

TENDER DOCUMENT

FOR

RENOVATION OF EXISTING LIBRARY SPACE

AT

INTERNATIONAL CENTRE FOR GENETIC ENGINEERING & BIOTECHNOLOGY (ICGB)

Aruna Asaf Ali Marg, New Delhi – 110067

Website: www.icgeb.res.in

Notice Inviting Tender (NIT) No: ICGEB/LIBRARY (GF&FF)/2017**IMPORTANT INFORMATION**

Name of the Work	Renovation of Existing Library Space, ICGEB Campus
Estimated Value	Rs. 24,95,000/- (Rupees Twenty-Four Lakhs Ninety-Five Thousands Only)
Earnest Money Deposit (EMD)	Rs. 50,000/- (Rupees Fifty Thousands only) in the form of a demand draft to be drawn in favour of International Centre for Genetic Engineering & Biotechnology payable at New Delhi.
Distribution of Tender Document	The tender document can be downloaded from the website and used for submission.
Pre-Bid Meeting	21 September 2017 at 14.30 hours at ICGEB New Delhi
Site Visit	Interested Bidder may visit the work site before the pre-bid meeting. For site visit, please contact Ms. Gita Prakash, Component Manager, Tel: 26742880, 26741358, 26742357 on any working day (Monday to Friday) between 10:00 to 17:00 hours.
Last Date and time for Bid Submission	27 September 2017 on or before 15:00 hours (Bids received after this date and time will not be accepted)
Address at which Bid is to be submitted	Component Manager, International Centre for Genetic Engineering & Biotechnology, Aruna Asaf Ali Marg, New Delhi – 110067. The Bid is required to be submitted in person along with all the specified documentation and EMD. Bidder is requested to obtain due acknowledgement of submission of proposal.
Date, Time & Place of opening of the Technical Bid (Part – A)	Time and date will be intimated in advance through e-mail and or telephone. Bidders are supposed to provide all contact information in their Technical Bid (Part-A of the bid) Place: International Centre for Genetic Engineering & Biotechnology (ICGEB), Aruna Asaf Ali Marg, New Delhi – 110067.
Date, Time & Place of opening of the Financial Bid	Time and date to be informed later on to technically qualified Bidders through e-mail and telephone. Place: International Centre for Genetic Engineering & Biotechnology (ICGEB), Aruna Asaf Ali Marg, New Delhi – 110067.

GENERAL CONDITIONS OF TENDER:

1. **Submission of Tender:** Tenders should be submitted in sealed envelopes in two Parts separately, i.e. **“Technical bid” (Part-A)** and **“Price bid” (Part-B)**. Both the parts should be further sealed in an envelope super-scribing NIT No & name of work, bidders name & address. The tender duly filled in may be sent to the above mentioned address either by post or hand delivered in the **tender box after ensuring that due entries are made in the register kept at the reception. It should not be handed over to any employee of the centre. No tender shall be accepted later than the time schedule specified above.**

Any clarifications/amendments/corrigenda etc., to NIT before last date of submission of bid will only be available on our website: www.icgeb.res.in. Therefore bidders are advised to keep visiting our website.

2. **Technical Bid (Part-A):** In this bid, the bidder should submit a covering letter on company’s letter head, company profile, list of plant, machinery & tools in his possession, copies of similar work orders successfully executed during the last five years. **No deviations in respect of NIT conditions are acceptable.**

The following specific conditions are essential for technical qualification:-

- i) Earnest Money Deposit. An EMD of Rs 50,000/- (Rupees Fifty Thousands only) to be submitted with the technical bid. Companies registered with National Small Industries Corporation Ltd. (NSIC) will be exempted from submission of EMD, However they have to furnish the documents certifying that they are registered under NSIC for the category of civil construction work, or similar work.
- ii) All the pages of NIT (including blank Price Bid) duly signed & stamped by the bidder as a token of acceptance of the NIT conditions.
- iii) Copies of TIN no., PAN no., Service Tax Registration and GST Registration.
- iv) Copies of work order and its completion certificates of similar works (Similar works means - Interior works including furniture, partitions, flooring, false ceiling, finishing, electrical works and lighting, data and voice wiring along with fixtures and outlets) executed successfully during the last 5 yrs. in Govt., Public sector, Autonomous body or reputed Public Ltd. Company, with at least one work order of value Rs 20,00,000/- (Rupees Twenty Lakhs only) or two work orders each of Rs 12,50,000/- (Rupees Twelve Lakhs Fifty Thousands only) or three work orders each of Rs. 10,00,000/- (Rupees Ten Lakhs only).
- v) ICGEB reserves the right to visit the sites mentioned by the bidders. The bidder will have to arrange for such visits.

3. **Price Bid (Part-B):** In this bid the bidder is required to quote his item rates in the BOQ Attached in accordance with the scope of work, terms & conditions & technical specifications enclosed. The rates/price quoted by contractor should be all inclusive i.e. should include all material cost, labour, services, plant/machinery/tools & tackles, ladders & scaffolding required for work, freight, Insurance, Octroi, Govt. duties & levies, taxes (including GST, VAT, Service Tax, Sales Tax etc.), transport/cartage of materials/labour and all other expenses not specifically mentioned but reasonably implied. Nothing over and above these rates shall be payable to the contractor. Further nothing extra in rates will be considered for any variations in tender quantities or due to any site difficulties. It is mandatory for the bidder to quote all items rate as asked for in the BOQ/ PRICE schedule. Failure in not filling some item rates will lead to rejection of the tender. The bidders should quote unconditional rates, neatly written without any overwriting and all pages should be duly signed & stamped.
4. **Tax Liabilities:** Payment of any statutory direct or indirect taxes at the contractor's end, arising out of transactions due to this contract, will be solely the contractor's responsibility.
5. **Earnest Money:** An earnest money of Rs. 50,000/- has to be enclosed along with the Technical Bid (Part-A). The EMD shall be only in the form of Bank Draft in favour of 'International Centre for Genetic Engineering and Biotechnology', payable at New Delhi. No Cheques/Cash shall be accepted as EMD. The refund of EMD to unsuccessful bidders will be made after placement of order to the successful bidder. The EMD of successful bidder will be released after completion of work and site clearance.
6. **Validity of Tender:** Tender shall be valid for our acceptance without any change in rates and NIT conditions for a period of 120 days from the date of opening of price bid.
7. **Escalation:** No escalation over and above items rates quoted by the bidder shall be paid during the execution of contract.
8. **Completion time:** Time shall be the essence of this contract and entire work as titled above is to be completed in all respects within a period of **75 days (two and a half months) months from the date of issue** of LOI /Work order by the Centre. Any delay in completing the work for reasons attributable to the Contractor is liable for liquidated damages as per clause no. 16 of NIT. Under the force-majeure conditions or delay due to reasons beyond control of the contractor, ICGEB may grant suitable time extension for which the contractor has to request along with the justification/reasons well in advance to the Director, ICGEB for approval without any prejudice to price escalation. No time extension request shall be considered after the expiry of completion period/contract. The decision of the Director (ICGEB) will be final and binding on the bidder/contractor.
9. **Scope of Work:** Detailed scope of work, technical specifications & special conditions, makes of materials etc. are enclosed with this NIT as per Annexure –I. Contractor should carefully go through the same before filling rates. **In case of any conflict arising between the provisions of the General Conditions mentioned in this NIT and a particular Special Condition of contract, the provisions of the Special Conditions will prevail.**

10. **Deviations:** No deviation from the stipulated terms and conditions will be allowed. Tender will be unconditional.
11. **Site Conditions:** Contractor shall acquaint himself fully with the site conditions and the working environment of ICGEB before quoting his rates. No Compensation on account of any site difficulties will be entertained, at a later date, after award of the works.
12. **Correspondence:** All the correspondence in respect of tender/contractual obligation shall be made to Component Manager, ICGEB, Aruna Asaf Ali Marg, New Delhi-110067.
13. **Terms of Payment:** The payment shall be made on submission of the bills in proper format by the contractor after due certification by the ICGEB engineer responsible for supervision of the work. **Contractor can submit one interim bill and one final bill after completion of work for claiming payment based on actual quantities of items of work executed as per BOQ. The minimum value of the interim bill will be limited to Rs 10,00,000/- (Rupees Ten Lakhs only) and the maximum value of the interim bill will be limited to Rs 15,00,000/- (Rupees Fifteen Lakhs only)**
14. **Labour Laws:** The contractor will abide by all the rules and regulations related to labour laws, accident, workmen compensation act, workmen insurance etc. This will be the sole responsibility of the contractor. ICGEB will not be a party at any stage in any of the disputes relating to the above. In case, ICGEB has to bear any expenditure due to non-conformance of above provisions by the contractor, the same will be recovered from contractor's bills.
15. **Rules governing the Contractor's employees working in the ICGEB Premises:** The contractor's employees working inside the ICGEB campus will abide by the Centre's rules & regulations for works inside the campus. Any damage to the ICGEB property due to mishandling, carelessness on the contractor's or his workmen's part will be recoverable from the contractor's bills.
16. **Liquidated damages:** In case the work is delayed beyond the specified completion period for reasons attributable to the contractor, deductions on account of Liquidated damages @1% of the contract value per week will be deducted subject to a maximum of 10% of the contract value. However, ICGEB also reserves the right to get the work done by any other contractor at the risk and cost of the existing contractor and amount to that effect will be deductible from his bills/dues.
17. **Extra or substituted item:** If any extra or substituted item appears in the work, contractor shall submit its rate analysis supported with documents which shall be approved by ICGEB. If required, ICGEB can make its own analysis based on DSR document of CPWD or based on market rates for determining item rate.
18. **Defect Liability period:** Defect liability period shall be One Year from the date of completion of work. Any defect arising in this period due to contractor's fault will be rectified by him at his own cost. Failure to do so shall lead to forfeiture of security deposit.

19. **Security Deposit:** A security deposit equal to 10% of the value of work will be deducted from Contractor's bills. 5% of the Security Deposit will be returned after successful completion of the work (engineer's certification of final bill) and remaining 5% will be returned after the completion of defect liability period, after ensuring successful performance of the works / system executed by the contractor.
20. Contractor will take due permission for entry of all his workmen in ICGEB. No un-authorized person will be allowed to work inside.
21. The contractor will provide for all necessary materials, tools, equipment, access ladders & scaffolding, measuring instruments and working consumables etc. needed for execution of the works. Safe custody of all such material will be contractor's sole responsibility. No extra charges will be paid for the same. Watch and Ward of all material till the work is taken over by ICGEB shall be the sole responsibility of the contractor and pilferage etc. shall be entirely to his account.
22. During execution of work, the contractor should follow all standard norms of safety measures/precautions as per relevant IS codes and CPWD specifications to avoid accidents/damages to man, machines and buildings at his own cost. Contractor will have to make his own arrangement to escort the labour to the nearest hospital for treatment in case any injury happens to any worker during execution of work.
23. Manpower deployed by the contractor at our site for carrying out contract works is strictly prohibited being associated with any other works on the campus. No labour hutments/ jhuggis/ camps shall be allowed within ICGEB campus.
24. No material belonging to the contractor whether consumable or non-consumable should be brought inside the ICGEB campus without proper entry at the Main Gate nor any material should be taken out without proper gate pass issued by the authorized representatives of the Centre.
25. During execution of the work, contractor should dispose-off waste material outside the ICGEB Campus on regular basis and should keep the area of work properly cordoned off and neat and clean as far as possible. After completion of work, contractor should clear the site completely of all unwanted and junk material before submitting his final bill.
26. Tender once submitted will remain with the Centre and will not be returned to the bidders.
27. After award of work, contractor will immediately make a work program in consultation with ICGEB's Project Consultant as to which activity is to be done in which sequence. Thereafter, contractor will carry out the work in that sequence.
28. Quantities mentioned in the tender are approximate. Payment will be made to the contractor on the basis of actual quantities executed by him as per scope of work, drawings and Project Consultant's site instructions.
29. Contractor will keep one qualified and experienced supervisor at site at all times to look after the work and interact with ICGEB officials and Project Consultant for execution of work. If work at

site is proceeding without proper supervision from the contractor's side, that work will be rejected and will not be measured and paid.

30. ICGEB can make minor alterations in the scope of work during execution of work as per site conditions and new requirements. Contractor will have no extra claim in rates as well as time extension on this account. However, in case of major changes, suitable time extension can be given to contractor on the request of the latter.
31. Contractor will follow the provision of all prevalent labour laws, acts of central and local Govt. and shall be fully responsible for any violation in this regard. Contractor shall maintain proper attendance register, wage records and shall present them to the Centre whenever asked for. ICGEB can recover money from contractor's bills if it has to incur some expenditure in this respect.
32. **Termination of Contract:-** The Director, ICGEB reserves the right to terminate the contract on account of poor workmanship, failure to mobilize site within 15 days, non-compliance of set specifications for the works, abnormal delay in progress of work, violation of any contract provisions by the contractor. The contract can also be terminated at the request of contractor. In such cases the contractor is liable to pay Liquidated damages @ 5% of tendered value besides security deposit.
33. **Any dispute arising out of this contract will be subjected to jurisdiction of Delhi.**
34. ICGEB **reserves the right** to reject any or all the tenders in full or in part without assigning any reasons whatsoever, and the decision of the Centre in this regard will be binding on all the bidders. Tenders not complying with any of the provisions stated in this tender document are liable to be rejected. The Director, ICGEB reserves the right to accept or reject any tender without assigning any reason and does not bind himself to accept the lowest tender.

Accepted

(Signature of the bidder)

Note: Entire NIT (except Price Bid) is to be attached with "Technical Bid (Part-A)" duly signed & stamped by the bidder.

SPECIAL CONDITIONS OF TENDER:

1. Wherever the provisions of the Special Conditions are in variance with the General Conditions, the stipulations / provisions in the Special Conditions of Contract shall supercede the General Conditions of Contract.
2. The materials, design and workmanship shall satisfy the relevant Indian Standards, the job specifications contained herein and codes referred to. Where job specifications stipulate requirements in addition to those contained in the standard codes and specifications, these additional requirements shall also be satisfied. In the absence of any Standard/ Specifications/Codes of practice for detailed specifications covering any part of the work covered in this tender, the instructions/ directions of the ICGEB appointed Project Consultant will be binding on the Contractor.
3. The description of the items given under Technical Specification and Price Bid shall be read in conjunction with materials, job specifications and drawings and in case of any irreconcilable conflict between them, the rate quoted shall be deemed to be as per description of the item in the Technical Specification and Price Bid. However in such cases, the decision of the ICGEB appointed Project Consultant shall be final and binding on the contractor.
4. Electrical Power will be provided at one point at the site of work. The contractor will install an electric sub-meter of approved make and specifications at his own cost for the duration of the works and the total electricity consumed by the contractor for the works will be charged as per actuals and may be adjusted in the payments. The Contractors are expected to use electric power judiciously and ensure that no overload, misuse or mishap occurs while carrying out their works.
5. Tender drawings accompanying the tender document are indicative and issued for tendering purpose only.
6. Two sets of detailed drawings, on the basis of which actual execution or the work is to be carried out, will be furnished to the Contractor progressively based on the program evolved after the award of the work. The Contractor will not be entitled for any claim for any variation in the detailed drawings and the tender drawings. The Contractor shall provide and make at his own expenses any further copies required by him.
7. The offices of ICGEB will function normally through the entire duration of the project. Contractor should carry out the execution of works in a manner where all parts of the site except for the area handed over for execution works are provided with least disturbance.
8. The Contractor shall also give facility to the authorized representatives of ICGEB /statutory agencies/ authorities to inspect the works whenever required and shall observe and abide by any instructions given by the ICGEB appointed Project Consultant in regard to the use of plant, equipment and temporary works whether in respect of fire hazards or general safety and to any

restrictions on smoking or the use of naked lights by persons employed by the Contractor. Compliance of such requirements shall not be used as the basis of claim against Owner.

9. A complete Schedule of Execution will be prepared by the Contractor in consultation with ICGEB and the ICGEB appointed Project Consultant. However, notwithstanding other provisions in the Schedule of Execution, the area on the Ground Floor (Library Area) has to be completed and handed over within one month of award of contract.
10. For Electrical Work, the contractor shall provide Shop Drawings of the Main and Sub-Main Switchboards, Distribution Boards, Cable Trays and any other switchboards and panels, wherever applicable and approval shall be obtained from the ICGEB appointed Project Consultant before commencing fabrication or procurement.

Any equipment or switchboard manufactured without the written consent of the ICGEB appointed Project Consultant prior to the approval drawings shall be liable for rejection.

Drawings show general run of cables, approximate locations of outlets and equipment, utility symbols and schematic diagrams and are of no dimensional significance. Contractor should refer to the Architectural drawings for locations and also obtain approval from the ICGEB appointed Project Consultant wherever dimensions are not shown, or locations cannot be determined, from the drawings. The drawings should not be scaled to obtain locations.

11. For Electrical Work, payment for Conduiting, cables, earth strips and wires etc. will be made on linear measurements and will be measured up to and including the bends/accessories.
12. On completion of the installation of all electrical work and equipment, the testing will be done in conformity with the stipulated performance specifications. Any shortcoming detected in the system/ materials/ workmanship shall be rectified by the contractor to the entire satisfaction of the ICGEB appointed Project Consultant without any extra cost. The installation shall be tested again after removal of the defects and shall be commissioned only after approval by the competent inspecting authority and the ICGEB appointed Project Consultant.

The Contractor shall notify the ICGEB appointed Project Consultant at least 4 working days before testing of each system. The ICGEB appointed Project Consultant reserves the right to be present when such tests are being made.

If the Electrical Inspectorate requires manufacturer's test reports for any equipment used in the project, the Contractor shall obtain such approvals at no extra cost. Such approved reports shall be handed over to the ICGEB appointed Project Consultant.

The contractor shall provide the Standard Work procedure considering the operation & maintenance manuals provided by OEM for all the equipment at the time of handing over.

On completion of the work and before issuing of virtual completion certificate the contractor shall submit to ICGEB “As installed drawings” showing all the details of work done by him.

- 13.** The contractor shall have a valid Electrical contracting license before starting the work and till the completion of work.
- 14.** All repair work of Old Furniture to be repaired and manufacture of all New Furniture shall be carried out at the contractors' premises and not in the ICGEB campus. Contractor shall arrange for to and fro transportation and all work of repair, modification of old furniture and manufacture of new furniture is to be done off-site within the rates mentioned in the Price Bid. Nothing extra will be payable on this account.



TECHNICAL SPECIFICATIONS FOR CIVIL / INTERIORS / FINISHING WORKS:

For all Civil / Interior / Finishing works, Technical Specifications as per latest version of C.P.W.D. Specifications are to be followed. In case of any item of work or any material or working detail that is not mentioned in the C.P.W.D. Specifications, the same will be carried out based on item description in Bill of Quantities in conjunction with the drawings and details provided and after obtaining approval on all materials and after making physical samples as per instructions of the ICGEB appointed Project Consultant. The Project Consultant's decision in this regard will be final and binding.

SCOPE OF WORK**BRIEF SCOPE OF WORK FOR CIVIL / INTERIOR / FINISHING WORKS**

1. Demolition and Dismantling
2. Civil Work including brickwork and P.C.C. work
3. Partitions, Woodwork, Glazing work, Doors, Panelling, Window Blinds, Pelmet
4. Flooring Work
5. False Ceiling Work
6. New Furniture Items
7. Repair of Old Furniture
8. Finishing Works

TECHNICAL SPECIFICATIONS FOR ELECTRICAL / VOICE / DATA WORKS:

1 SPECIFICATIONS FOR INTERNAL WIRING

1.1. SYSTEM OF WIRING:

The system of wiring shall consist of single/multi core FRLS PVC insulated copper conductor wires in non-metallic PVC conduits/ metallic M.S. conduits as called for in the BOQ. All conduits shall be on the surface,(supported from the Ceiling), in the False Ceiling and concealed in other areas where RCC slab is provided unless otherwise called for in the drawings. All Down conduits shall be concealed unless otherwise called for.

1.2. GENERAL

Prior to laying of conduits, the Contractor shall get approved the conduit layout indicating the route of conduit, number and size of conduits, location of junction/ inspection/pull boxes, size and location of switch boxes, point outlet boxes and other details. These conduit layouts shall be got approved by the Consultant and then only conduit works should be started. Any modification or suggestions shall be approved by the Consultant in written manner before the laying of conduits.

1.3. MATERIALS:

M.S. conduits shall conform to Indian Standards IS : 1653 - 1964 -Specification for Rigid Steel conduits for Electrical wiring with the latest amendments.

M.S. CONDUITS:

M.S. conduits shall be solid drawn or lap welded conduits. Stove enameled inside and outside with minimum wall thickness of 1.6 mm for conduits upto 25 mm diameter and 2.0 mm wall thickness for conduits 32 mm diameter and above.

PVC conduits to be used for concealed work for all systems except Fire Alarm & Computer system where M.S. conduits shall be used. PVC conduits shall conform to Indian Standards IS : 9537(Part-3)-1983 -Specification for conduits for Electrical Installation (Part-I) General Requirements.

PVC CONDUITS:

PVC conduits shall be rigid, un-plasticized, heavy gauge having 1.6 mm wall thickness upto 25 mm diameter and 2.0 mm wall thickness for all sizes above 25 mm diameter. Minimum size of conduit shall be 20 mm dia. Minimum size of conduit for Power point wiring shall be 25 mm dia. The conduits shall be delivered to the site of construction in original bundles and each length of conduit shall bear the label of the manufacturer. The number of insulated copper wires that may

be drawn into the conduits of various sizes are given below and the fill shall not exceed 40% the maximum permissible number of 650/1100 volts grade single/multi core PVC insulated copper conductor wires of different sizes, that may be drawn into rigid metallic or non-metallic conduits.

<i>SIZE OF WIRE</i>	<i>SIZE OF CONDUITS (MM)</i>					nominal dia in mm
	20	25	32	40	50	
Nominal cross- Sectional area of wires in sq. mm	(Maximum number of wires)					
1.5	5	6	18	-	-	
2.5	3	4	10	-	-	
4.0	2	3	5	10	-	
6.0	-	4	6	8	-	
10.0	-	-	3	4	-	
16.0	-	-	-	3	5	
25.0	-	-	-	2	3	

1.4 PVC CONDUIT ACCESSORIES & CONNECTIONS:

The accessories used for PVC conduits shall conform to Indian Standards IS : 3419-1988- (Specification for fittings for non-metallic conduits).PVC conduits shall be joined by means of screwed or plain couplers. Where there are long runs of straight conduits, inspection boxes shall be provided at intervals as approved by the consultant. The threads of the pipe and sockets shall be free from grease and oil. It shall be thoroughly cleaned before making the screwed/plain joints. Proper jointing materials as recommended by manufacturers shall be used for jointing of PVC pipes. Use PVC couplers and connectors for PVC pipe connections and terminations in boxes. All the joints shall be fully water tight. Junction boxes and running joints shall be provided at suitable places to allow for subsequent extensions if any, without undue dismantling of conduit system. As far as possible diagonal run of conduits shall be avoided. Junction between conduit and adapter boxes, back outlet boxes, switch boxes and the like must be provided with entry spouts and smooth PVC bushes. Joints between conduit and iron clad Dis-

tribution Boards or control gear shall be effected by means of conduit couplers into each of which will be coupled smooth PVC bush from the inside of box or case. Conduit system shall be erect and straight as far as possible. All jointing methods shall be subject to the approval of the consultant.

BENDS IN CONDUITS:

Where necessary bends or diversions may be achieved by means of bends and or circular inspection boxes with adequate and suitable inlet and outlet screwed joints. In case of recessed system each junction box shall be provided with a cover properly secured and flush with the finished wall surface, so that the conductors inside the conduits are easily accessible. No bend shall have a radius of less than 2.5 times the outside diameter of the conduit. Conduits shall be cold bend by means of a Bending spring available with the manufacturers, heating is not permitted at site. Use of PVC conduit in places where ambient temperature is 60 degrees or above is prohibited. PVC Solvent shall be used for joints between conduits, conduits & Junction box etc. PVC checknuts and bushes shall be used for joining conduit with outlet boxes. PVC Closures shall be provided on unused mouths of Junction boxes.

Separate conduits shall be provided for the following system.

- i) Lights, Ceiling fans, Exhaust fans & 5A Light sockets.
- ii) Power sockets & A/C outlets
- iii) Telephone System
- iv) Television, Computer & Music system
- v) Emergency System.
- vi) Public Address System
- vii) Fire Alarm System.
- viii) Access control & CCTV System

Separate switchboards/outlets shall be provided for the following system.

- i) Lights, Ceiling fans, Exhaust fans & 5A Light sockets.
- ii) Power sockets & A/C outlets
- iii) Telephone System
- iv) Television, Computer & Music system
- v) Emergency System.

- vi) Public Address System
- vii) Fire Alarm system .

1.5 FIXING CONDUITS:

Conduits and junction boxes shall be kept in position and proper holdfasts shall be provided. Conduits shall be so arranged as to facilitate easy drawing of wires through them. Adequate junction boxes of approved shape and size shall be provided. All conduits shall be installed so as to avoid steam and hot water pipes. After the conduits, junction boxes, outlet boxes & switch boxes are installed in position their outlets shall be properly plugged so that water, mortar, insects or any other foreign matter does not enter into the conduit system. Exposed conduits shall be fixed by means of spacer bar/ saddles at intervals of not more than 600 mm in normal run and 500 mm from both sides of fitting or accessories. The saddles shall be of 3 mm x 19 mm mild steel flat, properly treated with primer and painted, securely fixed to support by means of nuts and bolts/rawl bolts and MS screws as required.

Conduits shall be laid in a neat and organized manner as directed and approved by the Consultant. Conduit runs shall be planned so as not to conflict with any other service pipe lines/ducts.

Where exposed conduits are suspended from the structure they shall be clamped firmly and rigidly to hangers of design to be approved by the Architect. Where hangers are to be anchored to reinforced concrete appropriate inserts and necessary devices for their fixing shall be provided at the time of fixing. Making holes or openings in the concrete will generally not be allowed. In case it is unavoidable prior permission of the Consultant shall be obtained. Conduits shall be fixed in the chase by means of staples not more than 600 mm apart and the chase filled with cement mortar 1 : 4 . Cutting of horizontal chases in walls is prohibited.

1.6. PROTECTION

To minimize condensation or sweating inside the conduit pipes all outlets of conduit system shall be adequately ventilated as directed and approved by the Consultant. All screwed and socket connections shall be adequately made fully water tight by the use of proper jointing materials i.e. Tropolin for PVC conduits & white lead for metal conduits.

1.7. SWITCH-OUTLET BOXES AND JUNCTION BOXES

All boxes shall conform to Indian Standards IS : 5133(Part-1)-1969 (Specification for boxes for enclosure of Electrical accessories) with the latest amendments. All outlet boxes for switches, sockets & other receptacles shall be fabricated from 1.6mm thick mild steel sheets duly painted with rust proof paint (zinc passivated) as called for, having smooth external & internal surfaces to true finish. Junction boxes and outlet boxes in contact with earth or installed in areas exposed to the weather shall be of 2mm thick mild steel and painted. Where called for, outlet boxes for

receiving switches, telephone outlets T.V. outlets, power plugs etc. shall be fabricated to proved shape and size to suit the cover plates of approved make for different utilities. The cover plates shall be of best quality Hylam sheets or ISI grade Urea Formaldehyde Thermosetting insulating material which shall be both mechanically strong and fire retardant, as approved by the Consultant. Proper supports shall be provided in the outlet boxes to fix the cover plates of switches as required. Separate screwed earth terminal shall be provided inside the box for earthing purpose. All boxes shall have adequate number of knockout holes of required diameter for conduit entry. Where called for outlet boxes for receiving switches and fan regulators in one box, shall be fabricated to approved shape and size to accommodate fan regulators and switches to be fixed on grid plates. These boxes shall be covered with Hylam sheets or ISI grade Urea Formaldehyde Thermosetting insulating material which shall be both mechanically strong and fire retardant. All junction boxes, pull boxes and outlet boxes shall be provided with sheet cover Urea Formaldehyde Thermosetting insulating material. The box cover shall be secured to the box with adequate number of round head brass screws of approved make. Outlets exposed to the weather shall be fully weather tight, complete with rubber gasketed covers, glass where used shall be fully heat resistant for the duty. The outlet boxes shall be painted with two coats of bitumastic paint before they are fixed in position. All Outlet boxes fixed in concrete/recessed in wall shall be of a minimum depth of 55mm.

1.8. INSPECTION BOXES

Rust proof (Zinc passivated) inspection boxes of 1.6mm thick mild steel sheet and of required size, having smooth external and internal finish shall be provided to permit periodical inspection and to facilitate removal and replacement of wires when required. Inspection boxes shall be mounted flush with ceiling/walls finished surface and shall be provided with screwed covers of Urea Formaldehyde Thermosetting insulating material sheet cover secured to the box with brass screws. Adequate holes shall be provided for ventilation in the inspection box covers.

1.9. TELEPHONE SYSTEM

Conduits, junction boxes, draw boxes, outlet boxes and covers to boxes for telephone system shall be as described under relevant clauses elsewhere in these specifications. Conduits for telephone system shall be at least 150 mm away from the electrical conduits. The conduits for telephone wiring shall be of specified size and shall be terminated at outlets as indicated on the drawings. Telephone system conduits shall have 2 mm diameter galvanized steel pull wires installed. Necessary Junction boxes to be provided for easy drawing of the Telephone wires from each unit to the Telephone Tag Box and from the Tag Box to the open ground.

1.10. T.V. & COMPUTER SYSTEM

Conduits junction boxes, draw boxes, outlet boxes and covers to boxes for T.V. & Computer system shall be as described under relevant clauses elsewhere in these specifications. Conduits

for T.V. & Computer system shall be at least 150mm away from the electrical conduits. The conduits for T.V. & Computer wiring shall be of specified size and shall be terminated at outlets as indicated on the drawings. T.V. & Computer system conduits shall have 2mm diameter galvanized steel pull wires installed. Necessary Junction boxes to be provided for easy drawing of the Television & Computer wires from each unit to the Junction Box and from the Junction Box to the open ground.

On the completion of the work the Contractor shall submit to the Owner layout Drawings indicating the complete Electrical Installation as installed . These Drawings shall in particular give the following information.

- i. Run and size of conduit, location of inspection/outlet boxes etc.
- ii. Number and size of wires in each conduit.
- iii. Location of switches, outlets, all types of DBs, Telephone, Television ,Computer, Call Bell & Public Address points, Light sockets, Power sockets, Fire Alarm points, etc. .
- iv. Layout and particulars of mains and sub-mains and cable route etc.
- v. Schematic diagrams for the complete Electrical System.
- vi. Layout of Complete Earthing System with size of Earthing conductors.
- vii. Layout and particulars of the Telephone, Public Address, Television, Computer.

1.11. CONDUCTORS

PVC insulated multi-strand copper conductor wires of 1100 Volts grade shall be used for three phase distribution and PVC insulated multistrand copper conductor wires of 1100 V grade shall also be used for Single phase distribution and shall conform to IS : 694 -1964 with the latest amendments and shall be ISI marked.

1.12. BUNCHING OF WIRES

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.

1.13. DRAWING OF CONDUCTORS

The drawing and jointing of copper conductor wires shall be executed with due regard to the following precautions, while drawing insulated wires into the 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 for a length of 15mm at the end of wire like sharpening of a pencil and it shall not be removed by cutting it square or ringing.

PVC insulated copper conductor wire ends before connection shall be properly soldered (at least 15mm length) with special Cu solder for copper conductor or shall be properly crimped with copper lugs/sockets as the case may be. Strands of wires shall not be out for connecting to the terminals. All strands of wires shall be soldered at the end before connection. The connecting brass-screws shall have flat ends. All looped joints shall be soldered and connected through terminal block/connectors. The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less. Conductors having nominal cross sectional area exceeding 6 Sq mm shall always be provided with cable sockets.

At all bolted terminals, brass flat washer 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 wire shall bear the manufacturer's label and the voltage grade at one meter intervals for the full length of coil, and shall be brought to site in new and original packages.

The sub-circuit wiring for points shall be carried out in looping system and no joint shall be allowed in the length of the conductors. No wire shall be drawn into any conduit, until all work of any nature, that may cause injury to wire is completed. Care shall be taken in pulling the wires so that no damage occurs to the insulation of the wire. Before the wires are drawn into the conduits the conduits shall be thoroughly cleared of moisture, dust, and dirt or any other obstruction by Drawing dry cloth through the conduits. The minimum size of PVC insulated stranded copper conductor wire for all sub circuit wiring for lights, exhaust fans, ceiling fan and 5A Light sockets points shall be 1.5 Sq mm. In case of power circuit not more than two 15 Amp power outlets shall be grouped in one circuit, wiring for the first power outlet shall be carried out with PVC insulated 6.0 sq mm copper conductor wires. Wiring for the second power outlet shall be carried with PVC insulated 4.0 sq mm copper conductor wires. All power outlets shall be connected with 4.0 sq mm PVC insulated copper conductor wires to the earth terminal of outlet. Separate circuit shall run with PVC insulated 4.0 sq mm copper conductor wires for water heaters, kitchen equipment, window Air conditioners and similar outlets at locations as shown on drawings.

The minimum size of wire from final distribution board to first tapping point in the circuit shall be 2.5 Sq mm. PVC insulated stranded copper conductor wires. Circuit shall not have more than a total of 8 points of fans, 5A Light sockets and Light points and its load shall not exceed 800 watts. Not more than two power circuits shall be drawn through the same conduit. Separate earth wire shall run for each circuit. In case two circuits of the same phase are running in the same conduit then a common earth wire is permissible. The size of earth wire for all the light points, ceiling fans, exhaust fans, light sockets, outlet boxes etc. shall be 1.5 sq mm PVC insulated copper conductor wires.

1.14. JOINTS

All joints shall be made at main switches, distribution boards, socket outlets, lighting outlets and switch boxes only. No joints shall be made inside conduits and junction boxes. Conductors shall be continuous from outlet to outlet. Joints where unavoidable, due to any specified reasons, prior permission in writing shall be obtained from the Consultant before making such connections.

1.15. MAINS AND SUB-MAINS

Mains and sub-mains wires where called for shall be of the rated capacity and approved make. Every main and sub-main shall be drawn into an independent adequate size conduit. Adequate size draw boxes shall be provided at convenient locations to facilitate easy drawing of the mains and sub-mains. An independent earth wire of proper rating shall be provided. The earth wires shall run along the entire length of the mains and sub-mains. The earth wires shall be fixed to conduits by means of suitable copper clips at not more than 1000mm distance. Where mains and sub-main cables are connected to switch gears, sufficient extra length of sub-main and main cable shall be provided to facilitate easy connections and maintenance.

1.16. LOAD BALANCING

Balancing of circuits in three phase installation shall be planned before the commencement of wiring, shall be got approved by the Consultant and shall be strictly adhered to.

1.17. COLOUR CODE OF CONDUCTORS

Colour code shall be maintained for the entire wiring installation; red, yellow, blue for three phases and “off” circuit black for neutral and green for earth (or bare earth wire)

Telephone Multi-core cables shall be of approved make and shall conform to following specifications.

- i) Type of conductor Electrolytic Annealed Tinned Cu conductor. (ATC)
- ii) Diameter of Conductor ... 0.61 mm dia uniform (minimum size)
- iii) Weight of conductor 2.52 Kg/Km minimum.
- iv) Resistance of conductor at 20 degree... 60 Ohms/Km,
- v) Radial Thickness of PVC insulation...0.3mm \pm 0.05mm uniform
- vi) Radious Thickness of PVC sheathing ... 1.2mm uniform \pm 0.2mm
- vii) Overall diameter of insulated conductor.. 1.2mm uniform

viii) High voltage Test. Able to withstand upto 500 volts D.C. up to 12 hours immersion in water.

1.18. MOUNTING HEIGHT DETAILS

1.18.1 The bottom of the light/fan switch board shall be at 1.0 meter above the finished floor level unless otherwise specified.

1.18.2 All plugs and socket outlets shall be of 5/6 pin type and the appropriate pin of socket shall be connected to the earthing system.

1.18.3 In case of light and fan circuit only 5 pin 5A socket outlets shall be used. 6 pin 15A socket outlets shall be provided only on power circuits. The switch controlling the socket outlet shall be adjacent to it. 6 pin 15 A socket outlets shall be located at the levels as indicated below unless otherwise specified.

- a In Kitchen at 300 mm above kitchen platform or FFL as per the location shown on the drawings.
- b In the bathroom at 1800 mm above FFL but Mirror lights shall be above Mirror of wash basin.
- c In all other rooms at 150 mm above FFL unless otherwise specified.

1.18.4 All Bracket light fittings ,unless otherwise specified shall be at a height of 2.1 meters above the floor level unless otherwise specified for some locations.

1.18.5 Unless otherwise specified, the ceiling fans shall be hung at 2.75 meters above the finished floor level.

1.18.6 Lamp holders in bath rooms are to be shrouded with insulating materials and fitted with protective shield.

1.18.7 All live conductors are to be insulated and safe guarded to avoid danger.

1.19 M.S.CONDUIT ACCESSORIES & CONNECTIONS:

The accessories used for M.S. conduits shall conform to Indian Standards IS : 3837-1966- (Specification for fittings for Rigid steel conduits with the latest amendments. M.S. conduits shall be joined by means of screwed or plain couplers. Where there are long runs of straight conduits, inspection boxes shall be provided at intervals as approved by the Consultant. The threads of the pipe and sockets shall be free from grease and oil. It shall be thoroughly cleaned before making the screwed/plain joints.

Proper jointing and Cleaning materials as recommended by manufacturers shall be used for jointing and cleaning of M.S. pipes. Use M.S. couplers and connectors for M.S.pipe connections

and terminations in boxes. All the joints shall be fully water tight. Junction boxes and running joints shall be provided at suitable places to allow for subsequent extensions if any, without undue dismantling of conduit system. As far as possible diagonal run of conduits shall be avoided. Junction between conduit and adapter boxes, back outlet boxes, switch boxes and the like must be provided with entry spouts and smooth M.S. bushes and M.S. Checknuts. Joints between conduit and iron clad Distribution Boards or control gear shall be effected by means of conduit couplers into each of which will be coupled smooth M.S. bush from the inside of box or case. Conduit system shall be erect and straight as far as possible. All jointing methods shall be subject to the approval of the Consultant.

M.S. CONDUIT CONNECTIONS:

Conduit connections for MS conduits shall be screwed metal to metal and be painted with one coat of self etching zinc chromate primer and two coats of enamel paint. The threads and sockets shall be free from grease and oil. Connections between screwed conduit and sheet metal boxes shall be by means of a brass hexagon smooth bore bush, fixed inside the box. Checknuts to be provided on inside and outside of box and connected through a coupler to the conduit or as directed by the Consultant. The joints in the conduits shall be free of burrs to avoid damage to insulation of conductors while pulling them through the conduits. Connections between PVC and MS conduits shall be through a junction box. Direct connection between PVC and MS conduits is not allowed.

2 CABLES

2.1. GENERAL

MV Cables shall be supplied, laid tested and commissioned in accordance with drawing specifications, relevant Indian Standards specification, Indian Electricity Act and manufacturers instructions. The cable shall be delivered at site in original drums with manufacturers name clearly written on the drums.

2.2. MATERIAL

MV CABLES : MV Cables shall be PVC insulated aluminium conductor armoured and unarmoured cables conforming to IS: 1554 (part I&II)-1976 & IS : 694-1977 (PVC Insulated cables for working voltages upto and including 1100 volts (second revision) with latest amendments. MV cables shall be suitable for under ground use and laid in trenches, ducts, cable trays, under roads and paved areas. MV Cables shall be termite resistant and shall be of approved make.

2.3. JOINTS IN CABLES

The contractor shall take care to see that all the cables are apportioned to various locations in such a manner as to ensure no straight joints in the cable run. If the straight joint in cable is

unavoidable due to any specified reasons, prior permission in writing shall be obtained from the Consultant before the use of such straight joints in cable.

2.4. JOINTING BOXES FOR CABLES

Cable jointing boxes shall be of appropriate size, suitable for PVC insulated cables of particular voltage ratings, and shall be manufactured by approved manufacturers.

2.5. JOINTING OF 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 the best practice in trade, in accordance with manufacturer's instructions and in an approved manner. All straight Joints shall be done in epoxy mould boxes with TROPOLIC/ M-Seal resin or approved equal. All terminal ends of conductors shall be heavily soldered upto at least 50mm length.

All cables shall be jointed colour to colour and tested for insulation resistance and continuity before jointing commences. The seals of cables must 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.

2.6. FILLING OF EPOXY COMPOUND

Equal quantities of resin and hardner shall be taken and 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 this will effect the properties of the compound. The mixture shall be used within 30-40 minutes of mixing. The surface on which epoxy compound is to be used shall be free from dust, rust, oil, grease and shall be dry. No disturbance or movement of joint shall be made till the epoxy compound has 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 it has completely hardened.

2.7. CABLES TERMINATION

Cable termination shall be done in terminal cable box using cable glands and the cable ends sealed with sealing compound.

2.8. BONDING OF CABLES

Where a cable enters any piece of apparatus, it shall be connected to the casing by means of an approved type of armoured clamps and gland. The clamps must grip the armouring firmly to the gland or casing, so that in the event of ground movement no undue stress is passed on to the cable conductors. The glands shall be either to the lead sheath by means of 'Plumbing Joint' as on a cone of approved materials, capable of being compressed into lead sheath. The gland or cone shall be capable of effecting a good electrical bond between both the armouring and lead of the cable and the casing.

2.9. LAYING OF CABLES

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. Great care shall be exercised in laying cable to avoid forming kinks. The drums shall be unrolled and cables run over wooden rollers in trenches at intervals not exceeding 2 meters. Cables shall be laid at depth of 750mm depth below ground level in the case of MV Cables. A cushion of sand, not less than 75mm shall be provided both above and below the cable, joint boxes and other accessories. HV and MV cables shall not be laid in the same trench and/or along side of water main. The cable shall be laid in excavated trench 80mm layer of sand shall be spread over the cable. The cable then shall be lifted and placed over the sand bed. The second layer of 80mm sand then be spread over the cable. The relative position of the cables laid in the same trench shall be preserved and the cables shall not cross each other as far as possible. At all changes in direction in horizontal and vertical planes, the cable shall be bent smooth with a radius of bend not less than 12 times the diameter of cable. Minimum 3 M long loop shall be provided at both sides of every straight joint and 5 Meters at each end of the cable. Distinguishing marks shall be made on the cable ends for identification. Insulation tapes of appropriate voltage and in red, yellow and blue colours shall be wrapped just below the sockets for phase identification. Aluminium Labels etched with the size of cable shall be provided around the two ends of each cable.

2.10. PROTECTION OF CABLES

The cable shall be protected by placing burnt bricks over the cables 600mm wide on the top layer of sand for the full length of underground cable. Where more than one cable is running in the same trench, the bricks shall cover all the cables and shall project a minimum of 80mm on either side of the cable.

Cable under road crossings and any surfaces subjected to heavy traffic, shall be protected by running them through Hume pipes of suitable size and Heavy grade quality.

Cables under paved areas (which form part of the building) shall be protected by running them through Stoneware/Hume pipes of 150 mm dia(minimum size) one meter below road level.

2.11. CABLES INSIDE BUILDINGS

Cables inside buildings shall be laid either in masonry trenches or carried on through trays or brackets. Where cables run in ducts inside the buildings the cables shall be adequately clamped to angle iron brackets, secured to the wall, as directed and approved by the Consultant. Where cables are suspended from ceilings they shall be carried over troughs or trays as directed and approved by the Architect. The supports shall be placed not more than 1.0 meter apart. All cables passing through walls below paved area, and concrete shall run through stone ware pipes or Hume pipes of adequate diameter recessed or exposed as directed. Cables running along walls

shall be supported and clamped to saddles, or hanger rigidly anchored at close intervals. Clear space between parallel cables shall be equal to the diameter of the cable but not less than 50mm. Where called for cable trenches shall be filled with fine sand. The contractor shall ensure that hangers, brackets and other supporting arrangements for cables are placed in proper position at the time of building the walls, concreting slabs, etc. cutting holes or opening in concrete may be carried out only with prior permission of the Architect.

All excavations and back fill including timbering, shoring and pumping required for the installation of the cables shall be carried out as per the drawings and requirements laid down elsewhere. Trenches shall be dug true to line and grades. Back fill for trenches shall be filled in layers not exceeding 150mm. Each layer shall be properly rammed and consolidated before laying the next layer. The Contractor shall restore all surfaces roadways, side walks, curbs, walls or other works cut by excavation of their original condition, to the satisfaction of Consultant.

2.12. MARKERS AND WARNING PLATES

Approved CI cables markers shall be provided along the route of the cables at every 30 meter distance and at both ends of road crossing, indicating HV cables and MV cables as applicable. Special CI markers shall be provided at all buried cable joints indicating “Electrical Cable Joints. GI plates engraving the size of cable and the place it serves shall be tied to the cable at regular intervals of 2 meters for easily identification of the cables.

2.13. TESTING OF CABLES

Prior to burying of the cables, following tests shall be carried out:

a. Insulation test between phases and phase to earth for each length of cable before and after jointing.

On completion of cable laying work and jointing the following tests shall be conducted in the presence of the Consultants.

- a. Insulation Resistance test (Sectional and Overall)
- b. Continuity Resistance Test.
- c. Sheath continuity Test.
- d. Earth Test.
- e. Physical Dimensions Test.

All tests shall be carried out in accordance with relevant Indian Standard Codes of practice and Indian Electricity Rules. The contractor shall provide necessary instruments, equipment 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 Architect / Consultant.

3 EARTHING

3.1 EARTHING

All the non-current metal parts of electrical installation shall be earthed properly. All metal conduits, trunking, cable sheaths, switchgear, outlet boxes, distribution boards, light fittings, fans and all other parts made of metal or conductive material shall be bonded together and connected by means of specified earthing system.

All earthing will be in conformity with the relevant provision of Rules 33 and 61 of the Indian Electricity Rules 1956 and Indian Standard Specifications IS:3043-1987 with latest amendments.

3.2. EARTHING CONDUCTORS

All earthing conductors shall be of high conductivity electrolytic copper of 99 % purity and shall be protected against mechanical injury or corrosion.

3.3. SIZING OF EARTHING CONDUCTORS

The cross sectional area of copper earthing conductor shall be same as the active conductor for sizes of active copper conductor upto 4.0 sqmm and shall be half the size for 16 sq mm active copper conductor and above. All fixtures, fans, outlet boxes and junction boxes shall be earthed with 1.5 sqmm PVC Insulated copper conductor wires. All power sockets and single phase A/C units shall be earthed with 4.0 PVC Insulated copper conductor wires. All Three phase Final Distribution Boards shall be earthed with 2 nos 4 mm dia bare copper conductor wires. The sizes of the earth continuity conductors should not be less than half of the largest current carrying conductors. The Sub-Distribution Board shall be earthed to 2 nos 600mm x 600mm x 3mm copper plate earthing stations through 25m x 3 mm copper strips.

3.4. CONNECTION OF EARTHING CONDUCTORS

Main earthing conductors shall be taken from the earth connections at the main switchboards to an earth electrode with which the connection is to be made. Submain earthing conductors shall run from the main switchboard to the sub-distribution boards. Final distribution boards earthing conductors shall run from sub-distribution boards.

3.5. PROHIBITED CONNECTIONS

Neutral conductor, sprinkler pipes, or pipes conveying gas, water, or inflammable liquid, structural steel work, metallic enclosures or cables and conductors, metallic conduits and lightning protection system conductors shall not be used as a means of earthing an installation or even as a link in an earthing system. The electrical resistance of metallic enclosures for cables and conductors measured between earth connections at the main switchboard and any other point on the completed installation shall be low enough to permit the passage of current necessary to operate fuse or circuit breakers and shall not exceed 1 ohm.

3.6. PROTECTION FROM CORROSION

Connections between copper and galvanised equipment shall be made on vertical face and protected with paint and grease. Galvanised fixing clamps shall not be used for fixing earth conductors. Only copper fixing clamps shall be used for fixing earth conductors. When there is evidence that the soil is aggressive to copper, buried earthing conductors shall be protected by suitable serving and sheathing.

3.7. EARTHING STATION

Plate Electrode Earthing : Earthing electrode shall consist of a tinned copper plate not less than 300mm x 300mm x 3mm thick as called for in the Schedule. The plate electrode shall be buried as far as practicable below permanent moisture level but in any case not less than 4.2 meters below ground level. Wherever possible earth electrodes shall be located as near the water tap, water drain or a down take pipe as possible. Earth electrodes shall not be installed in proximity to a metal fence. It shall be kept clear of the buildings foundations and in no case shall it be nearer than 2 meters from the outer face of the wall. The earth plate shall be set vertically and surrounded with 150mm thick layer of charcoal, dust and salt mixture. 20mm GI pipe shall run from the top edge of the plate to the ground level. The top of the pipe shall be provided with a funnel and a mesh for watering the earth through a pipe. The funnel over the GI Pipe shall be housed in a masonry chamber, approximately 300mm x 300mm x 300mm deep. The masonry chamber shall be provided with a cast iron cover resting over a GI frame embedded in masonry. Refer Sketch for additional details.

Pipe Electrode Earthing: Earthing electrode shall consist of a GI Pipe (class 'A') Indian Tube Company make or approved equal not less than 40mm dia and 4.5 meters long. GI Pipe electrode shall be cut tapered at the bottom and provided with holes of 12mm dia drilled at 75mm interval upto 2.5 meters length from bottom. The electrode shall be buried vertically in the ground as far as practicable below permanent moisture level with its top not less than 1.25 M below ground level. The electrode shall be in one piece and no joints shall be allowed in the electrode. Wherever possible earth electrodes shall be located as near water tap, water drain or a down take pipe. Earth electrodes shall not be located in proximity to a metal fence. It shall be kept clear of the building foundations and in no case shall be nearer than 2 meters from the outer face of the wall. Refer Sketch for additional details.

The pipe earth electrode shall be kept vertically and surrounded with 150mm thick layer of charcoal dust and salt mixture upto a height of 2.5 meters from the bottom. At the top of the electrode a funnel with a mesh shall be provided for watering the earth. The main earth conductors shall be connected to the electrode just below the funnel, with proper terminal lugs and check nuts. The funnel over the GI pipe and earth connection housed in a masonry chamber, approximately 350mm deep. The masonry chamber shall be provided with a cast iron cover resting over a CI frame embedded in masonry.

3.8. EARTH CONNECTION

All metal clad switches and other equipment carrying single phase current, shall be connected to earth by a single connection. All metal clad switches carrying medium voltage and high voltage shall be connected with earth by two separate and distinct connections. The earthing conductors inside the building wherever exposed shall be properly protected from mechanical injury by running the same in GI Pipe of adequate size.

Earthing conductors outside the building shall be laid 600mm below the finished ground level. The over lapping in copper strips at joints where required, shall be minimum 75mm. The joints shall be riveted and brazed with copper rivets and greased in approved manner. Sweated lugs of adequate capacity and size shall be used for all termination of wires above 1 Sqmm size and bare copper wire above 2.0mm dia. Lugs shall be bolted to the equipment body after the metal body is cleaned of paint and other oily substance and properly tinned. The earth wires entering the Final Distribution Boards shall be terminated with copper sockets crimped to its ends and tightened to the terminal with the help of flat end brass screws.

3.9. EARTH RESISTANCE

The earth resistivity of the soil where the earthing stations are located shall be submitted to the Consultant before the earthing work starts and get the approval of the Consultant/Owner. If the earth resistance is too high and multiple electrode earthing does/not give adequate low resistance to earth, than the soil resistivity immediately surrounding the earth electrodes shall be reduced by adding sodium chloride, calcium chloride, sodium carbonate, copper sulphate, salt and soft coke or charcoal in suitable proportions as directed by the consultants.

3.10. RESISTANCE TO EARTH

The resistance of each earth system shall not exceed 1.0 ohm in the case of Medium Voltage system and 0.5 ohm in the case of High Voltage system.

4 TESTING

4.1 GENERAL

On completion of the work the entire installation shall be subject to following tests:

- a) Wiring Continuity Test
- b) Insulation Resistance Test
- c) Earth Continuity Test
- d) Earth Resistively Test

Besides the above any other test specified by the local Authority shall also be carried out.

All tested and calibrated instruments for testing, labour, materials and incidentals necessary to conduct the above tests shall be provided by the Contractor at his own cost.

4.2. TESTING OF WIRING

All wiring systems shall be tested for continuity of circuits, short circuits and earthing after wiring is complete and before energising. The Test Certificates for the complete wiring shall be submitted in the Format and the Total Electrical Installation shall be got approved by the Electrical Inspector.

4.3. INSULATION RESISTANCE TEST

The insulation resistance shall be measured by applying between earth and the whole system of conductors, or any section thereof with all fuses in place and all switches closed (except in concentric wiring) all lamps in position of both poles of the installation, otherwise electrically connected together, a direct current pressure of not less than twice the working pressure (provided that it does not exceed 660 volts for medium voltage circuits) be applied. Where the supply is derived from A.C. three phase system, the neutral pole of which is connected to earth, either direct or through added resistance, pressure shall be deemed to be that which is maintained between the phase conductor and the neutral. The insulation resistance measured as above shall not be less than 50 divided by the number of points on the circuit provided that the whole installation shall not be required to have an insulation resistance greater than one mega ohm. The insulation resistance shall not be measured between all conductors connected to one phase conductor of the supply and all the conductors connected to the middle wire or to the neutral or to the other phase conductors of the supply. Such a test shall be carried out after removing all metallic connections between the two poles of the installation and in these circumstances the insulation resistance between conductors of installation shall not be less than that specified above. The insulation resistance between the case of frame work of housing and power appliances, and all live parts of each appliance shall not be less than that specified in the relevant Indian Standard Specifications or where there is no such specification shall not be less than half a mega ohm.

4.4. TESTING OF POLARITY OF NON-LINKED SINGLE POLE SWITCHES

In a two wire installation a test shall be made to verify that all non-linked single pole switches have been fitted in the same conductor through out, and such conductor shall be labeled or marked for connection to an outer or phase conductor or to the non-earthed conductor of the supply. In the three or four wire installation a test shall be made to verify that every non-linked single Pole switch is fitted in a conductor to one of the outer or phase conductor of the supply. The entire electrical installation shall be subject to the final acceptance of the Consultant as well as the local authorities.

4.5. EARTH RESISTIVITY TEST

Earth resistivity test shall be carried out in accordance with Indian Standard code of practice for earthing IS:3043:1987. All tests shall be carried out in the presence of the Consultant/Owner.

4.6 TEST CERTIFICATES

The Electrical Installation shall be tested as per relevant Indian Standards and Test Certificate to this effect shall be submitted to the Owner. The Contractor has to get the Total Electrical Installation approved by the Electrical Inspector and the permission to energise the same shall be submitted to the Owner.

5 SAFETY REQUIREMENTS

5.1 SCOPE

This section covers the requirements of items to be provided in the sub-station for compliance with statutory regulations, safety and operational needs.

5.2 REQUIREMENTS

Safety provisions shall be generally in conformity with the relevant Indian Standards and I.E. Rules and Regulations. In particular the following items shall be provided.

(a) Insulation Mats

Insulation Mats conforming to IS : 5424-1969 shall be provided in front of main switch boards and other control equipment as specified.

(b) First Aid Charts and First Aid Box

Charts (one in English, one in Hindi, one in Regional language), displaying methods of giving artificial respiration to a recipient of electrical shock shall be prominently provided at all the appropriate places . Standard First Aid Boxes containing materials as prescribed by St. John Ambulance brigade or Indian Red Cross should be provided in each sub-station.

(c) Danger Plate

Danger plates shall be provided on HV and MV equipments. MV danger notice plate shall be 200mm x 150mm made of mild steel atleast 2mm thick vitreous enameled white on both sides and with inscriptions in signal red colour on front side as required.

(d) Fire Extinguishers

Portable CO₂ conforming to IS : 2878-1976 dry chemical conforming to IS 2171-1976 extinguishers shall be installed in the sub-station at suitable places as specified.

(e) Fire Buckets

Fire buckets conforming to IS : 2546-1974 shall be installed with the suitable stand for storage of water and sand.

(f) Tool Box

A standard tool box containing necessary tools required for operation and maintenance shall be provided in sub-station.

(g) Caution Board

Necessary number of caution boards as “Man on Line” “Don’t switch on’ etc. shall be available in the sub-station.

(h) Key Board

A key board of required size shall be provided at a proper place containing castel key, and all other keys of sub-station and allied areas.

(j) Clauses for activation of lines, protection of third parties from shock

Reference to the Indian/OSHA standards

6 M V PANELS, SUB-DISTRIBUTION BOARDS & FINAL DISTRIBUTION BOARDS

All the M V Panels , Sub-Distribution Boards(SDB) & Final Distribution Boards(FDB) shall be suitable for operation on 3 phase, 4 wire, 415 Volts, 50 cycles, neutral grounded at transformer and short circuit level not less than 31 MVA at 415 volts.

The MV Panel, SDBs & FDBs shall comply with the latest edition of relevant Indian Standards and Indian Electricity Rules and Regulations. All Panels and Distribution Boards shall be fabricated by the contractor by using specified components as per the specifications given below:

6.1. CONSTRUCTION FEATURES

The Distribution Boards and Panels shall be metal enclosed sheet steel cubical, indoor, dead front, floor mounting type. The distribution boards shall be totally enclosed, completely dust and vermin proof. Gaskets between all adjacent units and beneath all covers shall be provided to render the joints dust proof. Panels and Distribution boards shall be preferably arranged in multitier formation. All doors and covers shall be fully gasketed with foam rubber and/or rubber strips and shall be lockable. All MS sheet steel used in the construction of distribution boards and Panels shall be 2mm thick and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet metal shall be seam welded, all welding slag grounded off and welding pits wiped smooth with plumber metal.

All covers shall be properly fitted and square with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with hank nuts. Self threading screws shall not be used in the construction of MV Panel & distribution boards. A base channel of 75mm x 40mm x 5mm thick shall be provided at the bottom. A minimum of 200 mm between the floor of MV Panel & Distribution board and lower most unit shall be provided. The MV Panel & Distribution Boards shall be of adequate size with a provision of 20% spare space to accommodate possible future additional switchgear in addition to spare feeders.

Knockout holes of appropriate size and number shall be provided in the Distribution Board and Panels in conformity with the location of incoming and outgoing cables.

Panels and distribution boards shall be provided with removable sheet steel plates at top and bottom to drill holes for cable entry at site. MV Panel shall be of Extendible type.

The Panels and SDBs shall be suitable for IP 42 protection.

6.2. CIRCUIT COMPARTMENTS

Each circuit breaker, MCCB and switch fuse units shall be housed in separate compartments and shall be enclosed on all sides. Sheet steel hinged lockable door shall be duly interlocked with the ACB/MCCB/switch fuse unit in 'on' and 'off' position. Safety interlocks shall be provided for air circuit breakers to prevent the breaker from being drawn out when the breaker is in 'on' position. The door shall not form an integral part of the draw out position of the ACB. All instruments and indicating lamps shall not be mounted on the ACB compartment door. Sheet steel barriers shall be provided between the tiers in a vertical section. The Knobs for holding the cubicle door in closed position shall be spring operating rotating type and not screwed type.

6.3. INSTRUMENT ACCOMMODATION

Separate and adequate compartments shall be provided for accommodating instruments, indicating lamps, control contractors and control fuses etc. These shall be accessible for testing and maintenance without any danger of accidental contact with live parts of the circuit breaker, bus bar and connections.

6.4. BUS BARS & BUS BAR CONNECTION

The bus bar and interconnections shall be of electrolytic Copper of 99.9 % purity of rectangular cross sections suitable for full load current for phase bus bars and full rated current for neutral bus bar and shall be extendible on either side. Minimum 200 Amps capacity bus bars shall be provided in the distribution boards. The bus bars and interconnections shall be insulated with PVC heat shrinking sleeves and colour coded. The bus bars shall be supported on unbreakable, non hygroscopic insulated SMC supports at regular intervals to withstand the forces arising from short circuit in the system. All bus bars shall be provided in a separate chamber and properly ventilated. The current density of copper shall be 1.6 Amps per sq.mm cross sectional area of Bus bar.

All bus bar connections in Panel and Sub-distribution boards shall be done by drilling holes in bus bars and connecting by cadmium plated M.S. bolts and nuts . 20% Additional cross section of bus bars shall be provided in all distribution boards to cover up the holes drilled in the bus bars. Spring and flat washers shall be used for tightening the bolts.

Automatically operated safety shutters to screen the live cluster when the breaker is withdrawn from cubicle is to be provided.

All connections between bus bars and switches and between switches and cable alley terminals shall be through solid copper strips of proper size to carry full rated current and insulated with PVC heat shrinking sleeves . All the M V Panels and SDBs shall be completely factory wired, ready for connection. All the terminals shall have adequate current rating and size to suit individual feeder requirements. Each feeder shall be clearly numbered from left to right to correspond with wiring diagram. All the switches and feeders shall be distinctly marked with a small description of the service installed. Minimum width of busbar Alley shall be 300 mm and that of cable alley shall be 450 mm.

6.5. TERMINALS

The outgoing terminals and neutral link shall be brought out to a cable alley suitably located and accessible from the panel front. The current transformer for instruments metering shall be mounted on the terminal blocks. Cable compartments shall be provided for incoming and outgoing cables.

6.6. WIREWAYS

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

6.7. CABLE COMPARTMENTS

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

6.8. METERS

All meters shall be housed in a separate compartment and accessible from front only. Lockable doors shall be provided for the metering compartment. The details of other meters and indicating lamps are as described in each switch board and neutral selector switch of appropriate range and scale. Wiring for meters shall be colour coded and labeled with approved plastic ferrules for easy identification. All meters shall be digital.

6.9. CURRENT TRANSFORMERS

Where ammeters are called for CT's shall be provided for current measuring more than 60 Amps. Each phase shall be provided with separate current transformer of accuracy class I and suitable V.A. Burden for operation of associated metering. Current transformers shall be in accordance with IS:2705-1964 as amended upto date and Cast Resin Type.

6.10. INDICATING PANEL AND METERING EQUIPMENT

All meters and indicating instruments shall be accordance with relevant Indian Standards. The meters shall be flush mounted and drawout type. Indicating lamps shall be neon type and of low burden. Indicating lamps shall be backed up with fuses of 5 Amps and toggle switch.

6.11. MOULDED CASE CIRCUIT BREAKERS (MCCB)

MOULDED CASE CIRCUIT BREAKERS(MCCB) : MCCB's shall be in accordance with IS: 2516-1985 & IEC 157-1 with the latest amendments. It shall be enclosed type made of Heat resistant high strength, flame retarding, thermosetting material rated for 500 V, 50 Hz. It shall have three position indicator 'ON', 'OFF' & 'TRIP' at top, bottom & middle position. It shall be provided with shunt trip and additional 2 Nos. NO & NC contacts. The minimum breaking capacity of MCCB's shall be 20 KA upto 100 AMPS rating and 35 KA for MCCB's above 100 AMPS rating upto 200 A and 50KA for MCCBs above 200 A. All MCCB.s shall have door operating handle (Rotary Operating Handle). The short circuit with standing capacity shall be ICS Rating and not ICU Rating.

6.12. EARTHING

Copper earth bars of 25mm x 3mm shall be provided for MV Panel and SDBs for the full length and connected to the frame work of the Panel and SDBs.

Provision shall be made for connection from this earth bar to the main earthing bar on both side of the Panel and SDBs.

6.13. PAINTING

All sheet steel work shall under go a process of degreasing pickling in acid, cold rinsing, phosphating, passivating and then sprayed with a high corrosion resistant primer. The primer shall be baked in an oven. The finishing treatment shall be by application. Two coats of synthetic enamel paint of approved colour and powder quoted. The seven Tank process shall be adopted.

6.14. LABELS

Engraved anodized aluminium labels shall be provided on all incoming and outgoing feeder switches. Circuit diagram showing the control wiring shall be pasted on inside of the panel door and covered with transparent laminated plastic sheet. The Label shall indicate the name of the feeder, the specific area it is feeding, ampere rating and the cable size it is receiving. The Labels shall be provided on the backside of the Panel in case of back access.

All the SDBs and Panels shall be subject to tests specified in relevant Indian Standards and test certificate shall be furnished.

6.15. SHOP DRAWING

Before fabricating the Panels and the SDBs/FDBs the contractor has to submit shop drawing with the wiring diagram for all the Panels and SDBs/FDBs to the Consultant and get approval from the Consultant.

6.16. INSPECTION

At all reasonable times during production and prior to shipment of equipment the contractor shall provide and secure for Consultant/ Owners representative every reasonable access and facility at their plant for inspection.

6.17. TEST CERTIFICATES

Testing of Panels and SDBs shall be carried out at factory and at site as specified in Indian Standards. The test certificates for the tests carried out at factory shall be submitted in duplicate. The polarity test, insulation resistance test will also be included.

6.18 MINIATURE CIRCUIT BREAKER & FINAL DISTRIBUTION BOARDS

Miniature circuit breaker shall be quick make and break type and confirm with Indian Standards IS : 8828 – 1978 (Specifications for Miniature Air Break Circuit breakers for voltage not exceeding 1000V) The housing of MCB's shall be heat resistant and having a high impact strength. The fault current of MCB's shall not be less than 9000 Amps at 230 volts. The MCB's shall be flush mounted and shall be provided with trip free manual operating mechanism "ON" and "OFF" indications.

The MCB contacts shall be silver nickel and silver graphite alloy coated with silver. Proper arc chutes shall be provided to quench the arc immediately. MCB's shall be provided with magnetic fluid plunger release for over current and short circuit protection. The over load or short circuit devices shall have a common trip bar in the case of DP and TPN Miniature circuit breakers. The MCB shall be tested and certified as per Indian Standards prior to installation.

All final distribution boards shall be provided with MCB's. TPN final distribution boards shall consists of 3 rows of single pole MCB's for each circuit, and each phase shall be connected to the incoming supply through double pole MCB isolator. Separate neutral bus bars shall be provided for each phase in the case of TPN Distribution Boards. In case Earth Leakage Circuit Breaker(ELCB) has to be provided in Final Distribution Boards then on the incoming side instead of DP MCB Isolator a DP ELCB shall be provided of Current rating same as that of DP MCB Isolator and current sensitivity maximum of 100mA. The ELCB shall conform to IS : 12640 - 1988 (Residual Current-Operated Circuit Breakers- Specifications) Solid links between MCB Isolator and backed by HRC fuse/Rewirable fuse and Neutral bus bar shall be provided. The Neutral shall be looped from one phase to another through DP Isolators. MCB's shall be provided on the phase or live conductor of each circuit and a neutral bar for the earthed neutral. The individual MCB in each row shall be detachable without disturbing the row of MCB's. Phase separation barriers of 3mm thick bakelite sheet shall be provided between the bank of MCB's fitting 3mm thick bakelite sheet cover shall be provided for each phase. There shall be ample space behind the bank of MCB's to accommodate all the wiring. All the internal wiring of final distribution Boards shall be concealed behind 3mm thick bakelite sheet. All the distribution boards shall be completely factory wired, ready for connection. All the terminals shall have adequate current rating and size to suit individual feeder requirements. Each circuit shall be clearly numbered from left to right to correspond with wiring diagram. All the switches and circuits shall be distinctly marked with a small description of the service installed. A four way 60 A Brass/Copper neutral link shall be provided with terminals suitable to receive 16 sq mm stranded copper wires with end sockets. The final Distribution Boards shall be fabricated as per consultants design.

7 SCOPE OF WORK AND MEASUREMENTS

BRIEF SCOPE OF WORK FOR ELECTRICAL WORKS

- a) Supply, Installation, connecting, testing and commissioning of the following :
- i) Conduiting and wiring for all light points, Exhaust fans, Light & power socket outlets, three phase outlets and equipment wiring.
 - ii) Complete earthing system
 - iii) Conduiting for Telephone system.
 - iv) Conduiting for Computer system.
 - v) All Cables, Mains & Sub-Mains
 - vi) All Final Distribution Boards.
 - vii) Supply & Installation of Light Fixtures
- b) The contractor shall carry out and complete the work under this contract in every respect in confirming with the current rules and regulations of the local Electricity Authority, stipulations of the Indian Standard Institution, and with the directions of and to the satisfaction of the owner. The contractor shall furnish all labour, material, appliances, equipment, transportation and incidentals necessary for providing, installing, testing and commissioning of the whole electrical installation as specified herein and shown as drawings.

This also includes any materials, appliances, equipment and incidental work not specifically mentioned herein or noted on the drawings/documents as being furnished or installed but which are customary to make the installation in working order. The work shall include all incidentals and jobs connected with Electrical installation such as earthing work and cutting chases/holes and making good the same and grouting and equipment.

On completion of the work and before issuing of virtual completion certificate the contractor shall submit to owner “As installed drawings” showing all the details of work done by him.

All Civil works in connection with the Electrical Installation including supply, laying and fixing of necessary inserts, hooks, brackets and sleeves etc

7.1 POINT WIRING

The rates for all point wiring items shall include :

1. Conduits, Conduit specials, bushes and other fittings concealed or exposed as called for.

2. Embedding conduit and allied fittings including the outlet boxes in walls, floors etc., during construction and/or in chases including cutting chases and making good with cement mortar as necessary in the case of concealed conduit work.
3. Providing and fixing approved fixing devices, saddles and grouting the same as required for exposed conduits.
4. Fabrication and Supply of G.I .boxes for switches, ceiling fan hooks, Exhaust fans outlet and lighting fixtures with 1.6 mm thick sheet steel.
5. Providing and fixing junction boxes with 3mm Hylam or 3mm/5mm thick Perspex sheet cover duly painted from inside to match the colour of the walls. All Junction boxes shall be MS only.
6. All fixing accessories such as clips, brass screws/brass washers raw plugs etc.
7. All work & material necessary (including circuit wiring from DB to first tapping point of each circuit with 2.5 sq. mm wires) in complete wiring of a switch circuit of any length from the distribution board to the following via the switch:
 - a) Ceiling rose
 - b) Connector
 - c) Back plate
 - d) Socket outlet
 - e) Lamps Holder
 - f) Any other terminal outlet boxes
 - g) Ceiling fan and Exhaust fan
8. Switch, socket outlet as called for.
9. Cable/wire as required upto lamp holder.
10. All metal boxes and boards concealed or surface mounted including those required for housing fan regulators.
11. All accessories necessary to complete wiring as specified.
12. FRLS PVC Insulated stranded Copper conductor earth wire for fixtures, switch outlet boxes and third pin of 5/15 Amps. socket to common earth.
13. Painting all exposed M.S. conduits, outlet boxes and junction boxes.
14. M.S. conduit for concealed and exposed wiring.
15. 2 mm dia G.I. pull wires in conduit work, wherever necessary.
16. The switch plate shall be made of I.S.I. grade Urea Formaldehyde Moulding powder. The base of the switches shall be made from high heat resistant phenol formaldehyde powder. The cost of switches shall include the cost of cover plates, cadmium fixing screws etc.

The switches/sockets shall be rocker operated.
17. Separate Earth wire shall run along with each circuit both for power and light circuits.

18. Cutting of floor and making good for carrying conduits also.
19. Numbering of Circuits with ferrules for all circuits at both ends.
20. Providing 15 Amps capacity Bakelite terminal Blocks for terminating the phase, neutral and earth wire at each fixture location.
21. PVC insulated copper conductor wire ends before connection shall be properly soldered (at least 15 mm length) with special Cu solder for copper conductor or shall be properly crimped with copper lugs/sockets as the case may be. Strands of wires shall not be out for connecting to the terminals. All stands of wires shall be soldered at the end before connection. The connecting brass-screws shall have flat ends. All looped joints shall be soldered and connected through terminal block/connectors.
22. Provide embossing on the sockets engraving “UPS” and “RAW”

7.2 CONDUITING & WIRING FOR TELEPHONE & COMPUTER SYSTEM

The rates for conduit work shall include :

1. All necessary specials and fittings.
2. M. S. inspection, junction and outlet boxes as required.
3. 3/5 mm thick Perspex sheet covers for inspection & junction boxes.
4. All fixing accessories such as clips, nails, brass screws/brass washers, etc.
5. 2 mm dia G.I. pull wires in conduit work, wherever necessary.
6. Providing and fixing approved saddle, hooks and grouting the same as required in the case of all exposed conduit work.
7. Embedding conduit and allied fittings including the outlet boxes in walls, floors etc., during construction and/or in chases including cutting chases and making good with cement mortar as necessary in the case of concealed conduit work.
8. Painting all inspection, junction and outlet boxes.
9. PVC conduit for concealed conduit wiring .
10. Painting of Hylam/perspex sheet cover from inside to suit the colour of the surrounding wall with two coats of paint.
11. Supply and fabrication of G.I. outlet boxes .

12. The outlet cover plate for Telephone outlets shall be made of I.S.I. grade Urea Formaldehyde Moulding powder. The cost of outlets shall include the cost of cover plates, cadmium fixing screws etc. also.
13. Numbering of wires on both ends of the wires for easy identification with PVC ferrule

7.3 EARTHING

The rates for earthing items include :

1. All fixing accessories such as brass saddles, brass screws, raw plugs etc.
2. Jointing by riveting in case of copper earth strips (2 per joint) and by welding in case of GI strips.
3. Cutting chase, making holes and making good the same wherever required.
4. All masonry work including earth work for earthing stations, earthing tapes and wires.
5. Effecting adequate and proper interconnections.
6. Use of copper thimbles for all wire terminations in the Distribution Boards , switches and sockets.

7.4 CABLES, MAINS AND SUB-MAINS

The rates for all items of work shall include:

1. Embedding conduits and allied fittings in walls, floors, etc., during construction and/or in chases including cutting chases and making good as necessary in the case of concealed conduit work.
2. Providing and fixing approved saddles, hangers, trays etc., and grouting the same as required for exposed conduits where called for. Providing dash fasteners for the threaded MS down rods(primer coated) used for hanging the cable \trays.
3. Providing and fixing junction boxes with 5 mm thick 'Hylam' sheet covers.
4. Effecting adequate and proper connections at terminations.
5. Ensuring that provision is left in various buildings components and trenches as the work proceeds, for incorporation of cable supports at a later date.
6. Providing all fixing accessories such as clamping devices, nuts and bolts, screws etc.
7. Clamping to supports where laid in trenches.
8. Excavation of trenches and bringing the trenches to exact level as required.
9. Providing sealing compound, thimble, solder etc., at joints and terminations as called for.

10. Providing proper supports for cable terminal boxes as called for.
11. Wherever cables pass through walls, ceiling, paved area or below roads provide sleeves/ hume pipes and making good as necessary.

7.5 DISTRIBUTION BOARDS

The rates for the following items of work generally include :

1. The supporting rigid steel frame work.
2. 1.6 mm thick MS boxes complete with dust proof and vermin proof covers and locking arrangements, mounted flush with surfaces.
3. All fixing accessories such as dash fasteners , bolts, nuts, screws, etc. as required.
4. Building into masonry/concrete work including all necessary cutting and grouting with cement mortar 1:2.
5. Effecting adequate and proper connections.
6. Effecting proper bonding to earth.
7. Painting/lettering on switches and distribution boards the location they serve and providing on each board its circuit diagram.
8. Touching up all damaged paint over exposed work with one coat of red oxide primer and two finishing coats of approved synthetic enamel paint.
9. Main Distribution Board and Final Distribution Boards shall be fabricated by Contractor with the specified equipment.
10. Provide 6 Amps. SP MCB for Light Points Circuits, 20 Amps. SP MCB for Power Circuits and 32 Amps. SP MCB for 1.5 Ton AC Unit.

7.6 SUPPLY & FIXING OF LIGHTING FIXTURES AND FANS

The rate for fixing of lighting fixtures and fans shall include:

1. Receiving the fixtures from the Owner's stores and assemble the same at site and testing the fixture before fixing.
2. All components that may be required to make the installation complete in all respects such as:
 - a. Suitable length of down rod, hanger and connecting wires, where called for.

- b. Wires for connecting the fixtures to the point through connector blocks.
 - c. All wood and metal blocks to serve as base of fixtures.
 - d. Bonding with common earth wires.
3. Drilling holes in supports where required.
 4. Fixing clamps, GI bolts and nuts, clips, brass screws, dash fasteners and other fixing accessories as required, including leaving necessary provision for fixing at time of concreting.
 5. Approved enamel painting for hanger rods, clamps and other components and fixing accessories as called for.
 6. Testing and commissioning of all fixtures and fans after installation.
 7. The lighting fixtures shall be suitable for 230 Volts, single phase 50 cycles A.C. supply system.
 8. Incandescent lamps shall be 100 Watts (maximum) and fluorescent lamps shall be 18 watts and 36 watts.
 9. Use G.I. suspenders and clamping to the slab with dash fasteners(4 per fitting) , including turn buckle arrangements for adjustable heights for hanging. They should be the same suspenders as used for hanging the False Ceiling grid ceiling.
 10. The contractor to mark the size of light fittings, speaker and fire alarm components on the false ceiling for the interior contractor to cut holes.

LIST OF APPROVED MAKES:**For Civil / Interior / Finishing Works:**

1. M.S. Pipe, Tubes, Flats, Angle, Tee Sections - SAIL, TISCO, RANA or approved equivalent
2. Cement (43 grade) - Ambuja, Birla, Ultratech
3. Plaster of Paris - Shri Ram, Birla, Sakami or approved equivalent
4. White Cement & Wall Putty - Birla, J.K
5. Water proofing compound - CICO or approved equivalent
6. White washing lime - Dehradun (Source)
7. Paints - Asian Paints, ICI, Nerolac
8. Fire Retardant paint - Viper or approved equivalent
9. Wax Polish - Mansion or approved equivalent
10. Wood Preservative - Asian Paints, J&N, Shalimar or approved equivalent
11. Glass / Tempered Glass - Asahi, Modi Guard or approved equivalent
12. Double Layered insulated Glass - AGC Planibel Clearlite
6 mm clear tempered glass - 12 mm Argon gas filing - 6 mm tempered glass or equivalent with minimum sound transmittance reduction of 30 dB or approved equivalent.
13. Calcium Silicate Board - Ramco 'Hilux'
14. Waterproof Ply - Garnet, National, Duro, Archid, Merino, Jyotiply
15. Commercial ply - Garnet, National, Duro, Archid, Merino, Jyotiply
16. Commercial Board - Garnet, National, Duro, Archid, Merino, Jyotiply
17. Veneer - Green, Duro, Donear, Archid
18. Laminate - Merino, Donear, Archid or approved equivalent
19. Cement Bonded Board - 'BISON' by NCL or approved equivalent
20. Gypsum board. - India Gypsum Ltd.
21. False Ceiling Members - Gyp. Steel of India Gypsum Ltd.
 - a) Perimeter
 - b) Ceiling section
 - c) Intermediate

d) Angle

- | | | | |
|-----|--------------------|---|--|
| 22. | Flush Door Shutter | - | Archid, Merino, Duro or approved equivalent |
| 23. | Door Hardware | - | As per approved sample |
| 24. | Door Lock & Handle | - | Dorset, or approved equivalent |
| 25. | Door closer | - | Dorset or approved equivalent |
| 26. | Vitrified Tiles | - | HR Johnson India, Orient, Kajaria or approved equivalent |
| 27. | PVC strips | - | Fixopan or approved equivalent |
| 28. | Window Blinds | - | MAC, Vista Levolor or approved equivalent |
| 29. | CPU Trolley | - | EBCO or approved equivalent |
| 30. | Drawer Slides | - | As per approved sample |

For Electrical/ HVAC / Voice / Data Works:

- | | | | |
|-----|--|---|---|
| 1. | M.S. Conduits | - | BEC |
| | M S Conduit accessories | - | Sharma/Steel Craft/ Rama/Disco |
| 2. | FRLS P.V.C. conduits & accessories- | | BEC (Grey) / Polypack |
| 3. | FRLS P.V.C. insulated copper conductor wires 1100 volts grade | - | Finolex/ Skytone /Bonton/Havells |
| 4. | MCCBs and Accessories | - | Schneider/Siemens/Legrand |
| 5. | Miniature circuit breakers/RCCBs/ DB | - | Legrand (MDS) / ABB/ Schneider |
| 6. | Switches, plugs, telephone outlets- (Modular Type) | | Legrand/Schneider/Philips/Simon/Northwest |
| 7. | Gang Box | - | Same as make of switch & sockets |
| 8. | G.I. Pipe | - | Tata/Jindal |
| 10. | PVC insulated Aluminium/copper conductor armoured cables of 1100 V/ 11000 volt grade | - | Bonton/Finolex/Havells/Skytone |
| 11. | FRLS PVC insulated flexible copper conductor armoured cables of 1100 V/ 11000 volt grade | - | Bonton /Finolex/ Skytone /Havells |
| 12. | FRLS PVC insulated Twisted / - shielded/Fire survival Copper L.V. Cable | | Bonton/Fusion Polymer |

13	Cable Glands	-	Chromium plated Brass heavy duty glands, double compression, weatherproof with rubber washers and gaskets of Comet make
14	Cable Lugs	-	Dowells crimping type
15	Light fixtures	-	Philips / Wipro or approved equivalent
16	Lamps	-	Philips/ Osram
17	Special light fixtures	-	As per specifications in BOQ
18	Indicating Lamps	-	Schneider / ABB/Legrand
19	Terminal Blocks	-	Elmex / Schneider
20	SPD	-	Mersen/OBO
21	Industrial socket outlet socket and top	-	MDS-Legrand / Bals/Clipsal/Hensel/ ABB
22	Maintenance Free Earthing	-	ERICO/Duval Messien/ Ashlok
23.	Cable Tray	-	BEC/Indiatech/KME
24.	Raceway – with sheet steel	-	BEC/Indiatech/KME
25.	Floor Access Box	-	M.K./ A H Meyer/Legrand/ONESTO
26.	SDB's and Panels	-	Neptune/Indiatech/AAA Switchgear/SPC Electro
27.	Data Networking system	-	AMP

Note: For all items not mentioned in the list above, all make and materials will be ISI marked and of reputed make and used only after obtaining approval from ICGEB appointed Project Consultant before procurement.

LIST OF TENDER DRAWINGS (Attached as Annexure):

PLANS

TA-1.1, TA-1.2, TA-1.1-E, TA-1.2-E, TA-1.1-L, TA-1.2-L

SECTIONS / ELEVATIONS

TA-4.1, TA-4.2, TA-4.3, TA-4.4, TA-4.5

DETAILS

TA-10.1, TA-10.2, TA-10.3, TA-10.4, TA-10.5, TA-10.6, TA-10.7



TENDER DOCUMENT

FOR

RENOVATION OF EXISTING LIBRARY SPACE

AT

INTERNATIONAL CENTRE FOR GENETIC ENGINEERING & BIOTECHNOLOGY (ICGEB)

Aruna Asaf Ali Marg, New Delhi – 110067

Website: www.icgeb.res.in

PART – B

PRICE BID

Notice Inviting Tender (NIT) No: ICGEB/LIBRARY(GF&FF)2017**SCHEDULE (BILL) OF QUANTITIES****Name of work: RENOVATION OF EXISTING LIBRARY SPACE, ICGEB CAMPUS****Summary of Price Bid**

<i>S.No.</i>	<i>Description</i>	<i>Amount</i>
A	CIVIL AND INTERIOR WORKS	
A.I	Demolition, Dismantling and Repairs	
A.II	Civil Work	
A.III	Partitions, Woodwork and Related Works	
A.IV	Flooring Work	
A.V	False Ceiling Work	
A.VI	Furniture Work: New Items	
A.VII	Furniture Work: Repair of existing furniture	
A.VIII	Finishing Work	
	Total for Civil and Interior Works	
B	ELECTRICAL, HVAC AND FIRE DETECTION WORKS	
B.I	HVAC Work	
B.II	Fire Detection and Fire Fighting Works	
B.III	Electrical, Telephone and Data Works	
	a. Point Wiring	
	b. Conduiting and Wiring for Voice and Data	
	c. Earthing System	
	d. Supply and Installation of Lighting Fixtures	
	e. Cables, Mains and Sub-Mains	
	f. Distribution Boards	
	Total for Electrical, HVAC and Fire Detection Works	
C	TOTAL FOR ALL WORKS	
	Total in Amount in Words	

(Signature of the bidder with seal)

S.No.	Description	Unit	Quantity	Rate	Amount
A	CIVIL AND INTERIOR WORKS				
A.I	Demolition, Dismantling and Repairs				
1	Demolishing Cement Concrete manually / by mechanical means including disposal of material within 50 metres lead as per direction of Engineer-in-Charge. a. Nominal concrete 1:3:6 or richer mix (i/c equivalent design mix)	cu m	1.00		
2	Demolishing R.C.C. work manually/ by mechanical means including stacking of steel bars and disposal of unserviceable material within 50 metres lead as per directions of Engineer - in- charge.	cu m	0.50		
3	Extra for scrapping, cleaning and straightening reinforcement from R.C.C. work.	kg	30.00		
4	Demolishing brick work manually/ by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer-in-charge. a. In cement mortar	cu m	1.50		
5	Removal of existing flooring carpets (including carpets in skirting) and stacking them in rolls at designated place within 100 m lead as per instructions of Engineer-in-charge	sq m	311.13		
6	Dismantling tile work in floors and roofs laid in cement mortar including stacking material within 50 m lead. a. For thickness of tiles above 25 mm upto 40 mm	sq m	13.50		
7	Dismantling stone slab flooring laid in cement mortar including stacking serviceable material and disposal of unserviceable material with 50 metres lead.	sq m	12.20		
8	Dismantling doors, windows and clerestory windows (steel or wood) shutter including chowkhats, architrave, holdfasts etc. complete and stacking within 50 metres lead : a. Of area 3 sq. metres and below	each	1.00		
9	Making holes in existing brickwork of size less than 300 X 300 mm for laying of refrigerant pipes, drainage pipes, conduits etc. The item includes making of all holes, repairs to the brickwork and filling up all holes with cement mortar (1:3, 1 cement: 3 coarse sand) or plain cement concrete (1:1:2, 1 cement: 1 coarse sand: 2 graded stone aggregate size 10 mm and below) for completely blocking the balance area of the opening after laying of the conduit / pipes, plastering the filling with cement plaster as per specifications with wire mesh at the joint of the new plaster and old plaster to provide a smooth finish, complete as per directions of engineer-	each	2.00		

	in-charge				
10	Repairs to plaster of thickness 12 mm to 20 mm in patches of area 2.5 sqm and under, including cutting the patch in proper shape, raking out joints and preparing for plastering the wall surface with white cement based polymer modified self curing mortar, including disposal of rubbish, all complete as per the direction of Engineer-In- Charge.	sq m	7.50		
11	Cleaning of surface existing terrazzo tiles or kota stone using approved chemical detergents / cleaners for removing remaining traces of glue / adhesive after removal of carpets and grinding of the existing terrazzo or kota stone flooring for removing all adhesive stains and preparing a smooth surface necessary for fixing vitrified tiles over the existing flooring with chemical adhesive complete as per instructions of engineer-in-charge	sq m	311.13		
12	Disposal of building rubbish / malba / similar unserviceable, dismantled or waste materials by mechanical means, including loading, transporting, unloading to approved municipal dumping ground or as approved by Engineer-in-charge, beyond 50 m initial lead, for all leads including all lifts involved.	cu m	40.00		
	Total for Demolition and Dismantling				
A.II	Civil Work				
1	Providing and laying cement concrete in retaining walls, return walls, walls (any thickness) including attached pilasters, columns, piers, abutments, pillars, posts, struts, buttresses, string or lacing courses, parapets, coping, bed blocks, anchor blocks, plain window sills, fillets, sunken floors, etc., upto floor five level, excluding the cost of centering, shuttering and finishing: a. 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)	cu m	1.20		
2	Steel Work in welded in built-up sections / framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required.	kg	Rate Only		
3	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level up to floor V level in all shapes and sizes in : a. Cement mortar 1:6 (1 cement : 6 coarse sand)	cu m	0.35		
	Total for Civil Work				

A.III Partitions, Woodwork and Related Works					
1	Providing wood work in frames of doors, windows, clerestory windows and other frames, wrought framed and fixed in position with hold fast lugs or with dash fasteners of required dia & length (item includes cost of hold fast lugs or dash fasteners as per requirement). a. Second class teak wood as per approved sample	cu m	0.65		
2	Providing wood work in frames of false ceiling, partitions etc. sawn and fixed in position using with hold fast lugs or with dash fasteners or with mild steel cleats of required dia, thickness & length (item includes cost of hold fast lugs or dash fasteners or mild steel cleats as per requirement): a. Kiln seasoned and chemically treated hollock wood	cu m	0.96		
3	Providing and fixing ISI marked flush door shutters conforming to IS: 2202 (Part I) non-decorative type, core of block board construction with frame of 1st class hard wood and well matched commercial 3 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters: a. 35 mm thick including ISI marked Stainless Steel butt hinges with necessary screws	sq m	11.50		
4	Extra for providing lipping with 2nd class teak wood battens 25 mm minimum depth on all edges of flush door shutters (over all area of door shutter to be measured).	sq m	11.50		
5	Providing and fixing plain lining with necessary screws/nuts & bolts/ nails, including a coat of approved primer on one face wherever the surface is not to be laminated, and fixed on wooden /steel frame work, complete as per direction of Engineer-incharge (Frame work shall be paid for separately). a. 12mm thick commercial ply conforming to IS : 1328 BWR type on one side or both sides of the framework b. 8 mm thick commercial ply conforming to IS:1328 BWR type on one side or both sides of the framework (measurement for both sides will be done seperately)	sq m	47.50		
6	Providing and fixing tempered (toughened) glass panels 10 mm thick in wooden frames (wood work to be paid seperately as per item 1 above). Maximum size of glass panels in either direction will be 2.0 m and item will be measured on the basis of exposed area of the glass sheet (i.e. portion inside rebates will not be measured)	sq m	5.87		

7	Extra for Providing and fixing double glazed tempered glass panels instead of 10 mm thick tempered glass panels (in item 6 above) in wooden frames (wood work to be paid seperately as per item 1 above) of the following specifications: a. 6 mm clear tempered glass - 12 mm Argon gas filing - 6 mm tempered glass (AGC Planibel Clearlite or equivalent) with minimum sound transmittance reduction of 30 dB.	sq m	3.60		
8	Providing and fixing 2nd class teak wood beading for holding in place glazing or plywood panelling within hardwood / teakwood framing as per direction of Engineer-in-charge. a. Size upto 15 X 25 mm b. Size larger than 15 X 25 mm but upto 19 X 50 mm b. Size larger than 19 X 50 mm but upto 25 X 80 mm	m m m	77.00 16.00 16.00		
9	Providing and fixing wooden profile with shape as per drawing to the exposed corners / sides / top edges of hard wood framework and plywood in partitions / panelling with iron screws, plugs and priming coat on unexposed surface etc. complete a. Second class teak wood thickness 18 mm maximum width upto 75 mm with groove 3 X 3 mm on all sides wherever there is a joint between profile and plywood lining of partition.	m	30.00		
10	Providing and fixing chromium plated brass 100 mm mortice latch and cylindrical lock with 6 levers and a pair of lever handles of approved quality with necessary screws etc. complete as per approved sample (Dorset Fabio FB10 or Dorset Eden ED10 or equivalent)	each	5.00		
11	Providing and fixing aluminium extruded section body tubular type universal hydraulic door closer (having brand logo with IS : 3564, embossed on the body, door weight upto 36 kg to 80 kg and door width from 701 mm to 1000 mm), with double speed adjustment with necessary accessories and screws etc. complete.	each	3.00		
12	Providing and fixing aluminium hanging floor door stopper with twin rubber stoppers, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour and shade, with necessary screws etc. complete	each	9.00		

13	<p>Providing and fixing partition upto ceiling height consisting of G.I. frame and required board, including providing and fixing of frame work made of special section power pressed/ roll form G.I. sheet with zinc coating of 120 gms/sqm(both side inclusive), consisting of floor and ceiling channel 50mm wide having equal flanges of 32 mm and 0.50 mm thick, fixed to the floor and ceiling at the spacing of 610 mm centre to centre with dash fastener of 12.5 mm dia meter 50 mm length or suitable anchor fastener or metal screws with nylon plugs and the studs 48 mm wide having one flange of 34 mm and other flange 36 mm and 0.50 mm thick fixed vertically within flanges of floor and ceiling channel and placed at a spacing of 610 mm centre to centre by 6 mm dia bolts and nuts, including fixing of studs along both ends of partition fixed flush to wall with suitable anchor fastener or metal screws with nylon plugs at spacing of 450 mm centre to centre, and fixing of boards to both side of frame work by 25 mm long dry wall screws on studs, floor and ceiling channels at the spacing of 300 mm centre to centre.</p>				
	<p>The boards are to be fixed to the frame work with joints staggered to avoid through cracks, M.S. fixing channel of 99 mm width (0.9 mm thick having two flanges of 9.5 mm each) to be provided at the horizontal joints of two boards, fixed to the studs using metal to metal flat head screws, including jointing and finishing to a flush finish with recommended jointing compound, jointing tape, angle beads at corners (25 mm x 25 mm x 0.5 mm), joint finisher and two coats of primer suitable for board as per manufacture's specification and direction of engineer in charge all complete.</p> <p>a. 66mm overall thickness Partition with 8mm thick double skin Calcium Silicate Board made with Calcareous & Siliceous materials reinforced with cellulose fiber manufactured through autoclaving process with Compressive Strength 225 kg/sq.cm, Bending Strength 100 kg./ sq.cm</p>	sq m	76.00		
14	<p>Deduct for fixing 8 mm thick double skin Calcium Silicate Board on only side of the framing in case the framing is fixed adjacent to wall surface</p>	sq m	17.00		
15	<p>Extra for providing an additional layer of 8 mm thick double skin Calcium Silicate Board on partitions in above item with joints staggered w.r.t joints on the inside layer.</p>	sq m	Rate Only		

16	Providing and Fixing Glass Wool insulation of thickness 35-50 mm using bonded glass fibre of density 32 kg / cu m having fire safety and material properties in accordance BS 2972 and BS 476 inside partitions	sq m	36.00		
17	Providing & Fixing decorative high pressure laminated sheet of plain /wood grain in gloss / matt/ suede finish with high density protective surface layer and reverse side of adhesive bonding quality conforming to IS : 2046 Type S, including cost of adhesive of approved quality on flush doors, partitions and panelling. In case any grooves are necessary in the surface to be laminated due to dimensions of the panel, the same shall be made as per details provided. Laminate used will be 1.5 mm thick suede or matt finish laminate, Merinolam Dutch Koawood, Crescent Acacia or equivalent in wood finish or Merinolam Ink, Dark Citrus or equivalent in solid colours a. 1.5 mm thick	sq m	89.00		
18	Extra for providing white, non-magnetic, dry-erase, writable laminate for markerboard instead of lamination as per item no 17 above	sq m	11.75		
19	Providing and fixing aluminium tray for whiteboard of size 300 mm length, 100 mm width fixed to panelling	each	1.00		
20	Providing and fixing skirting in 12 mm thick strips of teakwood of width 100 mm with butt jointing and screws (frame work and cover fillets) including finishing with french spirit polish or staining etc. complete. Entire skirting will be finished with staining or french spirit polish in semi-matte finish to match approved colour as per directions of engineer-in-charge. The top edge of the skirting strips will be finished in the profile as per detail provided in drawings TA-10.2 .	m	75.00		
21	Providing and fixing panelling strip below table top level for covering voice (telephone) / data / electrical wiring conduits using 165 mm wide strips of 12 mm thick MDF panel board, fixed to wooden framework / spacer made from hardwood framing. The panel will have openings of required size for switchboards and face plates. The hardwood framework / spacers and MDF board will be finished with synthetic enamel paint / staining over necessary coat of primer in approved shades. The item will be executed as per detailed drawing no. T-A-10.2 and will be measured based on length of the skirting in horizontal as well as vertical strips. Cost of hardwood spacers and framework is included in this item.	m	45.00		

22	Providing and fixing pelmet with design as per detailed drawing no. T-A-10.1 with 19 mm thick BWP commercial board and 12 mm thick commercial plywood. The entire pelmet arrangement will be fixed to wall or partition or panelling surface using hardwood framing in hollock wood as per detailed drawings provided. All visible surfaces will be painted with synthetic enamel paint and primer or polished with French Spirit Polish complete as per specifications. The entire item will be paid in running length of pelmet with nothing extra payable (payment for framing will be made seperately under item no 1 or no 2 above) a. Type A (fixed on top of half height partitions as per detailed drawings) b. Type B (fixed on wall panelling as per detailed drawings) c. Type C (fixed under over head cabinets as per detailed drawings, complete with shelf on top)	m	1.80		
		m	3.80		
		m	3.85		
23	Providing and fixing rubber sealing gasket of approved profile along perimeter of all fixed glazing panels.	m	16.00		
24	Providing and fixing 20 mm wide felt lining strips along edges of all door shutters including groove cutting in the door shutter as per requirements	m	20.00		
25	Providing and Fixing PVC door seals at the base of all door shutters including groove cutting in the door shutter as per requirements	m	6.00		
26	Providing and fixing 19 mm thick BWP commercial board directly to plastered wall surface using screws fixed to hardwood plugs anchored to wall using dash fasteners. All visible edges of the board will be covered with 2nd class teak wood edging and the surface will be prepared for application of laminate.	sq m	6.00		
27	Providing and fixing softboard made of 12 mm thick (un-laminated) "softboard" (low density particle board) covered with fabric as per approved sample on front and edges and fixed to existing walls / partitions using rawl plugs / fasteners at 400 mm intervals. The entire panel board will have a perimeter beading in teak wood of size 38 X 25 mm with french spirit polish as per specifications	sq m	9.00		
28	Providing and Fixing manually operated Roller type fabric window blinds in light colour (creme, white, light blue etc, brand MAC, Vista Levolor or equivalent) complete as per approved sample. a. Black out blinds b.Non-black out (translucent) blinds	sq m	7.50		
		sq m	28.00		
	Total for Partitions, Woodwork and Related Works				

A.IV	Flooring Work				
1	Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS: 15622, of approved make, in all colours and shades, laid on 20mm thick cement mortar 1:4 (1 cement : 4 coarse sand), jointing with grey cement slurry @ 3.3kg/sqm including grouting the joints with white cement and matching pigments etc., complete. (Approved tiles: Johnson Tiles Glazed Vitrified Tiles, Matt Finished: Mismo Sand lj Matt Uc, Pietra Grey Up Wh, Earthen Feel Satin Uc, Base price of tiles upto Rs 750 per sq m) a. Size of Tile 600x600 mm	sq m	265.00		
2	Deduct for not using 20 mm thick cement mortar 1:4 (1 cement : 4 coarse sand) bedding in laying of floor tiles and jointing with grey cement slurry @ 3.3kg/sqm	sq m	265.00		
3	Fixing glazed/ Ceramic/ Vitrified floor tiles with cement based high polymer modified quick-set tile adhesive (Water based) conforming to IS: 15477, in average 3mm thickness.	sq m	265.00		
4	Providing and laying Vitrified tiles in different sizes (thickness to be specified by manufacturer), with water absorption less than 0.08 % and conforming to I.S. 15622, of approved make, in all colours & shade, in skirting, riser of steps, over 12 mm thick bed of cement mortar 1:3 (1 cement: 3 coarse sand), jointing with grey cement slurry @ 3.3kg/sqm including grouting the joint with white cement & matching pigments etc. complete. (Base price of tiles Rs 750 per sq m) a. Size of Tile 600x600 mm	sq m	10.90		
	Total for Flooring Work				

A.V	False Ceiling Work				
1	<p>Providing & fixing false ceiling at all height including providing & fixing of framework made of special section, power pressed from M.S. sheets and galvanised with zinc coating of 120 gms/ sqm (both side inclusive) as per IS : 277 and consisting of angle cleat of size 25mm wide x 1.6mm thick with flanges of 27mm and 37mm, at 1200mm c/c, one flange fixed to the ceiling with dash fastener 12.5mm dia x 50mm long with 6mm dia bolts, other flange of cleat fixed to the angle hangers of 25 x10 x0.50mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I chanel 45 x15 x 0.90mm running at the spacing of 1200 mm c/c, to which the ceiling section 0.5mm thick bottom wedge of 80mm with tapered flanges of 26 mm each having lips of 10.5mm, at 450mm c/c, shall be fixed in a direction perpendicular to G.I intermediate channel with connecting clip made out of 2.64mm dia x 230mm long G.I wire at every junction, including fixing perimeter channels 0.50mm thick 27mm high having flanges of 20mm and 30mm long, the perimeter of ceiling fixed to wall/ partitions with the help of Rawl plugs at 450mm centre, with 25mm long dry wall screws @ 230mm interval, including fixing of Calcium Silicate Board to ceiling section and perimeter channels with the help of dry wall screws of size 3.5 x25mm at 230mm c/c, including jointing & finishing to a flush finish of tapered and square edges of the board with recommended jointing compounds, jointing tapes, finishing with jointing compounds in three layers covering up to 150mm on both sides of joints and two coats of primer suitable for boards, all as per manufacture's specification and also including the cost of making opening for light fittings, grills, diffusers, cut outs made with frame of perimeter channels suitably fixed, all complete as per drawings, specificaton and direction of the Engineer in charge but excluding the cost of painting with:</p> <p>Note: False Ceiling will be as per details provided in detail drawings and vertical strips will be measured and counted along with horizontal strips for this items</p> <p>a. 8 mm thick Calcium Silicate Board made with Calcareous & Siliceous materials reinforced with cellulose fiber manufactured through autoclaving process.</p>	sq m	23.00		

2	Repair of old gypsum board false ceiling including shifting of channels / members, repairs and finishing the entire surface complete for application of paint. This item will be executed where there is a modification / cutting in the false ceiling. Nothing extra shall be payable for repair of false ceiling except for painting.	Lump Sum			
	Total for False Ceiling Work				
A.VI	Furniture Work: New Items				
	<i>Important Note: Unless mentioned otherwise, Laminate used will be 1.5 mm thick suede or matt finish laminate, Merinolam Dutch Koawood, Crescent Acacia or equivalent in wood finish or Merinolam Ink, Dark Citrus or equivalent in solid colours</i>				
1	New Work Table (New Tables 1, 2 & 3) as per detailed drawings (without keyboard trays) consisting of work top and one under-counter storage unit (600 mm wide with single shutter) made of 19 mm thick BWP commercial board with 1.5 mm thick laminate finish on all visible surfaces and teakwood edging polished as per specifications to match laminate on all visible edges of commercial board. Total size of table top is 1450 / 1560 length X 550 width and height of top is 762 mm height. Item will be complete including all finishing, hardware, any cuts or notches required for fitting at site etc. a. New Table 1 (length of top 1460 mm, height of top 760 mm) Refer Drg no TA-10.4 b. New Table 2 (length of top 1685 mm, height of top 760 mm) Refer Drg no TA-10.5 c. New Table 3 (length of top 1460 mm, height of top 900 mm) Refer Drg no TA-10.6	each each each	1.00 1.00 1.00		
2	Table for three computer terminals (new Table 4) in library as per detailed drawings size: length of top 2440 X width 610 with height 762 mm (without any storage or keyboard trays) made with 19 mm thick BWP commercial board with 1.5 mm thick laminate finish on all visible surfaces and teakwood edging polished as per specifications to match laminate on all visible edges of commercial board, any cuts or notches required for fitting at site etc. complete with wire managers as per detailed drawing. Refer Drg no TA-10.7	each	1.00		

3	<p>Cupboard without rear panel (but having supporting members as found necessary) made of 19 mm thick BWP commercial board with 1.5 mm thick laminate finish on all visible surfaces and teakwood edging polished as per specifications to match laminate on all visible edges of commercial board for accommodating FHS 6,7,8,9,10. The cupboard will have three (3 nos.) compartments with five (5 nos.) shutters (2+1+2) made of 19 mm thick BWP commercial board or 25 mm thick commercial plywood with laminate finish. Cupboard will have a depth of 400 mm and a maximum height of 2100 mm while shutters will have a height of 2250 mm and will be measured by the frontal surface area of the cupboard unit. Item will be complete including all finishing, hardware like locks, catchers, handles, any cuts or notches required for fitting at site etc. Refer Drg no TA-4.5 for section and TA-4.1 / 4.2 for elevation of cupboard.</p>	sq m	6.20		
4	<p>New Over-head cabinet length 1920 mm X height 600 mm X depth 400 mm as per detailed drawings made of 19 mm thick BWP commercial board with 1.5 mm thick laminate finish on all visible surfaces and teakwood edging polished as per specifications to match laminate on all visible edges of commercial board. The unit will have two shelves closed with shutters made of 19 mm thick BWP commercial board. Item will be complete with all hardware, handles, locks, catchers, any cuts or notches required for fitting at site etc. <i>The size and placement of shutters and finishes will match that of existing furniture unit OH2. This unit will look identical to OH2 after modifications.</i></p>	sq m	1.15		
5	<p>Providing and fixing cupboard made of 19/25 mm thick BWP commercial board with 1.5 mm thick laminate finish on all visible surfaces and teakwood edging polished as per specifications to match laminate on all visible edges of commercial board within niche made out of calcium silicate board partitions, with one (1 nos.) shutter made of 19/25 mm thick BWP commercial board as per detailed drawing Refer Drg no TA-4.2 for section and TA-4.1 for elevation of cupboard. Payment will be made based on frontal area of cupboard space.</p>	sq m	1.25		

6	Table for photocopier / printer as per detailed drawings made of 19 mm thick BWP commercial board with 1.5 mm thick laminate finish on all visible surfaces and teakwood edging polished as per specifications to match laminate on all visible edges of commercial board. Total size of table is 1200 length X 400 width X 380 mm height.	each	2.00		
Total for Furniture Work: New Items					
A.VII	Furniture Work: Repair of Existing Furniture				
	<p>Important Notes:</p> <p>1. All items related to repair of existing furniture are to be understood in conjunction with furniture codes for existing furniture items as marked on plans. It is advised that bidders should quote only after physical examination and careful scrutiny of the existing furniture items.</p> <p>2. Unless mentioned otherwise, Laminate used will be 1.5 mm thick suede or matt finish laminate, Merinolam Dutch Koawood, Crescent Acacia or equivalent in wood finish or Merinolam Ink, Dark Citrus or equivalent in solid colours</p>				
1	Refurbishment of existing table including removal of existing laminate, repolishing with approved shade of french spirit polish with semi-matte finish after cleaning of old surface by removing grease and dirt with turpentine and rubbing with fine sand paper and applying wood filler paste wherever necessary, and re-lamination with 1.5 mm thick laminate of approved shade on all laminate surfaces. Item includes all operations for refurbishment including shifting, transportation of furniture for working and placement at final position a. RT 1	each	1.00		
2	Refurbishment of existing three-piece table including removal of middle piece, removal of mild steel supporting structure and fresh chrome plating of the same, joining of two remaining parts of the table after re-fitting of base structure after chrome plating, removal of laminate, repairs in woodwork and supporting mild steel structure as found necessary, repolishing with approved shade of french spirit polish with semi-matte finish after cleaning of old surface by removing grease and dirt with turpentine and rubbing with fine sand paper and applying wood filler paste wherever necessary, and re-lamination with 1.5 mm thick laminate				

	of approved shade on all laminate surfaces. Item includes all shifting, transportation of furniture for working and placement at final position			
	a. RT 2	each	1.00	
3	<p>Refurbishment of the following existing table and addition of table top extension of side unit by 150 mm including repairs in woodwork as found necessary, repairs / replacement of all locks and handles as per requirement, repolishing of edging with approved shade of french spirit polish with semi-matte finish after cleaning of old surface by removing grease and dirt with turpentine and rubbing with fine sand paper and applying wood filler paste wherever necessary. Any wooden edging in damaged condition will also be replaced as required with teakwood / rubberwood edging of same profile and thickness and finished with french spirit polish as per specifications. Item includes all operations for refurbishment including shifting and transportation of furniture for working and placement at final position, including making any cuts or notches required for fitting at site. The side unit of the table has to be modified to be accommodated on left side of the user, instead of the right side as it exists now. An extension to the top of the side unit, made in 19 mm thick BWP commercial board, has to be fixed with height and width matching the side unit of CWS and independent support from floor or existing table. This new top will also be finished in 1.5 mm thick laminate matching the existing laminate for visible surfaces and french spirit polish with semi-matte finish for internal areas and teakwood / rubberwood edging. All damages to surfaces caused by shifting of side unit and drawer unit will be made good with finishes mentioned above and the work will be carried out as per instructions of Engineer-in-chief / architect.</p> <p>a. CWS</p>	each	1.00	

4	<p>Refurbishment of the following existing workstations, including removal of laminate from top and sides as required, repairs in woodwork as found necessary, repairs / replacement of all locks and handles as per requirement, replacement of drawer slides and shutter hinges as required, repolishing with approved shade of french spirit polish with semi-matte finish after cleaning of old surface by removing grease and dirt with turpentine and rubbing with fine sand paper and applying wood filler paste wherever necessary, and re-lamination with 1.5 mm thick laminate of approved shade. Any wooden edging in damaged condition will also be replaced as required with teakwood edging of same profile and thickness and finished with french spirit polish with semi-matte as per specifications. Internal surfaces will be re-finished with french spirit polish. Item includes all shifting and transportation of furniture for working and placement at final position including making any cuts or notches required for fitting at site.</p> <p>a. WS1 b. WS2 c. WS3 d. WS4</p>	each each each each	1.00 1.00 1.00 1.00		
5	<p>Refurbishment of the following existing workstation, including removal of existing veneer from table top only, repairs in woodwork as found necessary, replacement of drawer slides, repolishing with approved shade of french spirit polish with semi-matte finish after cleaning of old surface by removing grease and dirt with turpentine and rubbing with fine sand paper and applying wood filler paste wherever necessary, and applying new veneer / 1.5 mm laminate of approved shade on top only. Any wooden edging in damaged condition will also be replaced as required with teakwood edging of same profile and thickness and finished with french spirit polish with semi-matte as per specifications. Internal surfaces will be re-finished with french spirit polish. Item includes all shifting and transportation of furniture for working and placement at final position including making any cuts or notches required for fitting at site.</p> <p>a. WS5</p>	each	1.00		

6	<p>Refurbishment of the existing overhead storage units, including cutting to size by reducing length from 2285 mm to 1920 mm from and removal of two shutters as per dimensions provided, removal of laminate from top, sides and shutters as required, repairs in woodwork as found necessary, repairs / replacement of all locks, handles and shutter hinges as per requirement, replacement of shutter hinges, repolishing with approved shade of french spirit polish with semi-matte finish after cleaning of old surface by removing grease and dirt with turpentine and rubbing with fine sand paper on areas with polish, and re-lamination with 1.5 mm thick laminate of approved shade. Any wooden edging in damaged condition will also be replaced as required with teakwood edging of same profile and thickness and finished with french spirit polish with semi-matte as per specifications. Internal surfaces will be re-finished with french spirit polish. Item includes all shifting and transportation of furniture for working and placement and fixing (hanging using dash fasteners on wall surface) at final position including making any cuts or notches required for fitting at site.</p> <p>a. OH 2</p>	each	1.00		
7	<p>Refurbishment of the following existing storage units, including repairs and additions in woodwork as found necessary, repairs / replacement of all shutter hinges, locks and handles as per requirement, replacement / addition of glass panelled wooden shutters with 2nd class teak wood 25 mm thick with glazing with 4.0 mm thick float glass panel, repolishing with approved shade of french spirit polish with semi-matte finish after cleaning of old surface by removing grease and dirt with turpentine and rubbing with fine sand paper on areas with polish. Any wooden edging in damaged condition will also be replaced as required with teakwood edging of same profile and thickness and finished with french spirit polish with semi-matte as per specifications. Item includes all shifting and transportation of furniture for working and placement at final position.</p> <p>a. FHS 1 (with new shutters in 2nd class teak wood frames with glazing and increase in depth of lower portion of storage by 100 mm for accommodating petty cash chest by cutting and removing part of back panel and addition of 8 mm ply back panel.)</p> <p>b. FHS 2 (new shutters not required)</p>	each each	1.00 1.00		

8	<p>Refurbishment of the following existing storage units, including removal of laminate from top, shelves and sides as required, repairs in woodwork as found necessary, repairs / replacement of all shutter hinges, pivot hinges, locks and handles as per requirement, replacement / addition of 4.0 mm thick frameless glass shutters or glass panelled wooden shutters with 2nd class teak wood 25 mm thick with glazing with 4.0 mm thick float glass panel, repolishing with approved shade of french spirit polish with semi-matte finish after cleaning of old surface by removing grease and dirt with turpentine and rubbing with fine sand paper on areas with polish, and re-lamination with 1.5 mm thick laminate of approved shade. Any wooden edging in damaged condition will also be replaced as required with teakwood edging of same profile and thickness and finished with french spirit polish with semi-matte as per specifications. Internal surfaces will be re-finished with french spirit polish. Item includes all shifting and transportation of furniture for working and placement at final position including making any cuts or notches required for fitting at site.</p> <p>e. FHS 4 (with 1 new shutters in 4.0 mm thick frameless glass shutters) f. FHS 5 (new shutters not required)</p>	each each	1.00 1.00		
9	<p>Refurbishment of the following existing open storage units, including removal of existing paint finish from all surfaces, cleaning of old surface by removing grease and dirt with turpentine and rubbing with fine sand paper on all areas, repairs to woodwork as found necessary, repainting with synthetic enamel paint as per approved shade over . Any wooden edging in damaged condition will also be replaced as required with teakwood edging of same profile and thickness and finished with synthetic enamel paint over ready-mixed pink or grey primer. Item includes all shifting and transportation of furniture for working and placement and fixing at final position inside new cupboard.</p> <p>a. FHS 6 b. FHS 7</p>	each each	1.00 1.00		

10	<p>Refurbishment of the following existing open storage units, including removal of laminate from sides and top as required, repairs in woodwork as found necessary, repolishing with approved shade of french spirit polish with semi-matte finish after cleaning of old surface by removing grease and dirt with turpentine and rubbing with fine sand paper on areas with polish, and re-lamination with 1.5 mm thick laminate of approved shade or repainting with synthetic enamel paint as per approved shade. Any wooden edging in damaged condition will also be replaced as required with teakwood edging of same profile and thickness and finished with french spirit polish with semi-matte as per specifications. Item includes all shifting and transportation of furniture for working and placement at final position inside new cupboard</p> <p>a. FHS 8 b. FHS 9 c. FHS 10</p>	each each each	1.00 1.00 1.00		
11	<p>Refurbishment of existing reading carrels (in library) including removal of laminate from sides and top as found required, repairs in woodwork / mild steel base as found necessary, fixing of Surface Mounted LED batten 600 mm long 10 W LED lamp with light switch behind existing front top fascia, repolishing of edging with approved shade of french spirit polish with semi-matte finish after cleaning of old surface by removing grease and dirt with turpentine and rubbing with fine sand paper on areas with polish, and re-lamination with 1.5 mm thick laminate of approved shade and repainting of mild steel base with synthetic enamel paint as per approved shade. Any wooden edging in damaged condition will also be replaced as required with teakwood edging of same profile and thickness and finished with approved shade of french spirit polish with semi-matte finish. Item includes all shifting of location and placement and fixing at final position including making any cuts or notches required for fitting at site.</p> <p>a. CR</p>	each	4.00		

12	Modifications to Librarian's desk including reduction in length of main front unit from total length of 6.0 m (approx) to 2.95 m and disconnection and shifting of side unit to separate location marked in drawing, the entire modification will be as per detailed drawing TA-10.3 and removal of laminate from top and repairs in woodwork as found necessary, repairs / replacement of all locks and handles as per requirement, replacement of drawer slides and shutter hinges as per requirements and repolishing of wooden surfaces with french spirit polish with semi-matte finish after cleaning of old surface by removing grease and dirt with turpentine and rubbing with fine sand paper on areas with polish and applying wood filler paste wherever necessary, and re-lamination of top with 1.5 mm thick laminate of approved shade. Both units created after modifications must be completed in all respects in structural stability and finishing, including making any cuts or notches required for fitting at site.	each	1.00		
13	Modification of existing computer table in Library by reduction of length from 2.95 m (approx.) to 2.44 m and shifting of supports as per requirements. The entire laminate on the top of the table will be removed. Modifications will include repairs in woodwork as found necessary, repolishing with approved shade of french spirit polish with semi-matte finish after cleaning of old surface by removing grease and dirt with turpentine and rubbing with fine sand paper on areas with polish, and re-lamination with 1.5 mm thick laminate of approved shade or repainting with synthetic enamel paint as per approved shade. Any wooden edging in damaged condition will also be replaced as required with teakwood edging of same profile and thickness and finished with french spirit polish with semi-matte as per specifications. Item includes all shifting and transportation of furniture for working and placement at final position including making any cuts or notches required for fitting at site. (CT)	each	1.00		
14	Providing lining with 4 mm thick commercial ply on top of existing tables using adhesive and nails to fix the ply to the table top material below the existing laminate for re-lamination on top.	sq m	16.00		
15	Providing CPU trolley made of black powder coated mild steel sheet with adjustable width and lockable casters 4 nos.	each	8.00		

16	Cleaning and checking for defects, if any, dismantling and / or shifting of all library stacks, periodical racks, cupboards and other pieces of furniture, to new location all complete.	Lump Sum			
Total for Furniture Work: Repair of Existing Furniture					
A.VIII	Finishing Work				
1	15 mm cement plaster on rough side of single or half-brick wall of mix: a. 1:6 (1 cement: 6 fine sand)	sq m	4.00		
2	Punning on walls with plaster of paris to required thickness (thickness of POP = maximum 6mm) to mend flaws, mis-alignment, angles, corners & edges, filling small holes and pits with POP, so as to obtain a smooth finish. Finished surface to be finished completely smooth for application of paint.	sq m	110.00		
3	White washing with lime to give an even shade : a. New work (three or more coats)	sq m	550.00		
4	Preparing existing surface of walls for application of premium acrylic emulsion by first removing old paint, flakes and surface undulations and defects on existing plastered and / or painted surface by rubbing with sandpaper, repairing cracks with chemical repair solution (Dr. Fixit or equivalent) wherever required, then applying 1 mm thick layer of wall putty (Birla White or equivalent) and preparing an absolutely smooth surface using whiting (chalk powder) if required. The item includes all operations and activities necessary for preparation of surface for application of primer and acrylic emulsion paint and nothing extra will be payable over this item for such work	sq m	375.00		
5	Wall painting on new surface and old surface after preparation with premium acrylic emulsion paint of interior grade, having VOC (Volatile Organic Compound) content less than 50 grams/ litre of approved brand and manufacture, including one coat of primer over smooth surface and one coat of premium acrylic emulsion and then applying additional coats wherever required to achieve even shade and colour. This item also includes all the operations required for painting on calcium silicate board partition and false ceiling, however for existing false ceiling and wall surfaces, preparation of base will be carried out as per item no 4 above. Nothing extra will be payable over this item for new work	sq m	620.00		

6	Grinding and Polishing of existing kota stone or terrazzo tiles flooring including all treads and risers of staircases, skirtings and all visible surfaces complete to a smooth mirror finish as per instructions of Engineer-in-Charge	sqm	50.00		
7	Cleaning and refurbishing of all existing windows by cleaning the glass panes, testing all openable shutters for smooth movement and oiling / replacement of defective handles and hinges	L.S.			
8	Applying priming coats with primer of approved brand and manufacture, having low VOC (Volatile Organic Compound) content before application of synthetic enamel. a. With ready mixed pink or Grey primer of approved brand and manufacture on wood work (hard and soft wood) having VOC content less than 50 grams/ litre b. With ready mixed red oxide zinc chromatic on steel / iron works having VOC content less than 250 grams/litre	sq m sq m	35.00 15.00		
9	Painting with synthetic enamel paint, having VOC (Volatile Organic Compound) content less than 150 grams/ litre, of approved brand and manufacture, including applying additional coats wherever required to achieve even shade and colour. a. Two or more coats	sq m	50.00		
10	Spray painting of book racks in approved shade (measured by area of book rack)	sq m	Rate Only		
11	Preparing surface of wood work for polishing with french spirit polish or painting with synthetic enamel paint complete by removal of existing paint or polish finish from all surfaces, cleaning of old surface by removing grease and dirt with turpentine and rubbing with fine sand paper on all areas to remove all surface finishes and coatings as well as surface undulations, applying wood filler paste wherever necessary to obtain smooth surface, etc. all complete for application of primer and synthetic enamel paint or french spirit polish. The item includes all operations and activities necessary for preparation of wood surface for application of primer and acrylic emulsion paint and nothing extra will be payable over this item for such work a. On old work	sq m	80.00		

12	French spirit polishing with semi-matte finish final coat. a. Two or more coats on New work with a layer of wood filler b. Two or more coats on Old Work with surface already prepared as per item no 7 above	sq m	71.00		
	Total for Finishing Work				
B	ELECTRICAL, HVAC AND FIRE DETECTION WORKS				
B.I	HVAC Work				
1	Providing and Fixing 1.0 TR Split Air Conditioning Unit (non-Inverter type) complete with fixing of both indoor and outdoor unit and copper piping for refrigerant and PVC piping for condensate etc. The unit will be of 5-star BEE rating and will be installed along with its own voltage stabilisers which will be included in the cost. Approved models: Carrier Superia 5-star 1.0 Ton non-Inverter model, Daikin FTF35QRV16 Split AC non-Inverter, Hitachi Zunoh 5200f (RAU514AWD) (mild steel frame for supporting of outdoor unit to be paid for separately)	each	2.00		
2	Fabrication and fixing of Mild Steel supporting structure for outdoor unit of split air-conditioning unit at specified location using P.C.C. base as per requirements, and supporting structure made of approved mild steel sections, complete with primer coating and synthetic enamel paint of approved colour.	each	2.00		
	Total for HVAC Work				
B.II	Fire Detection and Fire Fighting Work				
1	Testing of all existing smoke detectors, wiring and fire panel for operation	Lump Sum			
	Total for Fire Detection and Fire Fighting Work				
B.III	Electrical Work				
A.	Point Wiring				
	Important Note Point wiring rates are inclusive of 2X2.5 sq mm PVC insulated stranded copper conductor wires for circuit and 1.5 sq mm insulated earth wire. All wiring shall be FRLS.				
1	Wiring for the following light points with 3X1.5 Sq.mm FRLS PVC insulated stranded copper conductor wires in concealed M.S. conduits in False ceiling/ walls/ ceiling or in surface mounted M.S. conduits laid along grooves in coffers as directed including providing 6 amps flush type switches, 5 sided G.I Boxes for housing switches and				

	earthing complete as required.				
a.	First point controlled by one no. 6 amp switch.	Nos.	27.00		
2	Wiring for the following light points controlled by MCB in DB (Cost of MCB has been taken elsewhere in the tender) with 2 x 2.5 sq. mm FRLS PVC insulated copper conductor wires in concealed M.S. conduits in False ceiling/ walls/ ceiling or in surface mounted M.S. conduits laid along grooves in coffers as directed as called for and earthing complete as required.				
a.	First point controlled by existing MCB in D.B.	Nos.	Rate Only		
3	Same as item No. 1&2 above but LOOP POINT i.e. wiring of point looped from first point with 2 x 1.5 sq. mm FRLS PVC insulated copper conductor wire in concealed/exposed M.S. conduit and earthing	Nos.	54.00		
4	Wiring for 6 amps light plug outlets with 1.5 sq.mm PVC insulated stranded copper conductor wires in M.S. Conduits in ceiling/ walls/ floor as directed including providing 6 amps flush type 5 pin socket and 6 amps switch with cover plate, 5 sided G.I boxes for housing switches, sockets and earthing complete as required. (for raw Power outlets on walls / partitions and workstations)	Nos.	2.00		
5	Wiring for A/C outlet points with 2X4.0 sq mm PVC insulated stranded copper conductor wires in M.S. conduits/ walls/ floor ducts as directed including providing 32 A single phase Crompton reroyale socket and plug top, 32 A SP MCB(motor duty), 2 mm thick M.S. box to house the above duly painted and earthing with 2.5 sq. mm PVC insulated stranded Copper Conductor wires complete as required. This item may be installed in outdoor areas (for providing connection to outdoor unit) or in the indoor areas (for providing connection to indoor unit) as per requirements of the air-conditioner uni to be installed. Nothing extra will be payable for the location of the outlet point.	Nos.	2.00		
6	Fabricating supplying to site of installation, in floor including chase cutting of floor,leveling, refilling and making good the same from 1.6 mm thick and 2 mm thick cover pregalvanised MS CRCA sheet, totally enclosed, height 40 mm.The two lengths of raceways shall be fitted with Collars , 50 mm wide, 3 mm thick , press fit type. The raceways shall be clamped to the floor slab with GI clamps , 3mm thick and shall be				

	screwed to the floor slab. The joint between raceway and junction box will be made with GI flexible strip(3 nos), 3 mm thick, 4 inches long ,15 mm wide which will be nut bolted to the Junction box complete as required etc.			
a.	250 mm (wide) x 40 mm (height)	RM	30.00	
b.	150 mm (wide) x40 mm (height)	RM	10.00	
c.	100 mm (wide) x 40 mm (height)	RM	Rate Only	
7	Fabricating supplying to site of installation, Junction boxes for Floor and Ceiling raceways made from 2 mm thick , with 2.5 mm thick M.S. powder coated cover including providing neoprene gaskets between the cover and the junction box, cadmium plated flat/round head screws, height as per site condition,totally enclosed. Proper cutouts shall be made in the side walls for raceway entry wherever required. The junction box shall be all side walls should be welded except top cover and all side walls shall have suitable size of rectangular knock out holes for taking raceways / conduits as required and not a complete cut out. The top cover should be sealed with M Seal to make it dust and water proof complete as required etc. (variation in height may be considered for quoting as floor thickness may vary)			
a.	350 mm x 350 x 60 mm (height)	Nos.	Rate Only	
b	300 mm x 300 x 60 mm (height)	Nos.	5.00	
c	200 mm x 200 x 60 mm (height)	Nos.	5.00	
d.	150 mm x 150 x 60 mm (height)	Nos.	5.00	
e.	100 mm x 100 x 60 mm (height)	Nos.	4.00	
8	Wiring for UPS outlets with 3 Core 2.5 sq.mm PVC insulated stranded copper flexible cable in suitable size of M.S. Conduits/ Raceway in ceiling/walls/floor as directed including Providing and fixing of 2 Nos. 6 amp flush type 5 pin unisocket and 1 No. 6 amps switch with indicator, cover plate, 5 sided G.I. Boxes for housing switches and sockets and earthing complete as required (for UPS supply outlets: on walls / partitions and workstations)	Nos.	28.00	
9	Wiring for 6 Amps Light Plug Outlets with 3 Core 2.5 sq.mm PVC insulated stranded copper flexible cable in suitable size of M.S. Conduits/ Raceway in ceiling/walls/floor as directed including Providing and fixing of 1 No. 6 amp flush type 5 pin unisocket and 1	Nos.	15.00	

	No.6 amps switch with indicator, cover plate, 5 sided G.I. Boxes for housing switches and sockets and earthing complete as required (for UPS supply outlets: on walls / partitions and workstations)			
10	Wiring for 16 Amp UPS outlets with 3 core 4.0 sq.mm PVC insulated stranded copper Flexible cable in suitable size of M.S. Conduits / Raceway in ceiling/walls/floor as directed including providing and fixing of 1 No.16 amps flush type 6 pin socket and 1 No. 16 amps switch with indicator, cover plate, 5 sided G.I. Boxes for housing switches and sockets and earthing complete as required (for UPS supply outlets)	Nos.	Rate Only	
11	Wiring for 16 Amp Raw power outlets with 4.0 sq.mm PVC insulated stranded copper conductor wires in M.S. Conduits in ceiling/walls/floor as directed including providing and fixing of 1 No.16 amps flush type 6 pin socket and 1 No. 16 amps switch with indicator, cover plate, 5 sided G.I. Boxes for housing switches and sockets and earthing complete as required (for Raw power outlets on Walls / Partitions)	Nos.	15.00	
	Total for Point Wiring			
	B. Conduiting and Wiring for Data and Voice Systems			
1	Providing and fixing in position the following FRLS PVC conduits including all accessories concealed in F. ceiling/wall/ floor as required including M.S. junction or pull boxes with 3mm thick perspex sheet cover plate complete with 1.6 mm dia G.I. pull wires in the length of conduit.			
a	25 mm dia conduit	RM	500.00	
b	32 mm dia conduit	RM	45.00	
2	Providing and fixing in position suitable 1.6 mm thick G.I. outlet box with 3 nos RJ - 45 for Data/ voice outlet including crimping with all fixing accessories as required.	Nos.	3.00	
3	Providing and fixing in position suitable 1.6 mm thick G.I. outlet box with 2 nos RJ - 45 for Data/ voice outlet including crimping with all fixing accessories as required.	Nos.	20.00	
4	Providing and fixing in position suitable 1.6 mm thick G.I. outlet box with 1 nos RJ - 45 for Data/ voice outlet including crimping with all fixing accessories as required.	Nos.	10.00	

5	Supply and Laying including numbering / ferruling of wire (8 digit) and the continuity test for each cable of Cat 6 - Telephone / Data cable in existing G. I. Channel.	RM	1,650.00		
6	Supply and Laying including numbering / ferruling of wire (8 digit) and the continuity test for each cable of Cat 6A for Main connectivirt cables.	RM	90.00		
7	Providing and fixing of Krone Telephone Tag Block following pairs consisting of necessary Back Mount Frame, disconnection modules and grommets complete as required.				
a	20 pair Telephone Tag Block	Nos.	1.00		
8	Supply, drawing and making connections with Telephone Main Junction box and Telephone Outlet Box with annealed tinned copper conductor , PVC insulated and PVC sheathed GI strip armoured / Unarmoured Telecommunication cable in Conduit Pipe from the P & T Junction Box to the Main Telephone junction box including supporting from the roof complete with all accessories as required.				
a.	20 x (2 x 0.61mm) unarmoured Telephone cable.	RM	55.00		
b.	10 x (2 x 0.61mm) unarmoured Telephone cable.	RM	Rate Only		
9	Supply and fixing of Wall mounted data rack with 2 nos 24 Port Jack Panel including Patch Card etc complete as required (Networking switch to be provided by ICGB)	Nos	1.00		
Total for Conduiting and Wiring for Data and Voice Systems					
C	Earthing System				
1	Providing and fixing in position the following bare copper/ GI strips and wires including all fixing accessories and effecting proper connections.				
a.	G.I tape 50 mm x 6 mm	RM	Rate Only		
b.	25 x 3 mm Copper strip	RM	Rate Only		
c.	Copper wire 8 SWG	RM	90.00		
d.	Copper wire 12 SWG	RM	Rate Only		
2	Supplying ,laying, effecting proper connections, testing & commissioning of the following sizes of 1.1 KV unarmoured PVC insulated PVC sheathed copper conductor cables conforming to IS : 1554 Part I - 1976 with latest amendments laid over MS supports in existing RCC ducts/ laid in ground /laid on Cable Trays including clamping the cables to supports in an approved manner as required complete with all accessories.				
a	1 x 70 sq. mm unarmoured PVC insulated PVC Sheathed copper conductor cable (For UPS & Server Earthing)	RM	Rate Only		

b	2 Nos 1 x 16 sq. mm PVC insulated copper conductor wire (Green colour for UPS SDB Earthing)	RM	Rate Only		
c	2 Nos x 10 Sq. mm PVC insulated copper conductor wire (Green Colour for UPS DB Sub-main Earthing)	RM	45.00		
d	1 Nos x 10 Sq. mm PVC insulated copper conductor wire (Green Colour for UPS DB Sub-main Earthing)	RM	Rate Only		
e	1 x 35 Sq. mm PVC insulated copper conductor wire (Green Colour) for server & UPS earthing	RM	Rate Only		
3	Supplying and making terminal joints for the following size of 1.1 KV PVC insulated copper conductor armoured cables including providing heavy duty copper terminal crimping lugs, solder, insulation tape, approved sealing epoxy compound, double compression brass cable glands, effecting gland connections and effecting terminal connections to the equipment complete as required.				
a.	1 x 70 sq. mm unarmoured copper conductor cable joint	Jt	Rate Only		
b.	1 x 35 sq. mm unarmoured copper conductor cable joint	Jt	Rate Only		
4	Providing earthing station at location as called for including providing 600 mm x 600 mm x 3 mm thick tinned copper electrode 2 Nos 25 x 6 mm copper strip up to ground level 20mm dia medium class GI pipe (India Tube Company make or approved equal) CI funnel with 20 gauge GI wire mesh, masonry chamber with concrete base, CI manhole cover with frame (300mm x 300mm) and bitumastic paint and packing the fixture of charcoal and common salt around plate electrode complete as per I.S. (Minimum depth shall be 4.2 M) (for UPS& Server earthing)	Nos.	Rate Only		
Total for Earthing System					
D	Supply and Installation of Lighting Fixtures				
1	Providing and fixing luminaires of the following specifications including all lamps, covers / diffusers, hanging hardware, suspension cables etc. The luminaire samples will be approved by the Engineer-in-Charge and the fixing / suspension / mounting will be carried out as per locations and heights marked on the Lighting Plans provided in the tender and as per the manufacturer's technical specifications and instructions, unless otherwise specified by the Engineer-in-Charge. Nothing extra will be paid for additional height of fixing location of lighting fixtures or additional length of suspension.				

a.	Surface mounted luminaire with 32 W LED lamp with IP 20 rating size 1195 X 147 X 50 mm, CRI >80, lamp colour 4000K, including all suspension cables, rods etc complete. (Philips SmartBrite SM270, model no. SM270C LED 30S 4000 PSU WH or equivalent as approved)	each	50.00		
b.	Surface mounted luminaire with 12W LED lamp with IP 20 rating size 180 X 180 X 26 mm, CRI >80, lamp colour 4000K, including all fixing hardware and accessories etc complete. (Philips Sleek Surface Square shape white colour, model no.SM260C LED12S 4000 PSU WH or equivalent as approved)	each	2.00		
c.	Recess-mounted luminaire with 10.5W LED lamp with IP 20 rating size 190 X 190 mm CRI >80, lamp colour 4000K, including all fixing hardware and accessories etc complete. (Philips Green LED downlighter series Ultima 1000 Square 172 mm white colour, or equivalent as approved)	each	9.00		
d.	Surface Mounted LED batten 1200 X 50 X 30 mm 18 W LED lamp 3000K (Warm White) including fixing with clips etc. all complete. (Philips SlimLine 18 W warm white or equivalent as approved)	each	6.00		
e.	Surface Mounted LED batten 650 X 50 X 30 mm 9 W LED lamp 3000K (Warm White) including fixing with clips etc. all complete. (Philips SlimLine 9 W warm white or equivalent as approved)	each	8.00		
f.	Providing and commissioning 5 W LED Table Lamp of approved sample and colour (Philips 61013 Air 5-Watt LED Desklight Black or White colour or equivalent as approved)	each	3.00		
2	Removal / Dismatling of old light fixtures, wiring, conduits, switches and any other electrical infrastructure to be replaced by new items described above	L.S.			
	Total for Supply and Installation of Lighting Fixtures				
E	Cables, Mains and Submains				
1	Supplying, laying, effecting proper connections, testing & commissioning of the following sizes of 11/1.1 KV armoured /unarmoured PVC insulated PVC sheathed armoured aluminium/copper conductor cables conforming to IS : 1554 Part I - 1976 with latest amendments laid over MS supports in existing RCC ducts/ laid in ground /laid on Cable Trays including clamping the cables to supports in an approved manner as required complete with all accessories.				
a.	4 c x 16 sq.mm XLPE AL. AR CABLE	RM	45.00		
b.	4 c x 16 sq.mm XLPE CU. AR CABLE	RM	45.00		

2	Supplying and making terminal joints for the following size of 1.1 KV PVC insulated copper conductor armoured cables including providing heavy duty copper terminal crimping lugs, solder, insulation tape, approved sealing epoxy compound, double compression brass cable glands, effecting gland connections and effecting terminal connections to the equipment complete as required.			
a	4 c x 16 sq.mm XLPE AL. AR CABLE	Jt	2.00	
b	4 c x 16 sq.mm XLPE CU. AR CABLE	Jt	2.00	
3	Design manufacture , supply and fixing in position the cable trays of the following sizes for supporting 1.1 KV grade armoured/unarmoured aluminium /copper conductor cables. Fabricate the cable trays from perforated 1.6/2mm thick M.S. CRCA sheet duly galvanised with expansion coupler plates duly galvanised, with bolts, washer and nuts. Knock out holes for cable connections as per approved design. The tray should comply with the specification of NEC (National Electric Codes) and NEMA (National Electric Manufacturers Association). The steel should be as per IS:226 and galvanising as per IS :2629/BS 729/ASTM 123. The rate shall also include for supporting steel , fish plates , fixing accessories , nuts bolts, supporting down rods , dash fastener, cutting the RCC etc. complete as required.			
a.	150 mm wide x 40 mm x 1.6 mm thk	RM	40.00	
b	300 mm wide x 40 mm x 2.0 mm thk	RM	Rate Only	
Total for Cables, Mains and Sub-mains				
F	Distribution Boards			
1	Design, manufacture, supplying, installing, testing and commissioning of the following cubical type 2mm thick sheet steel enclosed fully recessed type, TPN Miniature Circuit Breakers Distribution Boards dust proof, vermin proof, with hinged and lockable doors complete with DP MCB Isolators and inter-connection with copper wires, or copper tapes, cable glands/conduit entry bushes, bonding to earth and painting. Also provide separate neutral busbar for each phase. Provide separate Earth Links. Use brass thimbles for connections of all wires.			
a.	Supply and installation of sheet metal enclosed double door 12 way TPN DB, each phase consisting of 12 Nos. 10/20 AMP SP MCB's and controlled by one number 30 mA sensitivity 63 AMPS DP ELCB in each phase backed up with 1 No 63 Amps 4P MCB as a main incomer.	Nos..	1.00	

b.	Supply and installation of sheet metal enclosed double door 8 way TPN DB, each phase consisting of 8 Nos. 10/20 AMP SP MCB's and controlled by one number 30 mA sensitivity 63 AMPS DP ELCB in each phase backed up with 1 No 63 Amps 4P MCB as a main incomer.	Nos..	Rate Only		
c.	Supply and installation of sheet metal enclosed double door 6 way TPN DB, each phase consisting of 6 Nos. 10/20 AMP SP MCB's and controlled by one number 30 mA sensitivity 40 AMPS DP ELCB in each phase backed up with 1 No 40 Amps 4P MCB as a main incomer. For UPS	Nos..	1.00		
Total for Distribution Boards					

