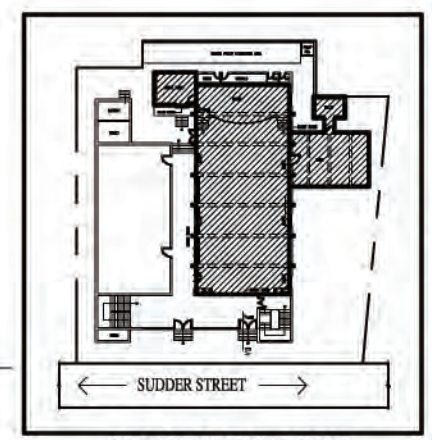
Signature of the Tenderer with Seal and Date

Signature of the Tender accepting Authority

* Please strike out whichever is not applicable



ELECTRICAL LAYOUT FOR GROUND FLOOR



KEY PLAN OF GROUND FLOOR

NOTES

1. ALL DIMENSIONS ARE IN MILIMETRES
2. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED

AREA :

AREA OF PROPOSED WORK = 381 SQM.

ELECTRICAL LEGEND:

NO	DESCRIPTION	SYMBOL
1.	18 WATT WALL LIGHT	
2.	2X18 WATT CEILING LIGHT	
3.	1X22 WATT CEILING LIGHT	
4.	2X11 WATT CEILING LIGHT WITH BATTERY BACK-UP	
5.	2X11 WATT CEILING LIGHT	
6.	150 WATT SPOT LIGHT	
7.	2X50W SPOT LIGHT	
8.	CEILING FAN	
9.	WALL FAN	
10.	6A SOCKET POINT	
11.	6/16A SOCKET POINT	
12.	DISTRIBUTION BOARD	
13.	ELECTRICAL DISTRIBUTION PANEL	

PROJECT:

ELECTRICAL WORK OF INSTITUTE OF COST ACCOUNTANTS OF INDIA (ICAI)

CLIENT :

INSTITUTE OF COST ACCOUNTANTS OF INDIA (ICAI)

DRAWING TITLE :

ELECTRICAL LAYOUT OF GROUND FLOOR

ELECTRICAL CONSULTANT :

AIRTECH CONSULTANCY SERVICES
CG-145, SALT LAKE, SECTOR-II
KOLKATA - 700 091

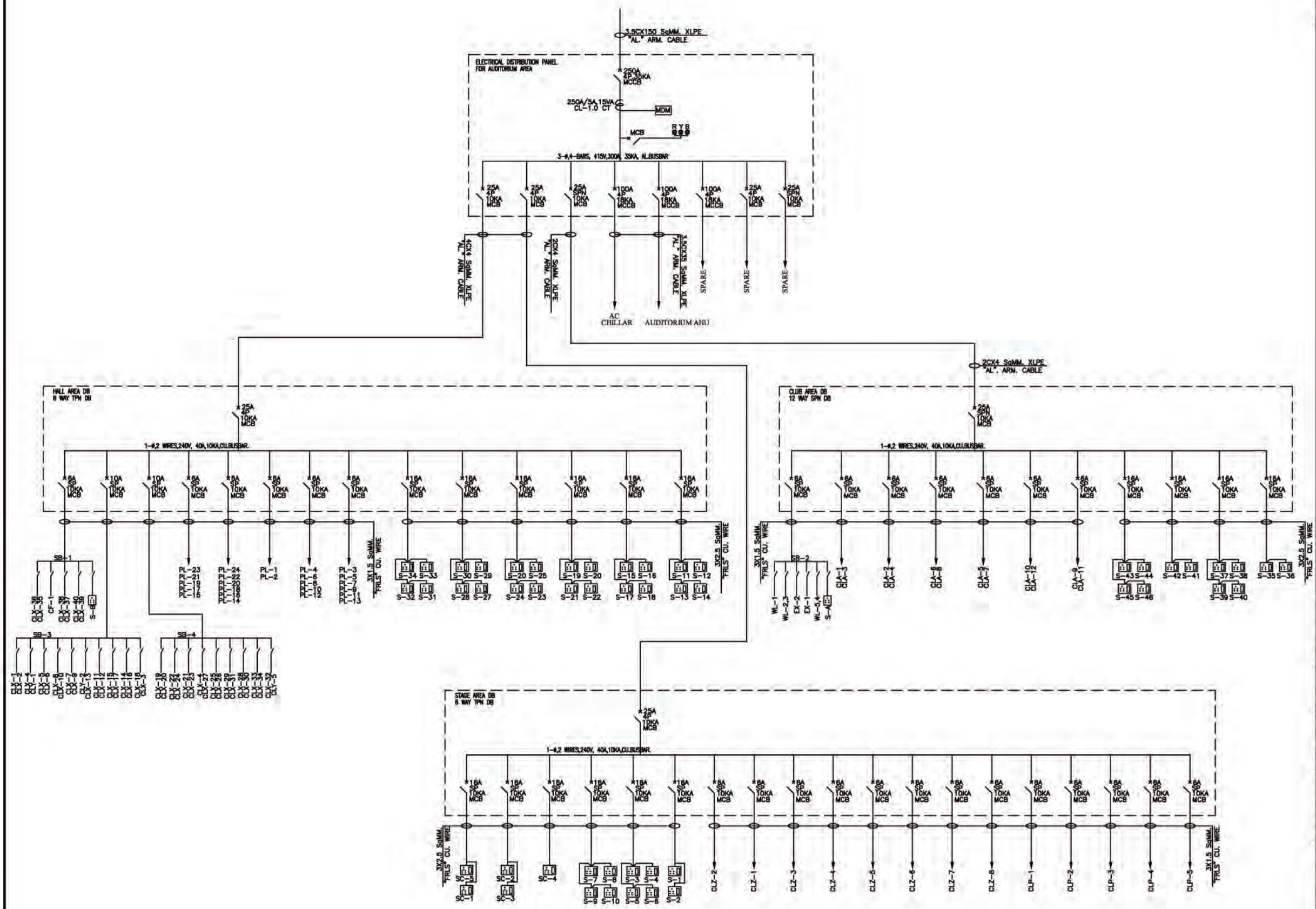
ARCHITECT:

PARTHA DAS & ASSOCIATES
ARCHITECTURE,URBAN DESIGN,LANDSCAPE,INTERIORS
AE-377,SECTOR-I,SALTLAKE CITY,CALCUTTA-700064

ISSUED FOR TENDER PURPOSE ONLY

DATE - 2.04.2013	DESIGN -
SCALE - 1:100 @A3	CHK. BY - DD
DRAWN BY - KM	D. NO. - PDA/ICAI/AD/TND/EL 1

N



NOTES

1. ALL DIMENSIONS ARE IN MILIMETRES
2. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED

AREA :

AREA OF PROPOSED WORK = 381 SQM.

PROJECT:

ELECTRICAL WORK OF INSTITUTE OF COST ACCOUNTANTS OF INDIA (ICAI)

CLIENT :

INSTITUTE OF COST ACCOUNTANTS OF INDIA (ICAI)

DRAWING TITLE :

SINGLE LINE DIAGRAM OF GROUND FLOOR

ELECTRICAL CONSULTANT :

AIRTECH CONSULTANCY SERVICES
CG-145, SALT LAKE, SECTOR-II
KOLKATA - 700 091

ARCHITECT:

PARTHA DAS & ASSOCIATES
ARCHITECTURE,URBAN DESIGN,LANDSCAPE,INTERIORS
AE-377,SECTOR-I,SALT LAKE CITY,CALCUTTA-700064

ISSUED FOR TENDER PURPOSE ONLY

DATE - 2.04.2013	DESIGN -
SCALE - 1:100 @A3	CHK. BY - DD
DRAWN BY - KM	D. NO. - PDA/ICAI/AD/TND/EL 2