EXTENSION WORK OF POST GRADUATION DEPARTMENT BUILDING AT PUNE CAMPUS

Volume – I

(Conditions of Contact)

Architects Consultant:
M/S. Agora designers Pvt. Ltd.
1249/50 Deccan Gymkhana,
Gokhale Chowk, Pune –411 004
Tel: 020-25539631
E-mail:agora.designers@gmail.com

OWNER:
The Registrar,
SNDT Women's University,
1, NathibaiThackersey Road,
Churchgate, Mumbai 400 020.
Tel:+91-22-22031879,
+91-22-22037524,
E-mail-engineerestate@sndt.ac.in

INDEX

Name of Work: Extension work of Post Graduation Department Building for Shreemati Nathibai Damodar Thackersey Women's University, Pune Campus.

The Registrar
SNDT Women's University

Sign & Seal of Contractor Corrections University Engineer

TENDER NOTICE

Ref No.: Est. RUSA. / (N/P)-1/2018-19/02

Dear Sir,

On behalf of, The Registrar **SNDT WOMEN'S UNIVERSITY** invites fresh **Item Rate** E-tenders for **Extension work of Post Graduation Department Building for Shreemati Nathibai Damodar Thackersey Women's University, Pune Campus.**

Tender forms can be obtained from official web site of http//:sndt.ac.in/tender and https://maharashtra.etenders.in/from 01St September 2018 at 10.30 a.m. onwards.

Pre-bid meeting will be held on 14Th September 2018 at 11.30 a.m. at Campus Office, SNDT Women's University, Erandwane, Pune.

The sealed tenders will be submitted on or before 24th September 2018 up to 17.00 hrs. at Administration Building SNDT Women's University, Nathibai Thackersey Road, Churchgate, Mumbai – 400 020 and opening tender will be held in Churchgate campus on 26th September 2018, 11.00 a.m. onwards. Contractors should remain present at the time of opening. **Any change in the opening time and date same will be communicated to all contractors on E-Tender Portal**. **The employer reserves the right to reject any or all tenders without assigning any reasons thereof.**

E-Tender Schedule is as below:

Seq No	ALLGOM Stage	Vendor Stage	Start Date & Time	Expiry Date & Time
1	Release of tender	-	01.09.2018 10.00	01.09.2018 10.30
2	-	Tender Download	01.09.2018 10.31	19.09.2018 17.00
3	-	Bid Preparation	01.09.2018 10.31	19.09.2018 17.00
4	Superhash Generation & Bid Lock	-	19.09.2018 17.01	21.09.2018 17.00
5	-	Control Transfer of Bid	21.09.2018 17.01	25.09.2018 17.00
6	Envelope 1 Opening	-	26.09.2018 11.00	26.09.2018 17.30
7	Envelope 2 Opening	-	26.09.2018 11.00	26.09.2018 17.30

Sd/
The Registrar
SNDT Women's University
1, NathibaiThackersey Road,
Churchgate Campus.

Sign & Seal of Contractor **Corrections** **University Engineer**

1. DETAIL TENDER NOTICE

1.1 Sealed **Item Rate** tenders are invited from qualified Contractors for the work as per the following details:

1.1.1	**Name and Location of Work**	Extension work of Post Graduation Department Building for Shreemati Nathibai Damodar Thackersey Women's University, Pune Campus.
1.1.2	**Estimated Cost of Tender**	**Rs. 4, 41, 77,295.22/- (Rs. Four Crore Fourty One Lakh Seventy Seven Thousand Two Hundred Ninety Five and Twenty Two Paisa Only.)**
1.1.3	**Cost of Tender**	RS. 2,360 /-(Rs. Two Thousand Three Hundred Sixty including GST Only) (Non refundable) in favour of The Registrar, SNDT Women's University payable at Mumbai drawn on Nationalized Bank only
1.1.4	**Scope of Work**	All Interior and Furniture works
1.1.5	**Date of Commencement**	Date of Work Order
1.1.6	**Time of Completion**	09 months (Nine Months including Monsoon) from the date of Work Order
1.1.7	**Date and Place of Submission of Tender**	On E Tender Portal as per give time Schedule and Hard copy on or before 24Th September 2018 upto 17.00 a.m. at Administration Building SNDT Women's University, Nathibai Thakersey Road, Churchgate, Mumbai – 400 020
1.1.8	**Time of Opening**	25Th September 2018 at 11.00 a.m onwards SNDT Women's University, Nathibai Thakersey Road, Churchgate, Mumbai – 400 020.
1.1.9	**Earnest Money**	**Rs. 2, 21,000/- (Rs. Two Lakh Twenty One Thousand only)** to be paid through Online Payment Modes i.e. Net Banking, Debit Card, Credit Card and NEFT/RTGS during Bid Preparation Stage.
1.1.10	**Total Security Deposit**	a) Total 2% of value of work (inclusive of all Taxes) b) 2% of which 50% to be paid at the time of agreement and 50% to be deducted from RA Bills.
1.1.11	**Refund of security deposit**	a) 50% of security deposit to be refunded after issue of certificate. Virtual completion. b) Balance 50% of security deposited to be refunded. After expiry of defects liability period of 12 months and its proper discharge.
1.1.12	**Additional Performance Security (Refer general condition no. 33, Page .41)**	Addition performance security in the form of DD/FDR/BG of any nationalize/Scheduled bank only should be enclosed in Envelop no. 2 (as applicable).
1.1.13	**Retention Money**	The proportion of payments retained shall be 6% from each R.A. bill subject to a maximum of 5% of final contract price.
1.1.14	**Defects Liability Period**	**12 months from date of Virtual Completion.**
1.1.15	**Liquidated Damage**	(1/2000) th of the initial contract price rounded off to the nearest thousand per day.

Note: Contractor should quote the rate by considering Goods and Service Tax (GST)

1.2 In the event of the tender being submitting by a firm, it must be signed by each proprietor/partner thereof, and in the event of the absence of any partner, it shall be signed on his behalf by a person holding a Power of Attorney authorizing him to do so.

1.3 Earnest Money

1.3.1 **Earnest money deposit shall be treated as a token of the tenderer earnestness to carry out the work Rs. 2, 21,000/- (Rs. Two Lakh Twenty One Thousand only)** to be paid through Online Payment Modes i.e. Net Banking, Debit Card, Credit Card and NEFT/RTGS during Bid Preparation Stage.

1.3.2 In the event of his tender being accepted, subject to the provisions of sub clause (1.5) below, the said amount of Earnest Money shall be appropriated towards the amount of Security Deposit payable by him under the General Conditions of Contract or refunded if the total security deposit is furnished.

1.3.3 After submitting the tender the Contractor withdraws his offer or modifies the same, or after acceptance of his tender the Contractor fails or neglects to furnish the balance of Security Deposit, then, without prejudice to another rights and powers of the Owner hereunder, or in Law, the Owner shall be entitled to forfeit the full amount of Earnest Money deposited by him.

1.3.4 In the event of his tender not being accepted, the amount of Earnest Money deposited by the Contractor shall, unless it is forfeited under the provisions of sub-clause (1.3.2) above, be refunded to him on his passing receipt thereof.

1.4 Receipts for payments made on account of any work when executed by a firm, should also be signed by all the partners except where the Contractors are described in their tender as a firm in which case the receipts shall be signed in the name of the firm by one of the partners or by some other person having authority to give effectual receipts for the firm.

1.5 Tender which proposes, any alteration in the works specified in the said form of invitation of tender or in the time allowed for carrying out the work or which contains any other conditions of any sort is liable to rejection.

1.6 The tenders shall be opened in the presence of Contractors who have submitted tenders or their representatives who may be present at that time. In the event of a tender being accepted, the Contractor shall be present for the purpose of identification, sign copies of the specifications and other documents and the agreement. In the event of the tender being rejected, the Owner shall refund the amount of Earnest Money deposit to the unsuccessful Contractors on their letter of demand for refund EMD.

1.7 The Owner reserves the right of rejecting all or any of the tenders without assigning any reason and is not bound to accept the lowest or any other tender.

1.8 No receipt for any payment alleged to have been made by a Contractor in regard to any matter relating to this tender shall be valid and binding on the Owner unless it is signed by the Architect/ Owners Authorized representative.

1.9 Tenders submitted without payment of Earnest Money Deposit will not be opened or accepted.

1.10 Drawings can be inspected in the office of the Architect **M/S. Agora designers Pvt. Ltd.** during working hours.

1.11 In case of any difference in the rates quoted in words and figures that given in words shall prevail.

1.12 The offer of the tenderer shall remain open for a period **of 120 days from date of submission**. During the period no tenderer will be allowed to withdraw his tender.

1.13 The tender documents shall be submitted in a sealed inner cover and a sealed outer cover with the envelope, containing the Earnest Money placed in between. All the envelopes/covers shall be addressed to the '**The Registrar, SNDT Women's University**', Churchgate, Mumbai with the name of the Contractor given in the bottom left hand corner and super scribed Tender for PG Extension work. The top most cover will be opened first. The cover containing the tender documents will only be opened if it is found that the Earnest Money submitted by the tenderers is in the appropriate form.

1.14 This is a Item rate tender.

1.15a Tenderer shall submit Rate Analysis of Civil Work items along with bid document at the time of submission.

1.15 Under circumstances Contractor is entitled to claim enhanced rates for items in this contract in during the execution.

1.16 All corrections and additions or pasted slips shall be initiated.

1.17 Tenderer should submit last 3 years audited financial statement duly signed by chartered Accountant.

1.18 No foreign exchange would be released by the Owner for purpose of construction materials, plants and machinery required for the execution of work contracted for.

1.19 The tenders are requested to submit to the Architects in writing (electronically or other way) before **01ST September 2018** (asking for any clarification or any variations or modifications that they would like to be made in the tender documents. Thereafter a pre-tender meeting will be held in Pune campus; at this meeting all issues raised by the tenderer will be discussed. Thereafter an amendment will be issued stating clearly as to the final modifications of the conditions which are acceptable to the Owner. This amendment will form part of the contract and the tenderer will be required to quote accordingly. Any other conditions given by the tenderer except those accepted in pursuance of the pretender meeting, will make the tender liable for rejection.

1.20 Sign & Seal of Contractor

Every page of the tender document shall have the seal of the Contractor and initialed, and full signature where specifically indicated.

1.21 No loss/ compensation / damages shall be payable by the Employer / Owner to the Contractor / anyone if the work stopped by the order of any judicial / Higher Administrative authority.

1.22 STUDY OF TENDER DOCUMENTS:

1.22.1 Upon submission of the Tender, it will be presumed that the Contractor has thoroughly studied the Tender document with all the terms, conditions, specifications, mode of measurements and drawings and has completely understood the nature, extent and scope of the work and is completely aware of his liabilities and responsibilities in respect of the contracted work.

1.22.2 In the event of any contradictions or inadequate clarity in this Tender document, these should be brought to the notice of the University/ Architects BEFORE quoting, and got properly clarified. In any case, at all times, the interpretation and decision of University / Architects shall be final and binding on the Contractor.

1.22.3 For the purpose of this Tender and subsequent construction Contract, any reference to the "The Registrar, SNDT Women's University" shall be the duly authorized representative spokesman for the Board of Governors and the Building Committee of the project, with absolute final authority.

1.23 VISITS TO SITE OF WORK

The Contractor is expected to visit the site of work and personally see the site conditions regarding water, labour conditions, leads, lifts, soil conditions and strata and all other factors affecting the work before submitting the quotation. Leads, lifts and permissibility for disposal of excavated material shall also be studied and considered in the quotations. **No extras or escalation** shall be granted on account of any error of judgment or miscalculation or misunderstanding of scope of the work.

1.24 UN CONDITIONAL QUOTATION

Submitted Tenders shall NOT be subject to ANY conditions other than those stipulated in the Tender Document. Quoted rates and amounts shall be deemed to be completely unconditional and any conditional Tenders are liable to be rejected outright. Contractors are requested to abide by this instruction, in their own interest, for the purpose of enabling comparison between equals with complete parity. If any, observation, assumptions, suggestions are not required to be communicated; these may be separately addressed to the University without having any bearing or impact on the Item rate quotation in the sealed Tender, in the process of evaluation.

1.25 ONE BID FOR BIDDER ONE WORK:

Each bidder shall submit only one bid for one work. A bidder who submits or participates in more than one Bid (other than as a subcontractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the Bidder's participation to be disqualified.

1.26 LANGUAGE OF THE BID:

All documents relating to the bid shall be in the English language.

1.27 CORRIGENDUM OF BIDING DOCUMENT:

Before the deadline for submission of the bid the University may modified the bidding document by issuing corrigendum on portal. Bidder should read all the corrigendum before quoting the rates. University will not entertain any objection during tender opening or later stage of tendering process.

1.28 CURRENCY:

Currency used in contract and for billing is **Indian Rupees** only.

2.1 TENDER IS TO BE SUBMITTED IN TWO SEPARATE SEALED ENVELOPES AS BELOW:

ENVELOPE NO. 1:

The first envelope clearly marked as "ENVELOPE NO. 1" shall contain the following documents.

I. Information regarding Income Tax Circle/Ward/District in which he is assessed for income tax valid and up to-date. Income Tax Clearance Certificate (in original) from the Income Tax Officer, or true copy thereof duly attested.
II. GST and PAN number.
III. List and details of other works tendered for in hand with the value of work unfinished on the last date of submission and the List of executed/completed projects. The names of Clients, awarded value of works etc.
IV. Names of Owner/Partners/Director of the Firm/Company and their addresses.
V. List of Machinery and Plants immediately available with the Tenderer for use on this work and list of machinery proposed to be utilized on this work but not immediately available and the manner in which it is proposed to be procured.
VI. Forwarding letter along with list of documents, forms, statements, specifications, etc.
VII. Document required for prequalification for bidding as mentioned in detail in chapter no. 4
VIII. Conditional tenders are liable to be summarily rejected.

2.3 ENVELOPE NO. 2: TENDER

The second envelope clearly marked as "ENVELOPE NO. 2' shall contain only the main tender, including the common set of conditions/stipulations, if any issued by the SNDT University and performance security as per clause 1.1.12 of Detail tender notice and in mentioned form thereof. Tenderer should quote his offer in Schedule 'B' (i.e. Volume-II) of the tender on **Item above or below Estimated Cost** to be submitted only in Envelope no. 2. He should not quote this offer anywhere directly or indirectly in Envelope no. 1.The Contractor shall quote for the work as per details given in the main tender and also based on the detailed set of conditions issued if any, and/or any additional stipulations made by The SNDT Women's University.

2.4 **SUBMISSION OF TENDER**

The two sealed Envelopes no. 1 and 2 shall be again put together in one common cover and sealed. This sealed cover shall be marked on the left-hand top corner as Tender for **"Extension work of Post Graduation Department Building for Shreemati Nathibai Damodar Thackersey Women's University, Pune Campus.",** the full name and address of the tenderer and the name of the authorized Supervisor delivering the sealed cover containing the tender shall be **Extension work of Post Graduation Department Building for Shreemati Nathibai Damodar Thackersey Women's University, Pune Campus.**

Tender shall be submitted to Owners Office as per Detailed Tender Notice 1.1.7

1.22.6 PERIOD OF DECISION

The Tenders shall remain open for acceptance for a period of 120 days from the date on which they are due for submission, or any other extended date for their receipt, and during this period NO Contractor shall be allowed to withdraw his tender.

1.22.7 IMPROPER AND INCOMPLETE TENDERS

i) Quotations shall be tendered on Item Rate Basis in the annexed Schedule of Item Quantities. Please read the PREAMBLES prior to the item descriptions and specifications carefully before quoting the rates. Specific Brands of materials have been prescribed in some items, while acceptable options of Brand specifications have been listed in Chapter 16 in the Tender.

ii) The quotations in the Tender shall be written clearly and shall be free from erasures, over-writing or conversions of figures. Corrections, where unavoidable, shall be made by crossing out, initialing and rewriting.

iii) Tenders received without Tender fee and EMD online payment receipt attached to the Envelope will NOT be accepted. Tenders received with any terms and conditions in variation with those stipulated in the Tender document shall NOT be considered.

1.22.8 ATTESTATION OF TENDER DOCUMENTS:

Contractors must RETURN the Tender Documents complete with the specifications, schedule of quantities, and drawings, with the Item rates, and total amounts in figures and words, and every page duly signed. Seal and Signature of the Contractor should also be placed below the summary at the end of the Schedule of quantities. Any tender not bearing signature of the Contractor on all documents accompanying the Tender is liable to be rejected.

ORIGINAL AGREEMENT NO .B-1/.....

NAME OF WORK : **Extension work of Post Graduation Department Building for Shreemati Nathibai Damodar Thackersey Women's University, Pune Campus.**

1)	Name of Contractor	:	_____
2)	No. & Date of Work Order	:	_____
3)	Amount put to Tender	:	**Rs.**
4)	Rate quoted	:	_____
5)	Amount of Contract	:	_____
6)	Date of commencement	:	_____
7)	Time stipulated for completion of work from the date of written order to start work, which will include the monsoon period.	:	
8)	Date of completion as per agreement	:	_____
9)	Actual Date of Completion	:	_____
10)	Reference to sanction of Extension of time	:	1) 2) 3)

Certified that this original Agreement contains

Pages from to

Fly Leaves _____ Nos.

Drawings _____ Nos.

Sign & Seal of Contractor **Corrections** **University Engineer**

ACKNOWLEDGEMENT BY TENDERER

To,

The Registrar, (hereinafter referred to as the Owner).
SNDT Women's University,
1, Nathibai Thackersey Road,
New Marine Lines, Churchgate,
Mumbai 400 020

Dear Sir / Madam,

I / We have visited the site, got all the information of site conditions and information regarding execution of contract, facilities available at site / offered by the University, read and examined all documents relating to the proposed work

a. Notice inviting tender
b. Prequalification form
c. Articles of Agreement
d. General Conditions of Contract
e. Special Conditions of Contract
f. General Specifications of Work
g. Schedule of Quantities

I / We hereby tender for execution of the works referred to the in the aforesaid documents upon the terms and conditions contained or referred to therein and in accordance in all respects with the specifications, designs, drawings and other relevant details at the rate contained in the SCHEDULE OF QUANTITIES and within the period (s) of completion as stipulated in APPENDIX 'A' of the Special conditions of contract.

In consideration of I / we being invited to tender, I / we agree to keep the tender open for acceptance for 120 days from the due date of submission thereof and not to make any modification in its terms and conditions which are not acceptable to the Owner.

Online payment of **Rs. 2, 21,000/- (Rs. Two Lakh Twenty One Thousand only)** be done as describing E-tender notice. If I / we fail to keep the tender open as aforesaid or make any modification in the terms and conditions of the tender which are not acceptable to the Owner, I / we agree that the Owner shall, without prejudice to any other right or remedy, be at liberty to forfeit the amount of the above said earnest money absolutely. Should this tender be accepted, I / we agree to abide by and fulfill all the terms, conditions and provisions of the aforesaid documents.

If, after the tender is accepted, I / we fail to commence the execution of the works, as provided in the Special Conditions of Contract / we agree that the Owner shall, without prejudice to any other right or remedy, be at liberty to forfeit the above said earnest money absolutely.

I / we agree that should the Owner decide to forfeit earnest money as aforesaid, unless a sum equal to the earnest money sanctioned above is paid by us forthwith, the Owner may, at its option, recover it out of the deposit and in the event of deficiency, out of any other money due to me/us otherwise.

DULY AUTHORIZED TO SIGN THE TENDER:

(ON BEHALF OF THE CONTRACTOR)

ADDRESS : _____

_____

_____

_____

DATE : _____

PHONE NUMBER : _____

EMAIL ADDRESS : _____

WITNESS : _____

SIGNATURE IN THE CAPACITY OF : _____

ADDRESS : _____

_____

_____

_____

DATE : _____

PRE-QUALIFICATION OF TENDERERS

Pre-Qualification of the Contractors for the Work of: Extension work of Post Graduation Department Building for Shreemati Nathibai Damodar Thackersey Women's University, Pune Campus.

1. The Registrar, on behalf of the Vice Chancellor, SNDT Women's University, invited eligibility documents from firms/contractors of repute for Pre-qualification of the contractor for issue of tender for the following:

Sr. No.	Name of Work	Estimated Cost	Period of Completion
(1)	(2)	(3)	(4)
1.	**Extension work of Post Graduation Department Building for Shreemati Nathibai Damodar Thackersey Women's University, Pune Campus.**	**Rs. 4,41,77,295.22/-**	**09 months**

2. Application supported by prescribed annexure along with supporting documents in physical form, shall be placed in sealed envelopes marked **"Pre-qualification Eligibility Documents"** and shall be submitted as described in Detail Tender notice.

3. Final Decision Making Authority
SNDT Women's University reserves the right to accept or reject any bid and to annul the process and reject all bids at any time, without assigning any reason or incurring any liability to the parties.

4. General:

4.1. All information called for in the enclosed forms should be furnished against the relevant columns in the forms. If for any reason, information is furnished on a separate sheet, this fact should be mentioned against the relevant column. Even if no information is to be provided in a column, a "nil" or "no such case" entry should be made in that column. If any particulars/query is not applicable in case of the party, it should be stated as "not applicable" or "N.A.". The parties are cautioned that not giving true and complete information called for in the application forms or not giving it in clear terms or making any change in the prescribed forms or deliberately suppressing the information shall result in the summarily disqualifying the party. Pre-qualification documents received late will not be entertained.

4.2. Overwriting should be avoided. Correction, if any, should be made by neatly crossing out, initialing, dating and rewriting. Pages of the eligibility criteria document shall be numbered. Additional sheets, if any added by the party, shall also be numbered. All the documents shall be sealed and signed by the party. They shall be submitted as a package with signed letter of transmittal.

4.3. References, information and certificates from the respective clients certifying suitability, technical knowledge or capability of the party shall be submitted along with the tender documents.

4.4. The party may furnish any additional information which he thinks is necessary to establish his capabilities to successfully complete the envisaged work. It is, however, advised not to furnish superfluous information. No information shall be entertained after submission of eligibility criteria document unless it is called for by the SNDT Women's University.

4.5. Any information furnished by the party found to be incorrect either immediately or at a later date, would render him liable to be debarred from tendering/taking up of work in SNDT Women's University. If such party happens to be enlisted contractor in SNDT Women's University, it shall also be removed from the approved list of contractors.

5. Criteria for eligibility:

Contractors who fulfill the following requirements shall be eligible for pre-qualification.

5.1. Should have satisfactorily completed the works as mentioned below during the last 5 years ending 31St March 2018

5.1.1. Average Annual turnover during the last 3 years, ending 31st March of the previous financial year, should be at least 30% of the estimated cost or more.

5.1.2. Experience of having successfully completed similar works during last 7 years ending last day of month previous to the one in which applications are invited should be either of the following:

a) Three similar completed works costing not less than the amount equal to 40% of the estimated cost

OR

b) Two similar completed works costing not less than the amount equal to 50% of the estimated cost

OR

c) One similar completed work costing not less than the amount equal to 80% of the estimated cost.

5.1.3. Definition of "similar work" should be clearly defined.

5.2. Should not have incurred any loss in more than two (2) years during the last 3 years ending 31st March 2018. This should be duly audited by a Chartered Accountant.

5.3. Should have a solvency of 4.25 crore which should be certified by the bank.

5.4. Should have own constructions equipment as per list required for the proper and timely execution of the work. Else, he should certify that he would be able to manage the equipment by hiring etc., and submit the list of firms from whom he proposes to hire.

5.5. Should have sufficient number of Technical and Administrative employees for the proper execution of the contract. The party should submit a list of these employees stating clearly how these would be involved in this work.

5.6. Financial information

5.6.1. Party should furnish the Annual financial statement for the last three (3) years.

5.6.2. Party should furnish solvency certificate in Form "B".

5.7. Experience in works highlighting experience in similar works

5.7.1. Party should furnish list of all works of similar nature successfully completed during the last Five years in Form "C".

5.7.2. Party should furnish list of the projects under execution or awarded in Form "D".

5.7.3. Particulars of completed works and performance of the party duly authenticated/certified by an officer not below the rank of University Engineer or equivalent should be furnished separately for each work completed or in progress in Form "E".

6. Selection criteria

6.1. SNDT Women's University reserves the right, without being liable for any damages or obligation to inform the party to reject any or all the applications without assigning any reason.

6.2. Any effort on the part of the party or his Supervisor to exercise influence or to pressurize the SNDT Women's University would result in rejection of his application. Canvassing of any kind is prohibited.

6.3. The party should disclose details of arbitration / litigation cases, if any, is pending or in progress. Hiding of such information would result in summarily rejection of his bid without assigning any reason.

Form B	
Form of Bankers' Certificate from a Nationalized/Scheduled Bank for Certifying the Solvency of the Party	
	This is to certify that to the best of our knowledge and information that M/s……having marginally noted address, a customer of our bank are/is respectable and can be treated as good for any engagement upto a limit of
	` ……
	Rupees ……
	This certificate is issued without any guarantee or responsibility on the bank or any of the officers.
Date:	(Signature)
	Authorized Bank Representative
Notes:	
1	Banker's certificates should be on letter head of the Bank.
2	In case of partnership firm, certificate should include names of all partners as recorded with the Bank.

Form C

Details of All Similar Works Completed During the Last Five (5) Years Ending 31ST March 2018

S. No.	Name of work and location	Owner / Client	Cost of work in Lakhs of Rupees	Date of commencement as per contract	Stipulated date of completion	Actual date of completion	Litigation / arbitration cases pending / in progress with details	Name, address & phone number of contactable reference	Remarks
1	2	3	4	5	6	7	8	9	10

Sign & Seal of Contractor **Corrections** **University Engineer**

Form D

Projects Under Execution or Awarded

S. No.	Name of work and location	Owner / Client	Cost of work in Lacs of Rupees	Date of commencement as per contract	Stipulated date of completion	Up to date Item of work complete	Slow progress if any and reasons thereof	Name, address & phone number of contactable reference	Remarks
1	2	3	4	5	6	7	8	9	10

Sign & Seal of Contractor **Corrections** **University Engineer**

Form E		
Performance Report of Works Referred to in Form C & Form D		
1	Name of the work / project location	:
2	Agreement No.	:
3	Estimated Cost	:
4	Tendered Cost	:
5	Date of Start of Work	:
6	Date of Completion of Work	:
i	Stipulated Date od Completion	:
ii	Actual Date of Completion	:
7	Amount of compensation levied for delayed completion, if any	:
8	Amount of reduced rate items, if any	:
9	Performance Report	:
i	Quality of Work	: Very Good / Good / Fair / Poor
ii	Financial Soundness	: Very Good / Good / Fair / Poor
iii	Technical Proficiency	: Very Good / Good / Fair / Poor
iv	Resourcefulness	: Very Good / Good / Fair / Poor
v	General Behaviour	: Very Good / Good / Fair / Poor
	Date:	(Signature)
		Authorized Client's Representative

ARTICLES OF AGREEMENT

Agreement made at Mumbai this _____ day of 2018 BETWEEN "The Registrar, SNDT Women's University, Mumbai" (hereinafter referred to as the Owner which expression shall include it **successors and assigns**) of the one part, AND, M/s _____ (hereinafter referred to as the Contractor which expression shall include his heirs, Executors, Administrators & Assigns) of the other part.

WHEREAS the Owner is desirous of **E-TENDER FOR EXTENSION WORK OF POST GRADUATION DEPARTMENT BUILDING FOR SHREEMATI NATHIBAI DAMODAR THACKERSEY WOMEN'S UNIVERSITY, PUNE CAMPUS.**

NET TOTAL COST: Rs. _____

(In words Rs. _____ AND WHEREAS the Contractor has deposited as Security Deposit a sum of Rs. _____ (Rs._____) with the owner for the due performance of this agreement **as per clause no. 1.1.10** of detail tender notice.

NOW IT IS HEREBY AGREED AS FOLLOWS:

1) In consideration of the payments to be made to the contractor as hereinafter provided, he shall upon and subject to the said conditions execute and complete the works shown upon the said drawings and such further detailed drawings as may be furnished to him by the University and described in the said specifications and the said priced schedule of quantities.

2) The Owner shall pay the contractor such sums as shall become payable hereunder at the times and in the manner specified in the said conditions.

3) The drawings, specifications, and priced schedule of quantities above mentioned shall form the basis of this contract and the decision of the Engineers for the time being as mentioned in the conditions of contract in reference to all matters of dispute as to the material, workmanship or account and as to the intended interpretation of clauses of this agreement or any other document attached hereto shall be final and binding on both parties and may be made a Rule of Court.

4) The said contract comprises the constructions above mentioned and all subsidiary works connected therewith within the said site as may be ordered to be done from time to time by the said University for the time being even though such works may not be shown on the drawings of described in the said specifications or the priced schedule of quantities.

5) The Owner reserves to himself the right of altering the drawings and nature of the work and adding to or omitting any items of the work or of having portions of the same carried out departmentally or otherwise and such alterations or variations shall be carried out without prejudice to this contract.

6) The said conditions and appendix thereto shall be read and continued as forming part of this agreement and the parties hereto will respectively abide by and submit themselves

to the conditions and stipulations and perform the agreement on their parts respectively in such conditions contained.

7) All disputes arising out of or any connected with this agreement shall be deemed to have arisen in Pune and only the Hon'ble Court in Pune shall have jurisdiction to determine the same.

8) The several parts of this contract have been read to us and fully understood by us.

As witness our hands this _____ day of 2018.

SIGNED BY THE SAID **OWNER**

IN THE PRESENCE OF

1.

2.

SIGNED BY THE SAID **CONTRACTOR**

IN THE PRESENCE OF

1.

2.

GENERAL CONDITIONS OF CONTRACT

1. **COMPETANCY OF TENDER** :

The work will be awarded only to those contractors who are considered to be substantially responsive bidders, capable of performing the class of work to be completed. Before passing the final award any or all bidders may have to show that they have the necessary experience, facilities, ability and financial resources to execute the work in satisfactory manner and also within the stipulated time.

2. **PAYMENTS** :

The tenderer must understand clearly that the rates quoted are for completed work and include all costs due to labour, all leads and lifts involved and if further necessitated, scaffolding plant, supervision, service works, power, royalties, octroi taxes etc. and to include all to cover the cost of lighting on night work if any and round the clock work as and when required and no claim for additional payment beyond the prices or rates quoted will be entertained and the tenderer shall not be entitled subsequently to make any claim on the ground of any representation or on any promise by any person (whether member in the employment of any University Department or not) or on the ground of any failure on his part to obtain all necessary information for the purpose of making his tender and fixing the several prices and rates therein relieve him from any risks or liabilities arising out of the tender.

(a) **RUNNING BILLS :**

Two payments in a month will be granted by the University Engineer if the progress is satisfactory. Contractor should submit bills to the University Engineer in appropriate forms.

(b) **FINAL BILLS:**

The contractor should submit final bill within one month after completion of the work and the bill will be paid within 5 months if it is in order. Disputed item and claims if any shall be excluded from the final bill and settled seperately leter on.

3. **ERASER** :

Persons tendering are informed that no erasers of any alterations by them in the text of the documents set herewith will be allowed and any such eraser or an alteration will be disregarded. If there is any error in writing, no overwriting should be done but the wrong words or figures should be struck out and the correct one written above or near it in an unambiguous way. Such correction should be initialed and dated. Only Tender submitted on portal will be considered admissible and no claim shall be entertained on correction made on hard copy.

4. **ACCEPTANCE** :

Intimation of acceptance of tender will be given by a telegram or on phone or a letter sent by Registered Post to the address given below the signature of the tenderer in the tenders. The tenders which do not fulfill any of the above conditions or those in the form and which are incomplete in any respect shall be liable for rejection.

5. PRECAUTIONS TO BE TAKEN BY THE CONTRACTOR TO PREVENT ACCIDENT :

i) No live electric lines should be allowed to run along the ground in the blasting zone and they should be at least about 10 ft. above ground if not more.

ii) The wiring cable should not be taken near the live electric line and it should be preferably shot firing cable as supplied by the supplier of explosives. If such a cable is not available a substitute cable recommended by the explosive suppliers should only be used. Under no circumstances should cable made up of several pieces jointed and tapped be used.

iii) The blasting shed from where the exploder is to finally operated should be at least 150 metre away from the area to be blasted. It should have a strong roof which can with stand the impact of flying stones at this range.

iv) Only trained hands should be allowed to handle explosives, cable detonators etc.

6.1 CONTRACTOR TO INFORM HIMSELF FULLY :

The contractors shall be deemed to have carefully examined the work and site conditions including labour, the general and special conditions, the specifications, schedules and drawings and shall be deemed to have visited the site of the work and to have fully informed himself regarding the local conditions and carried out his own investigations to arrive at the rates quoted in the tender. In this regard, he will be given necessary information to the best of the knowledge of Department but without any guarantee about it.

If he shall have any doubt as to the meaning of any portion of these general conditions or the special condition, to the scope of working of the specifications and drawings or any other matter concerning the contract, he shall in good time, before submitting his tender, set forth the particulars thereof and submit them to the Engineer in writing in order that such doubts may be clarified authoritatively before tendering. Once a tender is submitted, the matter will be decided in accordance with tender conditions in the absence of such authentic pre-clarification.

6.2 ERROR, OMISSIONS AND DISCREPANCIES :

(A) In case of errors, omissions and /or disagreement between written and scaled dimensions in the drawing or between the drawings and specifications etc., The following order of preference shall apply.

(I) Between actual scaled and written dimensions or descriptions on a drawing, the latter shall be adopted.

(II) Between the written or shown description of dimensions in the drawing and corresponding one in the specifications, the latter shall apply.

(III) Between the quantities shown in schedule of quantities and those arrived at from the drawings, the latter shall be preferred.

(B) In all cases of omission and / or doubts of discrepancies in the dimensions or description of any item or specifications, a reference shall be made to the Engineer, whose elucidation, elaboration or decision shall be considered as authentic. The contractor shall be held responsible for any errors that may occur in the work through lack of such reference and precaution.

6.3 WORKING METHODS AND PROGRESS SCHEDULES :

(a) The Contractor shall submit within the time stipulated by the Engineer-in-charge in writing the details of actual methods that would be adopted by the Contractor for the execution of any item as required by Engineer at each of the location, supported by necessary detailed drawing and sketches including those of the plant and machinery that would be used, their locations, arrangement for conveying and handling materials etc. and obtain prior approval of the Engineer-in-charge well in advance of starting of such item of work. The Engineer-in-charge reserves the right to suggest modifications or make corrections in the method proposed by the contractor, whether accepted previously or not, at any stage of the work to obtain the desired accuracy, quality and progress which shall be binding on the contractor. No claim on account of such change in method of execution will be entertained by Government so long as specifications of the item remain unaltered. The full responsibility for the safety and adequacy of the methods adopted by the contractor shall however, rest on the contractor, irrespective of any approved given by the Engineer.

In case of slippage from the approved work programme at any stage, the contractor shall furnish revised programme to make up the slippage within the stipulated time schedule and obtain the approval of the Engineer to the revised programme.

PROGRESS SCHEDULE

(b) The Contractor shall furnish within the period stipulated in writing by the Engineer-in-charge of the order to start the work, progress schedule using PERT/CPM technique in quadruplicate indicating the date of actual start, the monthly progress expected to be achieved and anticipated completion date of each major item of work to be done by him, also indicating and setting up materials, plants and machinery. The schedule is to be such as is practicable of achievement towards the completion of the whole work in the time limit and of the particular items, if any on the due date specified in the contract and shall have the approval of the Engineer-in-charge. No revised schedule shall be operative without such acceptance in writing. The Engineer is further empowered to ask for more detailed schedule or schedules in weekly form, for any item or items, in any case of urgency of work as will be directed by him and the contractor shall supply the same as and when asked for.

(c) The Contractor shall employ sufficient plant, equipment and labour as may be necessary to maintain the progress schedule. The working and shift hours restricted to one shift a day for operations to be done under the Government supervision shall be such as may be approved by the Engineer-in-charge. They shall not be varied without the prior approval of the Engineer. Night work requiring supervision shall not be permitted expect when specifically allowed by Engineer on each item, if requested by Contractor. The Contractor shall provide necessary lighting arrangements etc. for night work as directed by the Engineer without extra cost to Government.

Further, the contractor shall submit the progress of work in prescribed forms and charts etc. at periodical intervals, as may be specified by the Engineer-in-charge. Schedule shall be in the form of progress charts, forms, progress statement and/or reports as may be approved by the Engineer. The contractor shall maintain proforma, charts, details regarding machinery, equipment, labour, materials, personnel etc. as may be specified by the Engineer and submit periodical returns thereof as may be specified by the Engineer-in-charge.

(d) The Contractor shall be required to give a trial run of the equipment's for establishing, their capability to achieve the laid down specifications and tolerance to the satisfaction of the Engineer before commencement of the work. All equipment provided shall be of proven efficiency and shall be operated and maintained at all times, in a manner acceptable to the Engineer and no equipment or personnel will be removed from site without permission of the Engineer.

6.4 TREASURE TROVE :

In the event of discovery by the Contractor or his employees, during the progress of the works of any treasure, fossils, minerals or any other articles or value of interest, the Contractor shall give immediate intimation thereof to the Engineer such treasure of things which shall be the property of the Government.

6.5 SUPERVISOR AND WORK ORDER BOOKS :-

The contractor shall himself engaged an authorized all time Supervisor on the work who will be capable of managing and guiding the work and understand the specifications and contract condition. A qualified and experienced, Engineer shall be employed by the contractor as his Supervisor for technical matters in case the Engineer-in-charge considers this as essential for the work and so directs contractors. He will take orders as will be given by the University Engineer or his representative and shall be responsible for carrying them out.

This Supervisor shall not be changed without prior intimation to the University Engineer and his representative on the work site. The University Engineer has the unquestionable right to ask for change in the quality and strength of contractor's supervisory staff and to order removal from work of any of such staff. The contractor shall comply with such orders and effect replacements to the satisfaction of the University Engineer.

A work order book shall be maintained on site and it shall be the property of the University and the contractor shall promptly sign orders given therein by the University Engineer or his representative and his superior officers and comply with them. The compliance shall be reported by the Contractor to the Engineer in good time so that it can be checked. The blank work order with machine numbered pages will be provided by the Department free of charge for this purpose. The contractor will be allowed to copy out instructions therein from time to time. The order issued by the Government in University from time to time regarding Construction procedure shall be binding on the contractor in addition to the specifications contained in P.W.D. hand book Volume I and II and book of standard specification of P.W. Department and the specifications enumerated above.

6.6 INITIAL MEASUREMENTS FOR RECORD:-

Where for proper measurement of work, it is necessary to have initial set of levels or other measurements taken, the same as recorded in the authorized field book or measurement book of University by the Engineer or his authorized representative will be signed by the Contractor who will be entitled to have a true copy of the same made at his cost. Any failure on the part of the Contractor to get such levels etc. recorded before starting the work will render him liable to accept the decision of the Engineer as to the basis of taking measurements. Like-wise the Contractor will not cover any work which will render its subsequent measurements difficult or impossible without first getting the same jointly measured by himself and the authorized representative of the University Engineer. The record of such measurements on the Government side will be signed by the Contractor and he will be entitled to have a true copy of the same made at his cost.

6.7 <u>HANDING OVER OF WORK</u> :

All the works and materials before finally taken over by University it will be the entire liability of the Contractor to guard, maintain and make good any damage of any magnitude. Interim payments made for such work will not alter this position. The handing over by the Contractor and taking over by the University Engineer or his authorized representative will be always in writing copies of which will go to the University Engineer or his authorized representative and the Contractor. It is however, understood that before taking over such work, Government will not put it into regular use as distinct from casual or incidental one, expect as specifically mentioned elsewhere in this contract, or as mutually agreed to.

6.8 <u>ASSISTANCE IN PROCURING PRIORITIES, PERMITS ETC</u> :

The Engineer on a written request by Contractor will, if in his opinion the request is reasonable and in the interest of work and its progress, assist the Contractor in securing, the priorities for deliveries, transport, permits for controlled materials etc. where such are needed. The University will not however be responsible for the non-availability of such facilities or delays on this behalf and no claims on account of such failure of delays shall be allowed by the University.

The Contractor shall have to make his own arrangement for machinery required for the work.

7. <u>SAMPLES AND TESTING OF MATERIALS</u> :

i All materials to be used on work, such as cement, lime, aggregates, stone, asphalt, etc. shall be got approved in advance from the Engineer-in-charge and shall pass the tests and analysis required by him, which will be :

(a) as specified in the specifications of the items concerned and / or

(b) Red book

(c) as specified by the Indian Road Congress Standard Specification and code of practice for Road and Bridges or

(d) I.S.I. Specifications (whichever and wherever applicable) or

(e) As per M.O.R.T. & H specifications for Roads and Bridges latest edition Section 900 quality control for road work.

(f) Such recognized specifications acceptable to the University Engineer as equivalent there to or in the absence of such authorized specifications.

(g) Such requirements test and/or analysis as may be specified by the Engineer-in-charge in the order of procedure given above.

ii The Contractor shall at his risk and cost make all arrangement and/or shall provide for all such facilities as the Engineer-in-charge may require for collecting, preparing required number of samples for test or analysis at such time and to such places as may be directed by Engineer and bear all such charges, such samples shall also be deposited with University Engineer.

iii The Contractor shall as and when required submit at his cost the samples of materials to be tested or analyzed and if, so directed, shall not make use of or incorporate in the work any material represented by the samples until the required test or analysis have been made and after the test of the materials, finally accepted by the Engineer-in-charge.

iv The contractor shall not be eligible for any claim or compensation either rising out of any delay in the work or due to any corrective measure required to be taken on account of and as a result of testing of the materials.

v The contractor or his authorised representative will be allowed to remain present in the Department laboratory which testing the samples furnished by him. However the results of all the tests carried out in the Departmental laboratory whether in the presence or in absence of the contractor or his authorised representative will be binding on the contractor.

vi **Quality Control Tests :-**

The contractor shall at his own cost set up Laboratory at site of work to carry out the testing of materials which are to be used for the work. This laboratory shall be approved by the University Engineer. The testing shall be done as per frequencies mentioned in the specification/additional specification of each item of Schedule 'B'. The 30% of the test included in **Annexure 'A' (On Page No. 55)** shall be carried out in Vigilance and Quality Control Laboratory at the cost of contractor and balance 70% in the site laboratory. The test which are not included in Annexure 'A' 50% test shall be carried out each in Vigilance and Quality Control laboratory and site laboratory. The frequency of testing of construction materials is mentioned in **Annexure-B on Page No. 52 to 53.**

vii In case of material procured by the contractor, testing as required by the Codes and Specifications shall be arranged by him at his own cost. Testing shall be done in the presence of authorized representative of the **University Engineer**, at the nearest approved laboratory. If additional testing other than as required by specification is ordered, the testing charges, shall be borne by the Department, in case the test results are satisfactory and by the contractor if the same are not satisfactory.

viii In case of materials specified by the Government, if the contractor demands certain testing, the charges thereof shall be paid by the contractor if the testing results are satisfactory and the Department if the same are not satisfactory.

ix Contractor shall have testing machinery/apparatus in his possession**.**

(As Applicable for Work)

7.1 **QUALITY CONTROL ON WORKS AND MATERIALS** :

The Contractor shall be responsible for the quality of the work in the entire construction work within the contract. He shall, therefore, have his own independent and adequate set up for ensuring the same. This shall include establishing field laboratory for testing required for works. The laboratory shall be equipped with the equipment's and apparatus required for the testing. This equipment's shall be in working condition. The University Engineer of the work will verify these equipment's in the laboratory at site. The work shall not be started unless and until the laboratory is equipped with equipment's.

7.2 CO-ORDINATION :

When several agencies for different sub-works of the project are to work simultaneously on the project site, there must be full coordination between the contractors to ensure timely completion of the whole project smoothly. The scheduled dates for completion specified in each contract shall therefore, are strictly adhered to. Each contractor may make his independent arrangements for water, power, housing etc. if they so desire. On the other hand the Contractor are at liberty to come to mutual agreement in this behalf and make joint arrangements with the approval of the Engineer. No Contractor shall take or cause to be taken any steps or action that may cause disruption, discontent, or disturbance of work, labour or arrangement etc. of the contractor in the project localities. Any action by any Contractor which the Engineer in his unquestioned discretion may consider as infringement of the above code would be considered as a breach of the contract conditions and shall be dealt-with accordingly.

In case of any dispute of disagreement between the Contractors, the Engineer's decision regarding the co-ordination, co-operation and facilities to be provided by any of the Contractor shall be final and binding on the contractors concerned and such a decision shall not vitiate any contract nor absolve the Contractor of his obligations under the contract nor consider from the grounds for any claim or compensation.

7.3 TEMPORARY QUARTER AND SITE OFFICE

I) The Contractor shall at his own expense maintain sufficient experienced supervisory staff etc. required for the work and shall make his own arrangements for housing such staff with all necessary amenities outside the University campus.

II) The contractor shall provide furnish, maintain and remove on completion of the work; a suitable office on the work site for the use of University Engineer or his representative. The covered area exclusive of verandah should not be less than 40.00 sqm. It may have brick walls and asbestos or corrugated iron roof; paved floor should be 45 cm. above ground level. He should provide latrines, urinals and keep them clean daily. This will be supposed to be included in his offer.

7.4 PATENTED DEVICES, MATERIALS AND PROCESSES :

When the Contractor desires to use any designed device, materials or process covered by letter of patent or copy right, the right for such use should be secured by suitable legal arrangement and agreement with patent owner and a copy of their agreement shall be filed with the University Engineer if so desired by the latter.

7.5 WATER SUPPLY :

Availability of adequate water for works and sources thereof shall be confirmed by the Contractor before submitting the tender.

The Contractor shall make his own arrangements at his own cost for entering into contract with concerned authorities for obtaining the connection and carry the water up to the work site as required by him. The location of the pipe line with respect to the road shall be decided by University engineer and shall be binding on the Contractor.

The Contractor is advised to provide water storage tank of adequate capacity to take care of possible shutdown of water supply system.

7.6 ELECTRICITY :

The Contractor will have to make his own arrangement at his own cost for obtaining or providing electric supply at work site.

Electrical supply for the University use at work site shall be provided by the contractor. No charges would be payable by the University.

8. SAFETY MEASURES AND AMENITIES :

8.1 SAFETY MEASURES :

The Contractor shall take all necessary precautions for the safety of the workers and preserving their health while working on such job as require special protection and precautions wherever required. The following are some of the requirements listed, through not exhaustive. The contractor shall also comply with the directions issued by the Engineer in this behalf from time to time and at all times.

(i) Providing protective foot-wear to workers, in situations like mixing and placing of mortar or concrete, in quarries and place where the work is to be done under too much wet conditions as also for movements over surfaces infected with oyster growth etc.

(ii) Providing protective head wear to workers, working in quarries etc. to protect them against accidental fall of materials from above.

(iii) Taking such normal precautions like providing hand rails to the edges of the floating platform or barges, not allowing nails or metal parts or useless timber to spread around etc.

8.2 AMENITIES :

(i) Supporting workmen with proper belts, ropes etc. when working on any masts, cranes, grabs, hoist, dredger etc.

(ii) Taking necessary steps towards training the workers concerned of the use of machinery before they are allowed to handle it independently and taking all necessary precautions in and around the areas where machines, hoists and similar units are working.

(iii) Avoiding bare live-wires etc. as would electrocute workers.

(iv) Making all platforms, stagings and temporary structures sufficiently strong and not causing the workmen and supervisory staff to take undue risks.

(v) Providing sufficient first aid trained staff and equipment to be available quickly at the work site to render immediate first aid treatment in case of accidents due to suffocation, drowning and other injuries.

(vi) Providing full length gum boots, leather hand gloves, leather jackets with fireproof aprons to cover the chest and black reaching up to knees plain goggles for the eyes to the labour working with hot asphalt handling vibrators in cement concrete and also where use of any or all these items is, essential in the interest of health and well being of the labourers in the opinion of the Engineer.

8.3 EXPLOSIVE :

The Contractor shall at his own expense construct and maintain proper magazines, if such are required for the storage of explosives for use in connection with the work and such magazines, being situated constructed and maintained in accordance with the Government Rules applicable in that behalf. The Contractor shall at his own expenses obtain such license or licenses as may be necessary for storing and using explosives. Notwithstanding that the location etc. or storage of explosives are approved by the Engineer , the University , shall not bear any responsibility whatsoever in connection with the storage and use of explosives on the site or any accident or occurrence what - so-ever in connection, therewith, all operations of the Contractor in or for which explosives employed being at the risk of contractor and upon his sole responsibility and the Contractor hereby gives to University an absolute indemnity in respect thereof.

8.4 DAMAGE BY FLOODS OR ACCIDENTS :

The contractor shall take all precautions against damage by floods or from accident etc. No compensation will be allowed to the Contractor on this account or for correcting and repairing any such damage to the work during construction The Contractor shall be liable to make good at his cost any plant or materials belonging to the University lost or damaged by floods or from any other cause while is in his charge.

8.5 RELATION WITH PUBLIC AUTHORITIES:

(i) The Contractor shall comply with all rules, regulations, bye-laws and directions given from time to time by any local or public authority in connection with this work and shall himself pay all charges which are leviable on him without any extra cost to the University.

(ii) **POLICE PROTECTION**:

For the Special Protection of camp of the Contractor's works, the University will help the Contractor as far as possible to arrange for such protection with the concerned authorities, if so required by the contractor in writing. The full cost of such protection shall be borne by the Contractor.

8.6 INDEMNITY :

The Contractor shall indemnify the University against all actions, suits, claims and demands brought or made against it in respect of anything done of committed to be done by the contractor in execution of or in connection with the work of this contract and against any loss or damage to the University in consequence to any action or suit being brought against the Contractor for anything done or committed to be done during the execution of this contract.

The University may at its discretion and entirely at the cost of the contractor defend such suit, either jointly with the Contractor or single in case the latter chooses not to defend the case.

8.7 EDICAL AND SANITARY ARRANGEMENTS TO BE PROVIDED FOR LABOUR EMPLOYED IN THE CONSTRUCTION BY THE CONTRACTOR

a) The Contractor shall provide an adequate supply of pure and wholesome water for the use of labourers on work and in camps.

b) The Contractor shall construct trench or semi-permanent latrines for the use of the Labours. Separate latrines shall be provided for men and women.

c) The Contractor shall build sufficient number of huts on a suitable plot of land for use of the labourers according to the following specifications :-

1. Huts with Bamboo's and Grass may be constructed.
2. A good site not liable to submergence shall be selected on high ground remote from jungle but well provided with tress, shall be chosen wherever it is available. The neighborhood of tank, jungle, trees or wood should be particularly avoided; Camps should not be established close to large cutting of earth work.
3. The lines of huts shall have open space of atleast ten metres between rows. When a good natural site cannot be procured, particular attention should be given to the drainage.
4. There should be no over crowding. Floor space at the rate of 3 Sq. metre per head shall be provided. Care should be taken to see that the huts are kept clean and in good order.
5. The University does not bind itself for making available the required land to the contractor for labour campus.

a) The Contractor shall construct a sufficient number of bathing places, Washing places should also be provided for the purpose of washing cloths.

b) The Contractor shall engage a Medical Officer with a travelling dispensary for a Camp containing 500 or more persons if there is no Government or other private dispensary situated with 8 Kms. from the camp. In case of emergency the Contractor shall arrange a this cost of transport for quick medical help to his sick worker.

c) The Contractor shall provide the necessary staff for effecting satisfactory conservancy and cleanliness of the camp to the satisfaction of the University Engineer. At least one sweeper per 200 persons should be engaged.

d) The Assistant Director of Public Health shall be consulted before opening a labour camp and his instruction on matters such as water supply, sanitary conveniences, the camp site accommodation and food supply shall be followed by the Contractor.

e) The Contractor shall make arrangements for all ant malarial measures to provide for the labours employed on the work. The ant malarial measures shall be provided as directed by the Assistant Director of Public Health.

f) The anti-malaria and other health measures shall be as directed by the Joint-Director (Malaria and Filarial) Health Services, Pune.

g) Contractor shall see that mosquitogenic conditions are not created so as to keep vector populations to minimum level.

h) Contractor shall carry out anti-malaria measures in the area as per guidelines prescribed under National Malaria Eradication Programme and as directed by the Joint Director, (M & F) of Health Services Pune.

i) In case of default in carrying out prescribed antimalaria measures resulting in increase in Malaria incidence, contractor shall be liable to pay to Government the amount spent by Government on anti-malaria measure to control the situation in addition to fine.

j) The Contractor shall make sufficient arrangements for draining away the surface and sullage water as well as water coming from the bathing and washing places and shall dispose off this waste water in such way as not to cause any nuisance. He shall also keep the premise clean by employing sufficient number of sweepers.

k) The Contractor shall comply with all rules, regulation bye-law and directions given from time to time by any local or public authority in connection with this work and shall pay fees or charges which are leviable on him without any extra cost to Government.

l) In addition to above all provisions of the relevant labour act pertaining to basic amenities to be provided to the labourer shall be applicable which will be arranged by the Contractor.

9. <u>MISCELLANEOUS</u> :

9.1 For providing electric wiring or water lines ete. recesses shall be provided if necessary through walls, slabs, beams etc. and later on refilled it with bricks or stones, chipping cement mortar without any extra cost.

9.2 In case it becomes necessary for the due fulfillment of contract for the Contractor to occupy land outside the Department limits, the Contractor will have to make his own arrangements with the land owners and pay such rents, if any, are payable as mutually agreed between them.

9.3 The Contractor shall duly comply with the provision of the Apprentices Act 1961 (iii of 1961) and the rules and orders made thereunder from time to time under the said Rules and on his failure or neglect to do so he shall be subject to all the liabilities and penalties provided by the said Act and Rules.

9.4 It is presumed that the Contractor has gone carefully through the Standard Specification (Vol. I & II 1981 Edition) M.O.R.T. & H specifications (edition 2001) and Schedule of Rate of the PWD division, and studied the site conditions before arriving at rates quoted by him. The special provisions and detailed specification of wording of any item shall gain precedence over the corresponding contrary provisions (if any) in the standard specification given without reproducing the details in contract. Decision of University Engineer shall be final in case of interpretation of specification.

9.5 If the standard specifications fall short for the items quoted in the schedule of this contract reference shall be made to the latest Indian Standard specifications, I.R.C. codes. If any of items of this contract do not fall in reference quoted above, the decision and specifications as directed by the Engineer-in-charge shall be final.

9.6 The stacking and storage of building materials at site shall be in such a manner as to prevent deterioration or inclusion of foreign materials and to ensure the preservation of the quantity, properties and fitness of the work. Suitable precautions shall be taken by Contractor to protect the materials against atmospheric action fire and other hazards. The materials likely to be carried away by wind shall be stored in suitable stores or with suitable barricades and where there is likelihood of subsidence of soil, heavy materials shall be stored on paved platforms. Suitable separating barricades and enclosure as directed shall be provided to separate materials brought by contractor and from different sources of supply.

10. <u>DEFINITIONS</u> :

Unless excluding by or repugnant to the context :

a) The expression "University" as used in the tender documents shall mean the **"Shreemati Nathibai Damodar Thackersey Women's University".**

b) The expression "The University Engineer" as used anywhere in the tender papers shall mean officer for the time being of the SNDT Women's University who is designated as such.

c) The expression "Engineer" or "Engineer-In-Charge" as used in the tender papers shall mean the University Engineer of the work.

d) The expression "Contractor" as used in the tender papers shall mean the successful tenderer that is the tenderer whose tender has been accepted, and who has been authorised to proceed with the work.

e) The expression "Contract" as used in the tender papers shall mean the deed of contract together with or its original accompaniment and those later incorporated in it by mutual consent.

f) The expression "Plant" as used in the tender papers shall mean very temporary and necessary means necessary or considered necessary by the Engineer to execute, construct, complete and maintain the works and used in altered, modified, substituted and additional works ordered in the time and in the manner herein provided and all temporary materials and special and other articles of appliances of every sort, kind and description whatsoever intended or used therefore.

g) The expression "Department" as used in the tender papers shall mean Estate Department of the University.

h) The "Accepting authority" shall mean the officer competent to accept the tender.

i) The "Site" shall mean the land and/or other places where the work is to be executed under the contract including any other land or places which may be allotted by the University or use for the purpose of contract.

11. <u>TESTING ETC.</u> :

The Contractor shall be responsible for the quality of the work in the entire construction work within the contract. He shall, therefore, have his own independent and adequate setup for ensuring the same. This shall include establishing field laboratory for testing required for concrete works.

12. <u>AUTHORITIES OF THE UNIVERSITY ENGINEER</u> :

Save in so far as it is legally or physically impossible the Contractor shall execute, complete and maintain the works in strict accordance with the contract under the directions and to the entire satisfaction of the University Engineer and shall comply with and adhere strictly to the University Engineer instructions and directions on any matter (Whether mentioned in the contract or not) pertaining to this works.

The University Engineer shall decide all questions which may arise as to quality and acceptability of materials furnished and work executed, manner of execution, rate of progress of the works, interpretation of the plans and specifications and acceptability of fulfillment of the contract on the part of the Contractor. He shall determine the amount and quantity of work performed and materials furnished and his decision shall be final. In all such matters, and in any technical questions which may arise touching the contract, his decision shall be binding on the Contractor.

The University Engineer shall have the power to enforce such decisions and orders if the Contractor fails to carry them out promptly. If the Contractor fails to execute the work ordered by the Engineer-in-charge . The University Engineer may give notice to Contractor specifying a reasonable period therein and on the expiry of that period proceed to execute such work as may be deemed necessary and recover the cost there of from the Contractor.

12.1 <u>AUTHORITIES OF THE UNIVERSITY ENGINEER'S REPRESENTATIVE</u>

The duties of the representative of the University Engineer are to watch and supervise the work and to test and examine any material to be used for workmanship employed in connection with the works.

12.2 The Engineer-in-charge may from time to time, in writing delegate to his representative any of the powers and authorities vested in the Engineer-in-charge and shall furnish to the Contractor a copy of all such delegations of powers and authorities. Any written instruction or approval given by the representative of the Engineer-in-charge to the Contractor within the terms of such delegations (but not otherwise) shall bind the Contractor and the Department as though it had been given by the Engineer-in-charge , provided always as follows.

a) Failure of the representative of the Engineer-in-charge to disapprove any work or material shall not prejudice the power of the Engineer-in-charge thereafter to disapprove such work or materials and to order to pulling down, removal or breaking up thereof.

b) If the Contractor is dissatisfied with any decision of the Representative of the Engineer-in-charge he shall be entitle to refer the matter to the Engineer-in-charge, who shall there upon confirm/reverse or vary such decision.

13. LAY OUT OF WORK :

Layout of the work will be done by the Contractor in consultation with the University Engineer of the Department or his representative, some permanent marks should however be established to indicate the demarcation of the structure or any component thereof made to this permanent marks in measurement books and drawing signed by the contractor and the departmental officer, Responsibility regarding layout will be joint.

14. SETTING OUT

14.1 BUILDING WORKS :-

The Engineer-in-charge shall furnish the contractor with only the four corners of the works site and a level bench mark and the contractor shall set out the works and shall provide an efficient staff for the purpose and shall be solely responsible for the accuracy of such setting out.

The contractor shall provide, fix and be responsible for the maintenance of all stacks, templates, level marks, profile and other similar things and shall take all necessary precautions to prevent their removal or disturbance and shall be responsible for the consequence of such removal or disturbance, should the same take place and for their efficient and timely reinstatement. The contractor shall also be responsible for the maintenance of all existing survey marks, boundary marks distance marks and center line marks, either existing or supplied and fixed by the contractor. The work shall be set out to the satisfaction of the Engineer-in-charge. The approval thereof or joining with the contractor by the Engineer-in-charge in setting out the work, shall not relive the contractor of any of his responsibilities.

Before beginning the work, the contractor shall at his own cost provide all necessary reference and level posts, pegs, bamboos, flags, ranging rods, strings and other materials for proper layout of the work in accordance with the scheme for bearing marks acceptable to the Engineer-in-charge. The center, longitudinal or face lines and cross lines shall be marked by means of small masonry pillars. Each pillar shall have distinct mark at the center to enable the theodolite to be set over it. No work shall be started until all these ponts are checked and approved by the Engineer-in-charge in writing but such approval shall not relieve the contractor of any of his responsibilities. The contractor shall also provide all labour, material and other facilities, as necessary, for the proper checking of layout and inspection of the points during construction.

Pillars bearing geodetic marks located at the sites of units of works under construction should be protected and fenced by the contractor.

On completion of works, the contractor must submit the geodetic documents according to which the work was carried out.

14.2 RESPONSIBILITIES FOR LEVEL AND ALIGNMENT :

The contractor shall be entirely and exclusively responsible for the horizontal and vertical alignment, the levels and correctness of every part of the work and shall rectify effectually any errors or imperfections therein, such rectifications shall be carried out by the contractor, at his own cost, when instructions are issued to that effect by the University Engineer.

15. If measurements of items of the work are based on volumetric measurements calculated from levels taken before and after the construction of the item, a large number of leveling staves, tapes etc. will have to be kept available by the contractor at the site of the work for this purpose. Lack of the such leveling staves, tapes etc. in required numbers may case delay in measurements and the work. The contractor will have therefore to keep sufficient numbers of these instruments readily available at site and in good working condition.

16. STACKING AND STORAGE AND GUARDING OF MATERIALS :

16.1 The stacking and storage of material at site shall be in such a manner as to prevent deterioration or intrusion of foreign matter and to ensure the preservation of their quality, properties and fitness for the work. Suitable precautions shall be taken by the Contractor to protect the materials against atmospheric action, fire and other hazards. The materials likely to be carried away by wind shall be stored in suitable stores or with suitable barricades and where there is likely hood of subsidence of soil, heavy materials shall be stored on paved platforms.

Suitable separating barricades and enclosures as directed shall be provided to separate materials brought by Contractor and materials issued by University to Contractor under Schedule "A" Same applies for the material obtained from different sources of supply.

16.2 The Contractor shall at his own expense engage watchman for guarding the materials and plant and machinery and the work during day and night against any pilferage or damage and also for prohibiting trespassers.

16.3 No materials brought to the site shall be removed from the site without the prior approval of the Engineer-in-charge.

17. INSPECTION OF WORKS

17.1 The Contractor shall inform the Engineer-in-charge in writing when any portion of the work is ready for inspection giving him sufficient notice to enable him to inspect the same without affecting the further progress of the work.

17.2 The Contractor shall provide at his cost necessary ladders and such arrangements as are considered safe by the Engineer-in-charge for proper inspection of all parts of the work.

17.3 Contractor shall extend his full co-operation and make all necessary arrangements when needed for carrying out inspection of the work or any part of the work by the University officials. No compensation shall be paid to the contractor on this account.

17.4 The work shall be carried out by the Contractor without causing damage to the existing University property and / or private property. If any such damage is caused, the Contractor shall pay for restoration of the property to the original conditions, and any other consequent damages.

17.5 In the event of the occurrence of an accident involving serious injuries or death of any person, at site of work or quarry or at any place in connection with the work the same shall be reported in writing within twenty four hours of the occurrence to the Engineer-in-charge and Commissioner of Workmen's compensation.

17.6 The Contractor after completion of work shall clean the site of all debris and remove all unused materials other than those supplied by the department and all plant and machinery, equipment, tools etc. belonging to him within one month from the date of completion of the work, or otherwise the same will be removed by the department at his cost or disposed off as per departmental procedure. In case the material is disposed off by the department, the sale proceeds will be credited to the Contractor's account after deducting the cost of sale incurred. However, no claim of Contractor regarding the price or amount credited will entertained afterwards.

17.7 All constructional plant, provided by the Contractor shall when brought on to the site be deemed to be exclusively intended for the construction and the contractor shall not remove the same or any part thereof (save for the purpose of moving it from one part of the site to another) without the consent in writing of the Engineer-in-charge who shall record the reasons for withholding the consent.

18. <u>RESTRICTIONS BECAUSE OF LOCAL TRAFFIC</u>:

As there is local traffic by the side of construction during construction for the building, the Contractor will have to take proper precautions such as proper barricading, fencing, lighting, information and cautionary boards for safe and smooth flow of traffic, and keeping the concerned authorities informed about the work in progress.

19. <u>COMPLETION CERTIFICATE</u> :

19.1 The work shall not be considered to have been completed in accordance with the terms of the contract until the Engineer-in-charge shall have certified in writing to that effect. No approval of material or workmanship or approval of part of work during the progress of execution shall bind the Engineer-in-charge or in any way prevent him from even rejecting the work which is claimed to be complete and to suspend the issue of his certificate of completion until such alteration and modifications or reconstruction have been effected at the cost of the Contractor as shall enable him to certify that the work has been completed to his satisfaction.

19.2 After the work is completed the Contractor shall give notice of such completion to the Engineer-in-charge and within 30 days of receipt of such a notice the Engineer-in-charge shall inspect the work and if there is no defect in the work shall furnish the Contractor with a certificate indicating the date of completion. However, if there are any defects which in the opinion of the Engineer-in-charge are rectifiable he shall inform the Contractor the defects noticed. The Contractor after rectification of such defects shall then inform the Engineer-in-charge and Engineer-in-charge on his part shall inspect the work and issue the necessary completion certificate within 30 days if , the defects are rectified to his satisfaction, and if not, he shall inform the Contractor indicating defects yet to be rectified. The time cycle as above, shall continue.

19.3 In case defects noticed by the Engineer-in-charge which in his opinion are not rectifiable but otherwise work is acceptable at reduced payment, work shall be treated as completed. In such cases completion certificate shall be issued by the Engineer-in-charge within 30 days indicating the un-rectifiable defects for which reduction in payment is being made by him.

19.4 The issued of completion certificate shall not be linked up with the site clearance on completion of the work.

20. ANCILLARY WORK :

The Contractor shall submit to Engineer-in-charge in writing the details of all ancillary works including layout and specifications to be followed for its construction. Ancillary work shall not be taken up in hand unless approved by Engineer-in-charge. The Engineer-in-charge reserves the right to suggest modifications or make complete changes in the layout and specifications proposed by the Contractor at any stage to ensure the safety on the work site. The Contractor shall carry out all such modifications to the ancillary works at his own expenses as ordered by Engineer-in-charge.

21. SPECIAL CONDITIONS:

21.1 The Contractor should ensure that all safety precautions are observed by their laboures, working closed to the State Highway and while closing the State Highway precautions are taken including insurance etc., for their labour at the cost of the contractor and the contractor will bear all the expenses, compensation etc. if any accident occurs to the labour etc. No claim in this regard on whatsoever account shall be entertained and this decision of the Department will be final and conclusive.

21.2 The Contractor shall observe the rules and regulation imposed by traffic police for smooth flow of traffic on the diversion road and shall not be entitled for claims any compensation arising thereof.

In case of delay in handing over the land required for the work, due to unforeseen cause, the Contractor shall not be entitled for any compensation what-so-ever form the Government on ground that the machinery or labour was idle for certain period. Contractor may, however apply for extension of time limit which may be granted on the merit of the case.

22. REJECTION OF MATERIALS NOT CONFORMING TO SPECIFICATIONS:

Any stock or batch of material(s) of which sample(s) does not conform to the prescribed test and quality, shall be rejected by the Engineer or his representative and such materials shall be removed from site by the Contractor at his own cost. Such rejected materials shall not be made acceptable by any modifications.

Materials not corresponding in character and Quality with approved samples will be rejected by the Engineer or his representative and shall be removed from site at the Contractor's own cost.

23. INSPECTION OF OPERATIONS :

The Engineer and any person authorised by him shall at all times have access to the works and to all workshops and places (including required documents) where work is being prepared or from where materials, manufactured articles or machinery are being obtained for the works and the Contractor shall afford every facility for & every assistance in or in obtaining the right to such access.

24. FIELD LABORATORY :

The Contractor shall arrange to provide a well furnished and fully equipped field laboratory which shall be manned by adequately qualified technical staff. The laboratory shall preferably be located adjacent to the plant site and shall be provided with amenities like water supply, electric supply, toilet block etc. The list of equipment is enclosed **on Page No. 139.** This shall be considered as incidental to work and no separate payment whatsoever will be made for the same.

25. SUPPLY OF COLOURED RECORD PHOTOGRAPHS AND ALBUMS:

The Contractor shall arrange to take dated post card size coloured photographs at various stages/facts of the work including interesting and novel features of the work as desired by the Engineer-in-charge and supply them in five copies each in separate albums of appropriate size. He shall also arrange for the Video Filming of important activities of the work during the currency of the contract and edit it to a video film of 60 to 180 minutes playing time.

It shall contain narration of the various activities in English/Marathi by a competent narrator. The cassette shall be of acceptable quality and the film shall be capable of producing color pictures. This shall be considered as incidental to the work and no additional payment whatsoever will be made for the same.

26. SUPPLY OF SAFETY JACKETS TO LABOURERS/ SUPERVISORS/ ENGINEERS

As a safety measure during the execution of work all labours, construction and supervisory staff shall be provided with an orange colour jacket in flouroscent blue so as to make them starkly visible from a distance even during evening hours.

27. APPROVAL OF CONSTRUCTION MATERIALS AND CONSTRUCTION ACTIVITIES:

Approval of all materials for the work shall be obtained in writing from Engineer-in-charge or his representative before its use in the Project.

Before taking up of any construction activity the construction work done earlier shall be got approved in writing. Any failure on this account may result in the work for which the Contractor will be solely responsible.

Materials and job mix, etc. shall be got approved in writing atleast 15 days in advanced of the commencement of the corresponding activity. The testing charges shall be borne by the Contractor.

Besides the prescribed tests and frequencies any other test of tests over the prescribed frequency shall also be carried out by the Contractor at his own cost if so directed by Engineer-in-charge or his authorised representative.

28. CONDITION RELATING TO INSURANCE OF CONTRACT WORK.

Contractor shall take out necessary Insurance Policy/ (viz. Contractors All Risks Insurance Policy, Erection All Risks Insurance Policy etc. as decided by the Directorate of Insurance) so as to provide adequate insurance cover for execution of the awarded contract work for total contract value and complete contract period compulsorily from the "Directorate of Insurance, Maharashtra State, Mumbai only its postal address for Correspondence is "264, MHADA, First Floor, Opp. Kalanagar, Bandra (East) Mumbai – 400051" (Telephone Nos. 26590403/26590690 and Fax No. 26592461/26590403) Similarly, all workmen's appointed to complete the contract work are required to insure under workmen's compensation insurance policy. Insurance policy/policies taken out from any other Company will not be accepted. If any contractor has effected Insurance with any insurance company the same will not be accepted and the amount of premium calculated by the Government Insurance Fund will be recovered directly from the amount payable to the Contractor for the executed contract work and paid to the Directorate of Insurance Fund, Maharashtra State, Mumbai, The Director of Insurance reserves the right to distribute the risks of insurance among the other insurers.

29. BUILDING AND OTHER CONSTRUCTION WELFARE CESS : (Deleted)

Building and other construction worker welfare cess at 1% or at the rates awarded from time to time as intimated by the competent authority of building and other construction worker welfare Act 1996 shall be deducted from bill amount. Whether bill advance payment or secured advance.

30. Goods and Services Tax will be recovered from the bill of the contractor as per GST Act.

31. DIARY :

Contractor shall maintain, throughout the construction period, a diary in the from of a register regarding the following :-

i) Daily presence of all categories of labours.

ii) Daily availability and use of machinery and equipment's on work.

iii) Daily procurement, Consumption and balance of materials on site.

iv) Daily record of various visiting authorities alongwith name of the officers visited and timing.

v) Details of work executed per day. The register shall be closed on daily basis and signature of Engineers in charge or his representative should be taken over it.

32. ADDITIONAL TECHNICAL CONDITIONS

32.1 The work shall be carried out in the best workmanship like manner and in strict accordance with P.W.D. hand book Volume I & II 1960. Edition supplemented by specification attached and as per Standard Specifications Book of Government of Maharashtra of 1979 and as per specific order of the University Engineer or his representative from time to time.

32.2 The orders issued by the Government in P.W. Department and the University Engineer from time to time regarding construction procedure shall be binding on the contractor in addition to the specification contained in tender document.

32.3 The contractor shall submit day to day account of the materials issued to him and its use and also monthly progress and programmed of work.

32.4 (a) The concrete mix design shall be got approved from University Engineer and the mix design shall give preliminary strength of 1.33 times working strength.

(b) The maximum size of aggregate permissible would be as per A-7 page-8 of Standard Specifications Book 1979 Edition.

32.5 The items provided with watering for curing include continuous watering operations through out the day including lunch hours and also during holidays. For this purpose contractor shall have to construct tank of appro. 5000 liters capacity near each building and provide necessary Booster Pumps etc. to ensure adequate curing and wetting. Hold fasts coming in contact with R.C.C. columns shall be of sizes 30 cm x 4 cm to be fitted with two rows, nails fixed properly in concrete.

32.6 For all sand covering items, use of washed mixer sand (with sand washing machine) is obligatory. No separate claim in this regard will be entertained.

32.7 Material testing requirement frequency and type of testing is enclosed separately. Material to be used shall be tested accordingly and cost shall be borne by contractor.

32.8 For R.C.C. centering plywood and M.S. sheet of approved quality shall be used and adjustable props and fasteners shall be used.

32.9 The execution of any work from external side of the building 'H' frame steel scaffolding shall be used. No separate payment for claims in this regard shall be entertained.

32.10 The scaffolding shall not be supported on existing external walls of the building by making holes in it and also the scaffolds shall not rest on any part of the building.

32.11 Quality Assurance Manual: Contractor shall prepare the quality assurance manual booklet in consultation with the University Engineer. Quality assurance manual shall be comprehensive document covering every aspect of the work. University Engineer shall approve this document. The quality manual document shall be used only after approval from University Engineer. Provision of the quality manual be binding on the contractor. Quality manual shall be treated as a legal document as per with this contract document. It shall be used till the work is completed in full respect.

33. Additional Performance Security:

Bank Guarantee OR Demand Draft for Performance Security Deposit for Quoting Offer More than 1% below the tender cost. (As Per GR. Dated 12.04.2017). As per the directives laid down in Government of Maharashtra, Public Works Department, and Marathi Resolution No. CAT 2017/PRA.KRA 8/ Bldg-2/dt. 12.04.2017, If the bidder intends to quote his offer below more than 1 % of the Bid cost of the department then such bidder should upload a Bank Guarantee OR Demand Draft (in the form as prescribed by Government) from any Schedule Bank or Nationalized Bank against Additional Performance Security in Part-II Financial Bid as mentioned below:

A. If the Bidder intends to quote his offer below more than 1 % upto 10 % of the estimated cost put to Bid then he should submit a Bank Guarantee OR Demand Draft amounting to 1% of the Bid cost of the department towards Additional Performance Security and scanned copy of Bank Guarantee OR Demand Draft shall be uploaded in Part-II Financial Bid

B. If the Bidder intends to quote his offer more than 10 % below the estimated cost put to Bid then he should submit Performance security 1 % for every percent after 10 % below percentage in addition to the cost of 1% performance security mentioned above clause A for quoting below offer, scanned copy of Bank Guarantee OR Demand Draft shall be uploaded in Part-II Financial Bid (e.g. If Bidder quotes his offer 14 % below the estimated cost put to bid, then he should submit 14 - 10 = 4 % Additional Performance security + 1% = 5 % amount of the cost put to bid as a total Additional Performance Security.) If the amount of Additional Performance Security as required above (under A & B) is not submitted by the bidder along with Part II Financial Bid, then his offer will be treated as ''Non Responsive" and will not be considered.

1) Such Bank Guarantee OR Demand Draft shall strictly issued only by the Nationalized Bank or Scheduled Bank in favour of The Registrar, payable at Mumbai, SNDT Women's University.

2) The Bank Guarantee OR Demand Draft should bear the MICR and IFSC Code Number of the issuing bank.

3) The scanned copy of this Bank Guarantee OR Demand Draft shall be uploaded in Part-II Financial Bid (Financial Offer) of the bid. The Hard Copy of this Bank Guarantee OR Demand Draft shall be submitted in Envelop-II.

4) If such contractor will not comply the stipulations laid down in the bid and not qualified for the opening of his financial offer (Part-II Financial Bid) the Bank Guarantee OR Demand Draft of such bidder shall be returned within 7 days after the date of opening of the bid.

5) If the bidder comply the stipulations laid down in the tender and qualified for the opening of his financial offer (Part-II Financial Bid) then the Bank Guarantee OR Demand Draft of the other bidders (other than 1st and 2nd lowest bidder) shall be returned within 7 days after the date of opening of the bid.

6) The Bank Guarantee OR Demand Draft of the 2nd lowest bidder shall be returned within 3 days from the date of work order.

7) If it is found that the Bank Guarantee OR Demand Draft as above submitted by the bidder is False / Forged then the Earnest Money submitted by such bidder shall be forfeited and he will be entered in the Black List of the University.

8) The work order to the successful contractor shall be issued only after the encashment of his Bank Guarantee OR Demand Draft by The Registrar.

9) The amount of Additional performance security of successful contractor shall be refunded within the period of one month after the date of completion of defect liability period.

Note:- For calculating the amount of **ADDITIONAL PERFORMANCE SECURITY** contractors offer will be calculated in percentage rounded upto two decimal points only.

34. Contract Document

1.1. The following documents shall constitute the contract documents:
- 1.1.1. Articles of Agreement.
- 1.1.2. General Conditions of Contract.
- 1.1.3. Specifications.
- 1.1.4. Bills of Quantities.

1.2. The Contract Documents is complementary. What is called for in any one shall be has binding as is called for by all.

1.3. The Contract Document shall remain in the custody of the Owner so as to be available at all reasonable times for the inspection of the Owner or of the Contractor. Immediately after the execution of the contract one copy of the Contract Document and two copies of the

Contract Drawings shall, without charge, be supplied by the Owner to the Contractor and one copy of the Contract Document to the Owner.

1.4. So soon as is possible after the execution of this contract two copies of the Specifications, descriptive schedule or other like documents necessary for use in carrying the work shall without charge be supplied by the Owner to the Contractor.

1.5. Provided that nothing contained in the said Specifications, Descriptive schedules or other document shall impose any obligation beyond those imposed by the Contract Document namely by the Contract Drawing, the Contract Bills, the Articles of Agreement and these conditions. After the award of the Contractor the Contractor shall without charge be supplied with all such further drawings and details as may be prepared by the Owner and his Consultant, from time to time as the work proceeds as are reasonably necessary either to explain or amplify the Contract Drawings or to enable the Contractor to carry out and complete the work in accordance with these Conditions provided all such drawings shall be a reasonable development of the work described in the Contract Document.

1.6. The Contractor shall keep one copy of the Specifications, Descriptive schedule or other like document referred to in this clause and one copy of the contract Drawing and such other drawings and details supplied to him from time to time and referred to in this clause and written instructions referred to in this clause and clauses 9. and 30. at the site so as to be available to the Owner or his representative at all reasonable times.

1.7. None of the documents herein before mentioned shall be used by the Contractor for any purpose other than this contract and neither the Owner nor the Owner shall divulge or use except for the purpose of this contract any of the prices in the contract bills.

1.8. Upon final payment under the clause 31.6. of these conditions the Contractor shall if so requested by the Owner forthwith return to the Owner all Drawings, Details Specifications Descriptive Schedule and other Document of like nature which bears his name or that of the Consultant.

2. Type of Contract

2.1. The Contract shall be an Item rate contract. The Contractor shall be paid for the actual quantity of work done, as measured at site or as per drawing whichever is less, at the rates mentioned in the Contract.

3. Schedule of Quantities

3.1. The schedule of Quantities given in the Contract Bill is provisional and is meant to indicate the intent of the work and to provide a uniform basis for tendering. The Owner reserves the right to increase or decrease any of the quantities or to totally omit any item of work and the Contractor shall not claim any extras or damages on these grounds.

3.2. Any error in description or in quantity or omission of items from the Contract Bill shall not vitiate this Contract but shall be treated as a variation.

4. Contract Drawings

4.1. In general the Drawings shall indicate dimensions, position and type of construction; the Specifications shall indicate the qualities and the methods; and the Bill of Quantities shall indicate the quantum and the rate for each item of work. Any work indicated on the

Drawings and not mentioned in Specification or vice versa shall be furnished as though fully set forth in both. Work not specifically detailed, called for marked or specified shall be the same as similar parts that a detailed marked or specified.

4.2. The Contractor's work shall not deviate from the Drawings and the Specifications. The Owner's interpretation of these documents shall be final and without appeal.

4.3. Errors or inconsistencies discovered in the Drawings and Specifications shall be promptly brought to the attention of the Owner, through the clerk of works, for interpretation or correction. Local conditions, which may affect the work, shall likewise be brought to the Owner's attention. If at any time, it is discovered that work is being done which is not in accordance with the Contract Drawings and Specifications, the Contractor shall correct the work immediately. Corrections of defective work shall not be basis for any claim for extension of time. The Contractor shall not carry on work except with the knowledge of the Clerk-of -works.

4.4. Figured dimensions on the scale Drawings and large size details shall govern. Large size details shall not precedence over small-scale drawings. Any work done before receipt of such details, if not in accordance with the same, shall be removed and replaced or adjusted, as directed by the Contractor without expense to the owner. The general conditions apply with equal force to all the work including authorized extra works.

4.5. All drawings, Bills of Quantities and Specifications and copies thereof furnished by the Owner are his property. They shall not be used on any other work and shall be returned to the Owner at his request on completion or termination of the Contract.

4.6. Reinforcing steel bar bending schedules shall if requested by the owner be furnished to the Owneratleast fifteen days prior to the fabrication of the reinforcement.

5. Contract Sum

5.1. The contract sum shall not be adjusted or altered in any way whatsoever otherwise than in accordance with the express provisions of these conditions, and subject to clause 5.2. Of these conditions any error whether of arithmetic or not in the computation of the Contract sum shall be deemed to have been accepted by the parties hereto.

35. Claim for extra

1.1. When any instructions or decisions at site involve an extra or whereby the contractor may plan to claim an extra, it shall be the responsibility of the contractor to inform the Owner of the extra amount and get return authorization from the Owner before proceeding with the work involved.

1.2. Any modification carried out for expediting or simplifying work at the request of the contractor or his representatives shall not be taken as the basis for claiming an extra. However, if such modification shall also involve an extra, the rate for such modification shall be settled in advance and written authorization contained by the contractor from the Owner before proceeding with the work involved. If no such information is given by the contractor in writing to the owner such modification shall not be accepted as the basis for extra charge.

36. Extension

1.1. Upon it becoming a reasonably apparent that the progress of the works is delayed, the contractor shall forthwith give written notice of the cause of the delay to the Owner, and if in the opinion of the Owner the completion of the work is likely to be or has been delayed beyond that date for completion stated in the appendix to these conditions or beyond any extended time previously fixed under this clause.

1.1.1. By force majeure. Or

1.1.2. By reason of any exceptionally inclement weather. Or

1.1.3. By reason of loss or damage of occasioned by any one or more of the contingencies referred to in clause 47. of these conditions. Or

1.1.4. By reason of civil commotion, local combination of workmen strike or lockout affecting any of the trades employed upon the works or any of the trades engaged in the preparation, manufacture or transportation of any of the goods or materials required for the work. Or

1.1.5. By reason of Owner's instructions issued under clause 9, clause 30.1. or clause 38.2. of these conditions. Or

1.1.6. By reason of the contractors not having received in due time necessary instructions, drawings, details of levels from the Owner for which he specifically applied in writing on a date which having regard to the date for completion stated in the appendix to these conditions or to any extension of time then fixed under this clause was neither unreasonably distant from nor unreasonably close to the date on which it was necessary for him to receive the same. Or

1.1.7. By delay on the part of nominated sub-contractors or nominated suppliers which the contractor has taken all practicable steps to avoid or reduce. Or

1.1.8. By delay on the part of artists, tradesmen or other engaged by the owner in executing work not forming part of this contract. Or

1.1.9. By reason of the opening up for inspection of any work covered up or of the testing of any of the work, materials or goods in accordance with clause 37. of these conditions (including making good in consequence of such opening up or testing) unless the inspection of test showed that the work materials or goods were not in accordance with this contract. Or

1.1.10. By reason of the contractor's inability for reason beyond his control and which he could not reasonably have foreseen at the date of this contract to secure such labour goods or materials as are essential to the proper carrying out of the works.

Then the Owner shall as soon as he is able to estimate the length of the delay beyond the date or time aforesaid make in writing a fair and reasonable extension of time for completion of the works, provided always that the contractor shall use constantly his best endeavors to prevent delay and shall do that may reasonably be required to the satisfaction of the Owner to proceed with the work.

37. Damages for non-completion

1.2. If the contractor fails to complete the works by the date specified in these conditions or within any extended time fixed under clause 39. of these conditions and the Owner certifies in writing that in his opinion the same ought reasonably so to have been completed, the contractor shall pay or allow the owner a sum calculated at the rate stated in the appendix as agreed liquidated damages for the period during which the said work shall so remain or have remained incomplete, the owner may deduct such damages from any monies otherwise payable to the contractor under this contract.

38. Virtual completion and defects liability period

1.1. When in the opinion of the Owner the works are practically completed, he shall forthwith issue a certificate to the effect and virtual completion of the works shall be deemed for all the purpose of this contract to have taken place on the day named in such certificate.

1.2. Any defects shrinkage or other faults which shall appear within the defects liability period stated in the appendix to this condition and which are due to materials and workmanship not in accordance with this contract shall be specified by the Owner in a schedule of defects which he shall deliver to the contractor not less than 14 days after the expiration of the said defects liability period and within a reasonable time of the receipt of such schedule the Defects Shrinkages and other faults therein specified shall be made good by the contractor and (unless the Owner shall otherwise instruct in which case the contract sum shall be adjusted accordingly) entirely at his own cost.

1.3. Notwithstanding sub-clause 42.2. of this condition the Owner may whenever he considers it necessary so to do, issue instructions requiring any defect, shrinkages or other fault which shall appear within the defects liability period named in the appendix to these conditions and which is due to materials and workmanship not in accordance with this contract to be made good and the contractor shall within a reasonable time after receipt of such instructions comply with the same (and unless the Owner shall otherwise instruct in which case the contract sum shall be adjusted accordingly) entirely at his own cost. Provided that no such instruction shall be issued after 14 days from the expiration of the said defects liability period.

1.4. When in the opinion of the Owner any defects shrinkages or other defaults which he may have required to be made good under sub-clause 42.2. and 42.3. of this condition shall have been made good he shall issue a certificate to that effect, and completion of making good defects shall be deemed for all the purposes of this contract to have taken place on the day named in such certificates.

1.5. In no case shall the contractor be required to make good at his own cost any damages which may appear after virtual completion of the work unless the Ownershall certify that such damages is due to injury which took place before virtual completion of the works.

39. Payments withheld

The Owner may withhold or on account of subsequently discovered evidence nullify the whole or a part of any certificate to such extent as may be necessary in his reasonable opinion to protect the owner from loss on account of:

1.1. Defective work not remedied.

1.2. Failure of the contractor to make payments properly to subcontractor or for materials or labour.

1.3. A reasonable doubt that the contract can be completed from the balance then unpaid.

1.4. Damage to another contractor or sub-contractor.

1.5. Claims field on reasonable evidence indicating probable filing of claims.

When the above grounds are removed payment shall be made for amounts withheld because of them.

40. Labour

1.1. The contractor shall employ no child labourunder 14 years of age on the work. If female labour is engaged these hall make necessary provision for safeguarding small children and keeping them clear of the site of operations. No labour shall reside within the compound except authorized guards.

41. Protections of trees and shrubs

1.1. Trees and shrubs designated by the Owner shall be protected from damage during the course of the work and the earth level shall not be changed within three feet of such tree. Where necessary such trees and shrubs shall be protected by means of temporary fencing.

42. Guarantee

1.1. Besides guarantee required elsewhere, the contractor shall guarantee the work in general for one year as noted under clause of the conditions.

1.2. All required guarantees shall be submitted to the Owner by the contractor when requesting certification of accounts for payment by the owner.

43. Arbitrator

1.1. All dispute and differences of any kind whatever arising out of or inconnection with the contract or the carrying out of the works (whether during the progress of the works or after their completion and whether before or after the determination, abandonment or breach of the contract) shall be referred to and settled by the Owner who shall state his decision in writing. Such decision may be in the form of a Final certificate or otherwise. The decision of the Owner with respect of any of the excepted matters shall be final and without appeal. But if either the owner or the contractor be dissatisfied with the decision of the Owner on any matter, question or dispute of any kind (except any of the excepted matters) or as to the withholding by the Owner of any certificate to which the contractor may claim to be entitled then and in any such case either party (the owner or the contractor) may within 28 days after receiving notice of such decision give a written notice to the other party through the Owner requiring that such matters in dispute be Arbitrated upon. Such written notices shall specify the matters which are in dispute and such dispute or difference of which such written notice has been given and no other shall be and is hereby referred to the Arbitration. Final decision of a single Arbitrator to be agreed upon and appointed by both the parties, or in case of disagreement as to the

appointment of a single Arbitrator, to the Arbitration of two arbitrators one to be appointed by each party, which Arbitrators shall before taking upon themselves the burden of reference appoint presiding Arbitrator.

1.2. The Arbitrator, the Arbitrators as the case may be shall have power to open up review and revise any certificate, opinion, decision, requisition or notice save in regard to the excepted matters referred to in clause 55. and to determine all matters in dispute which shall be submitted to him or them and of which notice shall have been given as aforesaid.

1.3. Upon every or any such reference the cost of and incidental to the reference and award respectively shall be in the direction of the Arbitrator or Arbitrators or the umpire as the case may be who may determine the amount thereof or direct the same to be taxed as between Attomeys and clients or as between party and party and shall direct by whom and to whom and in what manner the same shall be borne and paid. This submission shall be deemed to be a submission to Arbitration within the meaning of the Indian Arbitration & Conciliation Act 1996 or any modification thereof for the time being in force, the award of the arbitrator or arbitrator's or the umpire as a case maybe shall be final and binding on the parties such reference except as to the withholding by the Owner of any certificates under clause 49. to which the contractor claims to be entitled shall not be open or entered upon until after the completion or alleged completions of the works or until after the practical cessation of the work arising from any cause unless with written consent of the owner and the contractor. Provided always that the owner shall withhold the payment of an interim certificate nor the contractor except with the consent in writing of the Owner in any way delay the carrying out of the works by reason of any such matters, question or dispute being referred to Arbitration but shall proceed with the work with all due diligence and shall until the decision of the Arbitrator or Arbitrator's or the umpire as the case may be given abide by the decision of the Owner and no award of the Arbitrator or the arbitrator's or umpire as the case maybe shall relieve the contractor of his obligations to adhere strictly to the Owners instructions with regard to the actual carrying out of the works. The owner and the contractor hereby also agree that Arbitration under this clause shall be a condition precedent to any right of action under the contract.

44. Good for Construction (GFC) or Approved for Construction (AFC0 Drawings

Contractor shall indicate the dates on which he requires drawings before starting the work. Contractor shall give a notice of 15 days to Owner/Consultant about the requirement of the drawing/decisions required by him to complete the project as per schedule. It is understood that all the drawings are not required at the beginning of the project for completing the project on time.

Consultant shall forward the drawings to the Contractor. Contractor shall immediately on receipt of 'GOOD FOR CONSTRUCTION' (GFC) drawings, check all specifications (technical specifications and pay item specifications/description) and GFC drawings and shall promptly (within a maximum time limit of three weeks) notify in writing to the Owner of any such omissions or discrepancies in such specifications or drawings.

Any claim/claims, which may result due to non-compliance of the above, shall not be entertained and work, shall be executed/completed at the cost and consequence of the Contractor.

Contractor shall call for the mission information/drawings from the Consultants in the prescribed form (Request for Information (RFI) only. Contractor shall give a time of 10 days to supply such necessary information required by him. Without specific request from the Contractor, about information required, it will be constructed that all the information is available with the Contractor.

Any delay in giving drawings/decisions/approval of samples shall be recorded by the Contractor and specific extension of time to complete the contract shall be given against such delays to the Contractor for completing the project. At the end of each month Contractor shall inform Owner/Owner about such cumulative delays affecting the schedule and obtain confirmation from time to time, Contractor's claim for extension of time will not be granted.

The Owner/Consultant will grant suitable extension in time if there is delay of supplying the information than specified above.

The decision of the Owner/Consultant on the extension of time is binding on the Contractor and will be outside the purview of arbitration

45. Termination

Owner reserves the right to terminate the contract at intermediate stage and charge the Contractor liquidated damages at the agreed rate in case

- Contractor fails to execute the project as per agreed milestones,
- Owner feels that Contractor will not be able to complete the work as per schedule.
- Persistent default in quality of work not as specified and not acceptable to the Owner/Consultant.

No compensation will be granted for such termination of the contract. Contractor shall prepare his final bill within one month of notice of such termination of work is given to him. Contractor shall not prevent another Contractor from moving on to site after such notice is given. Owner shall settle Contractor's bill within 45 days including time required for certifying the bill. Any additional time in settling the bill will attract interest burden at the rate of 12% per annum on the net amount due to the Contractor, as per certificate of Owner.

46. Rates of extra items

All the extra item rates will be settled by the Owner (before starting the work), whose decision will be final in this regard, by deriving them from similar items already quoted in the tender. In case this is not possible, the extra item rates shall be calculated as per the cost of the materials (including taxes and transport and wastage) plus cost of labour plus 20% of cost of materials and labour to cover his overheads and profits. The Owner's decisions in settling the rates of extra items shall be final and binding on the Contractor.

The Contractor shall furnish, on request from the Owner all documents required to justify his claim of rates of non-tender items/extra items, which he may be called upon to carry out.

The Owner will approve all extra item rates. No work shall be carried out unless rate of extra item is approved.

All extra items and their cost implications shall be prepared well in advance. These extra items shall only be executed after written approval from Owner.

47. Retention Money

The proportion of payments retained shall be 6% from each R.A. bill subject to a maximum of 5% of final contract price.

48. Units

In units of schedule of quantities, the abbreviations shall mean following:

Cu. M	=	Cubic Metre	R. M. or R. Mt	=	Running Metre
Sq. M	=	Square Metre	MT.	=	Metric Tonne
Q. R.	=	Quote Rate Only			

Annexure 'A'

QUALITY CONTROL TESTS

(Refer Condition No.7 (vi) on Page No.28)

Sr. No.	Material	Test
1	Laterite Stone	i) Compressive Strength. ii) Water Absorption
2	Trap Metal	i) Crushing value. ii) Impact value. iii) Abrasion value. iv) Water Absorption. v) Flakiness Index & Elongation index vi) Gradation
3	Bricks	i) Crushing Strength. ii) Water Absorption.
4	Flooring Tiles	i) Flexural strength ii) Water Absorption
5	Glazed Tiles	i) Water Absorption
6	Cement	i) Compressive Strength ii) Initial setting time. iii) Final setting time. iv) Specific Gravity v) Soundness vi) Fineness vii) Std. Consistency
7	Steel	i) Weight per meter. ii) Ultimate Tensile stress. iii) Yield stress iv) Elongation v) Bend Test.
8	Interlocking concrete paving block	i) Compressive Strength ii) Fexural Test iii) Resistance to wear
9	Wood work (shutters)	i) End immersion tests ii) Knife test iii) Glue adhesion test
10	Cement Concrete	i) Mix design ii) Compressive strength
11	Structural steel	i) Weight/Running metre

Annexure 'B'

Construction Material Testing & its frequency

(Refer Condition No.7 (vi) on Page No.28)

Sr. No.	Material	Rate	Frequency
1	**CEMENT**		
	1) Consistency 2) Initial & Final Setting time 3) Fineness 4) Specific Gravity 5) Soundness 6) Compressive Strength		Test per 50 M.t. above six tests shall be carried.
2	**METAL**		
a	1) Sieve Analysis (Gradation) (Concrete work)		1 Test for every day work
	2) Sieve Analysis Red Book Specification		1 Test per 100 m^3
	3) Sieve Analysis Granular Sub Base (N.H.Work) MOST		1 Test per 200 m^3
b	Water Absorption		1 Test per 200 m^3
c	Impact (Concrete WBM/BT)		1 Test per 200 m^3
d	Crushing		1 Test per for Each Source
e	Abrasion		1 Test per for Each Source
f	Flakiness & Elongation Index		1 Test per 200 m^3
g	Plasticity Index for blindage used for WBM		1 Test per 25 m^3
3	**SAND**		
	1) Water Absorption & Specific Gravity		1 Test per for Each Source
	2) Fineness Modulus		1 Test per for Each day
	3) Slit Content		1 Test per for Each day work
	4) Bulkage		1 Test per for Each day work
4	**BRICKS**		
	1) Water Absorption 2) Comp Strength 3) Effloresce		For each 50000 Nos bricks Above three test are to be carried out
5	**Flooring Tiles**		
	1) Flexural Strength 2) Water Absorption 3) Abrasion		For 2000 Nos of Tiles above three tests are to be carried out
6	**Glazed Tiles**		
	1) Water Absorption		1 Test- 6 Tiles per 2000 Nos.
7	**Concrete Mix Design**		**1 Concrete Mix Design for each**
	Compressive strength C.C.Cubes for Qty		grade of concrete per every per

Sr. No.	Material	Rate	Frequency
			hour
	Qty. utpo 5 m^3		1 Set (3 Nos.)
	6-15 m^3		2 Set (3 Nos)
	16-30 m^3		3 Set (3 Nos)
	31-50 m^3		4 Set (3 Nos)
	Quantity above 51 m^3		4+1 additional set per 50 m^3
8	**MURUM/ SOIL for earth work**		
	1) Optimum Dry Density		2 Test per 3000 m^3
	2) C.B.R.		1 Test per 3000 m^3
	3) Liquid & Plastic Limit/Plasticity Index		1 Test per 3000 m^3
	4) Filed Density 100% P.D.		1 Test per 3000 m^3
	5) Filed Moisture Content		1 Test per 3000 m^3
9	**WOOD**		
	1) Moisture Content		1 test per Source
	2) Density		1 test per Source
10	**WATER**		
	1) P.H. Value for Water and Sand		1 test per Source
	2) Chloride & Sulphate content		2 test per Source
11	**Steel**		
	1) Wt per meter 2) Ultimate Tensile Stress 3) Yield stress 4) Elogation		One test for every 5.0 MT or part thereof for each diameter

8. ADDITIONAL SPECIFICATIONS

1. The contractor shall achieve that following requirements in respect of quantity of work and his contract rate shall provided for the same.

1.1 ADMIXTURES :-

Whenever necessary the admixture should be used to achieved the required workability. The type of admixture should be got approved from Engineer-in-charge. The rate is inclusive of all admixtures etc. if found necessary.

1.2 CEMENT IN CONCRETE :

For this purpose the conditions mentioned in additional technical specifications from **Page 63** shall be applicable.

1.3 WATER / CEMENT RATIO :

For high quality concrete of low permeability, the water/cement ratio shall be as per IS 456 and mix design, more than 0.45 and preferably 0.40 or less subject to the attainment of adequate workability.

1.4 CURING FOR CONCRETE :

Special attention shall be paid to curing of concrete in order to ensure maximum durability and no minimize cracking. Concrete shall be cured with fresh water whenever it is possible to ensure that the concrete surface can be kept wet despite wind, etc. care shall be taken on avoid rapid lowering of concrete temperatures caused by applying cold water to hot concrete surface (thermal shock) Sea water shall not be used for curing reinforced concrete or prestressed concrete. Where there is doubt about the ability to keep concrete surface permanently wet for the whole of the curing period heavy duty membranes curing compound shall be used.

1.5 CONCRETE COVER TO REINFORCEMENT :

(i) The cover concrete must be of the same quality, impermeability and strength as the rest of the concrete. Special mix design should be carried out for the concrete to be used for making concrete cover blocks.

(ii) The concrete cover must develop sufficient alkalinity, and protect the steel. The alkalinity developed shall not be less than 0.04 N and shall not more than 0.08 N.

(iii) The cover must be uniform throughout and it's thickness shall be exclusive of plaster or other decorative finishes.

(iv) The concrete cover shall be as per the relevant clause of IS codes. In the case of poles the cover thickness shall be separately decided by the University Engineer.

1.6 DETAILING OF MISCELLANEOUS ITEM :

Binding Wires : All ends of binding wires shall be carefully turned inwards so that they do not project out of concrete and start rusting action. Plastic coated galvanised wires shall be used. Wherever possible polythene binding string and polythene bar grips shall be used, after making sure that these do not result in loss of bond or chemical reaction with concrete. The use is subject to approval of Engineer-in-charge.

1.7 BAR SPACING : As per relevant I.S. codes and as detailed design drawing or as directed by Engineer-in-charge.

1.8 HOLLOWS IN CONCRETE: After concreting is complete the concrete surface articularly where there is congestion of reinforcement, shall be tested by light hammering or if possible by Schmidtz hammer. Any portion showing signs of hollowness should be grouted immediately.

2. SPECIFICATION FOR FORMWORK AND STEEL CENTERING :-

1) FORMWORK :-

1.1 Formwork : Formwork shall include all temporary forms of moulds required for forming the concrete which is cst-in-situ, together with all temporary construction required for their support. Unless otherwise stated all formwork shall conform to I.S. Specification.

1.2 Design of Formwork :- Formwork including complete false work shall be designed by the contractor in accordance with I.S.: 2750 (1964), 4041 (1987) and all other relevant I.S. codes without any extra cost to the Government and these shall be got approved from Engineer before any formwork is taken up.

1.3 The contractor shall entirely be responsible for the adequancy and safety for false work not-withstanding any approval or review by the Engineer of his drawing and design. Proprietary system of formwork if used a detailed information shall be furnished to the Engineer for approval.

2) QUALITY OF SHUTTERING :

The shuttering shall have smooth and even surface and its joints shall not permit leakage of cement slurry.

2.1 Ply-board shuttering materials to be used shall be steel shuttering/marine plywood well seasoned free from projecting nails, splits or other defects that may mark on the surface of concrete. It shall not be so dry as to absorb water from concrete, or so green or wet as to shrink after erection. Mild steel plates or plywood shall be used for slab and beam bottoms.

2.2 The timber shall be accurately spawned planed on the sides and the surface coming in contact with concrete.

2.3 So far as practicable, clamps shall be used to hold the forms together. Where use of nails is unavoidable minimum number of nails shall be used and these shall be left projecting so that they can be easily with drawn. use of double headed nails shall be preferred.

3. TOLERANCE :-

3.1 The formwork shall be made so as to produce finished concrete true to shape, lines, levels plumb and dimensions as shown on the drawings, subject to the following tolerance unless otherwise specified in these documents or drawings or as directed by the Engineer :

a) Section dimension = 5 mm

b) Plumb = 1 in 1000 of height

c) Levels = 3 mm before any deflection takes place.

3.2 Tolerance given above are specified for local aberrations in the finished concrete surface and should not be taken as tolerance for the entire structure taken as a whole or for the setting and alignment of formwork which should be as accurate as possible to the entire satisfaction of the Engineer, Errors if noticed in any lift/ tilt of the structure after stripping of forms, shall be corrected in the subsequent work to bring back the surface of the structure to its true alignment.

4. SPECIAL PROVISION :-

Whenever the concreting of thinner members in required to be carried out within shutters of considerable depth, temporary openings in the side of the shutters shall, if so directed by the Engineer be provided to facilitate the puring and consolidation of the concrete. Small temporary openings shall be provided as necessary at the bottom of shutters of walls and deep beams to permit the expulsion of rubbish etc.

5. REMOVAL OF FORMWORK :-

The formwork shall be so removed that it shall not cause damage to concrete. Centering shall be gradually and uniformly lowered in such a manner as to avoid any shock or vibrations. Supports shall be removed in such a manner as to permit the concrete to take stresses due to its own weight uniformly and gradually.

The whole of the formwork removal should be planned and definite scheme of operation shall be worked out. Under no circumstances forms be struck until the concrete reaches a strength of at least twice the stress to which the concrete may be subjected at the time of striking but not before the period as mentioned in IS:456-2000 where ordinary portland cement is used.

6. STEEL CENTERING :-

6.1 Work include :

Erecting steel centering with contractor's material comprising of standard steel adjustable props and standard steel trusses / joists / spans, centering place for bottom of slab and steel plats for bottom of beams etc. of adequate strength properly balanced for obtaining adequate rigidity to with stand all loads coming on it including permanent and temporary fixtures and fastenings etc complete for R.C.C. member like beams slabs and canopy including its removal after the specified period, stacking making good the damaged parts / its replacement before its next use with all leads and lift (all centering material shall be contractor.)

6.2 For R.C.C. works formwork shall be of marine plywood of adequate thickness and grade only. The centering and supporting arrangement such as standard steel trusses/ joists/ spans standards adjustable/ fixed props. H type frames etc shall be designed by the Contractor and approved from the Engineer before commencement of its erection. The Contractor with the prior approval of the Engineer shall use standard steel centering arrangement which may be manufactured by the reputed firm.

6.3 The supporting arrangement designed by the contractor shall conform to the relevant I.S. code and Standard practice adopted in this type of work. The centering arrangement shall be adequately braced and properly secured by using appropriate type of fastenings and fixtures to ensure stability and rigidity of the centering to withstand all loads coming on it. The entire responsibility for design, erection, maintenance and safety etc. will exclusively rest with the contractor. The Engineer reserves right to call detailed design calculations of the entire centering or part there of to verify its stability and also reserve tight to reject entire centering arrangement or part there of and any material used for the centering in the event of which the contractor shall have to arrange for its replacemnet at his own cost.

3. SPECIFICATIONS FOR CONCRETE WORKS :-

(1) DESIGN OF CEMENT CONCRETE MIXES :

(a) All the cement concrete of grade M-15 and higher strength shall be done with proper mix design as per IS : 10262 - 1982 and shall confirm to the durability and other requirements of IS 456 2000. The mix design shall be got approved from the University Engineer from time to time whenever there is change in the source and type of cement and aggregates and change in the gradation of aggregates.

(b) The design of concrete mixes for various concrete items in the work shall be obtained by the contractor at his cost from and approved laboratory. The contractor shall submit in advance details of such design to the Engineer-in-charge for his prior approval.

(c) For concrete of Grade M-25/ M-30/M-35.

Preliminary mix design must be carried out from an approved laboratory, for subsequent changes field mix design shall be acceptable. However incase the University Engineer has got difficulty in acceptance of the field mix design, laboratory mix design shall be got done by the contractor from approved laboratory at his own cost. Cement, find aggregate and coarse aggregate must be used by weight only according to the requirement of the approved mix design.

(d) The concrete mix design shall give target strength of 1.33 times the working strength.

(e) The minimum size of aggregate permissible shall be as per para A-7 of Page - 8 f of standard specification book of 1979 Edition Vol. 1.

(f) The provision of the specification No. B-7 at page - 38 to 40 of Vol. 1 1979 Edition of standard specification book for controlled concrete shall be applicable for all the structural concrete items. The maximum water cement ratio shall be 0.45. The mix design shall be done accordingly.

(g) All the expenses of preliminary mix design, subsequent field/ laboratory mix design, work tests, shall be borne by the contractor.

(2) FROMWORK FOR CONCRETE WORK :

The forms of concrete shall be of the materials as directly by the University Engineer-in-charge and shall preferably be of steel or plywood, Forms shall be of the required shape, profile and lines. Suitable devices shall be used to hold corners, adjacent ends, edges of panel or other forms together in accurante alignment. The forms and joints shall tight enough. Forms used for circular curved or structures of unusual shape, petal dome etc. shall be of such a character that will result in smooth concrete surface and exact shape. They shall be prepared such that they will not warp or distort during erection or while placing concrete. Their design and layout shall be got approved form the University Engineer-in-charge in advance.

(3) ERECTION AND REMOVAL OF FORM WORK :

The centering and strutting shall be of steel or plywood board exclusively for concreting. The design and drawing should be got approved in advance from the Department. For minor members the Engineer-in-charge may, at his discretion, permit use of wooden shuttering. The centering and shuttering shall be close and tight to prevent leakage of cement slurry. The centering shall have the necessary props, bracing and edges sufficiently strong and stable which shall not yield or displace while or after laying of concrete. They shall be made in such way that they can be slackened and removed gradually and slowly without distributing the concrete. Centering and shuttering shall not be removed before the design strength is achieved.

(4) MIXTURE OF CONCRETE :

Design mix concrete as well as nominal mix concrete shall be mixed by following the provision in Standard specification at B. 6.4 unless otherwise directed by the Engineer.

Unless otherwise agreed by the Engineer concrete shall be mixed in a batch type mixer of such other type of mixer as the Engineer my approve.

During hot weather the Contractor shall ensure that the constituent materials are sufficiently cool to prevent the concrete from stiffening in the intervals between its discharge from the mixer and its final position.

(5) TRANSPORTATION, PLACING AND COMPACTION OF CONCRETE :

The method of transportation placing and compaction of concrete shall be followed as per section B.6.6, 6.7 and 6.8 of Standard Specification unless otherwise directed by the Engineer. The compaction shall be done with surface float vibrators for slabs and with pin vibrators for columns and beams. Vibrators of adequate vibrating capacity shall be employed for all types of works.

(6) CURING :

Curing shall be done by following provision of Section B.6.9 of Standard Specification and as directed by the Engineer.

(7) WORKING IN EXTREME WEATHER :

During windy weather sufficient protection shall be provided to prevent the cement from being blown away during the process of proportioning and mixing. During wet weather, the concrete shall be adequately protected as soon as it is placed in position.

No concreting shall be carried out during period of continuous heavy rains unless, it is completely covered during mixing, transporting and placing, In extreme hot weather, concreting shall be restricted to morning and evenings The time between mixing and placing of concrete shall be kept to the minimum and formwork shall be cooled by sprinkling with water.

(8) FINISHING :

Finishing work shall comply with requirement of section B.6.10 of Standard Specification unless otherwise specified herein below :

Immediately on removal of forms, the R.C.C. work shall be examined by the Engineer before any defects are made good.

(a) The work that has sagged or contains honey combing to an extent detrimental to structural safety or architectural concept shall be rejected.

(b) Surface defects of a minor nature shall be rectified generally as indicated below by the contractor.

i) Surface defects which require rectification when forms are removed usually consist of bulges due to movement of forms, ridges at form joints, honeycombed areas, damage resulting from the stripping of forms and bolt hole. Bulges and ridges shall be removed by careful chipping or tooling and the surface is then rubbed with a grinding stone. Honey combed and other areas shall be chipped out, the edges being cut as straight as possible and perpendicular to the surface, or preferably slightly under cut to provide a key at the edge, of the patch. Bolt holes shall be closed by cement mortar to ensure thorough filling.

ii) Shallow patches shall be treated with a coat of thin grout composed of one part of cement and one part of sand and then filled with mortar similar to that used in concrete. The mortar is placed in layers not more than 10 mm thick and each layer shall be given a scratch finish to secure bond with the succeeding layer. The last layer shall be finished to match the surrounding concrete by floating, rubbing or tooling on formed surfaces by pressing the form material against the patch while the mortar is still plastic.

iii) Large and deep patches requires filling up with concrete held in place by forms. Such patches shall be reinforced and carefully dowelled to the hardened concrete.

iv) The same amount of care to cure the material in the patches shall be taken for the whole structure. Curing shall be started, as soon as possible after the patch is finished to prevent early drying. Damp Hessian cloth may be used. But in some locations it may be difficult to hold it in place, a membrane curing compound in these cases will be most convenient.

(9) CONSTRUCTIONS JOINTS :

Construction joints shall be provided and treated following the provisions of Specification and as directed by the Engineer-in-charge.

(10) DURABILITY :

Minimum cement contents for different exposures and sulphate attack are given in Tables 4 and 5 o I.S. 456, 2000 shall be followed for design mix.

(11) TESTS AND STANDARD OF ACCEPTANCE :-

11.1 Tests and Standard of acceptance criteria of design mix concrete and nominal mix concrete shall be as follows:

Sampling and testing of Concrete shall be done as per provision of section B.6.12 of Standard Specifications. Acceptance criteria for strength of concrete shall be as per IS 456-2000.

Case falling outside the above limit shall be examined by the Engineer on Merits in each case.

11.2 DEFECTIVE CONCRETE :

Any concrete which gives substandard results, or is severely damaged due to cracking or shows excessive honey combing and exposure of reinforcement, if exhibits any fault which in the opinion of the Engineer, seriously impairs its function, may be declared as defective concrete. Such non acceptable concrete shall be removed from the site and replaced by fresh concrete of the specified quality by the contractor at his own expenses. Alternatively in case of acceptable concrete, the Contractor shall carry out whatever other remedy the Engineer may reasonably suggest "Small rendering shall be done by the Contractor without extra cost."

(12) KEEPING RECORDS :

The record of mix design, mixing, slum, testing of C.C. cubes etc. shall be maintained in accordance with Section B-6.13 of the Standard Specification.

LIST OF APPARTUS REQUIRED FOR BUILDING WORK

Sr. No.	Name of Apparatus	Nos (min) required
1.	30 m and 50 m chain/ tape	2 Nos
2.	Automatic leveling instrument/ Tachometer with all accessories like 5.00 metre staff	2 Nos.
3.	Vernier calipers	1 No.
4.	Cube moulds for concrete/ Cube moulds for cement mortar	6 Sets
5.	Silt jar for sand silt testing.	4 Sets
6.	Oven- Electrically operated, thermostatically controlled, range upto 200 ^{0}C sensitivity 1^{0}C.	1 No.
7.	Platform balance 300 kg capacity	
8.	Balance 20 kg capacity - self indicating type	1 No.
9.	Electronic Balance 5 kg capacity, accuracy 0.5 gm	2 Nos
10.	Water bath- electrically operated and thermostatically controlled with adjustable shelves, sensitivity 1^{0}C.	1 No.
11.	Thermometers : Mercury-in-glass thermometer, range 0^0 to 250^{0}C Mercury-in-steel thermometer with 30 cm stem, range upto 300^{0}C.	4 Nos.
12.	Kerosene or gas stove or electric hot plate.	1 No.
13.	Set of IS sieves with lid and pan: 450 mm diameter 63 mm, 53 mm, 37.50 mm, 26.50 mm, 13.20 mm, 9.50 mm, 6.70 mm, and 4.75 mm size 200 mm diameter 2.36 mm, 2.0 mm, 1.18 mm, 600 micron, 425 micron, 300 micron, 150 micron, and 75 micron	1 Sets 2 Sets
14.	Water testing Kit	1 Set
15.	Atterbergs Limits (liquid and plastic limits) Determination apparatus	1 Set
16.	Dry Bulk Density Test apparatus (sand pouring cylinder, tray, can etc.).	1 Set
17.	Speedy Moisture Meter complete with chemicals	1 Set
18.	Aggregate Impact Value Test apparatus/ Los Angles Abrasion Test apparatus.	1 Set

Sign & Seal of Contractor **Corrections** **University Engineer**

Sr. No.	Name of Apparatus	Nos (min) required
19.	Flakiness and Elongation Test Gauges	1 Set
20.	Vicat apparatus for testing setting times	1 Set
21.	Slump testing apparatus	4 Sets
22.	Compression and Flexural strength testing machine, 200 tonne capacity with additional dial for flexural testing.	1 No.

9. QUALITY ASSURANCE AND MAINTENANCE

To ensure the specified quality of work which shall also include necessary surveys, temporary works etc., the contractor shall prepare a quality assurance plan and get the same approved from the **University Engineer** within eight days from the date of work order. For this, contractor shall submit an organization chart of his technical personnel to be deployed on the work along with their qualification, job descriptions defining the functions of reporting, supervising inspecting and approving. The contractor shall also submit a list of tools, equipment's and the machinery and instrumentation which he proposes to use for the construction and for testing in the field and/or in the laboratory and monitoring. The contractor shall modify/supplement the organization chart and the list of machinery, equipment etc. as per the direction of the University Engineer and shall deploy the personnel and equipment on the field as per the approved chart and list respectively. The contractor shall submit written method statements detailing his exact proposals of execution of the work in accordance with the specifications. He shall get these approved from the **University Engineer**. The quality of the work shall be properly documented through certificates, records, check-lists and logbooks of results etc. Such records shall be complied from the beginning of the work and be continuously updated and supplemented and this shall be the responsibility of the contractor. The forms should be got approved from the **University Engineer-in-charge**.

The contractor shall prepare detailed completion drawings after completion of the work. He shall also prepare and submit a maintenance manual giving procedure for maintenance, with the period of maintenance works including inspections, tools and equipment to be used, means of accessibility for all parts of the structure. He shall also include in the manual, the specifications for maintenance work that would be appropriate for his design and technique of construction. This manual shall be submitted within the contract period.

EXTENSION WORK OF POST GRADUATION DEPARTMENT BUILDING FOR SHREEMATI NATHIBAI DAMODAR THACKERSEY WOMEN'S UNIVERSITY, PUNE CAMPUS.

VOLUME – II

(Technical Specifications)

MODE OF MEASUREMENTS

Note: The approved excavated earth shall be spread evenly in layers of 23 cm. inside the building plinth areas as indicated properly watered and rammed and the rate for this shall be included by the contractors under the excavation item. This item of work shall not be measured separately and paid for.

The methods of measurements for various items in the tender shall be generally in accordance with the I.S. 1200 (latest revision) subject to the following: -

The decision of the ARCHITECT / OWNER regards the interpretation of the mode of measurements shall be final and binding on the contractor.

EXCAVATION:

Note: It shall be measured in cubic metres. The pit sizes exactly as per the drawings shall be measured. If the actual pit is dug to sizes more than what are mentioned in the drawings for whatever reasons, the extra excavation will not be measured, unless allowed by architect (see last sentence). Also, the contractor will have to make good the extra excavation by filling earth, metal or concrete as is recommended by the structural consultant at his own cost. No deduction for volume of rock depots (refer "extra for rock cutting") shall be done, as the item of rock cutting is extra over item no. 1.01. In case of demolishing foundations, additional excavation may be allowed by the architect at his discretion.

a) Footings: Areas of excavation for footings shall be measured equal to the areas of the lowest concrete course as shown on the drawing. Depth shall be measured vertically from ground level to bottom of concrete course OR dry rubble packing as the case may be.

b) Plinth beams: Depth of excavation for plinth beam shall be measured from ground level up to bottom of beam and width of beam. If a leveling course is ordered it shall be measured up to and bottom of the leveling course.

c) Where excavation is made in trenches, measurements for cutting shall be taken by means of tape and staff and the width of concrete or rubble packing as shown on the drawing shall be considered as width of excavation.

d) Where excavation is made for leveling the site, levels shall be taken before start and after completion of work and total quantity of excavation computed from these levels in a manner approved by the consultant.

e) Where soil including soft rock and hard rock are mixed, hard rock after excavation shall be stacked separately measurement of the entire excavation

shall be taken as indicated above.

f) **Extra for rock cutting:** the quantity shall be measured in cubic metres only that rock which requires chiseling or blasting will be measured. The contractor shall stack the rock so obtained from excavation in a heap. The measurement for rock shall be by levels only. Before excavating in ROCK, levels of excavation have to be jointly recorded by the contractor and the site engineer, without joint measurements the excavation shall not be classified as HARD ROCK.

EARTH & MURRUM FILLING:

a) Owner's earth: - If asked to fill from the approved excavated stuff refer note on the top.

b) In open spaces: With murum brought from outside and from the client's earth lying on the property.

Filling shall be measured from cross sections of embankments, levels of which are recorded by means of levels before start of work and on completion of work. When it is not possible to measure filling from cross sections, it may be measured from loose stacks or lorry measurements with previous written permission from the consultant and 25% deduction shall be made from the measured quantity to arrive at the net quantity payable.

Watering and consolidation shall not be paid separately and shall be included in the rate of filling.

P.C.C. IN FOUNDATION

Shall be measured exactly as per the drawing. If the area of pit actually dug is more than the area of P.C.C shown in the drawing, the contractor shall do formwork to lay

P.C.C. as per the drawing and he shall bear the cost of this formwork. The P.C.C. for foundations shall be measured in Cu.M.

DRY RUBBLE SOLING / RUBBLE PACKING*:*

This shall be measured in square metre of the area covered.

BRICK MASONRY:

The brick walls wider than one brick length shall be priced per unit of Cu.M. and for all brickon- edge, half brick walls or full brick wide masonry shall be priced per unit of Sq.M.

The measurement shall be their full heights (upto the soffit of the slab or beam as the case may be), lengths (excluding the columns) and thickness.

Deductions for all openings, recess and lintels shall be made except for the following:

a) Such voids and openings that measure less than 0.1 sq.mt. in area on the surface and also templates, ends of beams joints etc.
b) Posts and wall plates which do not take up the entire thickness of the walls.

No extra shall be allowed for openings and recesses mentioned in the deductions above.

Measurement of brickwork in arches including flat arch shall be along with the brickwork of specified thickness.

The measurement of all brick cornices, architrave, bands etc., shall be measured in running meter.

The measurement of brick on edge coping of specified thickness shall be in Sq.m. on plan.

No extra shall be allowed for RCC stiffeners as specified in the bills of quantities.

RUBBLE MASONRY:

Except where otherwise described, stone work and stonewalling generally shall be given in cubic metres. And facia works in Sq.M.

When measuring walls, the thickness shall be measured to the nearest one mm.

Deductions shall be made as described under brickwork.

PLASTER:

Neeru finished and sand-faced plaster:

Rate for external plaster included for all heights.

Plastering on brick and concrete surface shall be measured in Sq.M. of the superficial area plastered.

No extra shall be allowed for beaded, chamfered or rounded arises or curved angles.

No deductions shall be made for opening less than 0.1 Sq.M. and the measurements of the plastered jambs shall not be added. Deductions for openings taken on the plastered surface shall be made on both the sides and the measurements of the plastered jambs added.

No extra coefficient for external plaster.

The measurement of all cornices, string courses and such mould work, which shall be of sections as per drawing including finish, shall be taken in running Metre. along with the wall and shall be inclusive of the core.

The rate for plasterwork shall include the jari finishing between the skirting tile and the plasterwork, or dado work and the plasterwork. No extras shall be allowed for the jari work.

FLOORING, SKIRTING, DADO:

The measurements of laying tiles, stones or patent stone to floors and wall dados shall be in the Sq.M. of actual areas covered. Areas less than 0.1 Sq.M. shall not be deducted. The measurements of floor of flooring shall be in Sq.M. taking horizontal measurement between sidewalks after the completion of the job and measurement of dados shall be in Sq.M. of the area of the wall covered (length into height).

Bedding and backing shall be included in rate of that particular item and shall not be measured separately.

CARPENTRY & JOINERY:

Carpenter and joiner's work shall be of the material including glazing and hardware and finish as mentioned in the bill of quantities.

All scantlings of shapes other than rectangular, which are intended to be measured in cu.mt. shall be measured as the smallest rectangular prism from which each separate piece of such scantling could be cut.

In all carpenters and joiners work an allowance of 1.5 mm on the specified size shall be made for each planned surface.

The measurement of all posts, beams joints and other scantlings shall be taken overall including tenons laps, joints and bearing. They shall be measured in cubic mt. Portions embedded in masonry or concrete or flooring shall not be measured separately.

Doors, windows & fanlights:

These shall be as per drawing and specifications mentioned in the bills of quantities. The measurements of joints, cills transoms and frames of doors and windows shall be measured along with the items specified. Horns beams and holdfasts as specified or shown on the drawings shall not be measured or paid for. The complete item work of door, window and fanlight shall be clear measurements in square metre of the opening after the entire completion of the job.

The measurements of doors with steel framing shall be in Sq.M. of the area of the door including the framework. Rate shall include for steel frame as shown on the drawing.

The measurements of doors, windows etc., with curved outline in elevation shall be of the full enclosing rectangle.

Those curved in plan shall be measured in Sq.M. with their extreme girth in width and height.

The rate per Sq.M. of doors windows, fanlight etc. shall be inclusive of the cost of fixtures and fittings including labour charges for fixing.

Cover Moulding:

His shall be of the shape and size as mentioned on the drawings and shall be measured in running mt. And no deductions shall be made for notching or skew cuts.

The measurements if skirting to walls shall be in running / Sq.M. and shall be measured along the length of the wall.

The measurement of treads and risers shall be in running / Sq.M. and shall be the clear visible dimensions, neglect the bearings etc., in plaster or masonry.

Partitions:

These shall be in Sq.M. including the framework. The rate to include for the entire work as mentioned in the bills of quantities including fixing the glass. The area of partition shall equal dimensions from the out-to-out of the frame dimensions. If doors are paid separately, the area of doors shall be deducted from the area of partitions.

Handrail

This shall be measured in running metre including bends and rounds. **Wall paneling:**

This shall be as per the specifications and shall be measured in Sq.M. of the actual area covered. The rate of include wall paneling its framework.

STEEL DOORS, WINDOWS, VENTILATORS & LOUVERS:

Clear width between side jambs and clear height between sill / floor and bottom of lintel / beam shall be measured. Hold fasts or portions embedded in masonry or flooring shall not be measured. The measurements shall be in Sq.M or per NO. as specified in the Bill of Quantities.

GLAZING:

Shall be measured in Sq.M.

FALSE CEILING:

The false ceiling or suspended ceiling shall be measured in Sq.M. of the total area covered, excluding bearings, if any. The rate to include for the necessary cradling

work and suspension work as mentioned in the bills of quantities. Deductions for light fixtures and air conditioning grills shall not be made.

WATER PROOFING:

TOILETS

The measurement of waterproofing to toilet blocks shall be the area of the floor treated with brickbat coba. (The area of the wall treated with waterproof cement plaster upto 600mm from top of the COBA shall be included in the same rate and shall not be measured separately). The measurement shall be in Sq.M. (Internal wall to wall area only shall be measured)

The area of waterproof plaster above 600 mm from top of the COBA shall be measured separately under WATERPROOF plaster.

TERRACE WATERPROOFING:

The measurements of waterproofing including the brick bat coba shall be total area of the **(length and breadth between the parapet walls)** treated surface excluding the area of the parapet treated with waterproofing. (No extra shall be paid for the VATA) The measurement shall be in Sq.M.

PAINTING:

External painting:

All external painting shall be measured plain. There shall be no extra coefficient for uneven surfaces / different types of plaster in the external plaster.

Contractor shall include the impact of such coefficient in his rate.

Internal Painting:

All internal painting shall be measured plain. There shall be no extra coefficient for uneven surfaces in the internal plaster or unfinished / or form finished concrete. Contractor shall include the impact of such coefficient in his rate.

Painting to other members:

All painting work shall be measured in square meter.

Net area of the surface painted shall be measured. No deductions will be made for unpainted surfaces of ends of joists, beams, posts, etc. and openings not exceed 0.5 Sq.M. each and no addition shall be made for reveals jambs, soffits, sills, etc., of these openings.

No.	Description of Work	How measured	Multiplying Factor
1	Paneled, framed, braced	Measured flat (not girthed) including frames, edges, chamfers, cleats, etc. shall be deemed to be included in the item.	1.30 (for each side)
2	Flush, part aneled and part glazed or gauzed	Measured flat (not girthed) including frames, edges, chamfers, cleats, etc. shall be deemed to be included in the item.	1.2 (for each side)
3	Fully glazed or gauzed or glazed louvered ventilators	Measured flat (not girthed) including frames, edges, chamfers, cleats, etc. shall be deemed to be included in the item.	0.8 (for each side)
4	Fully Venetian or louvered (not with glazing)	Measured flat (not girthed) including frames, edges, chamfers, cleats, etc. shall be deemed to be included in the item.	1.8 (for each side)
5	Weather boarding	Measured flat (not girthed). Supporting framework shall not be measured separately.	1.2 (for each side)
6	Trellis (not Jaffri) work one way or two way	Measured flat overall. No deductions shall be made for opening (supporting members shall not be measured separately)	1 (for each side)
7	Guard bars, balustrades, gratings, grills, railing, grill doors, grill partitions, etc.	Measured flat overall. No deductions shall be made for opening (supporting members shall not be measured separately)	1 (for painting all over)
8	Gates and open palisade fencing including standard braces, rails, stays, etc.	See note below	1 (for painting all over)
9	Carved or enriched work	Measured flat	2 (for each side)
10	Steel rolling/alligator type shutters	Measured flat over jambs, guides bottom and locking arrangement, etc. shall be deemed to be included in the item	1.1 (for each side)
11	Fully glazed or gauzed	Measured flat	1.0 (for all over)
Note: The height shall be taken from the bottom of the lowest rail, if the palisades do not go below it (or from the lower end of palisades if they project below the lowest rail) up to the top of palisades, but not up to the top of standards, if they are higher than the palisades; similarly for gates depth of roller shall not be considered while measuring the height.			

MEASUREMENTS OF CONCRETE ITEMS

Plain & reinforced, ordinary & controlled concrete:

The cement concrete items under various heads shall be measured to the exact dimensions, as per the drawings or the works executed under the orders of consultants or RCC specialist. The thickness of plaster finishing shall not be taken into account in measurements.

The rate for any particular item shall include all materials including all materials including all the concrete mixed as per the specifications and placing in position, and curing the concrete work, including all necessary centering shuttering and framework. The steel reinforcement shall be measured and paid for separately.

Concrete shall be measured a executed; no deduction shall be made for the following:

1) Volume of any steel embedded in concrete.
2) Voids not exceeding point one 0.10 Sq.M. in areas measured and point one 0.10 cubic meter in volume measurement.

LEAN CONCRETE:

Lean concrete shall be measured in cubic metre to the exact dimension as shown on the drawings. The depth of lean concrete shall be the difference in levels, before and after pouring the lean concrete in place. Measurements for filling in the pockets are approved if filled as per the instructions of the consultant.

FOOTING & PEDESTALS:

a) Footings: shall be measured in cubic metre. And shall be the sum of the straight and the sloping portion. The straight portion shall be the product of the area into the area into the height and the clopping portion shall be calculated by the trapezoidal formula.
   H / 3 (A1 + A2 + SQRT (A1 A2))

b) Pedestals: Shall be measured in cubic metre being the product of the area of the cross-section multiplied by the heights measured from the top of the footings upto the top of the floor concrete.

WALL

Concrete walls 23 cm and over in thickness shall be measured in cubic mt. Only such voids which measure more than 0.10 Sq.M. shall be deducted. The length of the wall shall be measured from top of the floor to the bottom of the ceiling or beams or beams as the case may be.

SLAB

Slab upto and including 230 mm shall be measured in cubic metre. The measurements of slabs shall be the area including bearing: no deductions shall be made for the portion of the slab which forms parts of the beam below (T beam or

L beam) or above (inverted beams). The openings are less than 0.1 Sq.M. shall not be deducted. Where the thickness of the slab changes, the length or width of the slab shall be measured from the center of the beam concerned. No extra shall be paid for the cantilever slabs.

FLOOR BEAMS

These shall be measured in cubic metre being the product of:

a) The length between the faces of the supporting beams of columns or the length including the bearings.
b) The breadth of the beam projecting below the slab and
c) The height or depth (average if verifying) projecting below the underside of the slab.

In case of inverted floor beams the product is of:

a) The length from column face to column face
b) The breadth of the stem projecting above slab and
c) The height or depth projecting above the top slab.

No extra shall be paid for cantilever beams. **LINTELS**

Lintels shall be measured in cubic metre and shall be the product of length, including the bearings and the cross-sectional area.

BANDS

Concrete bands of specified thickness shall be measured in Cu.M. The width shall be considered including its bearings in the masonry.

M. S. REINFORCEMENT:

The rates for M.S. reinforcement at any height shall include for the labour for cutting, hooking, cracking, placing in position and binding with binding wire complete.

The rate for M.S. reinforcement shall include for the binding wire, which will not be measured and paid for. Wastage will not be measured and paid for. Authorized overlaps only will be measured and paid for. Laps required because of the contractor's use of shorter bars will not be paid for. The chairs, spacers, pins etc will not be paid for. The contractor shall include the cost of them in his unit rate of item.

Reinforcement shall be measured in metric tonne.

STRUCTURAL STEEL WORK:

As per I.S.I. mode of measurement.

The steelwork shall be measured by weight except otherwise mentioned.

Unless otherwise specified, weight of cleats, brackets, packing pieces, bolts, nuts, washers, distance pieces, separators, diaphragm, gussets (taking overall rectangular dimensions), fish plates, etc, shall be added to the weight of respective items. In riveted works, allowance is to be made for weight of rivet heads. No deduction shall be made for rivet or bolt holes (excluding holes for anchor or holding down bolts). Deduction in case of rivet or bolt hole shall however be made if its area exceeds 0.02 m2 and for notch if its area exceeds 0.50 m2. For other types of openings like holes for service pipe etc, deduction shall be made if its area exceeds 0.1 m2.

ANTITERMITE TREATMENT:

The mode of measurement for payment to contractors shall be on the basis of plinth area of ground floor only.

APPROVED MAKES OF MATERIALS- CIVIL

NOTE :

1. All materials shall be of first quality as produced by the manufacturer. This is particularly applicable to glazed and ceramic tiles, paints and sanitary fittings.

2. In case it is established that brands specified below or not available in the market or the delivery period is too long; equivalent brands may be used after approval by the Architects, in which case contractor shall produce all necessary documents such as catalogs, certificates etc., to prove their suitability.

3. Approved samples shall be kept at site in the office of the clerk-of-works.

4. Where specifically called for, warranties shall be obtained from the manufacturers in favor of the owner.

No.	MATERIAL	APPROVED MAKE / BRAND
1.	Cement (53 grade)	Ultratech, A.C.C., Birla shakti, Ambuja
2.	Cement (43 grade)	Ultratech, A.C.C., Birla shakti, Ambuja
3.	**PPC**	Ultratech, A.C.C., Birla shakti, Ambuja
4.	White cement	Birla, J.K.
5.	Putty	Birla White / JK White
6.	Cement and mixtures (Plasticizers hardness, retardant etc.)	Fosroc, Sika qualcrete, Bauchemie
7.	High yield strength deformed bar	As specified, make Rajouri / Kalika / Rajlakshmi
8.	Steel Sections	Jindal, Hindustan & Tata.
9.	Anti termite treatment	Dursban (TC) (Chlorpyifos 20% EC)
10.	Glazed tiles	1st quality Nitco / Kajaria / Johnson / Euro or equivalent.
11.	Ceramic Tiles	Kajaria / Nitco/ Euro / Johnson

No.	MATERIAL	APPROVED MAKE / BRAND
12.	Kotah / Granite / Rough Shahabad flooring stone	Export Quality / As approved.
13.	Katni Marble	Export Quality / As approved.
14.	Flush Doors	Anchor, National, Tower, Classic
15.	Commercial Plywood	Anchor, Euro, National, Century,Greenply.
16.	Marine Plywood	Anchor, Euro, National, Century,Greenply.
17.	PVC Doors	Eureka / Sintex / Rajashree
18.	Laminates	Formica, Royal Touch, Marino, Greenlam
19.	Aluminium Sections	Jindal, Hindalco
20.	Glazing (Float Glass)	Modi Float, Triveni, Asahi, Saint Gobain
21.	SPIDER FITTINGS	Delco, Dorma, or equivalent.
22.	Floor springs/ Lock patch	Enox, Hardwyl,
23.	Silicon	dowcorning, Ge make
24.	Waterproofing Compounds	Dr.Fixit.,Pedilite, Impermo.
25.	Paints	Asian / Berger / Nerolac / Dulux
26.	Waterproof cement paint	Snowcem
27.	Asbestos Roof Sheets	Everest, Charminar
28.	Expansion bolts	Fischer / Hilti
29.	Acp work (elevation treatment)-fittings	Euro bond, Timex
30.	Vitrified tiles	Kajaria / Nitco/ Euro / Johnson
31.	Light Weight Bricks	Ecolite, U-crete, Ultratech, Flyo-crete.
32.	Gypsum –finished item	Gypsum india,
33.	Metacolour sheet	Tata, CRIL

STANDARDS OF CEMENT CONSUMPTION

Sr. No.	Item	Unit	Requirement in bags
	PLAINT CEMENT CONCRETE		
1.	Cement concrete (1:2:4)	Cum.	5.84
2.	Cement Concrete (1:3:6)	Cum.	4.05
3.	Cement Concrete (1:4:8)	Cum.	3.20
4.	Cement concrete (1:5:10)	Cum.	2.52
	REINFORCED CEMENT CONCRETE (as per mixed design)		
5.	Cement concrete M-15	Cum	Minimum As per IS Code / Design Mix
6.	Cement concrete M-20	Cum	Minimum As per IS Code / Design Mix
7.	Cement concrete M-25	Cum	Minimum As per IS Code / Design Mix
8.	Cement concrete M-30	Cum	Minimum As per IS Code / Design Mix
9.	Cement concrete M-35	Cum	Minimum As per IS Code / Design Mix
	BRICK WORK		
10.	B.B. Masonry in C.M. 1:6	cum.	1.44
11.	B.B. Masonry in C.M. 1:8 proportion	Cum.	1.13
12.	Half brick masonry in C.M. 1:3 proportion	Sqm.	0.17
13.	150 mm thick brick masonry	Sqm.	0.22
	MASONRY		
14.	U.C.R.S. Masonry in C.M.1:6 proportion	Cum	1.77
15.	C.R.S. Masonry in C.M. 1:5 proportion	Cum	1.80
16.	C.R.S. masonry in C.M. 1:6 proportion	Cum	1.50
	DAMP PROOF COURSE		
17.	Providing & laying damp proof course 50 mm thick in (1:2:4)	Sqm.	0.35
18.	Finishing the terrace slab 20 mm thick in C.M. thick in 1:3 proportion	Sqm.	0.20
19.	Providing water proofing to W.C. and bath	Sqm.	0.276
20.	Providing water proofing in W.C. and bath including brick bat coba.	Cum.	4.00
21.	Box Type Water proofing	Sqm.	0.50
	PLASTERING		
22.	Providing internal cement plaster 6 mm thick single coat in C.M. 1:4	Sqm.	0.045
23.	Providing internal cement plaster 6 mm thick single coat in C.M. 1:3	Sqm.	0.07
24.	Providing cement plaster 12 mm thick in single coat in C.M. 1:5	Sqm.	0.08
25.	Providing cement plaster 12 mm thick in single coat in C.M. 1:4	Sqm.	0.10

Sr. No.	Item	Unit	Requirement in bags
26.	Providing cement plaster 12 mm thick in single coat in C.M. 1:3	Sqm.	0.12
27.	Providing cement plaster 20 mm thick in single coat in C.M. 1:3	Sqm.	0.19
28.	Providing cement plaster 20 mm thick in single coat in C.M. 1:5	Sqm.	0.13
29.	Providing cement plaster 20 mm thick in single coat in C.M. 1:5 proportion	Sqm.	0.13
30.	Providing cement plaster 20 mm thick in single coat in C.M. 1:4 proportion	Sqm.	0.15
31.	Providing cement plaster 20 mm thick in single coat in C.M. 1:3 proportion	Sqm.	0.19
32.	Providing cement plaster 25 mm thick in two coat in C.M. 1:4 proportion	Sqm.	0.22
33.	Sand faced plaster in two coats	Sqm.	0.22
34.	Rough cast plaster in two coats in C.M. 1:4 proportion	Sqm.	0.22
35.	Providing flush groove pointing in C.M. 1:3 for brick work	Sqm.	0.03
36.	Providing flush groove pointing in to stone masonry in C.M. 1:3 proportion	Sqm.	0.025
37.	Providing tuck pointing with C.M. 1:3 prop	Sqm.	0.05
38.	Providing vee pointing for stone masonry in CM 1:3	Sqm.	0.03
39.	Providing fine finish 1.5 mm, thick over green surface	Sqm.	0.044
	PAVING, FLOORING FINISHING AND DADO		
40.	Providing and laying R.S.H. flooring 25mm to 30mm on bed of 1:6 C.M. and pointing C.M. 1:3	Sqm	0.135
41.	Providing and laying R.S.H. flooring 40mm to 50mm on bed of 1:6 C.M. and pointing C.M. 1:3	Sqm	0.14
42.	Providing and laying R.S.H. flooring 50mm to 60mm on bed of 1:6 C.M. and pointing C.M. 1:3	Sqm	0.150
43.	Providing and laying polished Shahabad stone flooring 25mm to 30 mm thick on bed 1:6 proportion	Sqm.	0.13
44.	Providing and laying polished Tandur stone flooring 25mm to 30 mm thick on bed 1:6 proportion	Sqm.	0.130
45.	Providing and laying polished Kotah stone flooring 25mm to 30 mm thick on bed 1:6 proportion	sqm.	0.130
46.	Providing and laying skirting and dado of polished Shahabad stone 25mm to 30 mm with 1:4 C.M.	Sqm	0.18

Sr. No.	Item	Unit	Requirement in bags
47.	Providing and laying skirting of polished Tandur stone 25mm to 30 mm with 1:4 C.M.	Sqm.	0.18
48.	Providing & laying C.C. flooring 40 mm thick with C.C. 1:1½:3	Sqm.	0.36
49.	Providing & laying C.C. flooring 50 mm thick with C.C. 1:1½:4	Sqm.	0.44
50.	Providing and laying flooring of plain cement tiles of 25 x 25 mm on bed for flooring	Sqm.	0.15
51.	Providing and laying plain cement tiles for dado and skirting 1:4 proportion	Sqm.	0.18
52.	Providing and laying coloured tiles 25 x 25 mm size	Sqm.	0.15
53.	Providing and laying for coloured tiles for dado skirting	Sqm.	0.18
54.	Providing and laying white glazed tiles for flooring	Sqm.	0.22
55.	Providing and laying glazed tiles for dado and skirting	Sqm.	0.21
56.	Providing and laying gray cement base mosaic tiles for flooring 25 x 25 cm	Sqm.	0.15
57.	Providing and laying for dado and skirting cement base mosaic tiles 25 x 25 cm	Sqm.	0.18
58.	Providing and laying machine cut white Makrana flooring	Sqm.	0.17
59.	Providing and laying is situ marble mosaic tiles 10 mm thick		
	Gray Cement	Sqm.	00.200
	White Cement	Sqm.	0.130
60.	Providing and laying is situ dado tiles 10 mm thick		
	Gray Cement	Sqm	0.20
	White Cement	Sqm	0.08
61.	Providing & laying required position flooring of broken china	Sqm.	0.30
62.	Providing and laying polished shahabad stone 25 mm to 30 mm thick for tread and riser	Sqm.	0.18

A) TECHNICAL SPECIFICATIONS FOR THE PLUMBING & SANITATION

1.1 COMPLETENESS OF CONTRACT:

1.1.1 If there is any description between specification BOQ, drawings, more straight would be allow.

1.1.2 Contractor shall be deemed to have carefully examined the specifications, general conditions and tender drawings, etc. and to have fully assessed and have satisfied himself as to the nature and character of the work to be executed, site conditions and other relevant matters and details.

1.1.3 Contractor shall provide all item whether specifically mentioned or not but which are usual or require to make a complete working system and ensure safe and satisfactory operation, apparatus, appliances, with the intent or purpose of these specifications. In case of doubt or doubts, the tenderer shall clearly point out his understanding of the specifications, before award of contract.

1.1.4 Contractor shall study the site conditions before tendering and shall satisfy himself before submitting his Tender as to the nature of the ground and subsoil, form and nature of the site, the hydrological, climatic and physical conditions at the site the quantities and nature of the work and the materials necessary for the completion of the work, the means of access to the site, the proneness of site to floods as found in the past also the accommodation required by him, and in general, shall himself obtain all necessary information as to the risks, contingencies, and other circumstances, which may influence of affect his Tender. The contractor has to include for all requirements such as scaffolding, making opening, grouting, welding jointing materials, gaskets, nuts & bolts, screws, paintings, including making good the opening and chases in walls, slabs, etc. in the price quoted.

1.1.5 Unless otherwise agreed in writing, the specifications, drawings and general conditions etc. form the contract documents and all clauses and conditions specified by the contractor stands null and void.

1.1.6 The quantities mentioned hereinafter are approximate and subject to variation without violating the contract.

1.1.7 Contractor has to provide special fittings like safety valves, pressure gauges etc, as necessary and should specify the Brand names and rating offered as part of the prices quoted.

1.2 REFERENCES:

1.2.1 References to standards, codes, specifications, recommendations shall mean the latest edition of such publications adopted and published at date of invitation to submit proposals.

1.3 DRAWINGS AND LITERATURE :

1.3.1 Before proceeding with the work, the Contractor shall submit for approval general layout and working drawings as are necessary to demonstrate fully that all parts of the materials to be furnished will conform to the specifications.

1.3.2 Within 15 days of acceptance of the Tender, the Contractor shall furnish three (3) prints of layout, assembly and erection drawings for approval. If any modifications are proposed by the Owner/Consultant, three further prints of the modified drawings shall be submitted. No modifications shall be made in a drawing after it has been approved by the Consultant / Owner, without prior consent.

1.3.3 Approval by the Owner / Consultant of the drawings shall not relieve the Contractor of any part of his obligation to meet all the requirements of the Contract or the responsibility for and pay for all alterations to the works due to discrepancies or omissions in the drawings or other particulars supplied by him, whether such drawings have been approved or not.

1.3.4 After execution of works, contractors shall furnish a set of original tracings of as-built drawings incorporating the modifications if any during execution.

1.4 INSPECTION & TESTING – AT CONTRACTOR'S PREMISES :

1.4.1 Owner or its authorized representatives shall have full power to inspect drawings of any portion of the work or examine the materials and workmanship of the plant at the Contractor's works or at any place from which the material is obtained. Acceptance of any material proves satisfactory but shall have to be paid by the Contractor in case the material or work is found defective or of inferior quality.

1.5 MATERIAL AVAILABILITY:

1.5.1 In case of non-availability of any particular material the Contractor shall procure next best available material and install the same at no extra cost to the owner, after written approval of the Owner through the consultant. Find decision on same would be take owner.

1.5.2 Materials & Samples- The materials / products used on the works shall be one of the approved make / brands out of list of manufacturers / brands /makes given in the tender document. The contractor shall submit sample / specimens out of approved makes of materials / products to the project manager for prior approval. In exceptional circumstances, project manager may allow alternate makes / brands of products / materials at this sole discretion. The final choice of brand / make shall remains with the project manager whose decision shall be final & binding and nothing extra on this account shall be payable to the contractor.

2.0 BASIS OF TENDERING:

2.1 The tender shall be complete covering the entire work of system and ancillary services including all building system and outside utilities as shown and specified.

2.2 The contractor shall consult specification, drawings and the schedule of quantities which gives an idea of these systems.

3.0 DRAWING:

3.1 The drawing accompanying these specifications are design drawings and generally are schematic. They do not show every offset, To cross Y's

junction coupling/Flanges/ disconnection arrangements/ etc. which are required for installation in the space provided. The Contractor shall follow the drawings, as closely as is practicable and install additional bend, elbows or junctions, etc, where required to suit local site conditions, from actual site measurement taken, subject to approval and without additional cost to the Owner. The Consultant reserves the right to make any reasonable change in outlet location prior to roughing in. All connection and appurtenances, shown in the various diagrams, shall be included in the finished job

3.2 It shall be the Contractor's responsibility to co-ordinate with all other agencies at site, for proper and adequate installation clearance.

4.0 ORDINANCE, CODE & REGULATIONS

4.1 It shall be the Contractor's responsibility to provide complete system, as indicated as and as required by applicable code. All clarifications and modifications, which have to be cleared with the appropriate, shall be carried out without additional cost, to Owner. Unless otherwise approved, the product shall bear the mark of approval of Indian standards, as required, the government bodies, code and ordinances of local authorities whose permissions are required for occupation of the building on completion.

5.0 UPVC PIPES FOR SEWAGE SYSTEM

5.1 SOIL, WASTE, VENT AND ANTI SIPHONAGE PIPES & FITTING:

All soil, waste, rain water pipes vent & anti siphon pipes or within plumbing shafts, vertical run shall be SWR UPVC of class B type conforming to IS No 13592. All UPVC pipes & fittings shall be of best approved make. The pipes should be of uniform thickness and they shall not be brittle but withstand for weather conditions. The fittings shall be of standard thickness. The pipes shall be installed and fixed securely to the wall with UPVC saddles away from wall and also should have threaded door cap for inspection incase of removal of chocked waste matter. The jointing of pipes & fittings should be with rubber rings for vertical and solvent cement for horizontal.

The support brackets and hangers and other supports, their spacing shall be as described under point no 8.

Also pipelines and fixtures in sunken portion should be properly encased at the locations and intervals as per requirements and as directed by Engineer in Charge / Project Manager. All soil pipes shall be extended at least 900 mm above parapet top.

5.2 MATERIAL AND FIXING

All soil, waste and anti-siphon pipes and fittings used within sunken floor areas or within plumbing shafts vertical run, shall be of the best approved Indian make of quality truly cylindrical and of uniform thickness. They shall not be brittle but shall allow for heavy cutting, and drilling, and shall not be less than diameter, mentioned in the schedule of quantities and shall be fixed away from the wall on special saddles. It will protect the brick wall from any leakage from vertical pipes.

5.3 JOINTS:

Jointing shall be carried out with rubber rings or solvent cement. The spigot of the pipe must be forced well home into socket and must be entered so that the joint may be of even thickness all rounding.

5.4 Supports, pedestals, and base for inspection chambers, gully traps and pipes shall be in 1:3:6 cement mix.

5.5 Pipe sleeves and insert, etc. through RCC walls either external or internal shall be of G.I or M.S., provided with water bar flange or as per the details given in drawing.

5.6 During installation opening of pipe shall be plugged with wood cut into required shape and wrapped with gunny bags and maintained free from dirt gettingin.

5.7 The size of branch waste for difference fittings shall be as follows:

Lavatory Basin	40 mm (1 ½)"
Urinal	40 mm (1 ½)"
Sink	40 mm (1 ½)"
Nahani trap	80 mm (3")
Special floor trap	80 or 100 mm as required with Grating

as specified.

5.8 Rainwater flushing shall be made as per details with rectangular shape grating and extension piece as specified.

5.9 All roof drain pipes and fittings shall be SWR UPVC of class A type conforming to
I.S. **13592**. This shall apply to pipes outside building or within the building or inside separate shafts.

5.10 The floor traps for toilet blocks shall be PVC with stainless steel grating, and traps shall have ISI stamping.

5.11 Bathroom C.P. grating shall be of boiled down design out of heavy cast brass with the chromium plating of the best approved standard.

5.12 The connection between the main pipe and branch pipes shall be made by using branches and bends with access doors for cleaning.

5.13 Floor traps shall be provided with 75 mm dia. Puff pipe where the length of the waste is more than 1.80 meter or the floor trap is connected to waste stack through bends. These Puff pipe connections shall not be measured separately and shall be deemed to have been allowed for, while quoting.

5.14 The waste from lavatories kitchen, basins, sinks, baths and other floor traps shall be separately connected to respective waste stack of upper floors. The waste stack of lavatories will be connected directly to manhole while the waste stack of others shall be separately discharged over gully trap.

5.15 The cost of fittings is to be covered under rate of pipe and hence payment will be made considering linear measurement of pipe only in Meter.

5.16 Hydrostatic Test

1 The purpose of this test is to locate any leaks at the joints and correct them prior to putting system into operation It is important to
Visually inspect the joints.

2 To isolate each floor or section being tested, test plugs are inserted through test fittings in the stack. All other opening should be plugged or capped with test caps. Fill the system to be tested with water at the highest point. All entrapped air in the system should be expelled.

3 Hydrostatic pressure of 0.5kg/cm^2 (5M) should be applied. Fifteen

minutes is suitable time for the test.

4 Once the stack is filled to desired level of water column, a visual inspection of the section being tested should be made to check the leaks.

5 If the leak is found, it should be removed and section retested.

6.0 C.P.V.C & U.P.V.C. PIPES & FITTINGS:

6.1 All supply pipes shall be of approved make of I.S. quality or equivalent to the requirements of the local authorities or as specified in the schedule and conforming to IS.

The support brackets and hangers and other supports, their spacing shall be as described under point no 8.

6.2 The joints shall be distributed in strict conformity with regulations. They shall be away from of the wall surface by at least 50 mm by means of support stand/ saddles. All control valves, stop cocks, ball valves; bib-cocks shall be of the best approved quality procurable of heavy cast drawn brass. All branches shall have individual control arrangements with full way valves, to enable regulations and cut off as required. They shall be of best Indian manufacture specified in the Schedule of quantities and of stampings and bear I.S.I. markings. All fittings shall be of approved quality make.

6.2.1 The water tightness of joints shall be assured by approved methods of jointing material

6.2.2 Approved Solvent Cement shall be used to make water tight joints.

6.3 INTERNAL WORK

For internal work C.P.V.C.(SDR – 11) pipes and fittings outside the walls shall be fixed either visible by means of approved pattern holder-bat clamps, keeping the pipe clear off the plastered wall by 15 mm for cold water and 15 mm for hot water. Wherever indicated on the drawings or as directed by the Consultants, chasing of walls shall be done to embed pipes. Regulation and National Building Code. All embedded hot water pipes are to be painted and coated and wrapped as above and then wrapped with three ply asbestos twine wrapped tightly around the pipe.

6.4 Alternative Materials:

6.5 In case the CPVC pipes are changed to G.I. / Kitec pipes if desired by the owner / employer the work is to be executed all as per manufacturer's

specifications and in workmanlike manner.

6.6 TESTING:

All CPVC / G.I. Pipes and fittings are to be tested to a pressure of 125% of its designed working pressure one hour to ensure that pies have proper joint and that proper materials have been used in jointing. All leaky joints must be made leak proof by redoing at Contractors expense.

6.7 All water fittings shall be of approved make and shall in all respects comply with the latest Indian Standard Specification I.S. The brass fittings shall be fixed in the pipe line in a workman like manner. Care shall be taken to see that joints shall sustain the above Hydraulic Test. The defective fittings and the joints shall be repaired, redone or replaced at Contractors expense.

6.8 Whenever a CPVC pipe crosses a floor, then a CPVC sleeve with the floor should be provided .On no account should lime or lime concrete come in direct contract with CPVC pipe and fittings. This important condition shall not be waived under any circumstances.

6.9 The cost of fittings, Brass fittings for connection of Valves, and other CP fittings is to be covered under rate of pipe and hence payment will be made considering linear measurement of pipe only in Meter.

No extra payment for any type of fitting will be made.

7 SANITARY FITTINGS:

All sanitary fittings shall be specified in Schedule of Quantities and approved by the Consultants / Owner. The same may also be procured by the Owner and issued for fixing, if so desired.

7.1 GENERAL

All setting and bedding of sanitary fittings shall be done carefully to suit the required levels. Mortar drops, paint slashes etc. shall be removed from fittings, walls and floor immediately before these get dry.

7.2 WOODEN PLUGS

The plugs shall be of hard wood and of size 50 mm x 38 mm at top and of length 50mm. These shall be fixed on wall in cement mortar 1:3 (1 cement: 3 sand), after the plugs are fixed in the wall the mortar shall be cured till it is set

7.3 WALL HUNG WATER CLOSETS :

Wall hung Box Rim Closets having back inlet and 'P' trap outlet shall be fixed on appropriate C.I. or M.S. brackets of suitable design to suit the thickness of toilet walls and ensure that the chair is self supporting and Independent of the wall.

7.4 LASTIC SEAT AND COVER:

The seat shall be fixed to the pan by means of two 8 mm dia. corrosion resistant

C.P. hinge bolts with a minimum length of shank of 65 mm and threaded to within 15 mm of the head. Each bolt shall be provided with two suitably shaped washers of rubber or other similar material for adjusting the level of the seat while fixing it to the closet. In addition one 8 mm non-ferrous metal of the washer shall be provided with each bolt. The maximum external diameter of the washers fixed on the underside of the pan shall not be greater than 25 mm. One arm of the hinge shall be fixed to the underside of the cover flush with the surface by means of 3 nos. 10 mm long C.P. screws.

7.5 BOWL PATTERN LIP URINALS:

Urinals shall be fixed in position by using screws, and shall be at a height of 65 cm from the floor level to the lip of urinal, unless otherwise directed. The wooden plugs shall be fixed in the wall in cement mortar 1:3

(1 cement: 3 fine sand). Each urinal shall be connected to waste pipe which shall discharge into the channel or floor trap. The connection between the urinal and flush or waste pipe shall be made by means or heavy type PVC trap which will not be affected by Uric Acid.

7.5.1 All urinal pans will have flushing system of approved type and make as approved by the Client / consultants.

7.5.2 All connections shall be made leak proof.

7.5.3 At specific instances semistall, full stall or squatting slab urinals may Be Specified in the schedule and / or drawings. Semi stall urinal pans should have approved type concealed chair brackets and accessories as demanded. The bottle traps should be made of PVC/HDPE extruded section to be free from action of acid etc. The fixing of the units shall be as per manufacturer's instruction.

7.5.4 Spreaders, inlet, outlet connection shall be prepared to actual site measurements, to ensure proper verticality and elegance. These shall be full bore and shall not form any dents.

7.6 WASH BASIN

The basin shall be supported on a part of concealed C.I. brackets fixed in cement mortar, 1.3 (1 cement: coarse sand). The C.I. brackets shall conform to I.S.775. The wall plaster on the rear shall be cut to rest over the top edge of the basin. After fixing the basin, plaster shall be made good and surface finished matching with the existing one. The C.P. brass trap and union shall be connected to 40 mm dia. waste pipe which shall be suitably bent towards the wall and shall discharge direct into the floor trap. The height of the front edge of the wash basin from the floor level shall be 80 cm.

7.7 PANTRY SINK

C.P. brass trap and union shall be connected to 40 mm nominal bore waste pipe instead of 32 mm nominal bore which shall suitably bend towards the wall.

7.8 The description in the bill of quantities is an indication of the style of plumbing unit required. The specialist plumber shall provide all the necessary plumbing hardware required for the specific type of unit and the quoted will provide for all contingent accessories, if not detailed, but are required for the functioning of the units.

Positioning of the units shall be planned with reference to the lines as a grid pattern so that all fixtures shall be tiles junctions and not in the tile surface. Connecting pipe shall be suitably ordered. The owners reserve right to procure the Sanitary pottery ware directly from approve source and the cost incurred will be recovered from the quoted while making payment. The material will be in the custody of the contractor, thereafter till commissioning.

7.9 All chromium plated pipe section, shall be ofextruded heavilyplated, and shall not peel off or fade out due to use.

7.10 Defects noticed in the fittings during the extended maintenance period due to latent/ patent shortcomings in quality manufacture or workmanship shall be replaced free of charge.

7.11 The short length of pipe connections to sanitary pottery ware exposed on wall shall be of full bore C.P brass pipe made actual measurement taken at site to suit locations as per detailed instructions and interior drawings.

Pipe with dents / deformation made to standard fittings available in the market shall not be placed on works.

7.12 Material used on urinal waste connection shall not form a discoloration

7.13 Disconnecting please, nipples etc, required for C.P connections, inlet /

outlet caps to unit etc, shall be inclusive the rate quoted and shall not be considered forextra payment.

7.14 The test to guarantee the quality of fixtures and their connections to the system shall be performed by the contractor after installation.

8.0 HANGERS AND SUPPORTS

8.1 GENERAL:

Provide proper solid angle iron / channel section, supports for all pipes complete with clamps, provide wooden guide to support pipe on the angle iron/hanger supports,in general where a bunch / slabs to facilitate welding of angle iron supports. For attachment in concrete, use "Dash" fasteners or Anchor plug type inserts or equivalent. Provide hangers within 1 meter of all change in direction of mains and a minimum of three hangers per expansion bend. Provide all additional structural steel angles, channels or other members not specifically shown but are required for proper support.

8.2 Where necessary additional hangers to be provided to rest hammers or hydraulic with proper rubber.

8.3 Space hangers as noted below except of all soil pipe which shall have a hanger of multiple fittings, sufficient hangers shall be provided maintain proper slope without sagging, in cast of angle. Suspended line, the following is suggested.

A) PIPE MATERIAL SPACING AND SUPPORTS

MATERIAL	NOMINAL PIPE SIZE	HORIZONTAL (M)	VERTICAL (M)
P.V.C.	15	0.6	2.4
	20	0.6	3.0
	25	0.6	3.0
	32	1.2	3.0
	40	1.2	3.0
	50	1.2	3.0
	65	1.2	3.0
	80	1.2	3.0
	100	1.2	3.0
	150	1.4	3.0
C.P.V.C.	15	0.5	1.0

	20	0.5	1.0
	25	0.5	1.0
	32	0.8	1.4
	40	0.8	2.0
	50	1.2	2.2
	65	1.5	2.2
	80	1.5	2.4
	100	1.8	2.4
	150	1.8	2.4

*** Note:** This is as referred in uniform Plumbing code .But in case the manufacturer recommends less spacing than above, the same will be applicable.

8.4 Provide floor stands, wall brackets of masonry piers, etc. for all lines running near the floor or near walls so that those lines, near concrete or masonry walls may hung also by hangers carried from wall brackets at a higher level than pipe. Hanging of lone pipe from another is prohibited.

9.0 VALVES AND PRESSURE GAUGES:

9.1 Pressure gauges shall have not less than 115 mm dia 10 mm gas threads, brass body; siphon and gauge cock of 10 mm size, Dial ranges shall be adequate for the pressure encountered and as specified.

9.2 Provide valve on branch pipe connection to equipment where indicated. Valves are to be located for easy access and are to be full bore of pipe connected together. Support all valves wherever necessary. The Valves should be tested and approved by local authorities as per Byelaws in force.

9.3 Valves shall be tagged with permanent label under hand wheel indicating type and duty.

9.4 Where indicated and specified, angle pattern stopcocks, at each hot and cold water inlet be provided. They should be Anti-scaling pattern same as faucets of approved manufacture.

9.5 Strainers: C.I. pot strainer with G.M. mesh screen in perforated brass strainer body of approved manufacture with a cock for blowing down. Screening area of strainer shall be minimum of 5 times more than pipe area, with 1 mm maximum size holes.

9.6 All tapping from distributors from main feeder shall have isolation valves in shafts, to ensure proper facility for maintenance and minimize the area

of cut off during repairs.

10.0 CUTTING, PATCHING, REPAIRING AND MAKING GOOD

10.1 Cutting, Patching and repairing required for the proper installation and completion of the work, specified in each division, including chasing plastering, masonry work, concrete work etc. and making good shall be carried out by the contractor wherever required. Holes which are oversize shall be refilled, so that a tight fit is obtained around the pipe or other object passing through.

Any damage to water proofed location should not be patched up without rectification by the water proofing agency (specialist contractor) to ensure his guarantee. Indiscriminate cutting and patching work should be avoided by proper coordinate planning the sleeves etc. while works of other agencies are in progress.

11.0 EQUIPMENT PROTECTION

11.1 All pipe and conduit openings shall be kept closed by means of plugs or caps to prevent the entrance of foreign matter. All piping conduit, fixtures, equipment or apparatus shall be protected from damages. Any item damaged prior to

final completion of work shall be restored to its original conditions or replaced at no expense to the Employer.

11.2 Accessibility: The installation of Valves, thermometers, clean out fittings another indicating equipment or specialties requiring frequent reading, adjustment, inspections, repairs, removal or replacement, shall be conveniently and accessibly located. Thermometers and gauges shall be installed so as to be easily read from the floor.

11.3 Inserts and Sleeves

A) GENERAL

In advance of placing of concrete slabs or construction of walls, furnish location of Inserts and sleeves necessary as a result of this operation shall be at no expense to the Owner. Opening shall be made as per Structural Consultant'sapproval.

B) PIPE SLEEVES:

1) WALL SLEEVES:

C.I or M.S. black pipe wall sleeves in cold store and pipe for cable, conduits, gas pipes, etc are to be inside flush with wall on both sides. Sleeves shall be large enough in diameter to provide 15 mm clearance around pipe for insulation Exterior wall sleeves for cable entry / pipe / earthling strips, etc. shall be flush with wall on both sides. Sleeves shall be large enough to allow caulking from outside using lead wool.

2) FLOOR SLEEVES:

Interior floor sleeves shall be of C.I. extending 50 mm more above finished floor. All pipes passing through sleeves shall be caulked with asbestos rope and finished with cement mortar, insulation butted to floor sleeves and sealed with insulating cement on both sides.

Interior floor sleeves for pantry areas shall be G.I. steel pipe extending 50 mm above finished floor. Caulking shall be the same for general areas.

Note: floor on grade sleeves shall be the same as exterior wall sleeves, caulked and made water tight.

12.0 EQUIPMENT, MATERIAL AND WORKMANSHIP:

12.1 Each piece of equipment shall meet the detailed requirements of the contract documents and suitable for the installation shown. Equipment not meeting all requirements will not be provided, even though specified along with other manufactures, in the list of approved makes.

12.2 Where two or more units of the same class are furnished, product of the same manufacture has similarity and easy replacement of spares. Furnish all materials and equipment, new and free from defects and of size, make, type, and quality here in specified or approved by the Consultant. All shall be installed in a neat and workmanlike manner.

13.0 CLEANING OPERATION AND TESTS:

13.1 Plumbing Equipment fixtures, piping etc. shall be free of stamping, marking (except those required by codes). Iron cuttings and other foreign material.

13.2 Water systems shall be cleaned thoroughly filled and flushed with water.

13.3 The entire mechanical apparatus shall operate at full capacity without objectionable noise or vibration.

13.4 The system has to be periodically given the tests specified in the presence of site Engineer and the client's representatives as herein specified.

All test equipment, accessories, materials and labour necessary for conducting the test and for inspection and repair work shall be arranged well in advance of the test date.

After shortcomings are repaired or defective items replaced the tests will be repeated until the entire system is found satisfactory. If the local regulations insist on similar tests in the presence of approving authorities, the same shall be complied with and acceptance from the authorities lodged with the Consultants / Employers.

13.5 The entire system of soil, waste and vent piping to be tested with water after the roughing –in is completed and before the fixtures are set. After setting the fixtures, provide smoke tests, after sealing all traps.

13.6 Water Tests:

Test entire system or sections, of system by closing all opening in piping except the highest opening and filing system with water to the point of overflow, if the system is tested in sections, plug each opening except the highest opening of the section filled with water. Keeps the water in system or in the specific section under test for at least 45 minutes before inspection starts with test pressure/ head lasting for two hours. The system must be free from leakage and defect at all joints.

13.7 Test all down spouts or rain headers and their branches within the building by water as described for the above soil, waste and vent system.

13.8 All Water Piping: Hydro –static test at 125% of its designed working pressure for a minimum of one hour without drop in pressure as required.

13.9 All systems shall be tested in sections as required to expedite the work of other trades and meet construction schedules and final test on completion.

13.10 On completion of the works, the following tests shall be performed to the satisfaction of the consultants/clients representatives to enable them issue of Virtual Completion.

a) a. Hydraulic test

b. Tests for anti-siphon system

d) c. Pump rating and output.

e) d. Inspection of all units and fixtures

13.11 The Contractor shall arrange on his own initiative for similar tests during the progress of works to ensure that there are non defects in

material/workmanship in portions of work to be concealed or embedded under the floor in felling.

a) HYDRAULIC TEST:

1. Suitable section as directed by the Engineer-in-charge shall be taken for such testing from time to time during progress of the work and satisfactory test given for that section. All testing apparatus, gauges, connections etc. and water required for testing shall be arranged by the Contractor at his cost. Owner does not undertake any responsibility to supply water for testing, which the Contractor has to arrange from the Municipality / M.I.D.C. or otherwise by paying the required charges directly. The owner shall have the right to recover such charges from his bills if complaint are received that Contractor has not paid the charges thereof.

2. Satisfactory hydraulic test shall be regarded when the section under test shall withstand the pressure as specified by the Engineer-in-charge for about ONE Hour without operating the test pump, the test pressure being maintained at the specified figures during that ONE Hour interval.

3. The entire pipe line, specials and all joints in that section appear to be dry. During testing if any joints are found leaky they shall be repaired and/or redone by the Contractor at his cost till the test is found satisfactory. Similarly, any pipes, collars, specials, show hair cracks, leaks, etc. during testing, the Contractor shall replace them with sound pipes and specials together with new joints, entirely at his own cost, till a satisfactory test is given. The pipe specials, etc. which crack during testing will, however, be supplied by the Contractor for replacement free for cost. The hydraulic test shall be given in presence of the Engineer-in-Charge.

14.0 EQUIPMENT & PIPING IDENTIFICATION;

14.1 Pipe Markers: Each piping systems shall be provided with a nameplate properly clamped or stenciled. Letters are to be 10 mm if 3 meter above the floor and 50 mm minimum if below that height. Nameplates on parallel group's pipes etc. shall be neatly lined up. Wording of lettering shall correspond to the equipment designation used in piping legend and shall be as approved. Name plated to be of GI. Sheets (gauge 20 SWG on 25 x 25 angle) secured on to sheet metal and angle iron to be welded on main pipe. In case of insulated pipe the 25 x 25 mm angle bracket should be projecting beyond insulation thickness.

14.2 VALVE REGISTER:

To be submitted in triplicate along with location and identification number in final drawing to be furnished by contractor.

15.0 MODE OF MEASUREMENT:

15.1 All work shall be measured net in decimal system, as fixed in its place, subject to the tolerance given below, unless otherwise stated:-

a) Dimensions shall be measured to the nearest 0.01meter.

b) Areas shall be worked out to the nearest 0.01 Sq.meter.

All measurements of cutting shall, unless otherwise stated, be held to the consequent waste.

15.2 All PVC pipes, such as soil, waste, vent and CPVC, UPVC & G.I. Pipes shall be measured in linear lengths along the center line, as completed. The rates shall include all joints and clamps etc. as specified in the respective items.

15.3 All full way valves, ball valves, non-return valves, sluicevalves etc. shall be measured in number after excluding them from liner measurement.

15.4 The diameters of pipes and fittings mentioned in the specifications are the inside diameter in all cases unless otherwise stated.(as in case of P.V.C. pipes)

16.0 TOOLS AND MATERIAL AND STORAGE:

a) The Contractor at his own cost and charge shall provide all materials, tools, tackles, measure, scaffolding, labour and water necessary for the completion of the whole work in all respects.

b) The Contractor shall pay the fees for testing the material to local authorities, or other statutory authorities.

c) The Contractor will obtain from time to time various permissions, and the completion certificates as per rules of all local and statutoryauthorities.

d) The Contractor shall arrange for the material and storage facility with the Building Contractor.

e) Any material, brought at site, shall not be removed without the written authority of the Consultants and owner when the contractors shall have received payment in respect of any certificate in which it is stated that the value of any unfixed materials on the work has been taken into account; such materials shall become the property of owner and the Contractor shall be liable for any loss or damage there to.

f) The Contractor shall insure the work against damages, for such sum as the owner may direct from time to time. All Insurance Policies are to be taken out in the joint name of owner and the Contractor in an office selected by the owner and all policies and receipts shall be deposited with the owner.

g) All the brackets and hangers for pipe shall be fixed to the wall or RCC slab using 'Dash' fasteners, wherever necessary. Exposing reinforcement bars for hooking will not be permitted.

h) Surplus material from the site shall be carted away by the Contractor without any cost to the owner and the storage space provided to the Contractor shall be handed over to the owner clean and ready for occupation, free from all encumbrances.

17.0 GENERAL SERVICES:

The Contractor shall pay the fees for testing the materials by the Municipal Corporation.

The Contractor will process and arrange from time to time various permissions and obtain the drainage completion certificate and adequate water supply Certificate under the rules of the local authorities.

18.0 BUREAU OF STANDARDS, COLOUR CODE:

In industrial and multidisciplinary installation like Hotels and Hospitals, additional item may be added for other systems.

To indicate the class of its contents, each pipe and appurtenances connected therewith shall be marked as under.

1	Water Drinking	-	Sea Green
2	Non Potable Water	-	Orange
3	Treated Effluent	-	Admiralty Blue

Charts showing the colors for primary identifications should be displayed at points where they are likely to be needed for references.

LIST OF APPROVED MAKES - PLUMBING

1	R.C.NP2Pipes	Local Make
2	Eco Drain (PVC Pipe) for External Drainage	Supreme/D-rex/Astral
3	G.I. Pipes Heavy Grade as per IS 1239	Tata, Zenith, Siddharth
4	CPVC / UPVC pipe	Astral / Prince / Supreme / Ashirwad
5	Gun Metal valve & fittings	Leader, Audco, TBS, Sant
6	PVC Valve	Astral / Prince / Supreme
7	Float / Equilibrium Valves	Prayag
8	Pressure Gauges	Flgt, H Guru, pricol
9	SMP pipe	NIECO
10	RCC Manhole cover	Make-nico , Pratibha
11	SWR PVC Pipe	Prince / Supreme
12	Pumps	CRI / Kirloskar / Laxmi Lada /
13	Butterfly Valves, Check Valves	Audco, Intervalve
14	Brass & Gun metal, gate valve, Strainers.	Leader, Audco, Sant
15	Pressure Reducing Valve	OR – TBS, ZOLOTO, VARTSILA
16	Ball Valves	ZOLOTO / RB / Giacomini
17	HDPE Pipes	Reliance, Godavari Polymers
18	Water supply fancy fitting like pillar taps, showers, sink mixers etc.	Metro / Johnson / As approved.
19	Flush valves	Metro / Johnson / as approved
20	SS Sinks	Nirali, Equivalent approved
21	Flush Valve	Slimiline
22	Sanitary Ware	Parryware / Hindware
23	PVC Pipes & Fitting	Supreme / Finolex.
24	Non Return Valve	ZIP, Advance
25	Air Release Valve	Giacomini / RB
26	Water Meters	Capstan, Keycee
27	Anchor Fasteners	Hilti, Fischer

C) TECHNICAL SPECIFICATIONS - ELECTRICAL

CONTENTS

1 MV SWITCHGEAR PANEL (PCC)

- Unless otherwise specified elsewhere in this specification, the rating performance and testing of the Boards shall conform to the latest revision of all the relevant standards.

- A list of some of the applicable standards is enclosed at ANNEXURE I.

- GENERAL TECHNICAL REQUIREMENT

- SHEET METAL WORK

  - The switchgear frame shall be fabricated using suitable mild steel structural sections or pressed and shaped cold rolled sheet steel of thickness not less than 2.5 mm.

  - Frames shall be enclosed by sheet steel of thickness not less than 2 mm cold rolled or 2.5 mm hot rolled, smoothly finished, levelled and free from flaws. Doors and covers shall be made of sheet steel of thickness not less than 1.6 mm cold rolled or 2 mm hot rolled. Stiffeners shall be provided wherever necessary.

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

- Cut-outs shall be true in shape and devoid of sharp edges.

- The complete structures shall be rigid, self-supporting, free from vibration, twists and bends.

- PAINTING

- All sheet steel work shall be phosphate in accordance with the following procedure and in accordance with relevant standards.

- Oil, grease, dirt and warp shall be thoroughly removed by emulsion cleaning.

- Rust and scale shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying.

- After phosphating, through rinsing shall be carried out with clean water, followed by final rinsing with dilute dichromate solution and oven drying.

- The phosphate coating shall be sealed by the application of two coats of ready mixed, stoving type zinc chromate primer. The first coat may be `flash dried' while the second coat shall be stoved.

- The panels shall then be painted with power coating having Siemens grey colour shade as per IS - 5

- The final finished thickness of paint film on steel shall not be less than 60 microns, and shall not be more than 80 microns.

- Finished painted appearance of equipment shall present an aesthetically pleasing appearance, free from dents and uneven surfaces.

- Alternatively, powder coated panels are also acceptable.

- CONSTRUCTIONAL FEATURES

- Switchgear shall be :

- of the metal enclosed, indoor, floor mounted modular type

- made up of the requisite vertical sections
- of dust and vermin proof construction
- Provided with a degree of protection of IP 52, unless otherwise specified.
- Easily extendable on both sides by the addition of vertical sections after removing the end covers.
- provided with a metal base frame made of structural steel channel section properly drilled for mounting the Switchgear along with necessary mounting hardware. Hardware shall be zinc plated and passivated.
- provided with labels on the front and rear indicating the switchgear designation.
- provided with cable entry facilities at top / bottom as specified with 3 mm thick removable gland plates.
- of uniform height of not more than 2150 mm.
- of single front execution .
- provided with gaskets all round the perimeter of adjacent panels, and base frame, removable covers and doors.
- provided with bus bars running at the top, all along the length of the switchgear in a separate sheet steel enclosure.

- Operating devices shall be incorporated only in the front of the switchgear.
- The switchgear shall be divided into distinct vertical sections each comprising :

- A completely metal enclosed bus bar compartment running horizontally.
- Individual feeder modules arranged in multitier formation. It is essential that the modules are integral multiples of the basic unit size to provide for flexibility in changes, if any, at site.

- Enclosed vertical bus bars serving all modules in the vertical sections. For safety isolation of the vertical bus bars, insulating barrier with cut-outs shall be provided to allow the power stab contacts to engage with vertical bus bars.

- A vertical cable alley covering the entire height. The cable alley shall be minimum 200 mm wide for Switch control modules and 500 mm wide for circuit breaker controlled modules.

- A horizontal separate enclosure for all auxiliary power & control buses, as required , shall be located so as to enable easy identification, maintenance and segregation from the main power buses. Tap-off connections from these buses shall be arranged separately for each vertical section.

- Each vertical section shall be equipped with space heaters which may be located in the cable alley.

- One metal sheet shall be provided between two adjacent vertical sections running to the full height of the switchgear except for the horizontal bus bar compartment. However, each shipping section shall have metal sheets at both ends.

- All equipment associated with a single circuit shall be housed in a separate module compartment of the vertical section. The compartment shall be sheet steel enclosed on all sides and the rear, with the withdraw able units in position or removed, except on the cable alley side. A plate cover with a slot to permit wiring connections shall be provided on the side corresponding to the cable alley. The front of the compartment shall be provided with a hinged door.

- For draw-out type modules, only the handles of control and selector switches, push buttons, knobs & cut-outs for lamps and meters shall be arranged on the front doors of the respective compartments to permit operation without opening the door. On circuit breaker controlled circuits, protective relays shall be mounted on the front door of the compartment. All other equipment pertaining to a circuit shall be mounted on the withdraw able chassis. All cut-outs shall be provided with gaskets for the purpose of dust-proofing.

- Current transformers shall not be directly mounted on the buses. Current Transformers on circuit breaker controlled circuits shall be mounted on the fixed portion of the compartment.

- In breaker compartments, suitable barriers shall be placed between circuit breaker and all control, protective and indication circuit equipment including instrument transformers. External cable connections shall be carried out in separate cable compartments for power and control cables.

- After isolation of the power and control connections of a circuit, it shall be possible to safely carry out maintenance in a compartment with the bus bars and adjacent circuits live.

- The with drawler chassis shall move on suitable guides and on suitably plated steel or stainless steel rollers or balls to facilitate easy withdrawal.

- Cable alleys shall be provided with suitable hinged doors. It shall be possible to safely carry out maintenance work on cable connections to any one circuit with the bus bars and adjacent circuits live. Adequate number of slotted cable support arms shall be provided for cleating the cables.

- Rear of single front switchgear shall be provided with removable panels. It shall be possible for one person to remove and fix the removable panel.

- All doors shall be provided with concealed type hinges and captive screws.

- Interchange ability

➢ Components and equipment that are not fully interchangeable are liable for rejection. VENDOR shall replace all such equipment by fully interchangeable equipment at his cost.

➢ The draw-out contacts shall be only between copper / copper alloy / aluminium faces, which are silver or tinplated. The contact design shall be such that there should be no arcing / deformation under the associated peak short-circuit current.

➢ Switchgear shall be designed in such a way that all component equipment and bus-bars operate satisfactorily without exceeding their respective maximum permissible rise in temperature under ambient temperature conditions prevailing within the switchgear cubicle, with reference ambient temperature outside the switchgear cubicles.

➢ Provision of ventilating louvers is considered undesirable. If ventilating louvers are considered essential by the VENDOR, these may be provided. However, all ventilating covers shall be provided with fine-screened brass

or GI meshes to prevent entry of vermin and dust.

- All dummy cubicles necessary to meet the requirement shall be included in the VENDOR's scope.

- MAIN BUS BARS AND TAPS

- Switchgear shall be provided with three phase and neutral bus bars as specified.

- Bus bars shall be of uniform cross section throughout the length of the switchgear, and up to the incoming terminals of feeder circuit breaker / switch.

- The bus bars shall be made of high conductivity copper or aluminium alloy of E91E grade as specified.

- Bus bars shall be provided with at least the minimum clearances in air as per applicable standards for a 500 V, 3 phase system.

- All bus-bars, bus-taps shall be insulated with close fitting sleeve of hard, smooth, dust and dirt free plastic insulation of high dielectric strength (450 V / min.) to provide a permanent high dielectric non-ageing and non-tracking protection; impervious to water, tropical conditions and fungi. The insulation shall be non-inflammable and self-extinguishing and in fast colours to indicate phases. The joints shall be insulated in such a way as to provide for accessibility of contact bolts for maintenance. The dielectric strength and properties shall hold good for the temperature range of 0^0 C to 90^0 C. If the insulating sleeve is not coloured but black, busbars shall be colour coded with coloured bands at suitable intervals.

- Bus bars shall be adequately supported and braced to withstand the stresses due to the specified short circuit currents for the associated switchgear. Bus bar supports shall be made of Hylam sheets, glass reinforced moulded plastic material, Permali wood or cast resin.

- Separate supports shall be provided for each phase of the bus bars. If a common support is provided for all three phase, antitracking barriers shall be incorporated.

- Bus bar joints shall be complete with high tensile steel bolts and Belleville washers and nuts. Bus bars shall be thoroughly cleaned at the

- joint locations and a suitable contact grease shall be applied just before

making a joint.

- CIRCUIT BREAKERS

Circuit breakers shall be -

- of the air break draw out type, mounted along with its operating mechanism on a wheeled carriage moving on guides, designed to align correctly and allow easy movements.

- of the shunt trip type as specified associated with the O/L, S/C protection releases.

- provided with an operating mechanism of the type specified in Data Sheet .

- provided with mechanically operated targets to show `Open' `Closed'

`Service' and `Test' positions of the circuit breaker.

- provided with locking facilities in the `Service' `Test' and `Isolated' positions. In test position the breaker will be tested without energising the power circuits. The breaker shall remain fully housed inside the compartment in the test position.

- provided with 6 NO & 6 NC potential free auxiliary contacts, rated 10 A at 240 V A.C. and 1 A (inductive breaking) at 220 V D.C.
- provided with `red', `green' and `amber' indicating lamps to show

`Closed' `Open' and `Auto-trip' conditions of the circuit breaer when breaker operating is controlled by a control switch.

- Circuit breakers shall be provided with the following interlocks :

- It shall not be possible to plug-in a closed circuit breaker, or to draw out a circuit breaker in the closed position.

- It shall not be possible to operate a circuit breaker unless it is in the fully plugged-in, test, or fully isolated position.

- Closing and trip coil shall operate satisfactorily under the following conditions of supply voltage variation :

- Closing coils - 85% to 110 % of rated voltage

- Trip coils-50 % to 110 % of rated voltage

- When shunt trip circuit breakers are specified the following series trip releases with adjustable settings shall be provided

  a) Overload

  b) Short circuit and
  c) Under voltage

- In addition to the adjustable current setting range specified in the, short circuit releases shall be provided with at least four adjustable time delay settings. If it is not possible to provide the specified adjustable current setting range for the short circuit releases, shunt trip circuit breakers together with necessary protective relays shall be offered.

- Facilities shall be provided for blocking the under voltage release, if so required at Site.

- Each of the foregoing releases shall be provided with a single pole, double throw, potential free alarm contact rated for 0.5 A, 220 V DC.

- Operating Mechanism

- Circuit breaker shall be provided with a manual operating mechanism.

- Manually operated mechanism shall be of the spring charging stored energy type, unless otherwise specified.

- The closing action of the circuit breaker shall charge the tripping spring ready for tripping.

- Speed of closing of contacts shall be independent of the speed with which the handle is operated.

- Circuit breakers provided with stored energy operating mechanism shall be provided with the following interlocks.

- The circuit breaker shall not close unless the spring is fully charged.

- Shocks, vibrations, or failure of springs shall not operate the breaker or prevent intended tripping.

- MINIATURE CIRCUIT BREAKERS

- Miniature circuit breakers for use on Lighting Panels & DBs shall comply with the requirements of applicable standards.

- CURRENT TRANSFORMERS

- Current transformers shall be of the dry type.

- Current transformers shall have a short time withstand rating equal to the short time withstand rating of the associated switchgear for one second.

- Unless otherwise specified, the minimum performance requirement of current transformers are as follows :

- Measuring CT's - 10VA, accuracy class 1.0 and an instrument safety factor of 5.

- Protective CT's - 15 VA, accuracy class 5 P and an accuracy limit factor of 10.

- Notwithstanding the above clause 4.11.3, it shall be the VENDOR'S responsibility to co-ordinate the current transformer burden with the requirements of relays, instruments and leads associated with that particular current transformer.

- All current transformers shall be earthed through a separate earth link on the terminal block to permit easy measurement of the current transformers insulation resistance. (CTS built-in with the thermal relays of the contactors are excluded.)

- INDICATING INSTRUMENTS AND METERS

- Electrical indicating instruments shall be minimum 96 mm square size, suitable for flush mounting.

- Indicating instruments shall have provision for zero adjustment outside the cover.

- Instrument dials shall be parallex free with black numerals on a white dial.

- Ammeters provided on motor circuits shall be provided with a suppressed extended scale to indicate motor starting current.

- Watt hour meters shall be of the direct reading electrodynamometer type complete with cyclometer type dials and reverse running stops.

- MULTI FUNCTION ELECTRICITY METER (MFE METER)

  - Multifunction electricity meter shall be provided on the panel for indicating the instantaneous parameters like voltage, current, frequency, power factor, apparent power, reactive power, active power, etc. and the integrated parameters like kwh, kvarh, etc.

- A single meter capable of recording energy and the various system parameters like, voltage, current frequency, power factor, active power, reactive power etc. shall be preferred.

- Multi function meter shall be microprocessor based compact unit having serial-port(s) for interface with local computer / Data Acquisition system.

- The meter shall have digital display unit. The digits shall be clear and bright. The unit shall have digits not less than 6. The design shall be such that the digits (counter) shall not reset for at least 5 years.

- All readings on the meter shall be direct reading type, that is, without involving any external multiplying factor. It shall be possible to programme the meter, at site, to suit the actual CT & PT ratios.

- M.F.E. meter shall be flush mounting type having all connections from the rear. Provision shall be available for testing / calibration of themeter.

- Meter shall be suitable for 50 Hz AC system with 5A CT secondary and 230V PT secondary rating and shall be 4-wire 3 element type capable of reading correctly even when used for unbalanced loads.

- Feather-touch push buttons shall be provided on the meters for enabling selection of various system parameters to be read. The parameters being displayed shall be identified on the displayed unit.

- MFE meter shall preferably be self-powered type. It shall have non-volatile memory so as to retain the recorded parameters during power failure / storage. In case the meter is having built-in self chargeable type battery back- up to support the retention of energy recording during storage / aux. supply failure, the same shall have a life not less than 7 years.

- The meters shall be of proven design and having been in satisfactory service in any similar (CT/PT operated) system for more than 12 months.

- INDICATING LAMPS

- Indicating lamps shall be :

  - Of the LED type and of low watt consumption
  - Provided with translucent lamp covers of colours `Red', `Green' and `Amber' as required in the control wiring diagrams.

- Bulbs and lenses shall be easily replaceable from the front.

- PUSH BUTTONS

- Push buttons shall be :
  - of the momentary contact, push to actuate type rated to carry 10A at 240V AC and 1A (inductive breaking) at 220V DC.

  - fitted with self reset, 2 NO and 2 NC contacts

  - provided with integral escutcheon plates marked with its function.

- `Start' `Open' `Close' push buttons shall be green in colour.

- `Stop' push buttons shall be red in colour.

- All other push buttons shall be black in colour.

- `Emergency Stop' push buttons shall be of the lockable in the pushed position type and shall be shrouded to prevent accidental operation. Key shall not be required for the operation of the push button.

- SPACE HEATERS

- Space heaters for switchgear panels shall be suitable for operation on the specified supply system.

  - provided with single pole MCB with overload and short circuit release.

  - provided with thermostat to cut off the heaters at 45 Deg. C.

- INTERNAL WIRING

- Wiring inside the switchgear shall be carried out with 1100 / 650 V grade, PVC insulated, stranded conductor wires. Minimum size of conductor for power circuits is 4 sq.mm copper or equivalent size aluminium conductor. Control circuits shall be wired with copper conductor of at least 2.5 sq.mm for CT circuits & 1.5 sq.mm for other circuits, the number and size of strands shall be 7 of 0.67 mm and 0.5 mm diameter respectively.

- Engraved identification ferrules, marked to correspond with the wiring diagrams shall be fitted to each wire. Ferrules shall be of yellow colour with black lettering.

- Spare auxiliary contacts of all equipment forming part of the switchgear shall be wired upto the terminal blocks.

- Wiring for equipment if supplied by the PURCHASER for which the VENDOR has to provide cut-outs (where indicated in the data sheets) shall be provided upto the terminal blocks.

- Spare and unassigned modules shall be complete with internal wiring.

- Wiring shall be terminated on preferably stud type terminal blocks such that the wires are connected by cable-lugs with nuts & washers / lock – nuts.

- Not more than two connections shall be made on any one terminal.

- TERMINAL BLOCKS

- Terminal blocks (both for power and control circuits) shall be of reputed make specially for CT and VT circuits. It shall comprise finely threaded pairs of brass studs of at least 6 mm diameter, links between each pair of studs, washers, nuts and locknuts. The studs, shall be accurately locked within the mounting base to prevent their turning. Insulated barriers

shall be provided between adjacent terminals.

- Terminals for circuits with voltage exceeding 125 V shall be shrouded. Terminal blocks shall be grouped depending on circuit voltage. Different voltage groups of terminal blocks shall be segregated.

- Terminal blocks shall be adequately rated to carry the current of the associated circuit. Minimum rating of the terminal block is 10 A.

- Terminals shall be numbered for identification as per enclosed drawings Engraved white-on-black labels shall be provided on the terminal blocks, describing the function of the circuit.

- LABELS

- All labels shall comprise white letters on a black background.

- Labels shall be made of non-rusting metal or 3-ply lamicoid, or engraved PVC.

- Labels shall be properly fixed, with provision to prevent distortion due to expansion.

- Size of lettering shall be 6 mm, unless otherwise specified.

- EARTHING

- Each Panel shall be provided with an earth bus bar running along the entire length of the board. Material and size of the earth bus bar shall be as specified in data sheets. At either end of the earth bus, one (1) clamp type terminal with nuts, bolts and earthing conductor of size and material indicated in data sheets. In case the earth bus is provided near top of the switchgear, one down comer at either end shall be provided for connection to the purchaser's earthing conductor.

- Earth bus bars shall be supported at suitable intervals.

- Positive connection between all the frames of equipment mounted in the switchboard and earth bus bar shall be provided by using insulated copper wires / bare bus bars of cross section equal to that of the bus bar, or equal to half the size of circuit load current carrying conductor, whichever is smaller.

- All instrument and relay cases shall be connected to the earth bus bar using 1100 / 650 V grade, 2.5 sq.mm stranded, copper earthing conductor.

- *TESTS*

- Switchgear shall be subjected to following tests :

  - Temperature rise test on power circuits.
  - Mechanical operation test.
  - High voltage test
  - Electrical control, interlock and sequential operation tests.
  - Verification of wiring as per approved schematic.

- Routine tests shall be carried out on all associated equipment as per relevant standards.

- *INSPECTION*

- The boards shall be inspected by purchaser's representative at following stages.

  a) After fabrication of the boards but before painting

  b) Completely painted & assembled Board for final inspection.

- A tentative schedule of the inspection programme shall be conveyed to the purchaser at least a week in advance to arrange for inspection. A copy of the internal test report shall be forwarded along with the inspection call.

ANNEXURE – I

LIST OF STANDARDS

Sr. No.	Specification No.	Tite
1.	IS 2516	Circuit Breakers
2.	IS 4237	Metal Enclosed Switchgear Current Transformers
3.	IS 2705	Potential Transformers
4.	IS 3156	Arrangement for Switchgear Bus bars Main connection and Auxiliary Wiring
5.	IS 375	Bus bar support Insulator Degree of protection
6.	IS 2544	Electrical Relays for Power System protection
7.	IS 2147	Electrical Indicating Instruments AC Electricity
8.	IS 3231	meters
9.	IS 1248	Aluminium bus bars
10.	IS 722	Code of practice for phosphating Iron & Steel
11.	IS 5082	HRC Fuses
12.	IS 6005	
13.	IS 2208	

ANNEXURE - II
SPECIFIC TECHNICAL REQUIREMENTS

1.0	GENERAL CONSTRUCTION OF SWITCHGEAR	
	Applicable for	Power Distribution Board/ MLDB / LP
	Enclosure	Indoor, Metal clad, compart mentalised single front, floor mounted, front operated, self supporting, suitable for rear access.
	Module Construction	Draw out type ACB / Switch modules as specified
	Degree of Protection Cable Entry	IP 42 Top /Bottom
2.0	BUS BARS	
a)	Material - 3 Ph & N	High Conductivity Aluminium / Aluminium Alloy E 91E
	- Earth Voltage Rating	Aluminium strip
b)	System Frequency	415 ± 10 %
c)	HV Power frequency withstand test voltage	50 Hz, + 3 % to - 3 %
d)		2500 V RMS, 50 Hz for one minute
e)	Rated Current a) Continuous	As per SLD
	b) Short time	50 kA RMS for 1 Second
	c) Maximum limit of temperature	80 Deg. C
	d) Sleeving	Heat Shrink Sleeving, Red, Yellow, blue for phases and black for neutral
3.0	CIRCUIT BREAKER	
	a) Service Type b)	Indoor As shown on Single Line Diagram

		enclosed
	c) Rated voltage	415 V ± 10 %
	d) No. of Poles	3 pole
	e) Frequency	50 Hz + 3 % to - 3 %
	f) System earthing	solidly grounded
	g) Insulation level (1 minute power frequency withstand voltage)	2.5 kV RMS
	h) Operating mechanism	Spring charged With μp based
4.0	i) Protective Releases CURRENT TRANSFORMERS	
	a) Service	Indoor
	b) Type	Resin Cast / Bar primary
5.0	c) Mounting	Inside Cubicle on stationary portion
6.0	PAINT SHADE SELECTOR SWITCH	Siemens Grey as per IS 5
	a) Rated voltage of main contacts	415V, AC
	b) Rated voltage of coils, auxiliary contacts	240V, AC
	c) Rated duty	AC3
7.0	CONTROL WIRING	
	a) Size	4.0 Sq. mm Cu for CT circuits 2.5 Sq. mm Cu for other circuits
	b) Type	Stranded
	c) Insulation	PVC

	d) Voltage grade	650 V
	e) Colour code	Grey / black
8.0	CONTROL TERMINALS	
	a) Type	Clip on
	b) Voltage grade	1100 V
	c) Current rating	10 Amp
	d) 10% spare terminal to be furnished	Yes
9.0	PUSH BUTTON	ON / OFF Momentary
	a) Type	10 Amp
10.0	b) Rating INDICATING LAMP	Cluster LED Type
	a) Type	0.25, 240 V
11.0	b) Lamp Wattage INDICATING METERS	
	a) Type	Moving iron
	b) Size	96 x 96 Sq.mm
	c) Accuracy class	1.5

2 1.1KV POWER & CONTROL CABLES

- **SCOPE**

The scope of this specification covers design, manufacture, inspection, testing at works. packing and forwarding of 1100 V grade LT Power and control cables.

- *STANDARDS*

The cables offered shall conform to the latest revision of relevant Indian Standard Specifications. Some of these standards are listed below.

Sr. No.	Spec. No.	Title
1.	IS 1554	PVC insulated heavy duty electrical cables for working voltages up to 1100 V
2.	IS 8130	Conductors for insulated electric cables and flexible cords
3.	IS 5831	PVC insulation & sheath of electric cables
4.	IS 3975	Mild steel wires, strips and tapes for armouring of cables
5.	IS 2633	Methods of testing weight, uniformity of coating, thickness on hot drip galvanised articles.
6.	IS 209	Specification for zinc
7.	IS 3961	Recommended current ratings for cables - PVC insulated & PVC sheathed
8.	IS 1753	Aluminium conductors for insulators cables

- **PRINCIPAL PARAMETERS**

- The LT Power & Control cables shall be used indoors / outdoors, directly burried or in open racks in the plant premises.

- They shall meet the requirements of IS specifications listed above and the general technical requirement detailed below.

- *GENERAL TECHNICAL REQUIREMENT*

- The cables shall be brand new. They shall be suitable for laying on trays, in trenches, ducts, conduits & underground buried installation

- All the LT power & control cables shall be heavy duty type, 1100 V grade with aluminium / copper conductor, PVC insulated, inner sheathed, armoured & over all PVC sheathed.

- The construction of the conductors shall be stranded for aluminium cables and solid for copper cables. Conductors of nominal area of 25

Sq.mm shall be circular. Those above may be circular or oval shaped.

- The core insulation shall be with PVC compound applied over the conductor by extrusion only & shall conform to the type A compound of IS 5831. Control cables having 6 cores or above shall be identified with prominent and indelible white coloured arabic numerical on the outer surface of the insulation at every 500 mm.

- The inner sheath shall be applied over the laid up cores by extrusion and shall be of PVC confirming to the requirements of type ST1 PVC compound. The extruded inner sheath shall be of uniform thickness of 0.5 mm up to 16 Sq.mm 0.8 mm up to 120 Sq.mm & 1.0 mm above 120 Sq.mm conductor size.

- The armouring shall be by single round galvanised steel wires for cable diameter up to 13 mm and galvanised steel strips for cables diameters above 13 mm.

- The outer sheath of the cables shall be applied by extrusion and shall be of PVC compound. Suitable chemicals shall be added to the PVC compound of the outer sheath to protect the cable against rodent and termite attack.

- The dimensions of the insulation armour and outer sheath materials shall be governed by IS 1554.

- The Bill of Material for the various cables is enclosed at annexure I

- **TESTS**

  All routine tests shall be conducted on the cables as specified in relevant IS. The test report shall be submitted to the purchase for approval.

- *INSPECTION*

  The cables shall be offered for Inspection by the purchaser's representative at manufacturer's works.

- **PERFORMANCE GUARANTEE**

The cables shall be guarantee for satisfactory performance for a period of 18 months from the date of dispatch or 12 months from the date of commissioning whichever is earlier.

- **DOCUMENTATION**

The supplier shall submit the drum wise routine test report of the supplied cables in 4 sets.

- **PACKING & FORWARDING**

  - The cables shall be packed in wooden drums of suitable barrel diameter and fully protected against mechanical damage.

  - Necessary information such as manufacturer's name, type size, voltage grade, Length of cable, drum number etc. An arrow shall be printed on the drum to show the direction in which the cable should be unwound from the drum.

3 CABLE LAYING

- **SCOPE**

The scope of this specification covers requirements for the installation, testing and commissioning of cabling system including supply and installation of cable accessories.

- **STANDARDS**

- The cabling system installation work shall comply with the latest applicable standards, regulation and safety codes and good engineering practices.

- The installation work shall conform to the latest applicable codes, Electricity rules, fire insurance regulations the applicable Indian standards specifications and the approved drawings.

- **PRINCIPAL PARAMETERS**

- The installation, testing & commissioning of cabling system shall be carried out in accordance with the general technical requirements furnished below and related specific project drawings.

- Supply of cabling accessories such as lugs, glands, termination kits, termination boxes, junction boxes, cable trays, conduits, pipes etc. shall

be as per the technical specifications detailed herein.

- **GENERAL TECHNICAL REQUIREMENT**

- **General scope of cable installation**

- The cable installation work shall include unloading of cables (whether supplied by Bidder or Client) storing in Client's / Bidders stores, preparation of cutting schedules for each drum, cutting, transporting to location, laying, fixing, putting identification tag numbers, properly dressing, terminating, testing and commissioning and any other work necessary for completing the work.

- The above work shall include laying of HT / LT power, control , lighting & communication cables as specified which shall be laid in trenches, on cable trays, in conduits as specified and as detailed in relevant drawings and cable schedules.

- The Bidder shall provide all supervision, labour, tools, testing equipments as required. All incidental hardware & miscellaneous items such as saddles, spacers, bolts / nuts, anchor fasteners , cable route & cable joint markers, protective bricks for buried cables, cable identification tags & ferrules, nylon cord, G.I.Wire / aluminium clamp as required for cable installation shall be part of installation work

- Related civil works such as trenches, tray supports, embedded conduits etc. shall be done by a separate civil contractor. However minor civil works such as patching up any holes made in walls, embedment of short conduits in floors, walls etc. shall also be a part of cable installation work.

- The manufacturer's, Owner's or Consultant's drawings schedules, instructions, cable entry locations and recommendations shall be correctly followed by the Bidder in handling, laying & terminating the cables. In case of any doubts or misunderstanding as to correct interpretation of instructions or drawings, necessary clarification shall be obtained by the Bidder for the Client.

- Any changes in the cable route required to be made due to site conditions shall be carried out by the Bidder in consultation with the Consultant and Client & after their approval.

- The Client shall arrange to clear the areas, routes, trenches through respective Bidders. The cabling contractor shall clean the trench, remove the cable drums, and other surplus material after the installation

work.

- The Bidder shall ensure good workmanship and shall assign qualified supervisors and skilled labour for this work.

- **Cable Laying**

- The Bidder shall install test & commission power & control cables which will be either furnished by the Owner or procured by the Bidder himself.

- The cables shall be laid as per the route shown on relevant drawings. The cable laying work shall include laying, pulling, dressing on cable trays, racks, vertical raceways & supply and installation of cable fixing saddles, spacers and nylon cords, G.I. Wires. Aluminium strip clamps as required for tying as necessary

- The quantities indicated in the cable schedule are approximate. All cable routes shall be carefully measured and cables cut to the required lengths leaving sufficient length for final connection of cable to the terminals in the equipment. Care shall be taken to minimise cable wastage. Drum wise cutting schedule shall be prepared before the cables are cut from the drums. An additional loop of 5 mtr. for main incomer cable at each panel & if proposed for other cables shall also be provided in the cable & cable length cut accordingly.

- Cables shall be laid in complete uncut Length from one terminal to another. No joints shall be allowed in the straight runs of the cables.

- Cable reels shall be utilised for cable pulling. After each cable is laid, identification cable tags shall be provided at each end of the cable. Cables shall be protected at all times from mechanical injury and from absorption of moisture through unprotected ends. Ends of cables shall be taped with PVC insulating Tape.

- Cables shall be neatly arranged in trenches and on trays in such a manner so that cris crossing is avoided and easy take off to equipment is facilitated.

- Sharp bending of cables shall be avoided. The bending radius of cables shall not be less than that recommended by the cable manufacturer.

- Where cables cross road, oil / water pipes, open gutters etc. they shall

be run in hume pipes / steel pipes as directed by the consultant. The depth of burial of pipe shall not be less than 750 mm.

- Directly buried cables shall be laid underground in excavated cable trenches. The trenches shall be of sufficient depth & width for accommodating all the cables correctly spaced. Minimum depth of buried cable shall be 750 mm for LT cables & 900 mm for HT cables. Before cables are placed in the trench the trench bottom shall be covered with a layer of sand. The cables shall be laid over this levelled layer of sand. The cable shall be covered up to 150 mm over the largest diameter cable in the trench. A protective Layer of 75 mm thick second class red bricks shall be laid on this sand cover. The reminder of the trench shall be filled with soil, rammed & levelled. Insulation test shall be conducted on each cable before back filling. Cable markers as specified shall also be installed along the route of the directly buried cable for easy identification of the cable route. Excavation for the trench, supply and laying of sand and brick and back filling shall be the responsibility of the Bidder.

- All cables shall be identified close to their termination point by cable numbers as per cable schedule. Cable numbers shall be punched on 2 mm thick aluminium strip of adequate size securely fastened to the cable and wrapped around it. Identification tags shall also be provided at every 15 m along the straight run and at every change in direction.

- Cables in racks & trays shall be tied by 3 mm Nylon cord, or Aluminium clamp to the tray after carefully dressing the cables. Cables shall be clamped along with wall, column, ceiling, structures etc. on emerging out of trenches before they are connected to the equipment.

- Control & Power cables shall be clamped separately. When power cables are laid alongside communication cables, minimum separations distance shall be 300 mm. The power & communication cables, minimum separation distance shall be 300 mm. The power & communication cables shall as far as possible cross each other at right angles. Distance between adjacent clamps shall be 450 mm.

- Cables shall be carefully pulled through conduits, hume pipes and steel pipes to prevent damage to the cables. If required, approved cable lubricant shall be used where a cable enters conduit, the cable shall be bent in larger radius.

Following guide of the pipe fill shall be used for sizing pipe size.

1. One cable in pipe 50 percent
2. Two cables in pipe 45 percent
3. Three cables in pipe 43 percent
4. More than three cables 40 percent

After the cables are installed and all the testing is complete, conduit ends above grade shall be plugged with suitable weather proof plastic compound or PUTTI Alternatively, PVC or wooden bushes shall be used.

- Cables directly laid on supporting angles in cable trenches (HT cables & larger size LT cables) shall be suitably clamped by means of G.I. Saddles or clamps. The supporting angles shall be painted before laying the cables.

- *Cable Termination*

- All PVC cables up to 1.1 KV grade shall be terminated at the equipments by means of compression type cable glands. All cable entries shall be through bottom only. Top entry termination shall be made only after approval from Owner.

- The termination shall be made in a neat & work man like approved manner by men specialised in this work.

- Power cables where colour coding is not available shall be identified with Red, Yellow, blue & black PVC tapes. For control cables PVC ferrules duly numbered shall be used. For trip circuit identification, additional red ferrule shall be used only in those cores.

- All the cores of Control cables shall be identified at both ends by their terminal numbers by PVC ferrules. Wire numbers shall be as per schematic, wiring and interconnection diagrams made available to the Contractor. All unused spare cores of control cables shall be neatly bunched and ferruled at both ends.

- When control cable cores are to be fanned out & bunched together with cord the Contractor shall make connections to terminal blocks & test equipments for proper operation before cables are corded together. After correct connections are established through operating equipment,

cable cores shall be cut to correct lengths, connected to terminal connectors in the specified manner & corded together.

- Most of the switchgear & control panels will be received with undrilled gland plates. Contractor shall drill the gland plate as required at no extra cost. Some extra holes shall be drilled & plugged for any future requirement. No. & size of extra holes shall be given by the Owner.

- Cable leads shall be terminated in the equipment terminals by means of crimped type solder less lugs of approved make. Cable cores up to 4 Sq.mm may be directly connected in to the terminals. All other cable sizes shall be crimped as specified. Crimping shall be done by hand crimping or by hydraulically operated crimping tool and conducting jelly shall be applied on the conductor.

- **Installation of Cables Accessories**

- Cable trays

The cable trays shall either run in concrete trenches or run overhead, along wall, column below slab etc.

The trays shall be GI ladder type or perforated as specified. The trays shall be laid in single, two & multi tier formation.

Vertical raceways & risers shall be fixed such that it gives a clear appearance.

Change in the line or elevation or addition of an offset shall be done by cutting standard length of available tray. Care shall be taken to eliminate any sharp bends in tray work to avoid any damage to the cable while pulling the cables.

No cables shall be laid until all the route is cleared and all tray work is complete.

- Conduits and Pipes

The Bidder shall install conduits & pipes as specified & shown in the construction drawings. All accessories & fillings required for completing the installation. Such as inspection fees, elbows, check nuts, brass end caps, pull boxes, saddles spacers, shall be in Bidder's scope of supply conduit fittings shall be of same material as the conduit.

Supply of Cable accessories

Various accessories required for completion of cable installation work shall be as per the specification's furnished below.

- Cable glands

a) The cable glands shall be made from solid drawn brass rods, machined for smooth finish, cadmium - Nickel plated and passivated to protect against corrosion. The gland shall be suitable for the specified cable sizes. The neoprene compression rings shall have wide range of compression to suit varying sizes & types of cables. Cable size shall be marked on the gland for easy identification.

b) Wherever specified in the schedule, the glands used shall be of following types.

- Double seal cone grip compression gland comprising of:
  Nipple with neoprene compression ring with groove for inner sheath of cable. Check nut with rubber washer to ensure dust tight joint between the enclosure and the gland. Cone and clamping ring for clamping the amour.

- The design of cone shall be suitable for any type of armoring i.e. wire or strip. gland body to accommodate various parts of gland with minimum clearance between walls. Neoprene compression ring with groove for the outer sheath of cable . Brass washer for proper positioning of the ring when compressed shall be provided. Compression nut to ensure perfect hold of cable by the gland.

- Single seal cone grip compression gland shall comprise of Nipple with neoprene compression ring with groove for inner sheath of cable. Check nut with rubber washer to ensure dust tight joint between the enclosure and the gland. Cone and clamping ring for clamping the armour. The design of cone shall be suitable for any type of armouring i.e. wire or strip. gland body to accommodate various parts of gland with minimum clearance between walls. Compression nut to ensure perfect hold of cable by the gland.

- Single seal compression gland for unarmoured cable shall comprise of :Nipple with neoprene compression ring with groove for inner sheath of cable. Check nut with rubber

washer to ensure dust tight joint between the enclosure and the gland. Gland body to accommodate various parts of gland with minimum clearance between walls. Compression nut to ensure perfect hold of cable by the gland.

- Cable lugs

Compression type cable lugs for Aluminium / Copper cables conductors shall be tinned copper to suit the specified conductor size. The current rating of the lugs shall be same as that of the cable conductor.

- Cable Tags

Cable tags shall be fabricated from 2 mm thick 20 mm wide aluminium strap of required Length to contain cable number, cable size etc.

- Ferrules

Ferrules shall be of approved type, size to suit core size mentioned and shall be employed to designate the various cores of control cables by terminal numbers to which the cores are connected.

- *TESTS*

The insulation resistance of every cable laid shall be measured between phases & phase to ground before termination is made.

- *INSPECTION*

- The cables shall be checked for any physical damage during laying.

- The terminations shall be checked for phase sequence & changed if required.

- The connections shall be cross - checked with the interconnection diagrams for their correctness.

- Cable tag no. shall be checked for its correctness as per the cable schedule.

4 WIRING

- Branch circuit conductor sizes shall be as shown in the schedule of quantities and or drawings.

- Final branch circuits shall preferably be kept in a separate conduit upto the Distribution Board. No other wiring shall be bunched in the same conduit except those belonging to the same DB.

- Looping system of wiring shall be used. Wires shall not be jointed. Where joints are unavoidable, they shall be made through approved mechanical connectors. No such joints shall be made unless the length of the sub circuit, sub main or main is more than the length of the standard coil.

- Power wiring shall be distinctly separate from lighting wiring.

- Every conductor shall be provided with identification ferrules at both ends matching the drawings.

- MAINS / SUB-MAINS WIRES

  Conduit wiring from lighting distribution board up to switch board and looping the phase conductor from one switch board to other as mentioned in the single line diagram shall be treated as mains / sub-mains wiring respectively. This shall be run in a conduit separate from that of point wiring. The estimated length of the conduits for the circuit wiring has been given in the schedule of quantities. This includes the length of conduits with different number of wires viz. 2, 4, 6, 8, etc.

- POINT WIRING

  Point wiring shall include all work necessary to complete wiring of any length from the tapping point of distribution circuit to the following via switch

  - Junction box / ceiling rose for light / fan points

  - Plug points

- The following shall be deemed to be include in the point wiring –

- Switch and switch box (for switch, fan regulator, bell push etc.)

- Conduit and accessories such as bends, inspection bends, tees, junction boxes etc.

- All fixing accessories for conduits and conduit accessories such as clamps, spacers, rowel plugs, G.I. screws etc.

- Wiring between switch and junction box / ceiling rose / plug point and wiring necessary between switch boards other than mains wiring shown in the drawing.

- POINT WIRING

Where the one lighting fixture is controlled from one switch, wiring will be from switch to fixture in case of group control, No of points will be control by one switch, wiring from switch to all fixtures controlled by that specific switch and in case of group control no of points will be controlled by one MCB, wiring will be from MCB to all fixtures controlled by that specific MCB.

- CONDUIT WIRING

- The scope of work shall cover supply, installation, testing and commissioning of all conduit wiring.

- RIGID AND FLEXIBLE CONDUITS

- PVC conduits and accessories shall be heavy gauge with wall thickness not less than 2 mm and as per IS Specifications IS – 9537.

- Flexible conduits shall be formed from a continuous length of spirally wound interlocked strip steel with a fused zinc coating on both sides. The conduit shall be terminated in brass or PVC adopters.

- ACCESSORIES

- Conduit fittings such as bends, elbows, reducers, chase nipples, split couplings, plugs etc. shall be specifically designed and manufactured for their particular application. All conduit fittings shall conform to IS:2667-1964 and IS:3887-1966. Wherever galvanised conduits are specified in the schedule of work, the fittings also shall be galvanised.

- WIRES

- All wires shall be single core multi-strand copper or single strand Aluminium, PVC insulated to IS:694 and shall be 660 V grade.

- All wires shall be colour coded as follows:

Phase	Colour of wire		
R	Red		
Y	Yellow		
B	Blue		
N	Black		
Earth	Green (insulated)	Control (If any)	Grey

- SWITCHES AND SOCKETS

- Switches shall be plate type of design with silver-plated contacts. Sockets shall be of 3 pin type. All switch and socket mounting on the modular plates and concealed PVC boxes. Combination of multiple switch units and sockets should be used in appropriate manner to minimise the switch boxes.

- Weather and waterproof switches/sockets of appropriate enclosure class shall be used as specified in the schedule of work.

- For heavy duty, metal clad sockets with M.C.B. isolator mounted in a galvanised steel box shall be provided.

- INSTALLATION

- The size of conduit shall be selected in accordance with the number of wires permitted under table given below. The minimum size of the conduit shall be
  20 mm dia unless otherwise indicated or approved. Size of wires shall be not less than 1.5 sq.mm copper.

Nominal dia. Of wires (mm)	Nominal Cross sec area (mm)	20 mm		25 mm		32 mm		38 mm	
		S	B	S	B	S	B	S	B
1/2.40	1.50	4	3	8	6	15	9	-	-
1/1.80	2.50	4	2	6	4	10	8	-	-

1/2.24	4.00	2	2	4	3	8	6	-	-
1/2.80	6.00	1	-	4	3	6	6	-	-
1/3.55	10.00	1	-	3	2	5	4	6	5

S - runs of conduits which have distance not exceeding 4.25 m between draw boxes and which do not deflect from the straight by an angle more than 15 degree.

B - runs of conduits which deflect from the straight by more than 15 degree.

- Conduits shall be kept at a minimum of 100 mm from the pipes of other non- electrical services.
- SEPERATE CONDUITS / RECEWAYS SHALL BE USED FOR
- Normal lights and 5A 3 pin sockets on lighting circuit.
- Power outlets - 15A 3 pin 20A/30A 2 pin + scraping earth metal clad sockets
- Emergency lighting
- Telephones
- Fire alarm system
- Public address system
- CC TV System for security
- Computer and data wiring
- UPS wiring.
- Wiring for short extensions to outlets in hung ceiling or to vibrating equipment's, motors etc., shall be installed in flexible conduits. No flexible extension shall exceed 1.25 m. Otherwise rigid conduits shall be used.

➢ Conduits embedded into the walls be fixed by means of staples at not more than 500 mm intervals. Chases in the walls shall be neatly made with brick cutter and refilled after laying the conduit and brought to the finish

of the wall but final finish will be done by the building Bidder.

- Conduits buried in concrete structure shall be put in position and securely fastened to the reinforcement and got approved by the Engineer, before the concrete is poured. Proper care shall be taken to ensure that the conduits are neither dislocated nor choked at the time of pouring the concrete. Suitable fish wires shall be drawn in all conduits before they are embedded. Where conduit passes through expansion joints in the building, adequate expansion fittings shall be used to take care of any relative movement.

- Inspection boxes shall be provided for periodical inspection to facilitate withdrawal and removal of wires. Such inspection boxes shall be flush with the wall or ceiling in the case of concealed conduits. Inspection boxes shall be spaced at not more than 12 meters apart or two 90 degree solid bends or equal. All junction and switch boxes shall be covered by 6 mm clear Perspex plate truly cut and fixed with cadmium plated brass screws. These junction boxes shall form part of point wiring or conduit wiring as the case may be including the cost of removing the Perspex cover for painting and refixing. No separate charges shall be allowed except where specially mentioned.
- Conduits shall be free from sharp edges and burrs and the threading free from grease or oil. The entire system of conduits must be completely installed and rendered electrically continuous before the conductors are pulled in. Conduits should terminate in junction boxes of not less than 32 mm deep. All metallic conducts shall be earthed.

- An insulated earth wire of not less than 1.6 sq.mm copper shall be run in each conduit.

- TELEPHONE DISTRIBUTION SYSTEM

- SCOPE

The scope of work shall cover supply, installation, testing and commissioning of the telephone distribution system.

- DISTRIBUTION SYSTEM

Telephone cabling shall be used 0.5mm. diameter electrolytic tinned copper conductors duly colour coded twisted pairs with rip cord.

Cabling shall be multipair, PVC insulated, sheathed and armoured and twin pair PVC insulated wires drawn in heavy gauge PVC conduits. Cables shall confirm to I.T.D. specification.

- TAG BOX

Telephone tag box shall have two terminal blocks cross connect type and shall be suitable for multipair cables. All incoming and outgoing cables shall be terminated on separate terminal blocks and all terminations shall be silver soldered. The cross connecting jumpers shall be insulates wires of the same diameter and screw connected. Tag blocks shall be mounted inside fabricated sheet steel boxes with removable hinged covers and shall be fully accessible. The enclosure shall be painted with two coats of red oxide and stove enameled.

- INSTALLATION

The installation of conduit shall be generally as specified under section "Conduit Wiring".

The connections at the tag blocks shall be silver soldered so as to achieve minimum contact resistance.

- INSPECTION AND TESTING

- The Bidder shall offer each part of work for inspection after completion of the job.

- The sample for materials, to be provided by the Bidder, shall be got inspected and approved from the Engineering in charge before procurement of these items.

- Any faulty or defective work shall be rectifies by the Bidder without any extra cost.

- The Bidder shall provide required test certificates and other documents for obtaining power supply to individual unit.

5 CABLE TRAYS AND STRUCTURAL STEEL

- **Scope**

This specification covers manufacturing, supply and installation of G.I. perforated cable trays of various sizes required for laying of control and power cables in EHV substation.

- **Standards**

The recommended practice of hot dip galvanizing of iron and steel and method of testing and inspection shall confirm to the requirements of the latest Indian standards. Some of these standards are listed below:

Sr. No.	Standard No.	T I T L E
1	IS:2629	Recommended practice for hot dip galvanizing of iron and steel
2	IS:2633	Methods of testing uniformity of coating on zinc coated articles
3	IS:4759	Method of determining of mass of zinc coating on zinc coated articles

- **General Technical Requirement**

- The hot dip galvanized perforated metal trays shall be made out of 16 SWG (1.6MM) M.S. sheet. The sheet shall be CRCA.

- Each tray section shall not be more than 2.5 M. and shall be provided with side coupler plate and associated hardware.

- Side coupler shall be fabricated out of 3 mm M. S. galvanized plate with four circular and four elliptical holes.

- The trays shall be hot dip galvanized after fabrication and punching. The coating of zinc shall not be less than 340 gm / sq. M.

- **Tests**

The cable trays shall be subjected to galvanizing test.

- M. S. Painted steel structure

Providing fabricating, installing M.S. Painted supports in trenches, on floor, on columns, etc as per requirement for fixing of trays, panels, marshalling boxes, including painting with two coats red oxide and two coats of paint of approved shade complete as per detail technical specification.

- Technical Specification

M. S. fabricated supporting structures shall be provided for supporting cable trays, panels, distribution boards, lighting panels etc. as well as rail poles to be provided on the transformer foundation for installing Power transformers.

- The fabricated supporting steel shall be painted with one coat of red oxide primer and two coats of paint of approved colour.

6 INDOOR AND OUT DOOR LIGHT FIXTURES

- SCOPE

This specification covers the requirement of lighting fixtures for lamps, Metal Halide lamps and the associated accessories.

- CODES & STANDARDS

- The design manufacture and performance of equipment shall comply with all currently applicable status, regulations and safety codes in the locality where the fittings will be installed. Nothing in this specification shall be construed to relieve vendor of this responsibility.

- Unless otherwise specified the fittings shall conform to the latest applicable Indian Standards, British Standards or IEC Standards. Some of which are listed below :

i)	IS : 1913	:	General and safety requirements for electric lighting fittings
ii)	IS : 3528	:	Waterproof electric lighting fittings
iii)	IS : 4012	:	Dustproof electric lighting fittings
iv)	IS : 2149	:	Luminaries for street lighting
v)	IS : 5077	:	Specification for decorative lighting outfits

- DESIGN REQUIREMENTS

- Fixtures (General)

Fixtures in general shall be designed for minimum glare. All light reflecting surfaces shall have optimum light rejecting co-efficient so as to ensure Q

maximum overall light output. (They shall be designed for continuous operation under atmospheric conditions specified in enclosed Project information - General' without reduction in lamp life or without deterioration of materials & internal wiring. Fixtures shall be complete with all accessories like ballast power factor improvement capacitors etc. If control gear is to be provided separately details shall be furnished.

- Reflectors

Reflectors shall be POT shaped deep drawn made out of high purity aluminium which electrochemically brightened and anodised. High transparency cover made out of clear acrylic and in single piece construction is fixed on to the housing by means of toggle clips. They shall be readily removable from the housing for cleaning and maintenance without disturbing

the lamps & without use of tools. They shall be securely fixed to the housing by means of positive fastening device of captive type.

- Lamp holders & Starter Holders

Lamp holders shall be of low contact resistance, resistant to wear and suitable for operation at the specified temperature without deterioration in insulation value, contact resistance or retention of the lamp.

Those shall hold the lamp in position under normal condition of vibration. Live parts of the lamp holder shall not exposed during insertion of removable of the lamp or after the lamp or after the lamp has been taken out.

- Ballast

The ballasts shall be of inductive, heavy duty type, filled with thermosetting, insulating, moisture repellent compound filled under pressure or vacuum. Ballast shall be provided with tapings to set the voltage within the range specified for Metal Halide lamps. End connections and taps shall be brought out in a suitable terminal block, rigidly fixed to the ballast enclosure. Separate ballast for each lamp shall be provided in case of multi lamp fixtures.

- Starters

Starters shall have bimetal electrodes and high mechanical strength, starters shall be replaceable without disturbing the reflector or lamp and without the use of any tool. Starters shall have brass contacts and radio interference capacitors.

- Capacitors

  The capacitors shall be hermetically sealed preferably in a metal enclosure to prevent seepage of impregnate and ingress of moisture.

- Mounting

  The mounting arrangement shall be side entry on bracket arms of 50 mm OD

- Earthing

  All metal or metal enclosed parts of the housing shall be bended and connected to the earthing terminal so as to ensure satisfactory earthing continuity throughout the fixture. 2 Nos. earthing terminations with 2 plain and one spring washers, shall be provided.

- Painting

  All the surfaces shall be thoroughly cleaned and digressed. The fixture shall be free from scale, rust, sharp edges and burrs The housing shall be single piece die-case aluminium which is painted grey finish.

- SPARE PARTS

  Whether included in the manufacturer's recommendation or not, unit prices of the following items shall be quoted together, with the suggested quantities and catalogue numbers.

- each type of lamp
- each type of control boxes.
- Each type of reflector
- Ballast for Metal Halide lamps
- Power factor improvement capacitors
- Starters
- Lamp Holders

- The unit prices shall not, however, be limited to the above items. Manufacturer may recommend additional spare items and quote the unit prices of the respective items.

- TESTS & TEST REPORTS

➢ Type tests, acceptance tests and routine tests for the lighting fixtures and accessories covered by this specification shall carried out as per the relevant Standards for the respective fixtures and their accessories.

➢ Manufacturer's type and routine test certificates shall be submitted for tests conducted as per relevant IS / BS for the fixtures and accessories.

- DRAWINGS AND DATA

➢ As part of the proposal, the Bidder shall furnish relevant descriptive and illustrative literature on lighting fixtures and accessories and following drawings / data from the respective lighting fixtures :

➢ Dimensional drawings

➢ Mounting details, cable entry facility and weights

➢ Light distribution diagrams (zonal & Isocandela)

➢ Light absorption and utilization factors.

➢ Lamp output Vs Temperature curve.

- GENERAL REQUIREMENTS

➢ Fixtures shall be installed at mounting heights as detailed on the drawings or instructed on site by the Architects/Consultants.

➢ Fixtures and/or fixture outlet boxes shall be provided with hangers to adequately support the complete weight of the fixture. Design of hangers

➢ and method of fastening other than shown on the drawings or herein specified shall be submitted to the Architect / Consultant's instructions.

- Flush mounted and recessed fixtures shall be installed so as to completely eliminate light leakage within the fixture and between the fixture and adjacent finished surface.

- Fixture mounted on outlet boxes shall be tightly secured to a fixture stud in the outlet box. Extension pieces shall be installed where required to facilitate proper installation.

- Fixture shall be completely wired and constructed to comply with the regulations and standards for Electric Lighting Fixtures, unless otherwise specified. Fixtures shall bear manufacturer's name and the factory inspection label unless otherwise approved.

- Wire insulation shall suit the temperature conditions inside the fixture and wires bypassing the choke shall be heat protected with a heat resistant sleeve.

7 *EARTHING*

The scope of work of present contract includes all the necessary materials required for carrying out the earthing as per statutory requirements without any extra cost.

- 3.0 M long G.I. Earthing

- Earthing shall be provided at the locations shown on the enclosed earthing layout drawing.

- Each earthing shall comprise of a 40 mm diameter (nominal) Gal. iron pipe of standard length of 3 meters. The G.I. Pipe shall be provided with clamping arrangement as shown in the enclosed indicative drawing.

- Two Hot dip galvanised M.S. Strips 50 x 6 mm shall be bent into two half rings around the socket of the C.I. Pipe extending on either side for clamping & bolting to the earth grid.

- The half rings shall be bolted rigidly to the C.I. Pipe at 4 locations with 16 mm bolts & nuts.

- The two strips shall then be bolted together on either side of pipe with 16 mm dia bolts & nuts.

- Two pairs of holes shall be provided on either side of the flats at 65 mm spacing for bolting the earth grid conductor with 12 mm dia bolts.

- The MS half rings shall be hot dip galvanised after shaping, drilling is completed. All bolts & nuts shall be provided with spring washers. All the hardware shall be hot dip galvanised.

➢ Bore Type Earthing for hard soil and rocky terrain

- Bore type earthing shall be provided in the area where soil is not normal or with Hard Murum or Rocky.

- To prepare the Earth pit in Hard Murum or Rocky area bore shall be drilled of dia 4.5" with the help of compressor and up to a minimum depth of 10 Mtrs.

- A 65 MM dia GI pipe 10 mtr long shall be in the base with a clamp as shown in the drawing. It should be connected to the pipe with the help of GI Nut & Bolts.

- The bentonet compared should be filled in the bore after lowering of GI pipe electrode.

➢ The BB masonry chamber with plastering shall be constructed for each earthling. A 600 x 300 mm CI cover with frame shall be fixed on the chamber.

➢ The earthling station shall be generally as per IS 3034 and enclosed drawings.

8 *EARTHING CONNECTION*

➢ on equipment to a main earthing ring. The earthing ring will be connected via links to several earth electrodes. The cable armour will be earthed through the cable glands.

➢ The following shall be earthed.

a) Transformer neutrals

b) Transformer Housing

c) All Switchgear and their earth buses

d) All fences/enclosures housing Electrical Equipment.

- System shall be earthed by two distinct conductors directly connected to independent earth electrodes which in turn, shall be connected to the earth loop. The earth connection shall be properly made. A small flexible aluminum cable loops to bridge the top cover of the transformer and the tank shall be provided to avoid earth fault current passing through fastening bolts when there is a lightning surge, high voltage surge or failure of the bushings.
- `All hardware used for earthling installation shall be hot dip galvanised for zinc passivated. Spring washers shall be used for all earthling connections of equipment having moving parts and for all the connections subject to vibrations etc.

Material Specifications	
1	415 V LT Cables
	: 1.1 KV grade Copper armoured PVC sheathed as per IS : 1554.
2	Household Wires
	: 650/1100 V grade, Copper conductor, multistrand, FR type as per IS : 694
3	PVC Conduit
	: Rigid, HMS/MMS, 20/25 mm Dia as per IS: 9537, 2 KV dielectric strength with
	R > 100 MW
4	Conduit Accessories
	: Same as above as per IS: 2667 & 3887. Only deep JB to be used in slab &
	regular JB in wall work.
5	Switches & Accessories
	:Switches shall be plate type of design with silver-plated contacts. Sockets
	shall be of 5pin type. All switch and socket mounting on the modular plates and
	concealed metal boxes.
6	Tel / TV Sockets
	: Same as above but switch type.
7	Fan Regulators
	: Electronic type, 5 step, 200 w with compensating R.
8	DB's
	: Double/Single door, Powder coated, Front door lockable, IP40 degree, Earth
	terminals, concealed mounting, suitable for SPN /TPN with neutral link.
9	MCB's / ELCB's
	: MCB shall be of 3/6/10 KA rating, IP20, Thermo set DMC material, flame
	retardant, 25 sq. mm. Terminal capacity, insulated shutters, DIN rail mounting.
	ELCB shall be 30/100/300 mA, as per IS:8828 / 13947.

APPROVED MAKES OF MATERIALS - ELECTRICAL

Sr. No.	**Materials**	**Manufacturers**
1	Rigid PVC conduit with accessories	Precision, Presto Plast
2	Multi strand FR copper conductor house wires of 650v grade	Polycab, Finolex
3	Switches/Sockets/Lan,Tel Sockets/Fan Regulator/Modular Plates and Boxes	Anchor Roma, Legrand Mylink
4	Double/ Single Door IP40 Distribution Boards	Legrand, Hager
5	1.1 kV grade Power and Control Cables	Vishal, Polycab
6	3/6/10KA MCB's and 30/100/300mA ELCB's/RCBO	Legrand, Hager
7	Multi pair and coaxial Tel and TV Cable	Brimson, Polycab

TECHNICAL SPECIFICATIONS (FOR INTERIOR WORK)

These specifications are for the work to be executed items to be supplied and materials to be used in the works as shown and defined on the drawings, tender documents and BOQ and described here in all under the supervision and to the satisfaction of the Architect / Employer.

The workmanship is to be the best available and of a high standard. Use must be made of specialist tradesmen in all aspects of the works, and allowance must be made in the rates for doing so.

The materials and items to be provided by the contractor shall be the best of their respective kinds, approved by the architect in accordance with any samples which may be submitted for approval and generally in accordance with the specifications. Where materials or products are specified in these specifications and or / bill of quantities by the name of the manufacture or the brand trade name or catalogue reference the contractor will be required to obtain the approval of the architect / employer before using a material or product other than the specified. The contractor shall produce all invoices, vouchers or receipted accounts for any materials if called upon to do so by the Architect.

Samples of all material are to be submitted to the architect for his approval before the contractor orders or delivers in bulk to the site. Also, the contractor will be required to submit specimen finishers of colours, fabrics etc. for the approval of the architect before according with the works. Should be submitted for the approval of the architect who will retain two copies all at the contractor's expenses.

1. PARTITIONS AND CABINET WORK

General: Partitions, cabinets, etc. shall be fabricated and assembled in the workshop as far as practicable and then brought inside the building ready to set in place. The various members shall be worked in the best manner known to the trade, mortised and tenoned, doweled, blocked

and glued together so as to avoid the use of nails as far as possible. The details shall be closely followed, moulding clearly cut and miters accurately made. Free edge of shutters, shelves, partitions, sides etc. shall be provided with first class teak wood edging, glued and nailed in approved manner or as mentioned in detailed specification. Drawer bottoms shall be of 6 mm commercial ply, unless otherwise shown. Drawer front, sides and back shall be of BWR plywood for thickness mentioned in the detailed specification. The drawers shall slide on SLIDING CHANNELS unless otherwise specified. In partitions 12mm thk BWR ply is to be used to cover the frame work.

Preservative treatment: All wood work in contract with masonry shall be painted with approved asphalt or anti termite & fire retardant coating (Viper or equivalent) before placing. Care shall be taken to keep exposed surfaces clear from tar etc. felt shall be used to isolated wood from masonry wherever practicable. All concealed wood etc. shall be treated fully and liberally with so lignum before placing in position.

Painting and Polishing: All exposed teak faces of partitions, glazing, doors, cabinet work etc. shall be Duco painted/ polished to approve finish. Door shutters, internal faces of cupboards and cabinets etc. shall be enamel painted to approved finish. Drawer bottoms, sides of drawers, etc. oiling etc. shall be carried out as specified. All the paints & polishes should be of LOW VOC content as per Green building norms

Protection of work: The contractor shall be responsible for the temporary doors and closing in opening necessary for the protection of the work during progress. He shall also provide and maintain any other temporary

a. **TIMBER / WOOD WORK** General: Specified variety of timber shall be used in thework. The timber shall be sawn in the direction of grains. The sawing shall be truly straight and square.

i. Timber generally is to be the best of kind, well and properly seasoned, of matured growth, free from worm holes, large loose or dead knots or other defects and sawn i.e., squarely and will not suffer warping, splitting or other defects through improper handling.

ii. The hardwood is to be well seasoned Saal, Hollock, Kail, Marandi or other approved similar locally obtainable hardwood weighing 610 Kg/cum.

iii. Teak wood would be of best quality from Burmah, Dandeli, and Balarshah, free from soft heart, worn holes and weighting 640 Kg /cum.

iv. The moisture contents in wood shall be as per the CPWD Specification 1977. The testing of wood shall be carried out as per CPWD Specification 1977.

v. All Steam Beach wood shall be free from worn holes, soft sap or knots. The wood shall be well seasoned as per IS: 287:1973 with a moisture content of 10%.

vi. No individual hard and sound knot shall exceed 6 Sq.cm. In size and the aggregate area shall be more than 1% of the area of the pieces. These shall not be less than 2 growth rings per cm. width in cross-section.

vii. All dimensions given in the schedule of quantities and drawings are the required finished sizes.

viii. Timber shall be well seasoned and kiln dries with a moisture content of 12% nominal plus 2% for teak wood. The contractor should get the timber tested for moisture content of wood at his own cost.

ix. All timber shall be treated with preservatives and fire retardants.

x. All timber shall be free from worm holes, loose or dead knots or other defects and shall not suffer from warping, splitting or other defects.

xi. All wood to be used shall be approved by architect or University Engineer.

xii. Timber is to be out to the required sizes and length as soon as practicable after the works are begun and stored under cover so that the air will circulate freely around it. Journey is to be prepared, immediately after the placing of contract, framed up (but not bonded) and stored until required for fixing in position, when it is to be bonded and waged up. Any portions that warp or develop shakes or other defects are to be replaced before wedging up, the whole of the work is to be framed and finished in a proper and workman like manner in accordance with the detailed drawings and fitted with all necessary mottoes straps, belts screws etc. running bonded joints are to be cross tongued with teak on guess and where over 1 - 1/28 thick double tongued. Joiner's work generally unless otherwise specified.

xiii. Templates boxes and moulds shall be accurately set out and rigidly constructed so as to remain accurate during the time they are in use.

xiv. Grounds are to be clean shown, free large knots, splayed as required, plugged and fixed to walls etc. at 1'6" centres. Wood plugs are to be cut on the twist, patent wall plugs or plastic filling may be used in lieu of wood plugs with the approval of the Architect.

xv. All unexposed surfaces of timber e.g. false ceilings, backings fillets backs of doors frames, cupboard framing, grounds etc. are to be treated with two coats of approved timber preservative like solignim, kirticite, term seal or cast oral or vacuum pressure impregnated with and approved water soluble timber preservative before fixing of bedding.

xvi. JOINTS- All joints will be standard, mortised and tendon, dovetail, do we, cross halved metered tongued and grooved and rebated, nailed or glued but joints, will not be permitted except in exceptional cases, ailed but joints will not be accepted. All joins shall be smeared with white lead.

xvii. Whenever solid wood is specified it shall be as per I.S.I. and of good quality. The type of wood shall be got approved before collecting the same on site. Fabrication of wooden members shall be started only after approval. It shall be free from large, loose, dead of cluster knot, flows, shakes, wraps, bends or any other defect. It shall be uniform in

substance and of straight fibres as far as possible. It shall free from rates, decay, harmful fungi and other dejects of its usefulness for the purpose for which it is required. The colour of wood shall be uniform as far as possible. The scantlings planks etc. shall be seen in straight lines and planes in the direction of grain and of uniform thickness.

xviii. FIRST CLASS TEAK WOOD: - First class teak wood shall have no individual hard and sound knots, more than 6 sq. cm. In size and the aggregate area of such knots shall not more than 1% area of piece. The timber shall be closed grained.

xix. SECOND CLASS TEAK WOOD: No individual hard and knots shall be more than 15 sq. cm. in size and aggregate area of such knots shall not exceed 2% of the area of piece.

b. COMMERCIAL PLYWOOD

Plywood to be used shall be grade BWR, i.e., it shall have bounded with BWR (Boiling Water Proof) type synthetic resin adhesive shall be equal or superior quality that is laid down in IS: 303-1960.

The veneers for all grades shall be either rotary cut or sliced. The Veneers shall be sufficiently smooth to permit even spread of glue. The thickness of all veneers shall be uniform, within a tolerance 5%, corresponding veneers on either side of center one shall be of the same thickness and species. The requirement of thickness of the face and core veneers shall be as follows:

i. In 3 ply board upto 5 mm thick, the combined thickness of the face veneers shall not exceed twice the thickness of the center ply.

ii. In a multiply boards, the thickness of any veneer shall not more than thrice the thickness of any other veneer.

iii. The sum of the thickness of the veneers in one direction shall approx. to the sum of the thickness of the veneers at right angles to them and shall not be greater than 1-5 times this sum except for 3-ply as specified in (i).

iv. The moisture content shall not be more than 12.5% by mass. It shall either be of Mafatlal, Kit ply make or other equivalent approved made. Where B.W.P. Grade is specified it should be boiling water proof confirming to I.S. standards.

v. Plywood should be used after applying white anti-termite liquid. Nails or screws fixed in the plywood should be equally spaced. The plywood sides wherever they are visible should be covered with the beading patti. Too many joints in furniture pieces will not be considered.

vi. Rough finished sides while fitting the fixtures like locks, hinges etc will not be considered.

vii. The contractor will have to make punctures of cut-outs as required by electrical or any other contractor, for which the owner will make no separate payment or by the respective contractor. All contractors will work in team of good spirit and in good faith.

viii. Certain details shall be modified as per the site adjustments.

c. DOOR SHUTTERS – FLUSH SHUTTERS :

i. All door shutters shall be 35 mm thick flush door solid core type non-decorative Industrial made conforming to IS – 2202 and ISI certified with block board core (confirming to the requirements as per IS-1659), for which the manufacturer shall produce the necessary evidence. The flush shutters shall be made with internal lipping of hardwood 25 mm thick and both faces commercial ply veneered. Adhesive used shall be phenol formaldehyde synthetic resin conforming to BWP types specified in IS-848-1974.

ii. Contractor shall obtain the approval for the name of the manufacturer of the flush door shutters from the Engineer-in-charge before placing the supply order. While asking for the approval, copy of the "Bureau of Indian Standard" letter under which manufacturer has been authorized to mark the product with ISI marking should be attached. Engineer-in-charge, before giving the approval shall ensure that the validity date of license has not expired.

Testing of Flush Door Shutters:

On receipt of the shutters at site, the Engineer-in-charge shall be entitled to get the samples of door shutters tested in any approved laboratory. From each lot of shutters, one shutter shall be selected at random by the Engineer-in-charge. The cost of the door shutters selected as samples, their transportation to the laboratory and cost of testing by the laboratory shall be borne by the Contractor and paid by university in running and final bill.

i. REBATING: The shutters shall be single leaf or doubled leafed as shown in the drawings and as directed by Engineer-in-charge. In case of double leafed shutters, the meeting of the stiles shall be rebated by one third the thickness of the shutter.

ii. On all door shutters, laminate, 1/1.5 mm th.shall be pasted with adhesives as specified by the manufacturers. The laminate shall be as per approved shade & texture, of make

iii. The bottom of shutters shall be 5mm above the finished floor level.

iv. Wherever stainless steel sheeting as a strike plate is mentioned, it shall be pasted with SR 198, along with SS stud screws @ 200 c/c, 50mm inside of all edges. This shall be pasted upto the bottom 1350mm ht. or as shown in the drawing. The SS sheet shall be 0.5 MM th.A sample of a single leaf as well as a double leaf shall be made and got approved from the Engineer-in-charge before ordering mass production. The sample, once approved shall be retained in the approved materials store under the supervision of the Engineer-in-charge.

v. Vision panel, wherever needed shall be 5/5.5mm. th.plain glass of the size as mentioned in the drawings. The panel shall be fixed within the cut-out made from within the door shutter. The cut edges shall be fixed with TW lipping 35 x 8mm.

The lipping shall be flushed with the outer edges of the door and the glass fixed in the center of this lipping with quarter round beadings, 15x15 mm.

d. LAMINATES

i. All the laminate to be used shall be of 1/1.5 m thickness in approved the colour and shade as proved and specified by the architect

ii. Joints in the laminates will not be permitted until and unless the same is unavoidable or is required as per the drawings

iii. It shall be matt finish manufactured by Greenlam / Formica India Ltd or as mentioned in the list of approved makes. Or its equivalent as per the sample shown by the Consulting unless otherwise specified. It shall satisfy all the I.S.I. standards for melamine coated laminated fibre boards contractor shall have to take approval of the Department for each sheet of the laminates.

e. VENEERS: The best quality natural wood veneers of the specified wood and of thespecified thickness shall be used. It shall be in matching group and of uniform shade and as per the selection and approval. The contractor shall have to obtain the approval of the prior to pressing of veneers. The contractor shall have to use the brand of veneers as approved by the Architect.

f. RUBBER: Natural latex rubber (Geo foam or its equivalent) of specified density andthe thickness shall be used for all the cushions and padding for upholstered furniture. Loose cushions of all furniture should have solid foam walling to keep up proper shape.

g. FASTENINGS AND HARDWARE: Extent and intent: The intention of the contract isthat that the building as shown shall be completely equipped with required hardware. Any required item not noted or listed shall be finished in a grade equal to and in harmony with similar item listed**.**

General: All hardware shall be of the best quality of its type and strictly in conformity with the materials and finish described in schedule of hardware. If called upon to do so, the contractor shall arrange to get hardware specially manufactured to the design, requirements and standards laid down by the Architect.

Samples: Samples of each different item of hardware including screws or any particular item of hardware shall be submitted to the Architect for approval.

Quality: All hardware shall be of perfect fit, uniform in finish and free from imperfections that affect serviceability or mar the appearance.

Guarantee: The contractor shall be responsible for the proper working of all hardware, for a period of one year from the date of completion of acceptance of the building.

i. The fixtures and fastenings, that is, butt hinges, teemed strap hinges, sliding door stoppers, casement window fasteners, casement stays and ventilators, Handles, Sliding channels catch shall be made of the metal as specified in the item or its specifications.

ii. They shall be of Stainless Steel, iron, brass, aluminium, chromium plated iron, and chromium plated brass copper oxidized iron copper oxidized brass or anodized aluminium as specified.

iii. The fixtures shall be heavy type. The fixtures and fastenings shall be smooth finished and shall be such as will ensure case of operation.

iv. The samples of fixtures and fastenings shall be got approved as regards quality and shape before providing them in position.

v. Brass and anodized aluminium fixtures and fastenings shall be bright finished, SS fixtures to be finished as mentioned in the specifications.

vi. Screws, nails, bolts will be of brass or other non-corrosive metal. In hardware, they will match the finish of the hardware item.

vii. Nails, in a finished surface shall be neatly punched and the hole filled with wood filler matching the finish. Screws, in a finished surface will be round head, raised head or sunk beneath the surfaces and the hole plugged with a wood plug with matching colour and grain of the wood surface, unless especially detailed.

viii. HARDWARE: Hinges, locks, latches, door tracks etc. shall be as specified by the manufacture specified. In a variation of this quality of the substitute shall be equal to or better than the original specified, and samples should be submitted to the Architect for prior approval.

ix. HARDWARE AND METALS: -The hardware throughout shall be of approved manufacture and supply well-made and equal in every respect to the samples to be deposited with the Architect. The contractor any be required to produce and provided samples from many different sources before the Architect is able to make a decision and he should allow in his rates for so doing.

Fittings generally shall have SS brush finish unless otherwise specified, and shall be suitable for their intended purposes.

Screws are to match the finish of the article to be fixed and to be rounded of flat headed or counter sunk as required.

Cover up and protect at the brass and bronze surfaces with thick grease or other suitable protective material, renew as necessary and subsequently clean off and clear away on completion.

Aluminium and stainless steel 304/316 shall be of approved manufacture and suitable for its particular application. Generally the surfaces of aluminium shall have an anodized finish and both shall comply with the sample approved the Architect.

All steel brass, bronze, aluminium and stainless steel articles shall be submitted to a seasonable test for strength; if so required by the Architect at the Contractor's expenses.

All brazing and welds are to be executed in a clean and smooth manner rubbed down and left in the flat test and tidies way, particularly where exposed.

Chromium plated shall be in accordance with B.S. 1224 or as per approved specification and shall be on base materials of copper or brass or as specified by Architect.

SS fittings shall be in accordance with IS ---- and as per specifications The hardware throughout shall be of approved manufacturer.

h. Adhesives – Adhesive shall be Phenol Formaldehyde Synthetic resin conforming to B.W.P. (Boiling Water Proof) type specified in IS: 848-1974. Only synthetic resin adhesive shall be used for bonding cores members to one another, including core frame, and for lipping, glazing frame, Venetian frame and other exposed parts where such binding is done.

i. Nails, spikes, screws and bolts - Nails, spikes and bolts shall be of the best quality mild steel or wrought and of length and weights approved by the Architect. Nails shall comply with IS: 1959-1960 or equivalent approved quality samples. Bolts with I.S. or equivalent approved quality samples. Brass headed nails are to comply with B.S. 1210. Wire staplers shall comply with B.S.1494 or equivalent.

j. **GLASS :-**All glass shall be of the best quality, free from specks, bubbles, smokes, veins,air holes, blisters and other defects. The kind of glass to be used shall be as mentioned in the item or specification or in the special provisions or as shown in detailed drawings. Thickness of glass panel shall be uniform. All glass to be approved manufacture complying with IS: 3548-196 or as per approved quality and sample.

The compound for glazing to metal is to be special non hardening compound manufacture for the purpose and of 9 brand and quality approved the interior Designer.

In cutting glass, proper allowance shall be made for expansion. Each square of glazing to be in one whole sheet and after cutting the edges to be properly filled.

All cracked, scratched and broken pane should be replaced. All glass surfaces should be properly cleaned inside out.

k. **MELAMINE FACED PARTICAL BOARD -** It should be three layered wood based particle board, such as Nova pan melamine faced prevaricated on both sides. Particle board should be ISI 3087 FPTH (type II, 1965) marked on edges and should also confirm to German din standard viz DIN 66761. It should impart good bending strength, modules of elasticity, internal bond strength and screw holding strength. Melamine faced surface should has resistant to crack at 100 and should pass cigarette burn test.

l. HILUX calcium silicate boards for Partition

i. The board should be non-combustible to prevent spread of fire when applied on inner walls and ceilings. They should not discharge toxic gas or smoke.

ii. Fire resistance should be 1 hour with integrity and Insulation as per BS 476 Part 22

iii. Finally edges of the board are to be jointed and finished so as to have a flush look which includes filling and finishing with compatible filler compound/ Silicon Acrylic based putty and self-adhesive fiber glass mesh and two coats of primer

iv. STORAGE : Boards should be stored indoors placed flat on level supports , stacks should not have more than 100 boards of 6mm. separate stacks with a hard wood board when placing one over the other

v. HANDLING : Boards should be lifted clear off the stack and should not be dragged one over another and should place the boards down carefully in order to avoid damage

vi. Appearance : Boards are to be off-white in color and have a factory grain smooth surface on one face with a lightly textured reverse face.

vii. Termite and vermin resistant: The boards should not affected by insects, vermin, microorganisms

m. CORIAN Acrylic surface for table tops and Partition

i. Composition: Corian should be solid, non-porous surfacing material homogeneously composed of ±1/3 acrylic resin (also known as PolyMethylMethAcrylate or PMMA), and ±2/3 natural minerals.

ii. Clearances: :The recommended expansion clearance with UN-caulked Corian® joints should be minimum 30.5 x 10 –6 x (length of the Corian® piece) x (biggest temperature range expected in °C) in mm. Joints to be caulked should be approximately 3 mm wide to allow satisfactory caulk penetration and expansion.

iii. Joints : corner joints should be made square (butt) rather than mitred. All Corian® joints should be reinforced. The edges to be joined should be straight, smooth and clean. Joints should only be made with "Joint Adhesive for DuPont Corian®". Make cutouts with a router equipped with a sharp 9.5 mm diameter (minimum) carbide bit.

iv. Corners of a cut-outs must be rounded to 5 mm radius and edges smoothed, top and bottom, all around a cutout. L- and U- shaped corners need smooth, 13 mm radius inside corners. For hob cutouts corners should be reinforced with a Corian® corner block.

v. Sealants and Adhesives: FDA-listed silicone sealant sold by DuPont or its distributors should be used to achieve the best performance and color match. Vertical panels of Corian® may be installed over suitable substrates, including water-resistant gypsum board, marinegrade plywood and ceramic tiles. Use "Silicone Sealant" for DuPont Corian® whenever low flame spread is required. In other cases, light colored elastic polyurethane adhesive or Type I (ANSI A 136.1-1967) elastic solvent based spread mastic adhesives may also be used. DO NOT USE WATERBASED ADHESIVES. Install countertops on perimeter framing support (without added substrate) using small amounts of silicone sealant. For making joints in countertops, repairs and custom edges, "Joint Adhesive for DuPontCorian®" is required. When used in accordance with manufacturer's instructions, it provides a smooth.

Rough Carpentry: Materials unless otherwise called for, all framing and other concealed wood members shall be of first class hard wood.

Workmanship: All carpenter‟s work shall be done by skilled workmen using proper tools. All joints shall as far as possible, be mortised and tenoned and glued with best quality approved waterproof glue. Where mortise tenon joints are not possible, the joints shall be securely nailed with the longest nails that may be used without splitting the wood. Wherever it is necessary or adequate joints cannot be formed by nailing, the members shall be lapped or jointed by GI straps or extra wood blocks. All joints shall be done with neatness and as approved and directed by the Architect.

2. **LABORATORY FURNITURE –** Manufacturing, assembling, transporting and placing /fixing in position knock down factory made modular furniture such as cabinets below lab platform, above lab platform, Loft cupboard, Utility cabinet, Shelves , Storage, Loft of utility cabinet, Cabinet below washbasin Platform, Mirror cabinet as per drawing, specification and direction of University Engineer. All outer exposed edge of all panels shall be covered and sealed with PVC edge banding tape of required thickness of Rehau or Dollkin or with hot melt, minifix fittings, plastic dowels, modular clips screws washer etc. in approved factory.

a. **Table Tops –** All table tops to be made up of 17mm +/- 1mm Jet black Granite. Thefront edge of the granite shall be chamfered at an angle of 28 deg and smoothened. The back splash for the wall bench shall be granite 18/19mm thick material for an height of 4" from the finished table top level

b. **Carcass** – Under table trolleys/ drawers to be supported on SS tube framework madeout of SS 304 in dry labs and SS 316 in wet labs (a material test report (MTR) of the actual material to validate it as being 304 or 316). The same can be tested with molybdenum test kit by Engineer-in-charge on site.

c. Shutter and shelves: Made of 19 mm thick calibrated BWR plywood conforming to IS 303, with Both sides 1mm thick decorative high-pressure lamination sheet of plain / wood grain in gloss / matt / suede finish with high density protective surface layer conforming to IS : 2046, pressed on a hot-press method with Fevicol-SD ,Henkel (Dorus 4972) adhesives. All the edges must be sealed with 2mm PVC/ABS (Poly Vinyle Chloride /Acrylonitrile Butadiene Styrene) edge bands, glued on Computer controlled automatic edge banding machine with pre-milling operation using hot-melt glue while pre-milling function putting 'on' mode

d. Back Panel: Made of 12 mm thick calibrated BWP plywood conforming to IS 303, with both sides 1mm thick decorative high-pressure lamination sheet of plain / wood grain in gloss / matt / suede finish with high density protective surface layer conforming to IS : 2046, pressed on a hot-press method with Fevicol-SD ,Henkel (Dorus 4972) adhesives. All the edges must be sealed with 2mm PVC/ABS (Poly Vinyle Chloride /Acrylonitrile Butadiene Styrene) edge bands, glued on Computer controlled automatic edge banding machine with pre-milling operation using hot-melt glue while pre-milling function putting 'on' mode.

e. Utility cabinet and loft : Made of 19 mm thick calibrated BWP plywood conforming to IS 303, with both sides 1mm thick decorative high-pressure lamination sheet of plain / wood grain in gloss / matt / suede finish with high density protective surface layer conforming to IS : 2046, pressed on a hot-press method with Fevicol-SD ,Henkel (Dorus 4972) adhesives. All the edges must be sealed with 2mm PVC/ABS (Poly Vinyle Chloride /Acrylonitrile Butadiene Styrene) edge bands, glued on Computer controlled automatic edge banding machine with pre-milling operation using hot-melt glue while pre-milling function putting 'on' mode

f. Drawers – Drawers to be made out of 1.2 mm thk perforated steel sheets of SS 316. The material should be conforming to IS 6911:1992. The corrosion resistance of SS sheets could be tested as per IS 10461 (Part 1):1983 and 10461 (Part II) 1985

g. **Laminates** – compact laminates conforming to standard mentioned above. The labs tohave chemical resistant compact laminates / anti-bacterial compact as specified.

h. **Sink** - Sink supports shall be the hanger type, suspended from top front and top rearhorizontal rails of sink cabinet by four 1/4" dia. rods, threaded at bottom end and offset at top to hang from two full length reinforcements welded to the front and rear top rails. Two 3/4" x 1-2/2" x 12 gauge channels shall be hung on the threaded rods to provide an adjustable sink cradle for supporting sinks. When sink capacity exceeds 3,750 cu. in., the sink supports shall be suspended from full-length reinforcements welded to the two end rails. Two 1" x 2" x 10 gauge full-length channels shall be hung from the four 1/4" dia. rods to provide an alternate sink cradle.

The impact resistance should be high which will minimize damage during and after installation. The sinks should be with self-draining base and should be suitable for mounting on top or underside of the work benches. The sinks should be compatible to a vast number of acids, alkalis and reSupervisors. The size of the sink is 560Lx355Dx245H
mm (approx.) and Bowl size is 500Lx293Dx245Hmm (approx.). This sinks shall have bottle trap with reducing coupler of size 51x31mm and with 38mm polypropylene pipe of one foot length.

i. Poly propylene Sinks – Wherever specifically mentioned, The sinks should be injection molded from Poly propylene co-polymer resin. Polypropylene to have very high resistance to attack from a wide range of chemicals and the ability to withstand temperatures up to 100 deg C.

ii. Stainless steel sink - Stainless steel A ISI 304(18/8) kitchen sink as per IS 13983 of NIRALI / DIAMOND/ ALLEX make

i. Hardware – Hardware made out of SS 316 conforming to standards

i. Drawer suspension assembly shall consist of 2 sections providing a quiet, smooth operation on ball bearing nylon rollers. All drawers shall be self-closing from a point 125mm open. Cabinet channels shall maintain alignment of drawer and provide an integral drawer stop, but the drawer shall be removable without the use of tools. Drawers shall rise when opened thus avoiding friction with lower drawers and/or doors. Drawer suspension system shall incorporate a double stop, lock open feature.

Drawer and Door Pulls/ Handles : Pull shall be of modern design, offering a comfortable handgrip, and be securely fastened to doors and drawers with screws.

ii. All pulls shall be of SS 316. Two pulls shall be required on all drawers over 600 long. Use of plastic pulls (molded or extruded), or a design not compatible for usage by the handicapped will not be acceptable.

iii. Hinges: Hinges shall be made of Type 304/ 316 stainless steel .089 thick, 65mm high, with brushed satin finish. Hinges shall be attached to both door and case with two screws through each leaf. Doors less than 900 mm in height shall be hung on one pair of hinges, and doors over 900 mm high shall be hung on 3 hinges

3. P.O.P. Punning

General: Plaster of Paris punning (Plaster) is generally applied on already cement plastered surface to give it a smooth and even surface.

Preparation of surface: Projecting burrs of mortar formed during existing cement plaster shall be removed. The surface shall be scrubbed clean with wire brushes. In addition the plastered surface shall be pock marked with painted tool, at spacing of not more than 4 cm centers and depth of pocks to be approx. 3 mm deep. This is to ensure a proper key for the plaster. The surface shall be cleaned of all oil and grease marks etc.

Plaster of Paris: The Plaster of Paris shall be of semi-hydrate variety calcium sulphate. It shall not be too quick setting. Initial setting time shall not be less than 17 minutes.

Application: The material will be mixed with water to a workable consistency. Plaster of Paris shall be applied directly on the wall plasters in suitable sizes panels and finished to smooth surfaces by steel trowels. The plaster shall be applied in such a manner that it fully fills the gaps the thickness over the plastered surface is as specified int. the description of the item. The finished surfaces shall be smooth and true to plane, slopes or curves as required.

4. PAINTING

Extent and intent: The contractor shall supply all materials, labour, tools, ladders, scaffolding and other equipment necessary for the completion and protection of all painting work. Painting, as herein specified shall be applied to all surfaces requiring painting throughout the interior and exterior of the building as given in the schedule of finishes or elsewhere. Care is to be taken that all surfaces to be painted are thoroughly cleaned and dry.

Materials: Materials used in the work shall be of manufacture approved by the Architect/Employer. Ready mixed paints, varnishes, enamels, lacquers, stains, paste fillers, distempers and other materials must be delivered to the job site in the original containers, with the seals unbroken and labels intact. Each container shall give the manufacturer's name, type of paint, colour of paint and with unbroken seal and instructions for reducing the thinning shall be done only in accordance with directions. Remove rejected materials immediately from the premises. All brushes tools. Kettles etc. used in carrying out the work shall be clean and free from any foreign matter. All paint material shall be stored in cool, dry conditions clear of other stores. The mixing of materials of different brands or during application shall not be permitted

Colour: All colours, as provided in the colour schedule shall be approved by the Architect/Employer. The contractor shall mix manufacturer's colours as per Architect's/ Employer's requirements and shall prepare painted samples of the colours selected and submit same for approval by the Architect. No work is to proceed until the Architect has given his approval, preferably in writing of the colour samples.

Ready mixed paint shall be used exactly as received from the manufactures and generally according to their instructions and without any admixtures what so ever

Commencement of work: Painting shall not be started until the surfaces to be painted are in a condition fit to receive painting and so certified by the Architect. Painting work shall be taken in hand only after all other contractor‟s work is completed. Building where painting work is to be commenced shall be thoroughly swept and cleaned up before commencement of painting.

a. All the paints shall meet with the following general requirements

i. Paint shall not show excessive setting in a freshly opened full can and shall easily be predisposed with a paddle to a smooth homogeneous stage. The paint shall show non curdling levering caking or colour separation and shall be free from lumps and skins.

ii. Paint as received shall brush easily, possess good levelling properties and show no running or sagging tendencies.

iii. The paint shall not skin within 49 hours in a three quarters filled closed container.

iv. The paint shall dry to a smooth uniform finish from the manufactures and generally according to their instructions and without any admixtures what so ever.

b. White Wash / Dry distemper

i. White wash shall be provided to over plastered surfaces, if any, as directed by Project Manager and Architect.

ii. Dry distemper of approved shade shall be provided to all internal surfaces of all rooms including toilets and kitchen etc. all as directed by Project Manager and Architect.

iii. Before application of white wash / distemper the surfaces shall be prepared to clean and even surface.

iv. White wash shall be prepared from lime slacked on site, mixed and stirred with sufficient water to make a thin cream. This shall be allowed to stand for 24 hours and shall be screened through clean cloth. Four kg. of gum dissolved in hot water shall be added to each cubic meter of the cream (115 gm/cft). Blue shall be added to give required whiteness. The approximate quantity of water to be added in making cream shall be five liters per kg. of lime. 10% Zinc Oxide shall also be added to obtain a desired shining in the white wash.

v. Dry distemper shall be carried out in two or more coats over one coat of approved primer as per manufacturer‟s instructions to give even shades.

vi. White wash and dry distemper shall be applied in specified coats by using flat brushes or spray pumps. Each coat shall be allowed to dry before next coat is applied, if additional coats than what have been specified are necessary to obtain uniform and smooth finish it shall be given to no extra cost.

vii. The finished dry surface shall not show any signs of cracking and peeling nor shall it come off readily on the hand when rubbed.

viii. All paints have to be low VOC paints and certificates of the same should be provided by the bidder.

c. CEMENT BASE PAINT

i. Two or more coats of cement base paint shall be applied to give even shade on all external cement plaster, internal plaster surfaces or parapet surfaces. Soffits of chajja, lintels, beams and cills of external windows. The shades of paint shall be used as approved by the Engineer-in-charge. Each coat shall be cured well by wetting surfaces for at least three days.

ii. Alternatively, white cement slurry shall be used with pigment as required to achieve the desired shade. The white cement slurry shall be such as to provide a spread of 15 Sq.M per bag (50Kg) of white cement.

iii. For all external paints, a patch at least 10 Sq.M. in area has to be done and got approved form the Engineer-in-charge for quality, shade & texture.

d. ACRYLIC EMULSION PAINT

i. These paints are to be used on internal surfaces except wooden and steel. Plastic emulsion paint as per IS : 5411 of approved brand and manufacture and of the required shade shall be used.

e. PLASTIC EMULSION PAINT: Pigmented priming cost (emulsion thinned with water) followed by three or more finishing coats of plastic emulsion paint. Pasted filter to be applied every coat exempting the final finishing coat and sanded.

f. Painting on New Surface

i. The surface shall be thoroughly cleaned and dusted off. All rust, dirt, scales, smoke splashes, mortar droppings and grease shall be thoroughly removed before painting is started. The prepared surface shall have received the approval of the Engineer-incharge after inspection, before painting is commenced.

ii. Application: The number of coats shall be as stipulated in the item. The paint will be applied in the usual manner with brush, spray or roller. The paint dries by evaporation of the water content and as soon as the water has evaporated

the film gets hard and the next coat can be applied. The time of drying varies from one hour on absorbent surfaces to 2 to 3 hours on non-absorbent surfaces.

iii. The thinning of emulsion is to be done with water and not with turpentine. Thinning with water will be particularly required for the under coat which is applied on the absorbent surface. The quantity of water to be added shall be as per manufacturer‟s instructions. The surface on finishing shall present a flat velvety smooth finish. If necessary more coats will be applied till the surface presents a uniform appearance.

iv. Precautions:

1. Old brushes if they are to be used with emulsion paints should be completely dried of turpentine or oil paints by washing in warm soap water. Brushes should be quickly washed in water immediately after use and kept immersed in water during break periods to prevent the paint from hardening on the brush.

2. In the preparation of wall for plastic emulsion paintings, no oil base putties shall be used in filling cracks, holes etc.

3. Splashes on floors etc. shall be cleaned out without delay as they will be difficult to remove after hardening.

4. Washing of surfaces treated with emulsion paints shall not be done within 3 to 4 weeks of application.

NOTE

The specifications of the various items of the works will be as per latest editions of PWD/CPWD specifications for work with all correction slips. In absence of any detailed specifications in PWD/CPWD, latest Indian Standard specifications and code of practice shall become applicable.

Wherever, these codes are silent, the same shall be governed by sound engineering practice and the decision of EIC in matters of interpretations etc. shall be final and binding on the Contractor. In case of the material supplied by the specialized agencies the material specifications of the same agencies shall be made available with their address and telephone No. by the contractor and shall be used as per the same specification and as per the direction of EIC. If required the contractor shall arranged the inspection/ verification of the items from the Engineer of the expert agency. Item wise detailed technical specifications may be described in the tender to correlate with drawings and BOQ

5. **Polishing works -**The wooden article to be polished shall be first prepared to smooth surface with 400 fit black water proof sand paper. All dents shall be filled with epoxy putty and to be finally finished with DUCO, N. C. clear lacquer to a silky smooth finish.

The basic material shall be shellac dissolved in methylated spirit. The timber must be well sanded and cleaned and the grain, filled with grain filler. Any stating must be

done before applying the polish. Work evenly over the surface with slow figure of eight motion until the timber is coated with a thin layer of polish. The object is to apply a series of thin coats allowing only few minutes for drying between the two coats. When a level and even bodied surface is obtained the work is ready for spiriting off. Allow the work to stand for at least eight hours, then take a fresh rubber with a double thickness of cover material and charge it with methylated spirit. The object of spiriting off into is to remove the rubber marks and to give the brilliance of finish.

Any polish or paint spot marks etc. on flooring tiles should be cleared by the contractor before handling over the site

a. Spirit polish

i. Polish: Polishing material shall be prepared by dissolving pure shellac, varying in shade from pale orange to lemon yellow, free from direct and other materials, in methylated spirit at the rate of 0.15 Kg. shellac to 1 litter of spirit. Suitable pigment to achieve the required shade of polish shall be added as directed by the Architect.

ii. Preparation of Surface: The surface, cleaned of all dirt etc. shall be rubbed down smooth with sand paper and well dusted. Knots if visible shall be covered with a preparation of red lead and glue size laid on while hot. Holes and indentations shall be given a coat of wood filler made by mixing whiting (ground chalk) in methylated spirit at the rate of 1.5 Kg. of whiting to one litter of spirit. The surface shall again be rubbed down perfectly smooth with fine sand paper and wiped clean.

iii. Application: Three or more coats of polish shall be applied over the above surface, to achieve a finish as approved by the Architect. The polish shall be applied with a pad of woolen cloth covered by a fine cloth. The pad moistened with polish shall be rubbed had on the wood surface in a series of overlapping movements, applying the material uniformly over the entire area to give an even finish. Subsequent coats shall be applied in similar manner after the previous coat is allowed to dry. The finishing shall be done with fresh piece of clean fine cloth, damped with methylated spirit and applied by light rubbing. The finished surface shall have a uniform texture and high gloss.

b. Wax Polishing

i. Preparation of Surface: The surface to be polished shall have been finished smooth. Knots, cracks and holes on the surface shall be cleaned and filled with wood putty (fine saw dust mixed with bees wax). The fillings when dry shall be rubbed down with a carpenters file and then the entire surface shall be rubbed down perfectly smooth and wiped clean. In no case shall sand papers be rubbed across the grains so that even fine marks are not seen on the surface.

ii. Application: The polish shall be applied evenly with a clean soft pad of cotton cloth in surface is completely and fully covered. The surface is then continuously rubbed till the surface is quite dry. A second and third coat shall be applied in the same manner and rubbed continuously until the surface is dry. The final coat shall then be applied and rubbed until the surface has assumed a uniform gloss and is dry, showing no sign of stickiness. The

finished surface shall have a uniform flossy finish as approved by the Architect.

MELAMINE FINISH

The Melamine finish shall be applied on the French spirit polished surface.

The melamine coat preferable of clearly hard glaze shall be applied with a cloth Pad. The surface shall then be left to dry for at least six hours and further coats are applied with a paint brush. If the duration of gap is more than 24 hours between coats, the previous coat shall be rubbed down with a fine glass paper or a medium grade of steel wool. The matt finish shall be obtained by giving a final coat of clean reseal matt coat.

1. FALSE CEILING

POP False Ceiling

The thickness of POP ceiling shall be 10mm & will include all the curves, coves,etc as per architectural design. The frame work shall be treated with one coat of primer of zinc coating of grade 350 as per IS 277 and shall be true to planers or slopes as specified.

The joints in the expanded metal shall be provided only under the main steel frame work. The plaster of Paris shall be of calcium sulphate semi-hydrate variety, its fineness shall be such that when sieved through a sleeve of IS sieve designations 0.05mm for 5 min after drying the residue left on it shall not be more than 1% by weight. It shall not be too quick setting. Initial setting time shall not ne less than 13 min. The average compressive strength of material determined by testing 5 cm cubes after removal from mould. After 24 hours and drying in an over at 40 c till weight of the cubes is constant, Shall not be less than 84 Kg/sq.m.

The material will be mixed with water to a workable consistency; plaster of Paris shall be applied to the underside of expanded metal in suitably sized panels and finished to a smooth surface by steel trowels. The finished surface shall be smooth and true to planed slopes or curved as required.

Mineral fiber Ceiling –The Mineral fiber ceiling should be a recessed visible grid and a tegular edge design, creating a ceiling with a shadow effect that accentuates each tile and partially conceals the grid system. The visible surface of each tile should be 7mm below the grid.

ACCESSIBILITY: The tiles should be easily demountable. Minimum demounting depth according to installation diagram.

Light Efficiency: White 010, nearest NCS color sample S 0502- Y, 84% light reflectance (of which more than 99% is diffuse reflection)

2. The system should be consists of connect grid system , with an approximate weight of 2.5 kg/m2 , manufactured room high density glass wool, The visible surface should be coating and the back of the tile is covered with glass tissue. The edges are painted.

Measurements: Length and breadth of the plan area of the finished work shall be measured correct to a centimeter. No deduction shall be made for openings provided nor shall extra payment be made either for any extra material or labour involved in such openings. Rate shall include provision of access panel with MDF panel, rate to include decorative work with such or raised levels in false ceiling. Rate shall include all scaffolding staging etc.

3. Aluminum / GI perforated Metal Ceiling system

The metallic ceiling shall have regular beveled/plain edge powder Coated aluminum / GI ceiling tiles In size 600mm x 600 mm x 0.6 mm & color RAL 9003 white & having perforation of 1.8 dia circle with a backing of factory pressed black non woven tissue the epoxy powder coat should electro statically be applied in a controlled environment and then be baked to achieve the perfect fusion with the metal surface to be laid on to be exposed grid system 24mm comprising main runner, cross tees and wall angles. for installation to comprise intermediate channel of size 45mm x 0.55mm thk with two flanges of15mm each suspended at 1200 mm clipped to spring runner, bracket and connectors for spring runners securely fixed to structure using GI soffit cleats fixed to ceiling with 6mm dia and 50mm long dash fasteners, 4mm GI adjustable rods with galvanized level clips spaced at 1200mm center along with the runner by approved suspension and bracket and connectors for spring runners. Wall angles 19mm X 22mm with clips to be secured to the wall at 450mm maximum center to the successful completion of the job to the satisfaction of the Engineer-in-charge. The rate shall be inclusive of making openings for light fittings, grills, diffusers, cutouts, wastage and necessary hardware etc

Demountable Aluminum Ceiling The ceiling should be laid in true horizontal level with Concave and Convex demountable ceiling panels made of aluminum of nominal size 600mmx900mmx1.0mm (actual size: 607x911x1.0mm) having a perforated (micro perforation with 2.5mm dia holes and 22% open space and 12.8mm border) surface and having Fire Performance CLASS A (ASTM E 84) and an NRC of 0.7suitable for Green Building application, with Recycled content of 50%. The tile shall have colour as per approval and acoustical fleece glued to the back of the tiled shall be laid on hook-on grid systems with hook-on (J-bar) carriers and Alignment (spacer) bars suspended from the structural soffit using a system of threaded rods. The rate shall be inclusive of making openings for light fittings, grills, diffusers, cutouts, wastage and necessary hardware etc all complete as per Engineer-In-charge at site.

Alignment bars will be spaced at every 1200 mm intervals secured to the structural soffit using 6mm (M6) threaded rods in a direction parallel to the length of the curved panels. The hook on carrier bars shall be secured perpendicular to the alignment bars using rivets or nuts at every 911mm intervals. The concave and convex curved panels shall be placed alternatively on the hook-on bars and secured by the special tabs provided on the hook-on carriers. Special perimeter trim (optional) may be fabricated to conceal the carrier bars in the shorter direction of the panel. The rate shall be inclusive of making openings for light fittings, grills, diffusers, cutouts, wastage and necessary hardware etc.

4 SS metal ceiling

The ceiling should be perforated & laid Clip-in & will consist of 600x600 mm clip in tiles of stainless steel in 0.35 mm thickness with bevel edge in metallic finish with Light Reflectance > 60% and suitable for Green Building application, with Recycled content of 25%.

Installation: To comprise 3000mm long „C" channels spaced at 1200mm centers securely fixed to the structural soffit by support clamp & approved hangers. The last hanger at the end of each C channel should not be greater than 600mm from the adjacent wall. Use a C-channel connector for splicing two pieces of C-channels. 4000mm Dp-12 Main carriers (spring tee bars) shall be spaced at 600mm centres in a direction perpendicular to the C channels and shall be secured at every intersection with C channel using a dp-12 hanger. Tiles should be clipped in between two Dp-12 carriers (spring tee bars) from below. Perimeter trims to be of wall angles of white colour secured to walls at 450mm maximum centers. Cut tiles to be secured to the wall angles using a spring clamp. All complete as per Arch Drawing. Rates inclusive of necessary cutouts

5 Calcium silicate board false ceiling

The thickness of the false ceiling should be 12.5mm thick conforming to IS: 2095 including providing and fixing of frame work made of special sections power pressed from MS sheet and galvanized in accordance with zinc coating of grade 350 as per IS: 277 and consisting of angle cleat of size 25 mm wide x 1.6 mm thick with flanges of 22 mm and 37 mm at 1200 mm centre to centre one flange fixed to the ceiling with dash fastener 12.5 mm dia x 40 mm long with 6 mm dia bolts to the angle hangers of 25 x 25 x0.55 mm of required length, and other end of angle hanger being fixed with nut and bolts to GI channels 45 x15 x 0.9 mm running at the rate of 1200 mm centre to centre and also including the cost of making openings for light fittings, grills, diffusers, cutouts made with frame of perimeter channels suitably fixed The joints between the Calcium silicate board are finished flush and even with jointing compound and tape. Coat of primer suitable for Calcium silicate board after putty including double scaffolding. All complete as directed.

List of Approved Make for Interior Work:-

No	Location / Proto type	Material	Type	Makes
1.	Wooden Furniture	Plywood of varying thicknesses (i) Carcass, shutter and shelves: 19 mm thick (ii)Back Panel: 12 mm thick (iii)Top panel : 35 mm thick	BWR plywood conforming to IS 303,	Green, Century, Duco, Kitply
2.	Surface finish - laminate	Exposed side	1mm thick decorative high- pressure lamination sheet of with high density protective surface layer conforming to IS :2046	Greenlam, Royal touch, Merino
3.	Surface finish - laminate	Exposed side – in chemical labs	Acid resistant laminates	Greenlam Lab guardian 9801, 9802
4.	Surface finish - veneer	Exposed side	plywood 4 mm thick, one side decorative veneer conforming to IS: 1328	Ekbote veneers, Duro, Green
5.	Surface finish - glass	Counter Top - 12 mm thick	clear float glass in table top including crystal polishing of edges to required shape	Modifloat, Saint gobain
6.	Glass film	White board film	Glossy white polyester film with whiteboard capabilities	3M – WH-111
7.	Internal finish - Laminate	other side	White 0.8mm thick balancing laminationconforming to IS : 2046, pressed on a hot-pressmethod	Greenlam, Royal touch, Marino
8.	Adhesives			Fevicol-SD SH/ Marine Henkel (Dorus4972)
9.	Edge Finish for veneered furniture	6 mm thk Burma teak lipping, Teak wood for		Rehau/ Sidmark
10.	Hardware	Handles – 250/300 mm	SS	Kich/ Hafele / Hettich / Ozone/ Yale
11.	Hardware Furniture	Handle –100 mm/ 64 mm	SS	Kich CH /Tunes A10/ Hafele / Hettich

Sign & Seal of Contractor **Corrections** **University Engineer**

No	Location / Proto type	Material	Type	Makes
13.	Cabinet knobs	Cabinet knobs 25/50 mm	SS 304/316	Kich N56 S / Hafele / Hettich
14.	Drawer sliders	Drawer sliders – work cabinets - Metabox	SS	Ebco / Hafele / Hettich
15.	Telescopic sliding channels	Telescopic sliding channels for drawers	SS 304/316	Kich / Hafele / Hettich/ CNR/ BOSCH
16.	Spring Hinges	Spring Hinges for cabinets	SS 304/316	Ebco/ Hafele / Hettich
17.	Floor mounted spring hinges	Floor mounted spring hinges	SS 304/316	Ozone/ Hafele/ Hettich/ Enox
18.	Patch fittings	Patch fittings for frameless glass shutters	SS 304/316	Hafele/ Hettich Ozone/ Enox
19.	Patch locks	Patch locks for frameless glass shutters	SS	Hafele/ Hettich/ Ebco/ Europa
20.	Drawer Locks	Drawer locks	SS	Godrej /HafeleInox/Ebco/ Europa/ Hettich
21.	Cabinet Lock	Cabinet Lock	SS 304/316	Hafele / Godrej/Ebco /Europa/ Hettich
22.	Door Lock	Door Lock	SS 304/316	Hafele / Godrej/ Europa/ Doorset
23.	D brack for Glass Shelves	D brack for glass shelves	SS 304/316	Hafele/ Hettich
24.	SS Perforated sheets	SS perforated sheets – 1.2 mm – 316 grade	SS 304/316	
25.	Window Shades – work areas,	Blinds roller blinds	Roller Blind - 38mm OD roll formed lock seamed steel of 0.5mm thickness	
26.	Gypsum Board			Gyp India

No	Location / Proto type	Material	Type	Makes
27.	Modular Ceiling			Armstrong
28.	PVC carpet 1.50 mm thk 3.00 mm thk			Vista, Carara,
29.	MS frame			Tata sections
30.	Mirror 6mm thk			Modi

EXTENSION WORK OF POST GRADUATION DEPARTMENT BUILDING FOR SHREEMATI NATHIBAI DAMODAR THACKERSEY WOMEN'S UNIVERSITY, PUNE CAMPUS.

VOLUME – III

Bill of Quantity (BOQ)

And

Drawings

SUMMARY

Sr. No.	SUMMARY STATEMENT :-	AMOUNT
I	**CIVIL WORK**	
A	DEMOLATION & DISMANTLING WORK	
B	EXCAVATION, FILLING AND SOLING	
C	CEMENT CONCRETE (PLAIN & REINFORCED)	
D	MASONRY WORK (STONE AND BRICK)	
E	PLASTERING AND FINISHING	
F	WATER PROOFING WORK	
G	FLOORING, SKIRTING AND DADO	
H	DOORS, WINDOWS AND VENTILATORS	
I	CEILING WORKS	
J	PAINTING WORKS	
K	LIFT	
L	POST TENSION WORK	
I	**GRAND TOTAL FROM (A) TO (L)**	
II	**PLUMBING WORK**	
III	**FIRE**	
IV	**ELECTRICAL WORK**	
	TOTAL (I + II + III + IV)	

NOTE:

1. **Contractor should consider cost of scaffolding wherever required for the work while quoting the quote no extra cost will be considered during execution.**
2. **During execution existing Ground and 1st floor will be used by the institute so contractor should consider the factor of safety of occupants and should provide safety net without extra cost apart from the contract cost along the peripheral of the building so that construction material should not fall on ground during the execution.**

BILL OF QUANTITIES

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
A	**DEMOLATION & DISMANTLING WORK**				
1	**Dismantling brick masonry** in lime or cement mortar and stacking the materils as directed with all leads, lifts etc.	95.36	Cu.Mt.		
2	**Removing rich mix cement concrete** including stacking the spoils as directed with all leads, lifts etc, complete.	12.24	Cu.Mt.		
3	**Removing brick bat** coba including stacking the spoils as directed with all leads, lifts etc, complete.	206.63	cum		
4	**Removing doors and windows with frames** and stacking the materials as directed with all leads, lifts etc. complete.	46.00	No.		
5	**Removing cement tiles, or marble or polished shahabad floor or dado** without bed concrete including stacking the materials as directed with all leads, lifts etc. complete	565.28	Sqm.		
6	**Shifting Building Rubish** including loading in truck and conveying to dumping point approved by Pune Corporation, unloading, spreading etc. complete. With all leads and lifts.	314.23	Sqm.		
	Total to Main summary				
B	**EXCAVATION, FILLING AND SOLING**				
7	**Excavation for foundation in earth, soil of all types, sand, gravel and soft murum**, including removing the excavated material upto a distance of 50 m. beyond the building area & stacking and spreading as directed, dewatering, preparing the bed for the foundation and necessary back filling, ramming, watering including shoring and strutting etc. complete. **(Lift upto 1.5 m.)**	390.20	Cu.M.		
8	**Excavation for foundation in hard murum** including removing the excavated materials upto distance of 50 metres beyond the building area and stacking and spreading as directed, dewatering,	360.47	Cu.M.		

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
	preparing the bed for the foundation and necessary back filling, ramming, watering including shoring and strutting etc. complete. (Lift upto 1.50 m)				
9	**Excavation for foundation in Hard rock** by chiselling, wedging, line drilling, etc. including trimming and levelling the bed, removing the excavated materials upto a distance of 50 metres beyond the building area stacking as directed, dewatering and back filling with available earth/ murum ramming, watering etc. complete. (Lift upto 1.5m)	10.80	Cu.M.		
10	**Filling in plinth and floors** with approved excavated material in 15cm. to 20cm. layers including watering and compacting etc. complete.	371.27	Cu.M.		
11	**Filling in plinth and floors with contractors material/brought from outside** and approved by Engineer incharge in layers of 15 cm to 20 cm including watering and compaction etc. complete.	257.40	Cu.M.		
12	Providing dry/ trap/ granite/ quartzite/ gneiss **rubble stone soling** 15 cm to 20 cm thick including hand packing and compacting etc. complete.	119.76	Cu.M.		
13	Providing preconstructional antitermite treatment as per I.S. 6313 (Part-II) by treating the bottom surface and sides of excavation at the rate of 5 litres of emulsion concentrate of 1.0 percent of chlorophyrifos per square meter of surface area covering 10 years guarantee on bond paper.	268.13	Sq.M.		
14	Providing preconstructional antitermite treatment as per I.S. 6313 (Part-II) treatment by treating the backfill in immediate contact with foundation at the rate of 5 litres of emulsion concentrate of 1.0 percent of clorophyrifos per square metre of vertical surface area covering 10 years guarantee on bond paper.	268.13	Sq.M.		
15	Providing preconstructional antitermite treatment as per I.S. 6313 (Part-I) to the soil along the external face of building by	321.75	Sq.M.		

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
	punching holes of 1.2 of 1.5 C.M. diametre about 30 -60 cm deep at 15 cm c/c as close to the wall as possible and to inject 0.5 percent of aldrin or clorophyrifos at the rate of 7.5 litres per hole and sealing the same with proper filling and covering 10 years guarantee on bond paper.				
	Total to Main summary				
C	**CEMENT CONCRETE (PLAIN & REINFORCED)**				
16	Providing and laying Cast in situ/Ready Mix cement concrete in M-10 of trap/ granite/ quartzite/ gneiss metal for foundation and bedding including bailing out water, formwork, laying/pumping, compacting, roughening them if special finish is to be provided, finishing if required and curing complete, with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/concrete Batch mix plant (Pan mixer) etc. complete. With natural sand/V.S.I. quality Artificial Sand	39.66	Cu.M.		
17	Providing and laying Cast in situ/Ready Mix cement concrete M- 25 of trap / granite /quartzite/ gneiss metal for R.C.C. work in foundations like raft, strip foundations, grillage and footings of R.C.C. columns and steel stanchions etc. including bailing out water, formwork ,cover blocks, laying/pumping, compaction and curing roughening the surface if special finish is to be provided (Excluding reinforcement and structural steel) etc. complete, with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With natural sand/V.S.I. quality Artificial Sand	5.00	Cu.M.		
18	Providing and laying Cast in situ/Ready Mix cement concrete M- 25 of trap / granite /quartzite/ gneiss metal for R.C.C. columns as per detailed designs and drawings or as directed including centering, formwork, cover blocks compacting and roughening if special finish is to be provided and curing etc. complete. (Excluding reinforcement and structural steel).with fully automatic	95.59	Cu.M.		

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
	micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With natural sand/V.S.I. quality Artificial Sand				
19	Providing and laying Cast in situ/Ready Mix cement concrete in M-25 of trap/ granite/ quartzite/ gneiss metal for R.C.C. beams and lintels as per detailed designs and drawings or as directed including centering, formwork, cover blocks, laying/pumping, compactionand roughening the surface if special finish is to be provided and curing etc. complete. (Excluding reinforcement and structural steel).with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With natural sand/V.S.I. quality Artificial Sand	210.50	Cu.M.		
20	Providing and laying Cast in situ/Ready Mix cement concrete M- 25 of trap/ granite / quartzite/ gneiss metal for R.C.C. slabs and landings as per detailed designs and drawings including centering, formwork, cover blocks, compaction, finishing the formed surfaces with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening if special finish is to be provided and curing etc. complete.(Excluding reinforcement and structural steel).with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With natural sand/V.S.I. quality Artificial Sand	191.60	Cu.M.		
21	Providing and laying Cast in situ/Ready Mixcement concrete M- 25 of trap/ granite/ quartzite/ gneiss metal for R.C.C. chajja as per detailed design and drawings including centering, formwork, cover blocks, laying/pumping, compacting and roughening the surface if special finish is to be provided and curing complete. (Excluding reinforcement and structural steel). with fully automatic micro processor based PLC with SCADA enabled	46.20	Cu.M.		

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
	reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With natural sand/V.S.I. quality Artificial Sand				
22	Providing and casting in situ cement concrete in M-25 of trap/ granite/ quartzite/ gneiss metal for R.C.C. pardi 75mm thick fins including centering, formwork, cover blocks compacting and roughening them if special finish is to be provided and curing complete. (Excluding reinforcement).With fully automatic micro processor based PLC with SCADA enabled reversible drum type concrete mixer With natural sand. Spec. No.: Bd.F.11 Page No. 304 and B.7, Page No. 38	18.78	Cu.M.		
23	Providing and fixing in position TMT - FE - 500 bar reinforcement of various diameters for R.C.C. pile caps, footings, foundations, slabs, beams columns, canopies, staircase, newels, chajjas, lintels pardis, copings, fins, arches etc. as per detailed designs, drawings and schedules. including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required complete.	79.75	M.T.		
	Total to Main summary				
D	**MASONRY WORK (STONE AND BRICK)**				
24	Providing uncoursed rubble masonry of trap / granite / quartzite / gneiss stones in cement mortar 1:6 in foundation and plinth of inner walls / in plinth of external walls including bailing out water manually , striking joints on un exposed faces and watering etc.complete.	1.00	Cu.M.		
25	Providing fly ash brick masonry with conventional / I.S. type fly ash bricks in C.M. 1:6 in foundation and plinth including bailing out water manually striking joints, racking out joints watering and scaffolding etc. complete.	5.00	Cu.M.		
26	Providing fly ash brick masonry with conventional/ I.S. type bricks in cement mortar 1:6 in superstructure including striking joints, raking out joints, watering and scaffolding etc. Complete	5.00	Cu.M.		
27	Providing Second class fly ash brick	5.00	Sq.M.		

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
	masonry with conventional / I.S. type bricks in cement mortar 1:4 in half brick thick wall including mild steel longitudinal reinforcement of two bars of 6 mm diameter / two hoop iron strips 25 mm x 1.60 mm at every third course, properly bent and bounded at ends scaffolding raking out joints and watering etc. complete.				
28	Providing Autoclaved Aerated Concrete Block masonary of Ecolite or equivalent make conforming to IS:2185 (Part 3) - 1984 in extra fine jointing mortar of fixoblock of UltraTech or equivalent in superstructure including striking joints, raking out joints and scaffolding etc. Complete. (The test shall be carried out conforming to IS:6441 (Part I) - 1972)	200.60	Cu.Mt.		
29	Providing Autoclaved Aerated Concrete Block masonary of Ecolite or equivalent make conforming to IS:2185 (Part 3) - 1984 in extra fine jointing mortar of fixoblock of UltraTech or equivalent in Half brick thick wall including striking joints, raking out joints and scaffolding etc. Complete. (The test shall be carried out conforming to IS:6441 (Part I) - 1972)	1347.43	Sq.Mt.		
	Total to Main summary				
E	**PLASTERING AND FINISHING**				
30	Providing internal cement plaster 12mm thick in single coat in cement mortar 1:4 without neeru finish to concrete or brick surfaces, in all positions including scaffolding and curing etc. complete.	6893.12	Sq.M.		
31	Providing sand faced plaster externally in cement mortar using approved screened sand, in all positions including base coat of 15 mm thick in cement mortar 1:4 using waterproofing compound at 1 kg per cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8 mm thick in cement mortar 1:4 finishing the surface by taking out grains and curing for fourteen days scaffolding etc.complete.	1599.38	Sq.M.		
32	Providing and fixing chicken mesh of 22 gauge, with about 30 cm. width at the	356.25	Sq.M.		

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
	junction of R.C.C members and brick work, of approved quality including fixing mesh in position by necessary drilling in concrete /B.B.masonry and or tying by binding wire etc. complete.				
33	Providing and applying gypsum plaster (with Gypsum material of Gypsum India / Mega Sign or equivalent make) with finishing with gypsum material in 10 to 13 millimeter thickness to previously plastered surface / or on newly brick surface (Excluding rough cast plaster) in all position including preparing and Finishing the surface scaffolding etc.complete.	4177.39	Sq.M.		
34	Providing and applying Two coats of wall care Putty of 2mm thickness for plastered surface and 5-6mm thickness finished concrete surface to Ceiling and Walls to prepare surface even and smooth of Brands BIRLA WHITE, BERGER, BISION, J.K., make, etc complete. a) For plastered walls/ceiling 2mm	2086.74	Sq.M.		
35	Providing and applying Two coats of wall care Putty of 2mm thickness for plastered surface and 5-6mm thickness finished concrete surface to Ceiling and Walls to prepare surface even and smooth of Brands BIRLA WHITE, BERGER, BISION, J.K., make, etc complete. b) For finished concrete walls/ceiling 5 to 6mm	5.00	Sq.M.		
36	Providing and applying Texture plaster with finishing with Purlina/ Rustic texture material (with texture material of Asian/ Renava/ Nitco/ Temtex or equivalant company make) in 3 to 4 milimeter thickness on previously finished plastered surface including plaster Groove 6mm thick or Tape Grooves 35 to 45 mm thickness or as required in all postion including preparing the surface scaffolding etc. complete. (Excluding texture Paint and Texture Paint Finishing) (Prior permission of S.E. is required before inclusion of this item in the estimate)	5.00	Sq.M.		
	Total to Main summary				

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
F	**WATER PROOFING WORK**				
37	Providing cement based water proofing treatment to terraces (Indian water proofing or alike) with brick bats laid in required slope to drain the water for any span after cleaning the base surface. Applying a coat of cement slurry admixed with approved water proofing compound and laying the brick bats on bottom layer in C.M.1:5 admixed with approved water proofing compound filling up to half depth of brick bats, curing this layer for 3 days, applying cement slurry over this layer joints of brick bats with C.M.1:3 admixed with approved water proofing compound and finally top finishing with average 20 mm. thick layers of same mortar added with jute fiber at 1 Kg per bag including finishing the surface smooth with cement slurry admixed with approved water proofing compound. Marking finished surface with false squares of 300mm x 300 mm. making the junctions at the parapet rounded and tapered top for required height, with drip mould at the junction of plaster and parapet and curing and covering 10 years Guarantee against leakproofness on Court fee stamp paper of Rs. 500/- including ponding test etc. complete.	974.08	Sq.M.		
38	Providing water proof bedding for flooring of Bath and WC 25 mm thick in C.M. 1:3 including using approved water proofing compound in specified proportion as per manufacturers specifications for per bag of cement including leveling, curing and covering 10 years guarantee on court fee stamp paper of Rs.500/- including ponding test etc. complete.	303.80	Sq.M.		
39	Providing waterproof plaster in W.C. and bath 12 mm thick for dado in cement mortar 1:3 with neat finishing, floating using waterproofing compound at the rate of 1 kg. per bag of cement of approved make and manufacturer and curing etc. complete. (Excluding Tiles) (As directed by Engineer in Charge)	850.64	Sq.M.		
40	Providing and laying jointless Polydee-LM,	5.00	Sq.M.		

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
	a highly flexible elastometric coating for RCC / cementitious surface for terrace waterproofing on B.B. Coba / R.C.C, after application of TP-42 Primer on perfectly clean surface (free from loose dust and foreign matter) application of 1st coat of Polydee-LM @ 700 gms/sqm and applying 2nd coat of Polydee-LM @ 700 gms/sqm and finishing the same with sprinkling the AG-10 granules on the wet coating. (After finishing covering the treatment with 25mm cement plaster for protection with fibrillated 6mm Plyplast fibre @ 125 gms/sqm to be paid in separate item.) covering 7 years guarantee on Court Fee Stamp Paper of Rs. 100/- etc. complete.				
	Total to Main summary				
G	**FLOORING, SKIRTING AND DADO**				
41	Providing and laying machine cut machine polished machine cut Kota stone slabs 20 to 25 mm thick for treads and risers of steps and staircases, with rounded nosing for the treads on a bed of 1:4 cement mortar including cement float, filling joints with neat cement slurry, curing, polishing and cleaning etc. complete.	109.05	Sq.M.		
42	Providing and laying machine cut machine Polished Kota stone flooring 25mm to 30mm thick and required width in plain/ diamond pattern on bed of 1:6 C. M. including cement float, filling joints with neat cement slurry, curing, polishing and cleaning etc. complete.	230.00	Sq.M.		
43	Providing and laying vitrified rustic matt stone finish tiles having size 590 mm to 605 mm x 590 mm to 605 mm of 8 to 10mm thickness and confirming to IS. 15622-2006 (Group Bla) of approved make, shade and pattern for flooring in required position laid ?on a bed of 1:4 cement mortar including neat cement float, filling joints, curing and cleaning etc. complete. a) Flooring	1484.33	Sq.M.		
44	Providing and laying vitrified rustic matt stone finish tiles having size 590 mm to 605 mm x 590 mm to 605 mm to 8 to 10mm thickness and confirming to IS. 15622-2006 (Group Bla) of approved make, shade and pattern for flooring in	108.28	Sq.M.		

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
	required position laid ?on a bed of 1:4 cement mortar including neat cement float, filling joints, curing and cleaning. etc. complete. b) Skirting				
45	Providing and laying Antiskid Ceramic tiles of approved quality of size 30 cm x 30 cm and confirming to IS 15622-2006 (Group-B IIA) for antiskid flooring in required position laid on a bed of 1:4 cement mortar including cement float, filling joint with cement slurry cleaning curing etc. complete.	131.39	Sq.M.		
46	Providing and laying ceramic tiles having size 30 cm. x 45 cm. confirming to corresponding I.S. for dado and skirting in required position with readymade adhesive mortar of approved quality on plaster of 1:2 cement mortar including joint filling with white/ colour cement slurry cleaning curing etc. complete.	510.38	Sq.M.		
47	Providing and laying in position flooring of telephone black / Amba White / Cat bary brown / Ruby red / Ocean Brown granite stone of approved shade and size 18 mm to 20 mm thick on bed 1:6 cement mortar including cement floats striking joints, pointing in C.M. 1:3 curing and cleaning etc. complete.	5.00	Sq.M.		
48	Providing and laying telephone black / Amba White / Cadburybrown / Ruby red / Ocean Brown granite stone of 18 to 20 mm thick for door frame/ dado/ window boxing etc. On C.M. 1:6 including filling joints with polymer base filler nosing the sharp edges wherever necessary, curing, etc. complete.	342.67	Sq.M.		
49	Providing and constructing granite kitchen platform with fixing of stainless steel sink 600 mm x 450 mm size as per detailed drawing including vertical both side polished kadappah stone 25 to 30 mm thick supports with kadappah top 35 to 40 mm thick and polished granite 16 to 20 mm top with side strips of granite at front and both sides of platform raised with two vertical granite supports 15 cm height and top granite of 75 x 40 cm including cutting, opening for sink of required size in	6.88	Sq.M.		

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
	kadappah as well as granite etc. complete. (Platform top size 5.00 m x 0.60 m and height is 0.75 m)				
50	providing and fixing oval type under counter wash hand basin of 16 inch x 22 inch size and of special colour shade having telephonic black / coloured granite of 180 mm thick stone black kadappa framework including chromium plated coupling bottle - Trap using CERA company or equivalent oval typa wash basin model no 3448 as per detailed drawing or as directed by engg incharge etc complete. (Counter size 1.20 m x 0.60 m)	16.00	Nos		
51	Providing and fixing machine cut mirror polished 18 mm to 20 mm thick telephone black granite / Amba White / Cat bary brown / RBI red / Ocean Brown granite stone partition with rounding the edges etc. complete . Both side polish	6.48	Sq.Mt.		
52	Providing and fixing heavy duty inter locking concrete Coloured paving blocks of 80 mm thickness of having a strength of 300 kg/Sq.cm. of approved quality and shape on a bed of crushed sand of 25 to 30 mm thick including skirting joints and cleaning etc. complete	112.00	Sq.Mt.		
53	Machine polishing to cement/marble mosaic tiled flooring or any other type of flooring including cleaning, washing, etc. complete.	909.30	Sq.Mt.		
	Total to Main summary				
H	**DOORS, WINDOWS AND VENTILATORS , RAILING**				
54	Providing and fixing **frame with / without ventilator of size as specified with Country cut teak wood** for doors and windows including chamfering, rounding, rebating, iron holdfast of size 300mm x 40mm x 5mm with oil painting, etc. complete	0.15	Cu.m.		
55	Providing and fixing **frame with / without ventilator of size as specified with Red Mirantti wood** for doors and windows including chamfering, rounding, rebating, iron holdfast of size 300mm x	3.69	Cu.m.		

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
	40mm x 5mm with oil painting, etc. complete				
56	Providing and fixing **marine ply Solid Core flush door shutter** in single/ Double leaf 35 mm thick as per detailed drawings, both side laminate including all necessary beads, moulding and lipping, wrought iron hold fasts,chromium plated fixtures and fastenings, with brass mortise lock, chlorium plated handales on both side and as per detailed design & drawing etc. complete.	136.65	Sq.M.		
57	Providing and fixing fiber glass reinforced polyster door shutter 35 mm thick as per IS 14856 (2000) (Reaffirmed 2006) without ventilator including chromium plated fixtures and fastening with chromium plated handles on both sides, etc complete.	41.40	Sq.M.		
58	Providing & Fixing **Solid core PVC door shutter** of approved colour & make, with all necessary and as per detailed design & drawing etc.	5.00	Sq.M.		
59	Providing and fixing in position. (as per I.S.1868 / 1982) Aluminium sliding window of two tracks with rectangular pipe having overall dimension 63.50 x 38.10 x 1.02 mm at weight 0.547 kg/Rmt. and window frame bottom track section 61.85 x 31.75 x 1.20 mm at weight 0.695 kg/Rmt. Top and side track section 61.85 x 31.75 x 1.30 mm at weight 0.659 kg/Rmt. The shutter should be of bearing bottom 40 x 18 x 1.25 mm at weight 0.417 kg/Rmt. Inter locking section 40 x 18 x 1.10 mm at weight 0.469 kg/Rmt. And handle section 40 x 18 x 1.25 mm at weight 0.417 kg/Rmt. and top section 40 x 18 x 1.25 mm at weight 0.417 kg/Rmt. As per detailed drawings and as directed by Engineer in charge with all necessary Aluminium sections fixtures and fastenings such as roller bearing in nylon casting and self locking catch fitted in vertical section of shutter including 5 mm thick plain glass with all required screws and nuts etc, complete. With colour Anodising without box	58.80	Sq.M.		

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
60	Providing and fixing in position (as per 1868 / 1982) Aluminium sliding window of three tracks with rectangular pipe 95 x 38.10 x 0.90 mm at weight 0.637 kg/Rmt. with window frame bottom track section 92 x 31.75 x 1.30 mm at weight 1.070 kg/Rmt.. Top and side track section 92 x 31.75 x 1.30 mm at weight 0.933 kg/Rmt. The shutter should be of bearing bottom 40 x 18 x 1.25 mm at weight 0.417 kg/Rmt. Inter locking section 40 x 18 x 1.10 mm at weight 0.469 kg/Rmt. and handle and top section 40 x 18 x 1.25 mm at weight o.417 kg/Rmt. As per detailed drawings and as directed by Engineerincharge with all necessary Aluminium sections fixtures and fastenings such as roller bearing in nylon casting and self locking catch fitted in vertical section of shutter including 5 mm thick plain glass and aluminium mosquito net shutter with stainless steel jail with all required screws and nuts etc, complete. With colour Anodising without box	373.20	Sq.M.		
61	Providing and fixing in position aluminium fixed window fully glazed of any size as per detailed drawing and as directed by Engineerincharge with all necessary alluminium sections including necessary fixtures and fastening such as 5 mm thick clear float glass etc. complete. b) With powder coating Note While arriving at the rate of item of item weight at 6.90 kg/Sqm is considered.	4.44	Sq.M.		
62	Providing and fixing in position powder coated aluminium louvered windows / ventilator of various sizes with powder coating as per detailed drawing and specifications including aluminium frames 80 x 38 mm x 1.22 mm box type, 5 mm thick sheet glass louvers, of approved quality etc. complete.	20.16	Sq.M.		
63	Providing and fixing mild steel grill work for windows, ventilators etc. 20 kg/sqm as per drawing including fixtures, necessary welding and painting with one coats of anticorrosive paint and two coats of oil painting complete.	425.85	Sq.M.		

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
64	Providing and fixing mild steel grill railing 15 kg/sq.m with Ghanateak wood hand rail of size 75mm x 60 mm and sill of 75mm.x 25mm and newel posts for staircases, including fabricating, fixtures, erecting, painting the grill work with one coat of anticorrosive paint and two coats of oil painting with approved colours and polishing the sill, hand rail and the newelpost with french polish.	17.04	Sq.M.		
65	Providing and fixing 40mm diameter and 1.5mm thick Stainless steel hand railing in S.S.304 Grade including fabricating ,fixtures, erecting, necessary welding, grinding, finishing, buffing to stainless steel pipe etc. complete	12.00	R.mt.		
66	Providing and fixing 900mm high S.S.304 Grade Stainless steel railing with 40mm diameter and 1.5mm thick at top,40mm diameter and 1.5mm thick vertical supports spaced at 1.5m center to center and 8mm thick toughened glass including fabricating ,fixtures, erecting , necessary welding , grinding , finishing, buffing to stainless steel pipe etc. complete	5.20	R.mt.		
	Total to Main summary				
I	**CEILING WORKS**				
67	Providing and fixing 15 mm thick eco-friendly densified edge calcium silicate false ceiling (like aeroltie) of approved texture spintone/cosmos/hexa or equivalent of size 595mm x 595mm in true horizontal level, suspended on interlocking metal grid of hot dipped galvanized steel sections (galvanising at @12 gm/sq.m including both sides)consisting of main T runner suitably spaced at joints to get required length and size 24X38mm. made from 0.33mm thick(minimum) sheet, spaced 1200mm center to center and cross T of size 24X28mm made of 0.33mm thick(minimum) sheet to be interlocked at the middle of the 1200x600 mm panel to form the grid of size 600x600mm resting on periphery walls/partitions on a perimeter wall angle precoated steel of size 24x24x3000 made of 0.4 mm thick (minimum) sheet with the help of all plugs at 450mm and laying 15 mm thick	736.32	Sq.M.		

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
	densified edges calcium silicate ceiling tiles of approved texture (spintone/cosmos/hexa) in the grid, including light fittings , fixtures , smoke detectors etc., wherever required. Main T runners suspended from ceiling with using G.I. slotted cleats of size 25x35x1.6 mm fixed to ceiling using 12.5mm dia. And 50mm long dash fasteners, 4mm G.I. adjustable rods with galvanized steel levels clips of size 85x30x0.8mm, spaced at 1200mm center to center along main T bottom exposed with 24mm of all T-sections shall be prepainted with polyester baked.				
J	**PAINTING WORKS**				
68	Providing and applying priming coat over new wood and wood based surfaces, including preparing the surface by thoroughly cleaning oil, grease, dirt and other foreign matter, sand papering and knotting, scaffolding etc. complete.	5.00	Sq.M.		
69	Providing and applying pearl/ luster finish paint of approved colour and shade to the existing plaster surface including scaffolding, preparing the surface, applying the acrylic wall putti etc. complete.	5.00	Sq.M.		
70	Providing and applying washable oil-bound distemper of approved colour and shade to old and new surfaces in one coat including scaffolding, preparing the surfaces. (excluding the primer coat.)etc. complete.	5.00	Sq.M.		
71	Providing and applying **Royale Aspira** finish paint of approved colour and shade to the existing plaster surface including scaffolding, preparing the surface, applying the acrylic wall putti etc. complete.	11320.47	Sq.M.		
72	Providing and applying two coats of exterior acraylic emulsion paint confirming to corresponding I.S. of approved manufacture and of approved colour to the plastered surfaces including cleaning ,preparing the plaster surface, applying primer coat ,scaffolding if	5.00	Sq.M.		

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
	necessary , and watering the surface for two days etc complete.				
73	Providing and applying two coats of exterior **Apex-Ultima-Protek** paint confirming to corresponding I.S. of approved manufacture and of approved colour to the plastered surfaces including cleaning ,preparing the plaster surface, applying primer coat ,scaffolding if necessary , and watering the surface for two days etc complete.	2527.94	Sq.M.		
74	Providing and applying three coats of water proof cement paint of approved manufacture and of approved colour to new plastered surfaces including scaffolding if necessary, cleaning and preparing the surface, watering for two days etc. complete.	5.00	Sq.M.		
75	Providing and applying two coats of textured synthetic paint of approved shade and quality and one coat of primer before applying textured paint including scaffolding if necessary preparing surface by thoroughly cleaning oil, grease, dirt and other materials as required, etc. complete.	5.00	Sq.M.		
76	Providing and applying melamine polish of required finish to the wood work by spray machine including knotting and preparing the even surface by scraping, applying French polish , scaffolding if required etc. complete. Note:The work to be executed on prior approval of Superintending Engineer will be necessary.	8.00	Sq.M.		
	Total to Main summary				
K	**LIFT**				
77	Providing & fixing elevator/ lift of make prescribed in the make list with machine roomless & gearless technology, automatic rescue device, 6 persons capacity (Make - Kone, Schindler Elevator)	1.00	**No**		
	Total to Main summary				
L	**POST TENSION WORK**				
78	POST TENSIONING WORKS - Design & Execution of Post Tensioning works including decoiling the strands, cutting to the required lengths, supplying and laying	2.30	**MT**		

Sr. No	Description Of Work	Qty	Unit	Rate	Amount
	of HT strands, sheathing (GI corrugated ducts 80mm x 20 mm 0.30 mm thick) jointing with couplers, and inserting the strands, profiling, fixing live end anchorages including the supply of stressing anchorages suitable for 5-5 & 5-4 Tendons, grout vents, making dead end anchorages including flowering the strands, fixing tendon support bars, supervising the fixing of antibursting reinforcement, stressing the cables, end trimming, grouting the cables with cement and admixtures, with required Plant & Machineries, tools and tackles, consumables etc(Cement For Grouting has to be supplied by client/main contractor)., including obtaining approval from client for the work done as per the requirement of Engineer-In charge at site. The approved Post Tensioning agency and the Main contractor has to obtain the approval from Architects - All floors in metric tons of PT steel quantity.				
	Total to Main summary				
M	**PVC SLEEVES, CORE CUTTING AND BAR GROUTING**				
79	Providing & fixing **75MM TO 150MM Dia PVC sleeves** in RCC member as per requirement for service lines by consultant as per instruction by RCC consultant and as directed by Engineer in charge	40.00	**No**		
80	Providing **75MM TO 150MM Dia core cutting** in RCC member as per requirement for service lines by consultant as per instruction by RCC consultant and as directed by Engineer in charge	40.00	**No**		
81	Providing **12MM TO 20MM Dia Bar grouting** in RCC member as per requirement for service lines by consultant as per instruction by RCC consultant and as directed by Engineer in charge	40.00	**No**		
	Total to Main summary				

	GROSS TOTAL

ABSTRACT SHEET FOR PLUMBING WORK (DSR 2017-18)

Sr. No	Item Description	Qty	Unit	Rate	Amount
	WATER SUPPLY				
1	Providing and fixing on walls/ ceiling/ floor 15 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	40.0	Running Meter		
2	Providing and fixing on walls/ceiling/floor 20 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	32.0	Running Meter		
3	Providing and fixing on walls/ ceiling/ floor 25 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	64.0	Running Meter		
4	Providing and fixing on walls/ ceiling/ floor 32 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	32.0	Running Meter		
5	Providing and laying in trenches 15 mm dai. CPVC pipe including necessary excavation, fittings. Refilling trenches etc. complete Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	40.0	Running Meter		
6	Providing and laying in trenches 20 mm dai. CPVC pipe including necessary excavation, fittings. Refilling trenches etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	32.0	Running Meter		
7	Providing and laying in trenches 25 mm dai. CPVC pipe including necessary excavation,	32.0	Running Meter		

Sr. No	Item Description	Qty	Unit	Rate	Amount
	fittings. Refilling trenches etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.				
8	Providing and laying in trenches 32 mm dai. CPVC pipe including necessary excavation, fittings. Refilling trenches etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	32.0	Running Meter		
9	Providing and fixing on **walls/ ceiling / floors, ISI mark of below diameter ASTM uPVC SCHEDULE 40** pipes with screwed sockets & brackets, joints and necessary fittings such as socket's back nuts, elbows, bends, tees, reducers, plugs, clamps etc. including necessary drilling holes in walls, slabs, beam etc. and remaking good the demolished portion to restore the same in original condition neatly, testing etc. complete. (Prior approval of sample and brand by Executive Engineer is necessary before use).				
	25 mm dia	23.0	RMT		
	32 mm dia	20.0	RMT		
	40 mm dia	100.0	RMT		
	50 mm dia	20.0	RMT		
	65 mm dia	365.0	RMT		
10	Providing and fixing of below dia PVC Ball Valve of approved make including necessary sockets / unions, nut, testing etc. complete. (Prior approval of sample and brand by Ex. Engineer is necessary before use)				
	25 mm dia	3.0	Nos		
	32 mm dia	3.0	Nos		
	50 mm dia	2.0	Nos		
12	Providing and fixing 75 mm dia stabiliser pipe/ P.V.C. soil vent/waste pipe and with necessary fixtures and fitting such as bends, tees, single junctions, slotted vent, clamps etc. complete	60.0	Running Meter		
13	Providing and fixing 100 mm dia stabiliser pipe/ P.V.C. soil vent/waste pipe and with necessary fixtures and fitting such as bends, tees, single junctions, slotted vent, clamps etc. complete.	80.0	Running Meter		

Sr. No	Item Description	Qty	Unit	Rate	Amount
14	Providing and fixing P.V.C. Rain water pipes of 160mm outer diameter and having wall thickness of 2.2 to 2.7 mm confirming to I.S. 13592-1992 including proper rainwater receiving recess with P.V.C. plug, bend, necessary fittings, such as, offsets, shoes, inluding fixing the pipe on wall using approved wooden cleats projecting 25mm to 40mm from face of wall a fixing with clips of approved quality and number ,filing the joint using rubbergasket with solvent cement and properly resting the shoe of pipes on C.C. or masonry blocks, including necessary scaffolding and maintenance for 3 yrs for any leakages or dislocations of pipes. All the P.V.C. fittings and additional 2 piece socket clips shall be got approved from engineer in charge etc. complete. (The contractor shall give 3 yrsguarantee bond for payment)	135.0	Running Meter		
15	Providing and fixing P.V.C. Rain water pipes of 110mm outer diameter and having wall thickness of 2.2 to 2.7 mm confirming to I.S. 13592-1992 including proper rainwater receiving recess with P.V.C. plug, bend, necessary fittings, such as, offsets, shoes, inluding fixing the pipe on wall using approved wooden cleats projecting 25mm to 40mm from face of wall a fixing with clips of approved quality and number ,filing the joint using rubber gasket with solvent cement and properly resting the shoe of pipes on C.C. or masonry blocks, including necessary scaffolding and maintenance for 3 yrs for any leakages or dislocations of pipes. All the P.V.C. fittings and additional 2 piece socket clips shall be got approved from engineer in charge etc. complete. (The contractor shall give 3 yrs guarantee bond for payment)	100.0	Running Meter		
16	Providing and fixing in position UPVC ultra violet stabilized 110 mm outer diameter cowl dome confirming to I.S.-4985 including making joints with solvent cement etc. complete	8.0	Number		
17	Providing and fixing 15 cm rigid PVC Nahani trap including PVC grating ,bend, connectingpiece of UPVC pipe up to the outside face of wall ,making the good damaged surface and testing etc. complete (	52.0	Number		

Sr. No	Item Description	Qty	Unit	Rate	Amount
	Prior approval of sample and brand by Ex. Engr. is necessary before use)				
18	Providing and laying for 150 mm dia salt glazed stoneware pipe including fittings Such as bends, tees, single junction, double junctions laying, jointing (including excavation and refilling the trenches) complete.	50.0	Running Meter		
19	Providing and laying concrete pipes of I.S.NP. class of 150mm diameter in proper line, level and slope including necessary collars, excavation, laying, fixing with collars in cement mortar 1:1 and refilling the trench complete.	100.0	Running Meter		
20	Providing and laying concrete pipes of I.S.NP. class of 225mm diameter in proper line, level and slope including necessary collars, excavation, laying, fixing with collars in cement mortar 1:1 and refilling the trench complete.	300.0	Running Meter		
21	Providing and laying concrete pipes of I.S.NP. class of 300mm diameter in proper line, level and slope including necessary collars, excavation, laying, fixing with collars in cement mortar 1:1 and refilling the trench complete.	375.0	Running Meter		
24	Providing and fixing 15cm x 10cm salt glazed stoneware gully trap in cement concrete 1:4:8 outside the building including cast iron grating in the sink, connecting glazed stoneware pipe, brick masonry chamber with cast iron lid and cast iron grating for the gully trap.	5.0	Number		
25	Providing and constructing Brick Masonry Inspection Chamber 60cm x 45cm x 90cm including 1:4:8 cement concrete foundation 1:2:4 cement concrete channels half round G.S.W. pipes, Brick Masonry, plastering from inside and airtight C. I. cover of 75 kg with lid and frame fixed in cement concrete.	15.0	Number		
26	Providing and constructing Brick Masonry Inspection Chamber 90cm x 45cm x 90cm including 1:4:8 cement concrete foundation 1:2:4 cement concrete channels half round G.S.W.pipes, Brick Masonry, plastering from inside and C.I. lid cover of 75 kg with lid and	23.0	Number		

Sr. No	Item Description	Qty	Unit	Rate	Amount
	frame fixed in cement concrete.				
27	Providing and constructing Brick Masonry inspection Chamber 90cm x 45cm including 1:4:8 C.C foundation, 1:2:4 C.C.channels/half round glazed stoneware pipe channel, salt glazed stone-ware intercepting trap with rodding pipe set in 1:4:8 cement concrete block, brick masonry plastering inside and Outside, with C.I. lead cover of 75 kg with frame fixed in cement concrete.	2.0	Number		
28	Providing and fixing reinforced cement concrete cover of size 90 cm x 45 cm with frame over inspection chamber etc. complete. Heavy duty (225 kg)	23.0	Number		
29	Providing and fixing reinforced cement concrete cover of size 60 cm x 45 cm with frame over inspection chamber etc. complete. Heavy duty (160 kg)	15.0	Number		
30	Providing and fixing C.P. Angular stop clock with wall flange Jaquar make or equivalent continental (CAT.NO. CON-059) including necessary sockets/union nut etc. complete.	28.0	Number		
31	Providing and fixing C.P. wall mixer with provision for overhead shower with 115mm long bend pipe and wall flange jaquar or equivalent ?make continental (CAT.NO. CON-273 UPR) including necessary sockets/union nut etc. complete.	1.0	Number		
32	Providing and fixing C.P. sink cock with raised J" shaped swinging casted spout jaquar or equivalent make continental (CAT.NO. CON -359) including necessary sockets/ union nut etc. complete."	6.0	Number		
33	Providing and fixing C.P. BIB cock with wall flange jaquar or equivalent make continental (CAT.NO. CON-047) including necessary sockets/ union nut etc. complete.	1.0	Number		
34	Providing and fixing 15mm diameter concussion push button type brass/gun metal self-closing tap including necessary socket complete.	20.0	Number		
35	Providing and fixing white glazed earthenware Wash Hand Basin of 55cm. x 40	4.0	Number		

Sr. No	Item Description	Qty	Unit	Rate	Amount
	cm. size including cold water pillar tap/cold and hot water pillar tap brackets, rubber plugs and brass chain, stop tap and necessary pipe connections including P.V.C. waste pipe and trap up to the outside face of the wall. Making good the damaged surface, testing etc. complete.				
36	Providing and fixing 1st class white glazed earthenware Orissa Type W.C. Pan 580 mm dia including P or S trap cast iron soil and vent pipe upto the outside face of the wall (1:5:1 0) cement concrete bedding 15 mm thick, 10 liter P.V.C. flushing cistern with all necessary pipe connection etc. complete.	16.0	Number		
37	Providing and fixing European type white glazed earthenware coupled closet symphonic trap with symphonic low level white glazed 10 litres cistern with black backlite seat with all necessary pipe connection etc. complete..	8.0	Number		
38	Providing and fixing coloured glazed earthenware full stall type Urinal with P.V.C. flushing cistern of 5 liters capacity with fitting, inlet pipes and stop tap brackets for fixing the cistern 32mm dia. P.V.C. flush pipe with fittings and flushing arrangement including lead soil pipe, lead trap soil pipe connection up to the outside face of the wall.	8.0	Number		
39	Providing and fixing white glazed earthenware sink 600mm x 200mm x 450mm including all connection of the G.I. supply and P.V.C. waste pipes up to the outside face of the wall, cold water chromium plated screw down bib tap, rolled steel or C.I. brackets, rubber plug with chain and stop tap complete.	1.0	Number		
40	Providing and fixing H.D.P container Syntex or alike one piece moulded water tank made out of low density polythyler and built corrugation including of delivery up to destination hoisting and fixing of accessories such as inlet, outlet overflow of all tanks capacity above 1000 to 20,000 litres	0.0	Litre		
41	Supplying and erectingsubmersible pump set suitable for erection on open well of required HP with 415 V 50 c/s.A.C. supply,	1.0	Each		

Sr. No	Item Description	Qty	Unit	Rate	Amount
	having delivery head from 36 to 18 m and discharge from 400 to 1000 Itrs. per minute (Max efficiency at 29 m head & 680 Itr discharge) & delivery pipe of necessary diameter erected with necessary H type clamps as per specification No. WP-OSP				
43	Supplying & erectingautomatic control panel for 3 Ph, 415 volt, A.c. Submersible/centrifugal pump set upto 7.5-10 HP consisting of DOL starter having relay range 13-21 AMP,S.P.P., Combined ammeter/voltmeter, phase indicating lamp enclosed in CRCA powder coated Vibration proof encloser with IP 54 protection. Control Panel should offer single phasing, phase reversal, phase inbalence etc (Similar to LT model no.MU G10 / CAT NO. SS95983)	1.0	Each		
	TOTAL				

Fire Estimate

Sr. No.	Item Description	Qty	Unit	Rate	Amount
	Fire Fighting & LV System				
	FIRE HYDRANT/DOWE COMER SYSTEM				
1	Supplying installing, testing, commissioning of Booster Pumpof 450 LPM at 35 m head single stage (mono block) 3 ph. 415 A.C. 7.5 HP or of suitable HP with suitable Stages as per specification No. FF-MFP/BP	1.00	EACH		
2	Supplying and erecting D.O.L. Starter400V. 3 phase, 50 cycles with no volt coil and overload element with necessary materials and connected to supply upto 7.5 H.P. (Similar to L & T make MK-1 DOL Model)	1.00	EACH		
3	Supplying, erecting & terminating PVC armoured cable 3 core 2.5 sq mm copper conductorcontinuous 5.48 sq mm (12 SWG) G.I. earth wire complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/CU	30.00	m		
4	Supplying and installing G.I.pipe above ground of 'C' class ERW of size 75/80 mm diawith necessary fittings as per specification No. FF-PP	12.00	EACH		
	Supplying and installing G.I.pipe above		EACH		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
5	ground of 'C' class ERW of size 100 mm diawith necessary fittings as per specification no. FF-PP	12.00			
6	Supplying and installing100 mm dia end line strainer for +ve suction as per specification No.FF-VL/ELS	1.00	EACH		
7	Supplying & Installing cast iron double flange butterfly valve of size 100 mm dia. as per specification No. FF-VL/BFV	1.00	EACH		
8	Supplying & Installing cast iron double flange butterfly valve of size 75/80 mm dia. as per specification No. FF-VL/BFV	1.00	EACH		
9	Supplying and installing double flange NRV of size 75/80 mm dia as per specification No. FF-VL/NRV	1.00	EACH		
10	Supplying & installing gun metal gate valve of size 25mm dia as per specification No. FF-VL/GV	5.00	EACH		
11	Supplying and installing Stainless Steel single outlet hydrant valve fitted with necessary accessories complete as per specification No. FF-VL/HV	5.00	EACH		
12	Supplying and installing wall mounting swinging Hose reel drum fitted with 19 mm dia. 30mhigh pressure polypropylene (Polyhose)long fitted with necessary accessories complete as per specification No. FF-FFA/HV	5.00	EACH		
13	Supplying fire fighting R.R.L. Hose pipe, 63mm dia,15m in length, fitted with necessary accessories complete as per specification no.FF-FFA/RRL	5.00	EACH		
14	Supplying & erecting high pressure rubber hose pipe 19 mm dia complete as per specification no. FF-FFA/RHP	6.00	m		
15	Supplying Stainless Steel branch Pipe 63 mm Ø fitted with 20 mm dia detachable hexagonal nozzle as per specifications No. FF-FFA/NZ	5.00	EACH		
16	Supplying and erecting 20/25mm Ø G.M.air release cock, with necessary G.I. coupling to be fitted on top of Air vessel	1.00	EACH		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
	or on wet riser as per specification No.FF-FFA/ARV				
17	Supplying and installing pressure gauge of 100 mm Ø., 0-300 PSI or 0-14 kg per cm square fitted with 12/15 mm Ø. pad cock valve, and G.I. pipe, elbow etc. as per requirement in an approved manner as per specification No. FF-FFA/PG	1.00	EACH		
18	Supplying and erecting M.S./CRCA cabinet for housing single hydrant valve (size 400 x 400 x 400mm.) made from 16 SWG sheet and angle iron 25 mm. x 25 mm. x 4 mm. having front doors with viewing glass (8"x6") and locking arrangement with necessary fixing material such as rubber bidding etc. duly painted in post box red colour.	5.00	EACH		
19	Supplying and installing G.I.pipe above ground of 'C' class ERW of size 100 mm diawith necessary fittings as per specification no. FF-PP	24.00	m		
20	Supplying and installing fire brigade Header(Siamese Connection)of 150 mm Ø for supplying water to wet riser system as per specification No. FF-FFA/SMC	1.00	EACH		
21	Supplying &erecting I.S.I. mark Rigid P.V.C. conduit 25 mm. dia. with necessary accessories in wall/floor with chiselling appropriately as per specification No: WG-MA/CC, para no. 1.2.1	30.00	m		
	FIRE ALARM SYSTEM				
22	Supplying, erecting, testing and commissioning the 6 Zones Microprocessor based conventional Fire Alarm Control Panel (FACP) with standard accessories complete as per specification No. FF-FAAS/FACP	1.00	EACH		
23	Supplying, erecting, testing and commissioning Manual Call Point (Pill box) with break glass push button in metal enclosure complete as per specification No. FF-FAAS/MCP	5.00	EACH		
24	Supply and erecting hooters with CRCA enclosure complete as per specification No.FF-FAAS/HTR	5.00	EACH		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
25	Supplying and erecting XLPEarmoured cable 2 core 1.5 sq.mm. copper conductor complete erected on wall/ ceiling as per specification No.CB-LT/CU	600.00	m		
26	Supplying &erecting I.S.I. mark Rigid P.V.C. conduit 25 mm. dia. with necessary accessories in wall/floor with chiselling appropriately as per specification No: WG-MA/CC, para no. 1.2.1	600.00	m		
27	Supplying, erecting and testing optical type smoke detector complete on box as per specification No. FF-FAS/SD	40.00	EACH		
	PUBLIC ADDRESS SYSTEM				
28	Supplying, erecting, testing and commissioning amplifier 120 W for Public address system suitable to operate on 230 Volts A.C. / 12 Volts D.C. supply as per specification No. FF-PA/AFR	3.00	EACH		
29	Supplying, erecting, testing and commissioningmicrophone as per specification No. FFPA/ MIC	1.00	EACH		
30	Supplying & erecting, stand for microphone.(Similar to AHUJA make model DGN)	1.00	EACH		
31	Supplying & erecting, Table stand for microphone.(Similar to AHUJA make model DGT)	1.00	EACH		
32	Supplying erecting, testing to 2 core shielded Microphone cable as per specification No. FF-PA/MCC	500.00	m		
33	Supplying, erecting, testing and commissioning sound column 15 Watts complete as per specification No. FFPA/ SOC	20.00	EACH		
34	System Controller complete with 4 Zone Call Station, Stem Type Microphone, 2 mm thick CRCA Sheet Powder Coated Rack, Dual Tone Control for Speech & Music, integration facility with Fire Alarm System, tone generator & Speech Processor with relays for activating tone & pre-recorded fire alarm messages, facility to intregrate with the base builder P.A System as specified. The rate	1.00	EACH		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
	inclusive of Periarity module, selector switch, micro phone etc CONTROLLER ROUTER ALL STATION CALL STATION KEYPAD				
35	Supplying &erecting I.S.I. mark Rigid P.V.C. conduit 25mm. dia. with necessary accessories in wall/floor withchiselling appropriately as per specification No: WG-MA/CC,para no. 1.2.1	500.00	m		
	FIRE EXTINGUISHER & SIGNALS				
36	Providing, supplying and fixing following optical signs having its own independent power source etc. complete (supply from batteries) Sample to be approved from Client/ Architect. "Fire Exits" (Size 365 x 119 x 84 mm or nearest)	5.00	EACH		
37	Providing and fixing portable fire extinguishers of approved make ISI marked of following capacity				
	Dry chemical powder of 6 kg capacity as per ISI 2171	10.00	EACH		
	ABC stored pressure type fire extinguisher of 6 kg. capacity as per IS:13849	10.00	EACH		
	Water-Co2 type fire extinguisher of 9 Lit.capacity as per IS:940	3.00	EACH		
	Co2 type fire extinguisher of 4.5 kg. Capacity as per IS:2878	8.00	EACH		
	Fire buckets of 9 lit. capacity 3 Nos. in each set including stand with paint etc. complete	5.00	EACH		
	TOTAL COST				

Electrical Cost

Sr. No.	Item Description	Qty	Unit	Rate	Amount
	LIGHT FITTINGS & OTHER ACCESSORIES				
1	Supplying and erecting square / round shaped CRCA /die-cast aluminium powder coated housing LED Panel (slim edge-lit) light suitable for 13 to18W with provision for plane complete.front frame with translucent cover fixed to the housing	78.00	EACH		
2	Supplying and erecting LED square / circular 13 to 15W downlighterhaving pressure die-cast aluminum housing,	5.00	EACH		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
	opal translucent cover, mounting arrangement with board for surface type or spring loaded mounting clips for flush type complete.				
3	Supplying & erecting T8 LED 18W tube light fitting (4 feet) withpolycarbonate housing, heat sink, integrated HF electronic driver complete (including lamp).	4.00	EACH		
4	Supplying & erecting T8 LED **2 X 18W** tube light fitting (4 feet) withpolycarbonate housing, heat sink, integrated HF electronic driver complete (including lamp).	241.00	EACH		
5	Supplying and erectingCorridor/Passage light fitting(2 feet) including 9W LED lamp, Comprises of Extruded channel in Plastic Silver grey Color & With same Plastic end cap on provided PVC block / wooden board.	24.00	EACH		
6	Supplying and erectingCorridor/Passage light fitting(2 feet) including 18W LED lamp, Comprises of Extruded channel in Plastic Silver grey Color & With same Plastic end cap on provided PVC block / wooden board.	16.00	EACH		
7	Supplying and erecting Five Star Rated Energy Saving Ceiling Fan 230 V A.C. 50 cycles 1200 mm complete erected in position as per specification no. FG-FN/CF	184.00	EACH		
8	Supplying and erecting Exhaust fan medium duty230 V A.C. 50cycles 225 mm. 1400RPM with condensor complete erected in position with necessary materials. Fan motor with moisture proof treatment and'E' class insulation and marking Sr. No. & date of erction.	24.00	EACH		
9	Supplying and erecting square shaped CRCA /die-cast aluminium powder coated housing LED Panel light (slim edge-lit) 600X600mm suitable for 36 W-40W with provision for plane front frame with translucent cover fixed to the housing complete.	20.00	EACH		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
10	Supplying and erecting street light Wall bracket made from 40 mm.dia 'B'class G.I. pipe 1.2 m in total length complete as per specification no. FG-BKT/WB	4.00	EACH		
11	Supplying and erecting LED square / circular 16 to 20W downlighter having pressure die-cast aluminium housing, opal translucent cover, mounting arrangement with board for surface type or spring loaded mounting clips for flush type complete.	4.00	EACH		
12	Supplying and erecting LED street light fitting suitable for above 70W- 75 lamp, including lamp, with PF > 0.95 class IP 65 and above Housing of pressure die cast alluminium alloy and heat sink extruded alluminium complete per specification No FG-ODF/FLS2	4.00	EACH		
	MAINS WIRING				
13	Supplying &erecting I.S.I. mark Rigid P.V.C. conduit 20 mm. dia. with necessary accessories in wall/floor with chiselling appropriately as per specification No: WG-MA/CC, para no. 1.2.1	1,440.00	m		
14	Supplying & laying Rigid PVC conduit 20 mm Dia. With necessary accessories in RCC work/false ceiling/false flooring as per specification No.WG-MA/CC, para no. 1.2.1	2,880.00	m		
15	Supplying and erectingUPVC reinforced flexible conduit 20 mm in dia.conforming to I.S. and approved make with required number of couplings, PVC bushes, check nuts etc. complete.	60.00	m		
16	Supplying and erecting PVC trunking (PVC casing-n- capping) of size 25 mm with accessories on wall/ceiling as per specification No: WG-MA/CON, para no. 1.1.2	800.00	m		
17	Supplying and erecting PVCROHScomplied Non flame propagatingunder floor ducts/raceways of 60mm Width x 25 mm depth x 3000 mm Length including the connectors and	30.00	m		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
	the clampsat required intervals complete. The ducts shall be in trapezoidal shape tested for 750 N point load suitable for inscreed application. as per specification no. WG-MA/UFD				
18	Supplying and erecting PVCROHScomplied Non flame propagatingunder floor ducts/raceways of 90mm Width x 35 mm depth x 3000 mm Length including the connectors and the clampsat required intervals complete. The ducts shall be in trapezoidal shape tested for 750 N point load suitable for inscreed application. as per specification no. WG-MA/UFD	30.00	m		
19	Supplying and erectingunderfloor junction box of size 150mm x 150mm x 55 mmwith flush finish powder coated appearance having knock outs for UPVC duct entry of size 60x25 mm width and 95x35 mm ducts complete as per specification no. WG-MA/UFB	15.00	m		
20	Supplying & erecting mains with 2x2.5 sq.mm F.R.L.S.H copper PVC insulated wirelaid in provided conduit/trunking/inside pole/Bus bars or any other places. as per specification No: WG-MA/BW	5,760.00	m		
21	Supplying & erecting mains with 2 x1.5 sq.mm F.R.L.S.H copper PVC insulated wirelaid in provided conduit/trunking/inside pole/Bus bars or any other places. as per specification No: WG-MA/BW	2,880.00	m		
22	Supplying & erecting mains with 1 x1.5 sq.mm F.R.L.S.H copper PVC insulated wirelaid in provided conduit/trunking/inside pole/Bus bars or any other places. as per specification No: WG-MA/BW	8,640.00	m		
23	Supplying & erecting mains with 2 x 4 sq.mm F.R.L.S.H copper PVC insulated wirelaid in provided conduit/trunking/inside pole/Bus bars or any other places. as per specification No: WG-MA/BW	1,200.00	m		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
24	Supplying & erecting mains with 1 x2.5 sq.mm F.R.L.S.H copper PVC insulated wirelaid in provided conduit/trunking/inside pole/Bus bars or any other places. as per specification No: WG-MA/BW	1,200.00	m		
25	Supplying PVC insulated PVC round sheathed 1.5 sq.mm (30 no. x 0.25 mm dia.) 3 core flexible multi stranded copper Industrial cable for voltage grade up to 1.1 Kv	1,134.00	m		
	POINT WIRING				
26	Point wiring for light/fan/bell concealed type in min 20 mm PVC conduitwith 1.5 sq.mm. (2+1E) FRLSH grade copper wires, modular type switch, earthing and required accessoriesas per specification No: WG-PW/CW	260.00	POINT		
27	Point wiring in PVC trunking (casing-capping) with 1.5 sq.mm (2+1E) FRLSH grade copper wire, flush type switch,earthing and required accessories as per specification No: WG-PW/SW	222.00	POINT		
28	Point wiring forlight/fan/bell /exhaust fan Hybrid type (Surface type under false ceiling and concealed type for drops & switch boards on walls) in min 20 mm PVC conduit / casing n caping with 1.5 sq.mm. (2+1E) FRLSH grade copper wires, modular t ype switch, earthing and required accessories as per specification No: WG-PW/CW	40.00	POINT		
29	Secondary Point wiring foradditional light/ Bell point, concealed type in min 20 mm PVC conduit with 1.5 sq.mm. (2+1E) FR/FRLS grade copper wires with required accessories	47.00	POINT		
30	Secondary Point wiring foradditional light/ Bell point in PVC trunking (casing-capping) with 1.5 sq.m (2+1E) FR / FRLS grade copper wire with required accessories as per	31.00	POINT		
31	Wiring for plug on board with Switch socket with copper wiring, earthing as per specification No: WG-PW/CW	62.00	POINT		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
32	Wiring for plug on board withSwitch socket concealed type and copper wiring, earthing and with modular accessories as per specification No: WG-PW/CW	62.00	POINT		
33	Supplying and erecting modular type 3 pin switch 6A / 16A Multisocket with safty shutter ISI mark approved make duly erected on provided plate and box with wiring connections complete.	397.00	Each		
34	Supplying and erecting modulartype switch 16 A ISI mark approved make duly erected on provided plate and box with wiring connections complete.	29.00	Each		
35	Supplying and erecting modulartype switch16 / 20 A with indicator, ISI mark, approved make duly erected on provided plate and box with wiring connections complete.	426.00	Each		
36	Supplying and erecting modular type telephone socket one gangwith safety shutter ISI mark approved make duly erected on provided plate and box with wiring connections complete.	56.00	Each		
37	Supplying and erecting modular type Computer Jack RJ45 with safety shutter ISI mark approved make duly erected on provided plate and box with wiring connections complete.	197.00	Each		
38	Supplying and erecting modulartype electronic step regulator for fan two module ISI mark approved make duly erected on provided plate and box with wiring connections complete.	184.00	Each		
39	Supplying and erecting modular type blanking plate one module ISI mark approved make duly erected on provided plate & box.	30.00	Each		
40	Supplying and erectingPVC Surfacemodular switch box with double mounting plate for 2 module duly erected in an approved manner.	4.00	Each		
41	Supplying and erectingPVC	4.00	Each		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
	Surfacemodular switch box with double mounting plate for 3 module duly erected in an approved manner.				
42	Supplying and erectingPVC Surfacemodular switch box with double mounting plate for 4 module duly erected in an approved manner.	15.00	Each		
43	Supplying and erectingPVC Surfacemodular switch box with double mounting plate for 6 module duly erected in an approved manner.	100.00	Each		
44	Supplying and erectingPVC Surfacemodular switch box with double mounting plate for 8 module duly erected in an approved manner.	25.00	Each		
45	Supplying and erectingPVC Surfacemodular switch box with double mounting plate for 12 module duly erected in an approved manner.	35.00	Each		
46	Supplying and erecting unbreakble concealed type modular switch box with double mounting plate for 2 module duly erected with required chiselling & finishing with cement morter / pop as per required to match the back ground as in an approved manner.	4.00	Each		
47	Supplying and erecting unbreakble concealed type modular switch box with double mounting plate for 3 module duly erected with required chiselling & finishing with cement morter / pop as per required to match the back ground as in an approved manner.	4.00	Each		
48	Supplying and erecting unbreakble concealed type modular switch box with double mounting plate for 4 module duly erected with required chiselling & finishing with cement morter / pop as per required to match the back ground as in an approved manner.	15.00	Each		
49	Supplying and erecting unbreakble concealed type modular switch box with double mounting plate for 6 module duly erected with required chiselling & finishing with cement morter / pop as	100.00	Each		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
	per required to match the back ground as in an approved manner.				
50	Supplying and erecting unbreakble concealed type modular switch box with double mounting plate for 8 module duly erected with required chiselling & finishing with cement morter / pop as per required to match the back ground as in an approved manner.	25.00	Each		
51	Supplying and erecting unbreakble concealed type modular switch box with double mounting plate for 12 module duly erected with required chiselling & finishing with cement morter / pop as per required to match the back ground as in an approved manner.	35.00	Each		
52	Supplying and erecting PVC Surface modulear doble mounting plate 2 module complete duly errected in an approved manner.	8.00	Each		
53	Supplying and erecting PVC Surface modulear doble mounting plate 3 module complete duly errected in an approved manner.	8.00	Each		
54	Supplying and erecting PVC Surface modulear doble mounting plate 4 module complete duly errected in an approved manner.	30.00	Each		
55	Supplying and erecting PVC Surface modulear doble mounting plate 6 module complete duly errected in an approved manner.	200.00	Each		
56	Supplying and erecting PVC Surface modulear doble mounting plate 8 module complete duly errected in an approved manner.	50.00	Each		
57	Supplying and erecting PVC Surface modulear doble mounting plate 12 module complete duly errected in an approved manner.	70.00	Each		
58	Supplying and erecting Modular safety power stripwith one modular switch16A and three sockets each 13A combination with overload and surge protection unit	150.00	Each		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
	on double mounting plate complete duly erected in an approved manner.				
59	Supplying and fixing anchor type fastner type fan hook with two numbers of 10 mm dia. 75 mm long with necessary materials for ceiling fan.	92.00	Each		
60	Supplying and erecting fan hook box of 10 mm ms round bar bounded to rcc bars upto 50 mm length each side pierced through 16 swg thick Al/ MS bowl 100 mm dia. Or equivalent square size and having depth upto 75 mm complete erected with duly painted by 1 coat of red offside paint and 2 coats of paint erected in position and without any slurry of cement concrete on either side of the box and positioned to the bottom level of slab.	92.00	Each		
61	supplying and erecting b grade GI pipe/ MS pipe down rod duly painted for fan complete erected with PVC three core flexible cable 1 sqmm copper PVC wire.	184.00	m		
	TELECOMMUNICATION AND DATA NETWORKING				
62	Supplying & erecting telephone cable 2 pair with 0.5 mm dia. laid in provided PVC casing / conduit as per specification No. WG-TW	2,520.00	m		
63	Supplying & erectingJelly filled unarmoured Telephone Cable 10 pair with 0.5 mm dia. laid in provided PVC casing / conduit as per specification No. WG-TW	20.00	m		
64	Supplying & erectingJelly filled unarmoured Telephone Cable 20 pair with 0.5 mm dia. laid in provided PVC casing / conduit as per specification No. WG-TW	100.00	m		
65	Supplying & erecting Jelly filled armoured telephone cable 50 pair with 0.5 mm dia. laid in provided trench as per specification No. WG-TW	100.00	m		
66	Supplying & erecting Jumper wire with 0.5 mm dia as per specification No. WG-TW	100.00	m		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
67	Supplying, erecting & commissioning Main Distribution Frame (MDF) Box 50x50 pairs as per specification No.WG-	5.00	Each		
68	Supplying, erecting & commissioning Junction box suitable for 50 pairs as per specification No. WG-TW	12.00	Each		
69	Supplying & installing UTP networkingCat-6 cablesuitable for LAN / WAN Computer net-working as per specification No.WG-COC/NC	3,940.00	Each		
70	Supplying and fixing 1 meter length, UTP Patch cordof Cat 6type in position as per specification No. WG-COC/PC	197.00	Each		
	CABLES AND END TERMINATION				
71	Supplying, erecting & terminating PVC armoured cable 3½ core 150 sq mmaluminium conductor with continuous 12.97 sq mm (8 SWG) G.I. earth wire complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL	500.00	m		
72	Supplying, erecting & terminating PVC armoured cable 4 core 25 sq mm aluminium conductor with continuous 5.48 sq mm (12 SWG) G.I. earth wire complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL	140.00	m		
73	Supplying, erecting & terminating PVC armoured cable4 core 4 sq mm copper conductorcontinuous 5.48 sq mm (12 SWG) G.I. earth wire complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/CU	140.00	m		
74	Supplying, erecting & terminating PVC armouredcable 4 core 6 sq mm copper conductorcontinuous 5.48 sq mm (12 SWG) G.I. earth wire complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no.CB-LT/CU	140.00	m		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
75	Supplying, erecting & terminating PVC armoured cable 3 core 2.5 sq mm copper conductorcontinuous 5.48 sq mm (12 SWG) G.I. earth wire complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/CU	150.00	m		
76	Supplying, erecting & terminating PVC armouredcable 4 core 10 sq mm copper conductor continuous 5.48 sq mm (12 SWG) G.I. earth wire complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/CU	20.00	m		
77	width and depth as per IS for laying provided L.T cable of 25 sq mm & above and covered withHalf round hume pipecomplete. As per specification no. CW-EXN-CTR	500.00	m		
78	Supplying & erecting cast iron cable indicator plate buried along with route of cable for PVC / XLPE armoured cable as per specification No. CB-CIP	34.00	Each		
79	Providing & erecting Hot dipped Galvanised Ladder type Cable tray manufactured from 16 swg (1.6 mm thick)GI sheet of 300 mm width & 100 mm height comprising all required standard accessories.	20.00	m		
80	Providing & erecting Hot dipped Galvanised Perforated type Cable tray manufactured from 16 swg (1.6 mm thick) GI sheet of 300 mm width & 75 mm height complete with necessary coupler plates & hardware in approved manner.	160.00	m		
81	providing & erecting Hot dipped Galvanised Perforated type Cable tray manufactured from 16 swg (1.6 mm thick) GI sheet of 150 mm width & 75 mm height complete with necessary coupler plates & hardware in approved manner.	160.00	m		
	DISTRIBUTION BOARDS				
82	Supplying & erecting triple pole and neutral distribution board (TPNDB)	9.00	Each		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
	surface/ flush mounted SP /TP MCBs of total 12 ways, on iron / G.I. frame/wooden board.(Vertical Busbar type) as per specification No. SW-SWR/MCBDB.				
83	Supplying & erecting triple pole and neutral distribution board (TPNDB)surface/ flush mounted SP / TP of total 24 wayson iron / G.I. frame/wooden board. (Vertical Busbar type) as per specification No. SW-SWR/MCBDB	4.00	Each		
		-			
84	Supplying & erecting triple pole and neutral distribution board (TPNDB)with doorsurface/ flush mounted SP / TP MCBs total 12 ways, on iron/ G.I. frame/wooden board.(Vertical Busbar type) as per specification No. SW- SWR/MCBDB	4.00	Each		
85	Supplying and erecting single pole and neutral distribution board (SPNDB) surface/flush mounted with 2 ways for incoming and 6 ways for outgoingSP MCB's on iron/ G.I. frame/wooden board as per specification No. SW-SWR/MCBDB	1.00	Each		
86	Supplying & erecting triple pole and neutral distribution board (TPNDB) with door surface/ flush mounted suitable for 3 Pole MCCB as Incommer & outgoing SP MCB (36 Poles) or TP MCB of 12 ways (36 Poles) on iron/ G.I. frame. (Vertical Busbar type) as per specification No. SW- SWR/MCBDB1	1.00	Each		
87	Providing & erecting 3 Pole MCCB of 200A,415V capacity with S.C. rating 25 kA (Ics=100% of Icu) thermal and magnetic setting with provided leads on iron /G.I. frame as per specification no. SW-SWR/MCCB.	1.00	Each		
88	Providing erecting and commisioning RCCB of electro-magnetic type with 30/100/300 mA sensitivity and having capacity of 16/25A FP complete as per specification No. SW-RCCB/RCCB	9.00	Each		
89	Providing erecting and commisioning RCCB of electro-magnetic type with	4.00	Each		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
	30/100/300 mA sensitivity and having capacity of 40A FP complete as per specification No. SW-RCCB/RCCB				
90	Providing erecting and commisioning RCCB of electro-magnetic type with 30/100/300 mA sensitivity and having capacity of 63A FP complete as per specification No. SW-RCCB/RCCB	4.00	Each		
91	Supplying, erecting & marking SPMCB 6A to 32A, C-series (for motor/power) in provided distribution board as per specification No. SW-SWR/MCB	108.00	Each		
92	Supplying, erecting & marking SPMCB 6A to 32A, B- series (for lighting) in provided distribution board as per specification No. SW-SWR/MCB	96.00	Each		
93	Supplying, erecting & marking TPMCB 6 A to 32Ain provided distribution board as per specification No. SW-SWR/MCB	4.00	Each		
94	Supplying, erecting & markingTPMCB 40A to 63A in provided distribution board as per specification No. SW-SWR/MCB	12.00	Each		
	EARTHING				
95	Supply, Installation, Testing and commissioning of UL Certified / CPRI Tested Maintenance Free Earthing comprising of Electrode of 17.2 mm diameter Low Carbon Steel with 250 micron Molecular Copper Bonded Earthing Rod of Length 3m along with 25 kg Carbon Based environment friendly back fill Ground Enhancing compound required to fill up the excavated earth with required quantity as per specification no EA-MOBI	2.00	Each		
96	Providing earthing with Copper earth plate size 60 x 60 x 0.315 cm with funnel with a wire mesh for watering and brick masonry block C.l. cover with minimum 25 kg of maintenance free earth conductivity enhancing mineral earthing compound complete with all materials, testing & recording the results	2.00	Each		

Sr. No.	Item Description	Qty	Unit	Rate	Amount
	as per specification no ESE -LA				
97	Supplying and erecting GI stripof required size used for earthing on wall and/or any other purpose with necessary GI clamps fixed on wall painted with bituminous paint in an approved manner with joints required. As per specification No EA-EP.	214.00	KG		
98	Supplying and erecting copper strip of required size used for earthing on wall and/or any other purpose with necessary copper clamps fixed on wall painted with bituminous paint in an approved manner with joints required. As per specification No EA-EP.	54.00	KG		
	SOLAR SYSTEM				
99	Supplying, Installing,Testing and commissioning of 10 KWp capacity On-Grid Solar Power Packwith GI mounting structure and inter connecting wires / cables without battery bank SPV Modules of 10 KWp, Solar power Conditioning unit of min. 10 KVA capacity complete. With 5 years on site performance warranty as per Specification no ESD-RT-ONG	2.00	Each		
	TOTAL COST				