



**INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE**  
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NIT NO.- IACS/WS/SB/ELEC/2017-18/104

DATE: - 12-02-2018

### NOTICE INVITING TENDER

Sealed Item Rate tenders are invited from bonafide, resourceful and eligible contractors for the work of “**Repairing and up gradation of sound system in the Auditorium, MLS Hall at IACS, Jadavpur, Kolkata**”. The estimated cost is **Rs.3,50,000/- (Rs. Three lack Fifty Thousand only)**. The estimate however, is mentioned as rough guideline. The tender will comprise of the items like *Earnest Money Deposit in proper form & shape, copy of eligibility documents (i.e. Credential), copy of PAN Card, copy of valid Electrical Contractor’s license, copy of valid Electrical Supervisor’s license, copy of valid trade license, copy of GST Registration Certificate, Bank A/C details, other commercial details, Company profile and any other document in support of technical capability along with quoted price with respect to the Bill of Quantities (BOQ) provided with the tender document.*

The minimum eligibility criteria for the contractors will be as follows:

- (1) Completion of one similar work of value not less than 80% of the estimated cost put to tender under Government, Semi-Government, PSU or Govt. funded Autonomous Body in the last 7 (seven) years to be reckoned from the date of issue of NIT.
- (2) Completion of two similar work each of value not less than 60% of the estimated cost put to tender under Government, Semi-Government, PSU or Govt. funded Autonomous Body in the last 7 (seven) years to be reckoned from the date of issue of NIT.
- (3) Completion of three similar work each of value not less than 40% of the estimated cost put to tender under Government, Semi-Government, PSU or Govt. funded Autonomous Body in last 7 (seven) years to be reckoned from the date of issue of NIT.
- (4) Only GST Registered Contractors can participate.

Similar work shall mean Electrical Installation Work consisting of wiring, fitting fixing, Cable Laying & End Termination, earth connection etc. preferably in laboratory/ research Centre/ educational institute etc.

The Earnest Money Deposit of Rs. 7000/- (Rupees Seven Thousand only) to be submitted with the tender in the form of Demand Draft/Banker’s Cheque/Pay Order of a scheduled Bank to be drawn in favor of “**Indian Association for the Cultivation of Science**” payable at Kolkata, failing which the tender shall be treated as canceled.

The stipulated time of completion of this work is 10 (Ten) days which will be reckoned from the date of handing over of site. However, the work will be carried out simultaneously with the civil counter part matching with the site requirements & condition.

<b>Tender Notice No.</b>	<b>IACS/WS/SB/2017-18-104, Dt. 12-02-2018</b>
Tender Issue Date	12-02-2018 to 19-02-2018
Last date of application for physical sale	19-02-2018 ( up to 1.00 pm)
Last date of submission of Tender	19-02-2018 ( up to 3.00 pm)
Date of Opening	19-02-2018 at 4.00 pm at the meeting room, Workshop

**Cost of Tender Form** : The tender paper may be purchased from the Workshop Department of IACS, Jadavpur against payment of **Rs. 500/- + 5% GST(CGST Rs.13 + SGST Rs.13 rounded) = Rs.526/-** per set (nonrefundable) in cash. However, the firms who will submit downloaded tender from our website ([www.iacs.res.in](http://www.iacs.res.in)) should deposit **Rs. 525/-** (nonrefundable) in the form of **Demand Draft/Pay order/Banker's cheque** (non-refundable) of a scheduled Bank with their tender in a separate envelope without which their tender will be summarily rejected.

**Tender Issue Date** : **12.02.2018 to 19.02.2018** (up to 2.00 P.M. on each working day)

**Last date of application for physical sale** : **19.02.2018 (up to 1.00 P.M.)**. Application should be made on printed letterhead of the firm mentioning the NIT no. & Name of work.

**Download from Website** : No need of Application

**Last date of Submission of Tender** : **19.02.2018 (up to 3.00 PM)**. Complete Tender Form along with **EMD in a sealed envelop super scribing the name of the work, NIT no. and due date of opening on the top of the envelop addressed to the Registrar, IACS, Jadavpur, Kolkata 700032 to be submitted to the Receiving/dispatch Section of IACS.**

**Date of Opening** : **19.02.2018 (at 4.00 P.M in presence of the intending bidders)**

**Acceptance of Tender** : IACS authority is not bound to accept the lowest Tender and reserves the right to reject any or all the tenders without assigning any reason thereof.

**Other terms & conditions:**

The EMD shall be treated as a part of the security deposit for the successful bidder. Tender submitted without EMD or EMD not in proper form & shape shall be summarily rejected. The Security Deposit will be released after six months from the date of successful completion of work. The EMD for unsuccessful bidders will be refunded on demand after finalization of tender.

Deviation limit for individual item, trade and contract as a whole is **25% (twenty five percent)**. However, the department reserves the right to execute in part or whole and can drop any item of the "schedule of work" of the tender. No claim whatsoever will be entertained in this regard.

If the contractor fails to maintain the required rate of progress or to complete the work and clear the site on or before the contract or extended date of completion, he shall without prejudice to any other right or remedy available under the law, pay compensation the amount calculated at the rates stipulated below or such smaller amount as the Director may decide (whose decision in writing shall be final and binding) on the amount of the tendered value of the work for every completed day / week (as applicable ) that the progress remains below or that the work remains incomplete.

- i) Completion period not exceeding 3 months (stipulated) @1% per week or part thereof provided always that the total amount of compensation for delay to be paid under this condition shall not exceed 5% of the tendered value of work.

The Engineer in Charge may without prejudice to his any other rights or remedy against the contractor in respect of any delay, inferior workmanship, any claims for damages and / or any other provisions of this contract or otherwise, and whether the state of completion has or has not elapsed, by notice in writing absolutely determine the contract in any of the following cases.

- i. if the contractor fails to rectify/replace the defects in spite of written notice by Engineer – in-Charge
- ii. If the contractor suspends the progress of work so that in the opinion of the Engineer-in-Charge he will be unable to secure completion of the work by the date of completion and do not improve performance even after written notice.
- iii. If the contractor neglects to carry out his obligation under the contract and / or commits defaults in complying with any of the terms and conditions and does not remedy if even after written notice.

When the contractor has made him liable for action under any of the aforesaid cases, the Engineer-in-Charge on behalf of IACS shall have powers

- a. To determine or rescind the contract. Upon such rescission, the full security deposit recoverable under the contract shall be liable to be forfeited and shall be absolutely at the disposal of IACS.
- b. After giving notice to the contractor to measure up the work done by him, get the balance work done by another contractor. Any expenses which may be incurred in excess of the sum which would work had been executed by him, shall be borne and paid by the original contractor and may be deducted from any of his dues.

Complete Tender Document will also be available at [www.iacs.res.in](http://www.iacs.res.in) and can be downloaded for submission. **Conditional tender including conditional rebates shall be summarily rejected. The quoted rate shall be inclusive of all taxes & duties, levies, cess etc i/c GST also.** Nothing extra will be paid to the Contractor except the accepted rate. In case of any discrepancies, the office copy of the tender document will be referred and shall be binding to the contractor.

**ACTING REGISTRAR**

**TENDER**

I/We have read and examined the notice inviting tender, schedule of quantities, terms and conditions and all other contents of the tender document.

I/We hereby tender for execution of the work as per schedule of quantities, specification, drawing and instructions.

I/We agree to keep the tender open for Sixty days from the date of submission for acceptance and not to make any modifications in its terms and conditions.

A sum of Rs. \_\_\_\_\_ is hereby forwarded in the form of Demand Draft/ Bankers cheque/PAY Order of a Scheduled Bank as earnest money deposit which shall be retained by IACS as a part of security Deposit.

I/We agree that if I/We fail to commence the work as specified in the schedule of quantities, an amount equal to the amount of the earnest money mentioned above shall be absolutely forfeited to the IACS without prejudice to any other right or remedy available in law.

Date \_\_\_\_\_

Signature of Contractor

Postal address \_\_\_\_\_.

Witness \_\_\_\_\_

Address/Occupation \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Acceptance**

The above tender is accepted by me for and on behalf of Indian Association for the Cultivation of Science for a sum of Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_). The letters referred to below shall form part of this contract agreement.

a) \_\_\_\_\_

b) \_\_\_\_\_

Date : \_\_\_\_\_ For and on behalf of  
Indian Association for the Cultivation of Science

Signature

\_\_\_\_\_

Designation

\_\_\_\_\_

# TECHNICAL SPECIFICATIONS & SPECIAL CONDITIONS OF CONTRACT FOR ELECTRICAL WORKS

## CHAPTER 1

### SPECIAL CONDITIONS OF CONTRACT

#### 1.1 General

- 1.1.1 These Special Conditions of Contract supplement the General Instructions, General Conditions of Contract, Bill of Quantities and basic rates and Technical Specifications and tender drawings enclosed thereto, and shall be considered as part of the Tender Papers. Where the provisions of these Special Conditions of Contract are at variance with General Conditions of Contract, the Provisions of these Special Conditions of Contract shall prevail.
- 1.1.2 The several documents forming the tender are to be taken as mutually complementary to one another. Detailed drawings shall be followed in preference to small scale drawings and figured dimensions in preference to scaled dimensions.
- 1.1.3 If there are varying or conflicting provisions in the documents forming part of the contract, the Engineer-In-Charge shall be the deciding authority with regard to the intentions of the provisions and his decision shall be final and binding on the contractor.
- 1.1.4 The Employer reserves the right to exclude any of the Schedule items on reasons of the rates not being reasonable or subsequent change of design for evaluation of tender and deciding the contract during execution or work.
- 1.1.5 The Contractor may be required to carry out any addition or alteration work other than the specified in the schedule of work / bill of quantities as and when required, by the 'Employer' within the completion period of the project.

#### 1.2 Scope of Work

- 1.2.1 The works to be governed by this contract shall cover delivery and transportation up to destination, safe custody at site, insurance, erection, testing and commissioning of the entire Electrical works.
- 1.2.2 The works to be under taken by the contractor will inter-alia include the following:
- i) Preparation of detailed 'AS BUILT' drawings of electrical wiring installation, cable laying, erection/fixing of switchgear etc.
  - ii) Pre-commissioning tests as per relevant standard specifications, code of practice, Acts and Rules.

- iii) Warranty obligation for Circuit Breaker, CT, Cables, Capacitor etc to be supplied by the Contractor.
- iv) All other earthwork and masonry works required to be done in connection with the electrical works.

### **1.3 Execution of work**

- 1.3.1 All the works to be carried out as per the approved drawing and direction of the Engineer- In-Charge.
- 1.3.2 Water & Power supply: - It will be provided by IACS free of cost for the beneficial use of IACS only. However, the contractor shall have to arrange for utilizing the same at their cost and risk.

### **1.4 Period of Completion**

- 1.4.1 Time is the essence of contract. Therefore, timely completion of project is very important. Normally no extension of time will be given. However, on account of delay if any, for the reason beyond the control of the contractor, necessary time extension may be granted if applied for by the contractor prior to the expiry of schedule time of completion.
- 1.4.2 No price variations shall be admissible on the contract rate for any item during the entire period of contract including extension periods. *The Contractor shall not have any claim whatsoever in this regard except statutory variation of duties and Taxes imposed by the Govt. of India/State Govt subsequent to submission of tender by the contractor.*

### **1.5 Quality of materials and works**

All the materials to be used in the execution of the contract shall be of the approved quality and of the class most suited for the purpose specified. The work shall also conform to the following Acts, Rules and Orders:

- i) Indian Factories Act
- ii) Indian Electricity
- iii) National Building Code
- iv) National Electrical Code
- v) Indian Standard Specifications

- 1.5.1 All erection work shall be of the best workmanship & quality to the entire satisfaction of the Employer. The Contractor shall ensure that the equipment and services under the scope of this contract whether manufactured or performed within the Contractor's premises or at his subordinate's premises or at the work site or at any other place are strictly in accordance with the provisions of this contract. For this purpose, if necessary the Contractor shall adopt necessary quality assurance programme to control such activities at all stages.

## 1.6 Electrical License

1.6.1 The work shall be carried out only by a Contractor holding a valid license issued by the State Government for carrying out the installation work of a voltage classes involved, under the direct supervision of the persons holding valid certificates issued or recognized by the State Government. **The tenderer should furnish with his tender the particulars of the license with validity period held by him. The successful tenderer shall furnish the names and particulars of certificates of competency of supervisors and workmen to be engaged for carrying out this work.**

1.6.2 The contractor shall not be allowed to engage sub-contractor directly or indirectly unless it is officially permitted by IACS.

## 1.7 Inspection

1.7.1 The Contractor shall provide without any extra cost to the Employer all materials, equipment, tools, labor and maintenance of every kind which the Employer's Inspecting Engineer may consider necessary for any test and examination to be made at the Contractor's or the Sub-Contractor's (if approved) premises and at site and shall pay all cost attended thereon.

1.7.2 All the equipment and materials shall be tested / inspected by the Employer or its authorized Inspecting Engineer and approved before they are installed / used in the execution of the works covered in the contract. If the Contractor uses any equipment / materials without the prior approval of Employer, those are liable to be rejected. The Contractor shall furnish, as and when demanded by the Engineer-in-Charge the T.C. (Test Certificate) and G.C (Guarantee Card) for verification of quality and make of the materials.

1.7.3 The Inspecting Engineer or his authorized Representative shall have at all times access to the Contractor's premises and shall have the power to

- i) Inspect and examine the materials and workmanship of the work at any time at the site of erection
- ii) Reject any part of the work submitted by the Contractor as not being in accordance with the contract.
- iii) Reject the whole of the work including equipment tendered for inspection if after the inspection of such portion as he may, in his discretion think fit he is justified that the same is unsatisfactory.
- iv) Mark the rejected equipment with a rejection mark so that the same may be easily identified



- v) Re-inspect at the time of erection at site any equipment both previously inspected and approved by the inspecting Engineer at the Contractor or Sub-contractor's (if approved) premises. Notwithstanding any approval given earlier, the Contractor shall make good such rejections made based on such re-inspection at site to the satisfaction of the Engineer.
- vi) The decision of the Inspecting Engineer as regards to the acceptance or rejection of equipment / work shall be final and binding to the Contractor.

#### 1.7.4 Consequence of Rejection

On the equipment / assemblies being rejected by the Inspecting Officer of the Employer at destination of the Contractor shall replace such rejected equipment/assemblies of the forthwith but in any event not later than a period of 2 (two) weeks in the case of minor equipment and 4(four) weeks in case of a major equipment from the date of rejection. The Contractor shall bear all the costs of replacement including freight, etc., but without being entitled to any extra time on this account. The decision as to whether the equipment is to be classified as Minor or Major for the purpose of this clause shall be that of an Engineer and is not questionable.

### 1.8 Installation

- 1.8.1 All works connected with and inclusive of installation and erection under this contract shall be done in accordance with the standard and established methods of installation and erection of electrical equipment and shall comply with relevant Indian Electricity Rules, National Electrical Code, BIS Codes of Specifications and Standards. The work shall also be strictly carried out in accordance with the instructions / recommendations of the manufacturers. **The equipment shall be leveled carefully before being fixed finally in position. All fragile and sensitive equipment shall be protected adequately and handled carefully during installation and erection.**

### 1.9 Commissioning Tests

- 1.9.1 As soon as the installations are ready for commissioning, the Contractor shall arrange for all the tests/ inspection as required by the relevant ISS and / or IE Rules and advise the Employer and others concerned. Employer shall depute their Inspecting Officer for witnessing the tests and to carry out inspection independently and also jointly with other concerned agencies where ever necessary and only after the installation passes the required tests and inspection, it should be commissioned / energized. **The contractor shall arrange all testing equipments/apparatus/instruments as will be required for conducting the tests without any extra cost. Test reports are required to be submitted before commissioning of the new installation.**

1.9.2 Visual Inspection shall include checks for satisfactory workmanship, all connections, painting, cleanliness of all fittings etc., and compliance with Indian Electricity Rules.

1.9.3 The ammeters, voltmeters and energy meters shall be checked for their calibration, scale, accuracy, etc. for compliance with the specified requirement. Routine tests certificates are required to be submitted on demand.

1.9.4 All cables shall be tested at manufacturer's works in compliance with relevant ISS. All cables and connections after erection shall be tested as required.

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**2.0 Warranty:** - The contractor shall stand guarantee that all the equipments and the works executed under this contract shall be free from all defects and faults in materials, design, workmanship and manufacture and shall be acceptable standards for the contracted works and in full conformity to the technical specifications, drawings and other contract stipulations for a period of 12 months from the date of completion of the works or **15** months from the date of supply of materials whichever is earlier.

**3.0 Completeness of tender:** -

All sundry fittings, assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections as required, and all other sundry items which are useful and necessary for proper assembly and efficient working of the various component of the work shall be deemed to have been included in the tender whether such items are specifically mentioned in the tender documents or not.

**4.0 Works to be done by the Contractor:** - Unless and otherwise mentioned in the tender documents, the following work shall be done by the contractor, and therefore, their cost shall be deemed to be included in their tender cost

- i) **Cutting and making goods all damages** caused during installation and restoring the same to their original finish.
- ii) Sealing of all floor openings provided by him for pipes and cables from fire safety point of view after laying of the same
- iii) Painting at site of all exposed metal surfaces of the installation other than pre-painted items like switch-gear, transformer etc. damages to finished surfaces of these items while handling and erection shall however be rectified to the satisfaction of the Engineer In-Charge.

**5.0 Tools for handling and erection:** - all tools and tackles required for handling of equipments and materials at site of works as well as for their assembly and erection and also necessary testing instruments shall be responsibility of the contractor.

**6.0 Care of Building:**

Care shall be taken by the Contractor to avoid damage to the building during execution of his part of the work. He shall be responsible for repairing of all

damages and restoring the same to their original finish at his cost. He shall also remove at his cost all unwanted and waste materials arising out of his work from the site.

## **7.0 Structural Alterations to Buildings**

- i) No structural member in the building shall be damaged / altered, without prior approval of the competent authority through the Engineer-in-charge.
- ii) Structural provisions like openings, cutouts, if any, provided by the department for the work, shall be used. Where these require modifications, or where fresh provisions are required to be made, such contingent works shall be carried out by the Contractor at his cost.
- iii) All such openings in floors provided by the Department shall be closed by the Contractor after installing the cables / conduits / rising mains etc. as the case may be, by any suitable means as approved by the Engineer-in-charge without any extra payment.
- iv) All chases required in connection with the electrical works shall be provided and filled by the Contractor at his own cost to the original architectural finish of the buildings.

- 8.0** Any concealed work must be given enough opportunity for inspection by the employer and after clearance of the said work concealment can be done

## **GENERAL TERMS AND CONDITIONS**

1. Submission of a tender/quotation by a tenderer/ quotationer implies that they have inspected and examined the site and its surroundings and satisfied themselves as to the nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves, obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their tender.
2. The tenderer shall be responsible for arranging and maintaining at his own cost all materials, tools and plants, water electricity, access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract document.
3. The tender/quotation for the work shall remain open for acceptance for a period of sixty days from the date of opening of tender/quotation. If any tenderer withdraws his tender before the said period or makes any modifications in the terms and conditions of the tender which are not acceptable to IACS, then IACS shall without prejudice to any other right or remedy be at liberty to forfeit 50% of the said earnest money as aforesaid.

4. All conditions/terms listed under "Terms and conditions" are applicable for all tenders/ quotations.
5. The successful tenderer /contractor, on acceptance of his tender by the accepting Authority, shall, within 7 days from the stipulated date of start sign this contract/agreement.
6. The Director, Indian Association for the Cultivation of Science (IACS) does not bind himself to accept the lowest or any tender and reserves to himself the authority to reject any or all tenders received without the assignment of any reason.

#### **General Rules and Directions**

1. The tenderer shall fill in the rates both in words and figures. The amount against each item is also to be filled in. In case of any discrepancy, the rates quoted by contractor in words shall be taken as correct.
2. All taxes regarding GST in respect of this contract shall be payable by the contractor. IACS will not entertain any claim whatsoever in respect of the same. The quoted rate shall be inclusive of all taxes and duties i.e. cess, surcharge etc. Nothing extra shall be paid in addition to the quoted rate.
3. Canvassing whether directly or indirectly in connection with tenders is strictly prohibited and the tender submitted by the contractor who resorts to canvassing will be liable to rejection.
4. The contractor whose tender is accepted will be required to furnish by way of Security Deposit for the fulfillment of his contract, an amount equal to 10% of the tendered value of the work. The Security Deposit will be collected by deductions from the running bills and Final bill of the contractor at the rates mentioned above and the earnest money if deposited in cash at the time of tenders will be treated as part of the Security Deposit.
5. On acceptance of tender, the name of the accredited representative of the contractor who would be responsible for taking instructions from the Engineer in Charge shall be communicated in writing to the Engineer in Charge.
6. All the works shall be carried out as per CPWD specification corrected up to date and Indian Electricity rule. Where CPWD specification is silent Indian standard specifications of B.I.S./ Specification laid down by IACS is to be followed.
7. The time allowed for execution of the work or the extended time in accordance with these conditions shall be the essence of the contract.  
In case of any event causing delay for which the contractor is not responsible, the contractor shall immediately give notice thereof in writing to the Engineer in charge but shall nevertheless make best endeavors to prevent or make good the delay.  
The Director, IACS may consider the notice and allow suitable extension of time for completion of work.
8. The contractor shall submit "running account bill" and final bill in triplicate

supported by detailed measurements and shall provide necessary assistance, Labour and tools for checking the measurement and quality of work.

9. The contractor shall execute the whole and every part of the work in the most substantial and workman like manner both as regards materials and otherwise in every respect in accordance with specifications. Unless otherwise given in the Contract documents the specification will mean standard specification of Central Public Works Department corrected up to date, Bureau of Indian Standard Specifications, and/or any other published standard or code.
10. The Engineer in Charge shall have the power to make alteration in, omission from, additions to, or substitutions for the original specifications drawings, design and instructions that may appear to him to be necessary or advisable.

The rates for such altered, additional or substituted work shall be determined by the Engineer in Charge as under.

- (i) Rate entered in the schedule of rates mentioned in the award letter Plus/minus the percentage by which the tendered amount of the works awarded is higher or lower than the corresponding estimated amount.
- (ii) Market rates.

11. Deviation limit for individual item, trade and contract as a whole, is 25% (twenty five percent). No claim whatsoever will be entertained in this regard.
12. The contractor shall provide all necessary superintendence during execution of work and as along there after as may be necessary for proper fulfilling of the obligations under the contract.
13. Security deposit will be refunded to the contractor if no complaint is pending on Record till after 6 (six) months after completion of the work and no labour complaint is pending against the contractor in respect of the work.
14. The contractor shall pay their workers as per the provisions of Minimum wages Act fixed and notified by the Government from time to time.
  - (i) No person below the Age of 14 years shall be employed to act as a workman.
  - (ii) First AID Box shall be made available by the contractor at all work sites.
  - (iii) The contractor shall provide all safety measures to his workmen like working platform, suitable scaffolding, gangways, ladder, helmets, gumboots, gloves safety belts, insurance coverage etc. according to the situation and nature of work.
  - (iv) In every case where compensation is to be paid to a workman employed by the contractor, as per provisions of Workmen's Compensation Act. The contractor shall arrange to pay such compensation in full and IACS will recover the same from the

dues and/or security deposit of the contractor and make arrangement to pay the same to the concerned.

15. In case of any dispute arising out of this contract during the progress of the work or after the cancellation, termination, completion or abandonment, the decision of the Director, IACS, shall be final and binding on the contractor.

It is also a term of the contract that if the contractor does not raise any claim in writing within 90 days from the date of cancellation, termination, completion or abandonment, the claim of the contractor shall be deemed to have been waived and absolutely barred and IACS shall be discharged and released of all its liabilities under the contract in respect of these claims.

## CHAPTER 2

### TECHNICAL SPECIFICATION

#### 1.0 Workmanship :

- i) Good workmanship is an essential requirement to be complied with. The entire work of manufacture / fabrication, assembly and installation shall conform to sound engineering practice involving highly skilled workers.
- ii) The work shall be carried out under the direct supervision of a highly experienced licensed SUPERVISOR, i.e. a person holding a certificate of competency issued by the State Govt. for the type of work involved, employed by the contractor, who shall rectify the defects pointed out by the Engineer-in-charge during the progress of work.

#### 2.0 General requirements and components: -

- i) Quality of Materials: -
  - a) All the materials and equipments supplied by the contractor shall be new. They shall be of such design, size and materials as to satisfactorily function under the rated condition of operation and to withstand the environmental conditions at site.
  - b) All the components shall conform to relevant IS specification wherever existing. Materials with ISI certification marked shall be preferred if not otherwise mentioned the tender.
  - c) For items of materials for which makes are approved by the Dept., only such approve makes shall be permitted in the work in accordance to the preference of the Engineer-in-Charge of the employer.

- d) **Commissioning on completion:** Before the workman leaves the work finally, the contractor must be sure that the installation is ready for commissioning after due testing.

### **3.0 Completion plan and completion certificate**

- i) For all the works, completion Certificate after completion of work as given in '**Appendix-A**' shall be submitted to the Engineer In-Charge.
- ii) 'As built' drawing to be submitted along-with Test/completion certificate which is an essential part for consideration of final bill.

Testing shall be carried out for the completed installation in presence of the E-in-C or his authorized representative to their satisfaction. All test result shall be recorded and submitted to the Dept. All necessary test instruments for the test shall be arranged by the Contractor if so required by the E-in-C. Calibration certificates may require to be produced on demand by the E-in-C

### **4.0 Testing of Earth Continuity Path**

The earth continuity conductor, including metal conduits and metallic enclosures of cables in all cases, shall be tested for electric continuity. 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 shall not exceed one ohm.