NATIONAL LAW SCHOOL OF INDIA UNIVERSITY

Nagarbhavi, Bangalore – 560242 (Old Pin – 560072), Karnataka.
Telefax: 080 – 2321 3160, 2316 0532, 533, 535 Fax: 080 – 2316 0534 Website: www.nls.ac.in, Email: registrar@nls.ac.in

TENDER DOCUMENT

NAME OF THE WORK

CLASSROOM INTERIOR WORKS OF NEW ACADEMIC BLOCK, NLSIU CAMPUS, NAGARBHAVI, BANGALORE

NATIONAL LAW SCHOOL OF INDIA UNIVERSITY

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TENDER DOCUMENT FOR

CLASSROOM INTERIOR WORKS OF NEW ACADEMIC BLOCK, NLSIU CAMPUS, NAGARBHAVI, BANGALORE

CONTENTS

SECTION 1: INVITATION FOR TENDERS (IFT)

1. The **National Law School of India University (NLSIU)** invites tenders from eligible tenderers, for the construction of works detailed in the Table below. The tenderers may submit tenders for all of the works given in the Table.
2. **TWO cover tender procedures shall be followed. The Tenderers are required to submit two separate sealed covers, one - containing the Earnest Money Deposit, the details of their capability to undertake the Tender and PART A of the Tender document duly signed and sealed (on all papers) (as detailed in ITT) which will be opened first and the second cover containing PART B in two copies (Original and duplicate), the Price Tender which will be opened only if the Tenderer is found to be qualified to execute the tendered works. The Tenderers are advised to note the minimum qualification criteria specified in Clause 3 of the Instructions to Tenderers to qualify for award of the contract.**

3. Tender documents may be downloaded from our website www.**nls.ac.in** under the head **News& Events.** For any general information, the tenderers may contact the Estate Officer/ The Finance Officer, NLSIU, Nagarbhavi, Bangalore – 560 072.

4. Tenders must be accompanied by Earnest Money Deposit specified for the work in the Table below. Earnest Money Deposit will have to be in any one of the forms as specified in the Tender documents and shall have to be valid for 45 days beyond the validity of the tender.

5. Sealed tender duly filled and signed is to be submitted to **The Finance Officer, NLSIU**, Bangalore, on or before 08.10.2021 **up to 16.00 hrs** and Technical bid will be opened on the next working day **at 15.00 hrs.** at the office of **The Vice Chancellor, NLSIU, Nagarabhavi, Bangalore – 560 072,** in the presence of representatives of participating tenderers.

6. Other details can be obtained from the Tender Documents.

TABLE

Name of work	Earnest MoneyDeposit (Rs.)	Cost of document (Rs.)	Period of completion
1	2	3	4
Classroom Interior Works of New Academic Block, NLSIU Campus, Bangalore.	Rs.1,00,000/- Lakh	Rs.2000/- + applicable taxes	4 Months

Contractor's Seal and Signature

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Part A - General

1. Scope of Tender

The National Law School of India University, Bangalore (NLSIU/the University) invites tenders following Two Cover tender procedure from eligible tenderers, for Interior Works of Classrooms of New Academic Block, at NLSIU Campus, Nagarabhavi, Bangalore (as defined in these documents and referred to as "the Works") detailed in the Table given in the Invitation for Tenders (IFT). The Tenderers should submit the tender for all of the works detailed in the table given in IFT.

2. Eligible Tenderers

2.1. Tenders from Joint ventures are not acceptable.

2.2. Tenders shall not be blacklisted by any firms/Organization or Government and Tenders should provide a declaration in this regard to The Registrar, NLSIU.

2.3. Tenders shall also meet the minimum qualification prescribed para 3 given below.

2.4. Conditional Tenders will be rejected.

3. Qualification of the Tenderer

All Tenderers shall provide the requested information accurately and in sufficient detail in Section – 3: Qualification Information.

3.1. To qualify for award of this contract, each Tenderer in its name should have:

3.1.1. In the last **three** years ending on 31.03.2021, achieved a minimum financial turnover (**for interior fit - out works only**) of Rs. 3.50 Crores (Rupees Three crores and fifty lakhs only) in at least one of the financial years. C.A. certificates for turnover and profit loss statement for each of the three years shall be enclosed. This should be duly audited by a Charted Accountant. Year in which no turnover is shown would also be considered for working out the average.

3.1.2. In the last **five years** ending on 31.03.2021:

(a) Satisfactorily completed as prime contractor,

i. at least one similar work of value not less than 75% of the estimated projectvalue
ii. or two similar works of value not less than 40% of the estimated project value
iii. or three similar works of value not less than 30% of the estimated project value

[Similar work, in this case shall mean interior fit out of seminar halls /auditoriums/ Classrooms with state-of-the-art finishes and technology (especially audio video systems) integration.]

(b) Executed in any one year, the following minimum quantities of work:

i. Vitrified tile flooring – 750 Sqm
ii. Civil works (construction of Masonry walls & Plastering) – 100 Sqm
iii. One complete interior fit-out work for carpet area not less than 500 Sqm, inclusive of False Ceiling, Plywood wall Paneling, Fabrication of Storage Cabinets & Furniture and Ceiling/Wall Finishes.
iv. Installation & Commissioning of Air Conditioning equipment – 40 TR
v. Installation & Commissioning of Audio Video Equipment (for corporate/ educational purpose - one complete Classroom/ Training Room/ Seminar Hall)

(c) The Tenderer or his identified sub-contractor should possess required valid Electrical license for executing building electrification works and should have executed similar electrical works.

3.2. Each Tenderer should further demonstrate:

3.2.1. Minimum solvency of Rs. 75,00,000/- (Rs. 75 Lakhs) certified by their bankers. The following certificates shall be enclosed:

i. Income Tax clearance Certificates and Profit & Loss accounts for the last three years ending on March 31,2021
ii. Solvency Certificate from the bankers of the Applicant.
iii. Audited balance sheet.

3.2.2. The tenderer must provide the past performance certificate from two (2) customers from the last three (3) years. The past performance certificate must provide the following information:

i. Name of the work
ii. Name of the Client & address
iii. Value of the Contract, Contract period and customer feedback.

The customers should rate the organisation on the following parameters on a scale 1-5 (1-Poor, 2-Average, 3- Good, 4-Very good and 5- Excellent) -Quality of work, Financial soundness, Technical Proficiency, Resource Facilities, General Behaviour and Dispute/ Litigation. If the feedback is for past contract, reason as to why the contract was not renewed. Performance Certificates from the same customer but for different works shall be treated as one contract (lowest rating of multiple jobs from same customer shall be considered).

3.2.3. Two or more tenders with qualification under clause 3.1.2.(c) from the same sub- contractor will be disqualified (Undertaking from the sub-contractor to the extent).

3.2.4. A declaration and undertaking of the tenderer that no related party (as defined under the Companies Act 2013) has participated in the tender and if any allegation of the same is proved shall lead to disqualification of both the tenderers.

3.3. **To qualify for package of contracts made up of this and other contracts for which tenders are invited in the IFT, the Tenderer must demonstrate having experience and resources to meet the aggregate of the qualifying criteria for the individual contracts**.

3.4. **Sub-contractor's experience and resources shall not be taken into account in determining the Tenderer's compliance with the qualifying criteria except to the extent stated in 3.1.2(c) above.**

3.5. **Evaluation criteria for qualification of bidders:**

SL. No.	Attributes	Maximum Points	Evaluation
1	Financial Strength:		i) 60% points for minimum eligibility criteria ii) 100% points for twice the eligibility criteria or greater
a	Turnover – FORM B	2 points	
b	Solvency/Bankers Certificate	2 points	
c	Profitable entity – FORM B	4 points	
2	Experience with similar works:**(Form C)**		
a	One similar work not less than 75% value	25 Points	

b	Two similar works not less than 40% of value		iii) In-between (i) & (ii) on pro-rata basis
c	Three similar works not less than 30% of value		
3	Experience in executing the following: **(Form D)**		
a	Civil Works – Flooring 750sq m/ Plastering 100 sq m	2 Points	
b	Interior Fit out - 500 sq m carpet area	5 Points	
c	Air-conditioning – 40 Tr capacity	5 Points	
d	Audio Video Equipment Installation in Seminar Halls/ Classrooms/ Auditoriums/ Training Rooms	5 Points	
4	Organisation Structure: **(Form A)**		
a	Organization & Staff	4 Points	
b	Track Record (Timely completion)	4 Points	
5	Sub – Contractor(s): **(Form G)**		
	A: Has/ Have required licenses and experience	2 Points	
6	Projects under arbitration/ litigation: **(Form H)**		Desirable to have contractors who are not blacklisted or have no ongoing litigations
a	Litigation	Yes/ No	
b	Arbitration	Yes/ No	
c	Black Listed from any organisation	Yes/ No	
7	Performance Certificate from the top-2 customers by revenue.	40 Points	Average of the top 2 customers on a scale of 5
	Total Points	**100**	

To be eligible the bidder must score not less than 50% of the points in each section and not less than 60 points overall. NLSIU however reserves the right to restrict the list of qualified bidders to any number as deemed suitable by it.

3.6. Only those tenders who meet all the above qualifications and submitted all the requisite documents will be considered. Incomplete tenders without or Insufficient EMD/ Tender fee and Pre-qualifications will berejected.

3.7. Even though the tenderers meet the above criteria, they are subject to be disqualified if theyhave:

- Made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements; and/ or
- Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc,; and/or participated in the previous Tender for the same work and had quoted unreasonably high/low tender prices and could not furnish rational justification.
- Related party (criteria as provided under the (Companies Act 2013) has participated in the tender.

4. One Tender per Tenderer:

Each tenderer shall submit only one tender for one package. A tenderer who submits or participates in more than one Tender (other than in cases of alternatives that have been permitted or requested) will cause all the proposals with the Tenderer's participation to be disqualified.

5. Cost of Tendering:

The tenderer shall bear all costs associated with the preparation and submission of his tender, and the University will under no case be responsible and liable for those costs.

6. Site visit:

The Tenderer at his own responsibility and risk is encouraged to visit and examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing the Tender and entering into a contract for construction of the Works. The cost of visiting the Site shall be at the Tenderer's own expense.

A. Tender Documents

7. Content of Tender documents

7.1. The set of tender documents shall have all the Sections given in Contents on Page 2.
7.2. The Tender documents should be duly complete in all respects and returned with this tender.

8. Clarification of Tender Documents

8.1. A prospective tenderer requiring any clarification of the tender documents may notify the University in writing or by email at the University's address indicated in the invitation to tender. The University will respond to any request for clarification which it receives earlier than 5 days prior to the deadline for submission of tenders. Copies of the University's response will be forwarded to all purchasers of the tender documents, including a description of the enquiry but without identifying its source.

9. Amendment of Tender documents

9.1. Before the deadline for submission of tenders, the University may modify the tender documents by issuing addenda.
9.2. Any addendum thus issued shall be part of the tender documents and shall be uploaded on website.
9.3. To give prospective tenderers reasonable time in which to take an addendum into account in preparing their tenders, the University shall extend as necessary,
9.4. The deadline for submission of tenders, in accordance with Sub-Clause 16.2 below.

B. Preparation of Tenders

10. Documents comprising the Tender

10.1. The tender submitted by the Tenderer shall be in two covers and comprise the following:

10.1.1. **First Cover – Shall be superscribed as 'TECHNICAL BID'**

i. Earnest Money Deposit in the prescribed format;
ii. Qualification Information as per formats given in Section 3 (Form A to Form I), with supporting documents, Certificates, Work Orders, Purchase Orders, Performance Certificates, etc.
iii. Company Registration Document, GST & PAN Registration, Income Tax Certificates, Profit-Loss Statement, Solvency Certificate, Related Party certificate, etc.

iv. Sub-Contractor Details with valid license where applicable.
v. Part A of Tender Document – Section 1 to 8, duly filled, with seal & signature on all pages.

10.1.2. **Second Cover – Shall be superscribed as 'FINANCIAL BID'. Enclosures in the Second Cover (Financial Bid) shall be in Two Copies, Original & Duplicate (clearly labelled as 'ORIGINAL' & 'COPY') and shall comprise of:**

i. Priced Bill of Quantities (Section 9)
ii. Accepted Make of Materials (Civil & carpentry, Electrical and Air Conditioning)
iii. Any other materials required to be submitted by Tenderers in accordance with these instructions. The documents listed under Sections 3, 4(I), 6 and 9 shall be filled in without exception
iv. Tender Drawings (20 Nos)

10.2. The tender documents shall be with signature & seal of the bidder on all pages including any notifications/corrigendum issued by the University.

10.3. Tenderers submitting tenders together with other contracts stated in the IFT to form a package will so indicate in the tender together with any discounts offered for the award of more than one contract.

11. Tender prices

11.1. The contract shall be for the whole works as described in Sub-Clause A.1, based on the priced Bill of Quantities submitted by the Tenderer.

11.2. The Tenderer shall fill in rates and prices and line item total (both in figures and words) for all items of the works described in the Bill of Quantities along with total tender price (both in figures and words). **Items for which no rate or price is entered by the Tenderer will not be paid for by the University when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities.** Corrections, if any, shall be made by crossing out, initialling, dating and rewriting.

11.3. All duties, taxes, GST and other levies payable by the contractor under the contract, for any other cause, shall be included in the rates, prices and total Tender Price submitted by the Tenderer.

11.4. The rates and prices quoted by the Tenderer shall not be subject to any adjustment during the performance of the contract in accordance with the provisions of clause of the Conditions of Contract.

12. Tender validity

12.1. Tenders shall remain valid for a period **90 (ninety) days** after the deadline date for tender submission specified in Clause 16. A tender valid for a shorter period shall be rejected by the University as non-responsive.

12.2. In exceptional circumstances, prior to expiry of the original time limit, the University may request that the tenderers may extend the period of validity for a specified additional period. The request and the tenderers' responses shall be made in writing or by email. A tenderer may refuse the request without forfeiting his earnest money deposit. A tenderer agreeing to the request will not be required or permitted to modify his tender, but will required to extend the validity of his earnest money deposit for a period of the extension, and in compliance with Clause 13 in all respects.

13. Earnest Money Deposit

13.1. The Tenderer shall furnish, as part of his tender, earnest money deposit of an amount equivalent to amount as shown in column 3 of the Table of IFT for this particular work. This earnest money deposit shall be in favour of "The Registrar, NLSIU, Bangalore" and shall be in the form of Demand Draft valid for 45 days beyond the validity of the tender. (After 70th day, a fresh DD for the same amount shall be obtained and submitted)

13.2. Any tender not accompanied by an acceptable earnest money deposit and not secured as indicated in Sub-Clauses 13.1 above shall be rejected by the University as non- responsive.

13.3. The earnest money deposit of unsuccessful tenderers will be returned within 60 days of the end of the tender validity period specified in Sub-Clause 12.1.

13.4. The Earnest Money Deposit of the successful Tenderer will be discharged when the Tenderer has signed the Agreement and furnished the required Performance Guarantee.

13.5. The Earnest Money Deposit may be forfeited:

13.5.1. if the Tenderer withdraws the Tender after tender opening during the period of tender validity;

13.5.2. if the Tenderer does not accept the correction of the Tender Price, pursuant to Clause 24; or

13.5.3. in the case of a successful Tenderer, if the Tenderer fails within the specified time limit to

(i) sign the Agreement; or

(ii) furnish the required Performance Guarantee

14. Format and signing of Tender

14.1. The Tenderer shall prepare one original and a copy (financial bid only) of the documents comprising the Tender as described in Clause10 of these Instructions to Tenderers, bound, with the volume containing the Form of Tender, and clearly marked "ORIGINAL" and "COPY" as appropriate. In the event of discrepancy between them, the original shall prevail.

14.2. The original and a copy of the Tender shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Tenderer. All pages of the tender where entries or amendments have been made shall be initialled by the person signing the tender.

14.3. The Tender shall contain no alterations or additions, except those to comply with instructions issued by the University, or as necessary to correct errors made by the Tenderer, in which case such corrections shall be initialled by the person signing theTenderer.

C. Submission of Tenders

15. Sealing and marking of Tenders

15.1. The Tenderer shall seal the original and a copy (financial bid only) of the Tender in separate envelopes, clearly labelled as "**TECHNICAL BID**" and "**FINANCIAL BID**", duly marking the envelopes as "**ORIGINAL**" and "**COPY**". These envelopes (called as inner envelopes) shall then be put inside one outer envelope.

15.2. The **inner and outer envelopes shall;**

(a) be addressed to the University at the following address:
THE VICE CHANCELLOR,
NATIONAL LAW SCHOOL INDIA UNIVERSITY,
NAGARABHAVI, BANGALORE-560242 (OLD NO. 560072)

(b) bear the following identification:
Tender for THE PROPOSED CLASSROOM INTERIOR WORKS, NEW ACADEMIC BLOCK, NLSIU, BANGALORE.
TENDER NUMBER: ……..
DATE OF OPENING: ……

(c) In addition to the identification required in Sub-Clause 15.2, the inner envelopes shall indicate the name and address of the Tenderer to enable the tender to be returned unopened in case it is declared late, pursuant to Clause 17.

(d) If the outer envelope is not sealed and marked as above, the University will assume noresponsibility for the misplacement or premature opening of the Tender.

16. Deadline for submission of the Tenders

16.1. Tenders must be received by the University at the address specified above no later than 10.08.2021 16.00Hrs. In the event of the specified date for the submission of tenders being declared a holiday for the University, the tenders will be received upto the appointed time on the next working day.

16.2. The University may extend the deadline for submission of tenders by issuing an amendment in accordance with Clause 9, in which case all rights and obligations of the University and the Tenderers previously subject to the original deadline will then be subject to the new deadline.

17. Late Tenders

Any Tender received by the University after the deadline prescribed in Clause 16 will be returned unopened to the Tenderer.

18. Modification and Withdrawal of Tenders

18.1. Tenderers may modify or withdraw their Tenders by giving notice in writing before the deadline prescribed in Clause 16.
18.2. Each Tenderer's modification or withdrawal notice shall be prepared, sealed, marked, and delivered in accordance with Clause 14 & 15, with the outer and inner envelopes additionally marked "**MODIFICATION FOR FIRST/ SECOND COVER**" or"**WITHDRAWAL**", as appropriate.
18.3. No Tender may be modified after the deadline for submission of Tenders.
18.4. Withdrawal or modification of a Tender between the deadline for submission of Tenders and the expiration of the original period of Tender validity specified in Clause
18.5. 12.1 above or as extended pursuant to Clause 12.2 may result in the forfeiture of the earnest money deposit pursuant to Clause 13.
18.6. Tenderers may only offer discounts to, or otherwise modify the prices of their Tenders by submitting Tender modifications in accordance with this Clause, or included in the original Tender submission.

D. Tender opening and evaluation

19. Opening of First Cover of all Tenders and evaluation to determine qualifiedTenderers:

19.1. The University will open the First covers of all the Tenders received (except those received late or withdrawn), including modifications for First Cover made pursuant to Clause 18, in the presence of the Tenderers or their representatives who choose to attend at 15.00 hours on the next

working day after tender submission date and theplace specified in Clause 16. In the event of the specified date of Tender opening being a holiday for the University, the Tenders will be opened at the appointed time andlocation on the next working day.

19.2. Envelopes marked "**WITHDRAWAL**" shall be opened and read out first. The First Cover of Tenders for which an acceptable notice of withdrawal has been submitted pursuant to Clause 18 shall not be opened.

19.3. Late and withdrawn Tenders will be returned unopened to tenders.

19.4. The University shall prepare minutes of the Tender opening, including the information disclosed to those present in accordance with Sub-Clause 19.2.

19.5. The Second Cover of all the Tenderers including modifications for Second Cover shall be placed in a large and securely sealed in the presence of the Tenderers or their representatives, who are present and also get the same signed by all those tenderers or their representatives. The large cover shall be kept in safe custody by the University.

19.6. The University will evaluate and determine whether each tender (a) meets the eligibility criteria defined in ITT Clause 2; (b) is accompanied by the required earnest money deposit as per stipulations in ITT Claus and (c) meets the minimum qualification criteria stipulated in ITT Clause 3.

19.7. **Evaluation criteria for qualification of bidders:**

SL. No.	Attributes	Maximum Points	Evaluation
1	Financial Strength:		i) 60% points for minimum eligibility criteria ii) 100% points for twice the eligibility criteria or greater iii) In-between (i) & (ii) on pro-rata basis
a	Turnover – FORM B	2 points	
b	Solvency/Bankers Certificate	2 points	
c	Profitable entity – FORM B	4 points	
2	Experience with similar works:**(Form C)**		
a	One similar work not less than 75% value	25 Points	
b	Two similar works not less than 40% of value		
c	Three similar works not less than 30% of value		
3	Experience in executing the following: **(Form D)**		
a	Civil Works – Flooring 750sq m/ Plastering 100 sq m	2 Points	
b	Interior Fit out - 500 sq m carpet area	5 Points	
c	Air-conditioning – 40 Tr capacity	5 Points	
d	Audio Video Equipment Installation in Seminar Halls/ Classrooms/ Auditoriums/ Training Rooms	5 Points	
4	Organisation Structure: **(Form A)**		
a	Organization & Staff	4 Points	
b	Track Record (Timely completion)	4 Points	
5	Sub – Contractor(s): **(Form G)**		
	A: Has/ Have required licenses and experience	2 Points	

6	Projects under arbitration/ litigation: **(Form H)**		Desirable to have contractors who are not blacklisted or have no ongoing litigations
a	Litigation	Yes/ No	
b	Arbitration	Yes/ No	
c	Black Listed from any organisation	Yes/ No	
7	Performance certificate from 2 customers over the last 3 years	40	Average of the top 2 customers on a scale of 5 shall be considered)
	Total Points	**100**	

To be eligible the bidder must score not less than 50% of the points in each section and not less than 60 points overall. NLSIU however reserves the right to restrict the list of qualified bidders to any number as deemed suitable by it. The University will draw out a list of finally qualified Tenderers.

20. Opening of Second Cover of qualified Tenderers and evaluation:

20.1. The University will open the Second Covers of Qualified at the appointed time and date in the presence of the Tenders or their representatives who choose to attend. In the event of the specified date of Second Cover opening being declared a holiday for the University, the Second Covers will be opened at the appointed time and location on the next working day.

20.2. Envelopes marked "**MODIFICATION FOR SECOND COVER**" shall be opened and the submissions therein read out in appropriate detail.

20.3. The Tenderers' names, the Tender prices, the amount of each Tender, any discounts, Tender modifications and withdrawals, and such other details as the University may consider appropriate, will be announced by the University at the opening.

20.4. The University shall prepare minutes of the Tender opening, including the information disclosed to those present in accordance with Sub-Clause 20.3.

21. Process to be confidential

21.1. Information relating to the examination, clarification, evaluation and comparison of Tenders and recommendations for the award of a contract shall not be disclosed toTenderers or any other persons not officially concerned with such process until theaward to the successful Tenderer has been announced. Any effort by a Tenderer to influence the University's processing of Tenders or award decisions may result in therejection of his Tender.

22. Clarification of Tenders

22.1. To assist in the examination, evaluation, and comparison of Tenders, the University may, at its discretion, ask any Tenderer for clarification of their Tender, including breakdown of unit rates. The request for clarification and the response shall be in writing or by cable, but no change in the price or substance of the Tender shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the University in the evaluation of the Tenders in accordance with Clause 24.

22.2. Subject to sub-clause 22.1, no Tenderer shall contact the University on any matter relating to its tender from the time of the Tender opening to the time the contract is awarded. If the Tenderer wishes to bring additional information to the notice of the University, it should do so in writing.

22.3. Any effort by the Tenderer to influence the University in the University's Tender evaluation, Tender comparison or contract award decisions may result in the rejection of the Tenderers' Tender.

23. Examination of Tenders and determination of responsiveness

23.1. Prior to the detailed evaluation of Tenders, the University will determine whether each Tender; (a) has been properly signed; (b) is substantially responsive to the requirements of the Tender documents.

23.2. A substantially responsive Tender is one which conforms to all the terms, conditions and specifications of the Tender documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the works; (b) which limits in any substantial way, inconsistent with the Tender documents, the University's rights or the Tenderer's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other Tenderers presenting substantially responsive Tenders.

23.3. If a Tender is not substantially responsive, it will be rejected by the University, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.

24. Correction of errors

24.1. Tenders determined to be substantially responsive will be checked by the University for any arithmetic errors. Errors will be corrected by the University as follows:

(a) where there is a discrepancy between the rates in figures and in words, the lower of the two will govern; and

(b) where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern.

24.2. The amount stated in the Tender will be adjusted by the University in accordance with the above procedure for the correction of errors and, with the concurrence of the Tenderer, shall be considered as binding upon the Tenderer. If the Tenderer does not accept the corrected amount the Tender will be rejected, and the earnest money deposit may be forfeited in accordance with Sub-Clause 13.5(b).

25. Evaluation and comparison of Tenders

25.1. The University will evaluate and compare only the Tenders determined to be substantially responsive in accordance with Clause 23.

25.2. In evaluating the Tenders, the University will determine for each Tender the evaluated Tender Price by adjusting the Tender Price as follows:

a) making any correction for errors pursuant to Clause 24; and
b) making appropriate adjustments to reflect discounts or other price modifications offered in accordance with Sub-Clause 18.5

25.3. The University reserves the right to accept or reject any variations, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the Tender documents or otherwise result in unsolicited benefits for the University shall not be taken into account in Tender evaluation.

25.4. If the tender of the successful Tenderer is seriously unbalanced in relation to the University's estimate of the cost of the work to be performed under the contract, the University may require the Tenderer to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with construction methods and schedule proposed. After evaluation of the price analyzed, the University may require that the amount of the performance security set forth in Clause 29 be increased at the expense of the successful Tenderer to a level sufficient to protect the University against financial loss in the event of default of the

successful under the contract.

E. Award of Contract

26. Award criteria

26.1. Subject to Clause 27, the University will award the Contract to the Tenderer whose Tender has been determined to the substantially responsive to the Tender documents and who has offered the lowest evaluated Tender Price, provided that such Tenderer has been determined to be (a) eligible in accordance with the provisions of Clause 2, and (b) qualified in accordance with the provisions of Clause 3.

27. University's right to accept any Tender and to reject any or all Tenders.

27.1. Notwithstanding Clause 26, the University reserves the right to accept or reject any Tender, and to cancel the Tender process and reject all Tenders, at any time prior to the award of Contract, without thereby incurring any liability to the affected Tenderer or Tenderers or any obligations to inform the affected Tenderer or Tenderers of the ground for the University's action.

27.2. Incomplete tenders with insufficient EMD/Tender fee and pre-qualifications will be rejected.

27.3. University reserves the right to accept or reject any or all tenders without any assigning reasons.

28. Notification of award and signing of Agreement

28.1. The Tenderer whose Tender has been accepted will be notified of the award by the University prior to expiration of the Tender validity period by email or facsimile confirmed by registered letter. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") will state the sum that the University will pay the contractor in consideration of the execution, completion and maintenance of the works by the Contractor as prescribed by the Contract (hereinafter and in the contract called the "Contract Price").

28.2. The notifications of award will constitute the formation of the Contract, subject only to the furnishings of a performance security in accordance with the provisions of Clause 29.

28.3. The Agreement will incorporate all agreements between the University and the successful Tenderer. It will be kept ready for signature of the successful Tenderer in the office of University within 30 days following the notification of award along with the Letter of Acceptance. Within 15 days of receipt, the successful Tenderer will sign the Agreement and deliver it to the University.

28.4. Upon furnishing by the successful Tenderer of the Performance Guarantee, the University will promptly notify the other Tenderers that their Tenders have been unsuccessful.

29. Performance Guarantee

29.1. The person/persons whose tender may be accepted (hereinafter called the Contractor which expression shall unless the context otherwise requires, include his heirs, executors, administrators and assigns) shall have to submit a Performance Guarantee (PG) in DD payable at Bangalore equivalent to **Rs.13,50,000/- (Rupees Thirteen Lakhs Fifteen Thousand Only)** within Thirty (30) days of the date of issue of the Letter of Acceptance.

29.2. The Performance Guarantee shall be submitted after the Letter of Acceptance but prior to signing of the Contract. The PG shall be initially valid upto the stipulated date of completion plus 60 days beyond that. In case, the time for completion of work gets extended, the contractor shall get the validity of PG extended to cover such extended time for completion of work plus 60 days.

29.3. The Performance Guarantee (PG) shall be released after physical completion of the work based on 'Completion Certificate' issued by the competent authority stating that the contractor has completed the work in all respects satisfactorily.

30. Retention Amount

30.1. The Contractor permit University to deduct an amount equivalent to **3.5% (Three point Five percent)** of all money payable for work done under the contract, at the time of making such payments to him/them and to hold such deductions as "**Retention Amount**".

30.2. The Retention Amount will also be deducted for Additional works or Non tender items.

30.3. The Retention Amount paid by a Contractor shall be refunded to him 30 days after 365 days, from the date of completion of the work and issue of virtual completion certificate, during which period the work should be maintained by the Contractor in good order and all reported defects should have been rectified/repaired whichever is later.

31. Advance Payment – Not applicable

32. Corrupt or Fraudulent practices

32.1. NLSIU requires that the Tenderers observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, NLSIU:

a) will reject a proposal for award if it determines that the Tenderer recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

b) will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded a NLSIU contract if it at any time it determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a NLSIU contract.

32.2. Furthermore, Tenderers shall be aware of the provision stated in Sub-Clause 50.2 of the Conditions of Contract.

SECTION 3: QUALIFICATION INFORMATION

The information to be filled in by the Tenderer hereunder will be used for purposes of computing Tender capacity as provided for in Clause 3 of the Instructions to Tenderers. This information will not be incorporated in the Contract. (**Information requested in this section may be submitted in below mentioned format printed separately on company letterhead with sign & seal of competent authority, along with supporting documents, PO's, Engineers Certificates, Completion Certificated and any other document required to establish correctness of information provided**)

1.1 Organizational Details:

FORM A		
1	Name & Address with telephone no./ fax no./ email ID	
2	a. Year of Establishment b. Principal place of business	
3	Legal status of the applicant (attach copies of the original document defining legal status)	
	a) Proprietary firm	
	b) Partnership firm	
	c) A limited company or corporation	
4	Names of Directors/ Principals with designation	
5	Designation of individuals authorised to act for the organisation	
6	Total No. of professional staff (in- house) Site Engineers: Admin Staff/Purchase: Others:	
7	Was the tenderer ever required to suspend any project for a period of more than three months continuously after commencement? If so, give the name of the project and the reason for suspension of project.	
8	Has the tenderer or any partner in case of partnership firm, ever abandoned the awarded project before its completion? If so, give the name of the project and reasons for abandonment.	
9	Has the tenderer, or any partner in case of partnership firm, ever been debarred/ black listed form competing in any organisation at any time? If so, give details.	
10	Any other Information considered necessary but not included above	

1.2 Total Value of Interior Fit-Out Works executed and payments received (turnover) in the last three years ending 31.03.2020 (In Lacs) (Year 2020 -21 excluded due to

pandemic & lockdowns):

FORM B			
Particulars	**Financial Year**		
	2018-19	2019-20	2020-21
Gross Annual turnover for Interior Fit Out Works only (Rs. In Lacs)			
Profit /Loss			
Certified by			

1.3 Work performed as Prime Contractor (in the same name) on works of similar nature over during the last **five** years ending 31.03.2021. (PO's, Work Completion certificates from University to be enclosed). Similar work, in this case shall mean interior fit –out of seminar halls /auditoriums/ Classrooms with state of the art finishes and technology (especially audio video systems) integration:

FORM C							
Project Name	Name of University	Description of Work	Value of Contract Rs.Lakhs	Date of issue of work order	Specified period of completion	Actual date of completion	Remarks explaining reasons for delay in completion of work
1	2	3	4	5	6	7	8

1.4 Quantities of work executed as prime contractor (in the same name) during the last **five** years ending 31.03.2021 (Relevant PO's indicating the said works to be enclosed) :

FROM D						
Year	Name of Work	Name of University	Works Executed			
			Vitrified Tile Flooring in SQM	Complete Fit-Out - Carpet Area in SQM	AV System Installation (Location & Details)	AC Equipment Installed (Tonnage)

1.5 Information on works for which Tenders have been submitted and works which are yet to be completed as on the date of this Tender.

(A) Existing commitments and on-going works:

FORM E							
Description Of Work	Place & State	Contract No. & Order Date	Name & Address of University	Value of Contract (Rs.Lakhs)	Stipulate Period of completion	Value of works remaining to be completed	Anticipated date of Completion
1	2	3	4	5	6	7	8

(B) Works for which Tenders already submitted:

FORM F						
Description Of Work	Place & State	Name & Address of University	Estimated Value of works (Rs.Lakhs)	Stipulate Period of Completion	Date when Decision is Expected	Remarks If any.
1	2	3	4	5	6	7

1.6 Reports on the financial standing of the tenderer, such as profit and loss statements and auditor's reports for the last three years (specified in 1.2 above);

1.7 Qualification and experience of the key technical and management personnel in permanent employment with the tenderer and those that are proposed to be deployed on this contract, if awarded.

1.8 Name, address, and telephone, email and fax numbers of the Tenderer's bankers who may provide references if contacted by the University.

1.9 Evidence of access to financial resources to meet the qualification requirement specified in ITTClause 3, Cash in hand, Letter of Credit etc. List them below and attach certificate from the Banker in the suggested format as under:

BANKER'S CERTIFICATE

This is certify that M/s.....…is a reputed company with a good financial standing. If the contract for this work, namely "CLASSROOM INTERIOR WORKS OF NEW ACADEMIC BLOCK, NLSIU" is awarded to the above firm, we shall be able to provide overdraft/ credit facilities to the extent of Rs Seventy five lakhs Rs (75.00Lakhs) to meet the working capital requirements for executing the above contract.

Sd/-
Name of the Bank, Senior Bank Manager
Address……

1.10 Proposals for the subcontracting components of works amounting to more than 20% of the contract price. Details of Sub-contractors for **Electrical & Air Conditioning Works** shall be mandatory irrespective of value/percentage of work.

FORM G			
Item of work	Value of Sub-Contract (Percentage Only)	Identified Sub-Contractor (Name & address)	Experience of similar work
1	2	3	4

1.11 Information on litigation/ arbitration in which the Tenderer is involved:

FORM H				
Other Party (ies)	Name & Address of University	Details of dispute	Amount involved	Remarks showing present status
1	2	3	4	5

1.12 The proposed methodology and program of execution, backed with equipment and labour planning and deployment, duly supported with broad calculations and quality control procedures proposed to be adopted, justifying their capability of execution of the work as per technical specifications within the stipulated period of completion as per milestones.

1.13 The tenderer must provide the past **performance certificate** from the top-2 customers by revenue. The past performance certificate must provide the following info: Name of the work, Name of the Client & address, Value of the contract, Contract period and customer feedback. The customers must rate the organisation on the following parameters on a scale of 1- 5 (1 -poor, 2 - Average, 3-good, 4-Very good and 5-Excellent). (Quality of work, Financial Soundness, Technical Proficiency, Resource

Facilities, General Behavior and Dispute/Litigation). If the feedback is for a past contract, reason as to why the contract was not renewed. Performance Certificates from the same customer but for different works shall be treated as one contract (lowest rating of multiple jobs from same customer shall be considered).

FORM I						
Sl.No	Contract Executed	Name& Address of the University	Certificate date	Completion Date	Contract Amount	Rating on scale of 5
1						
2						
3						
4						
5						

(On letterhead of issuing organization)

PERFORMANCE CERTIFICATE

This is Certify that M/s…… is reputed company and had contract with us of Value INR …….. for the period……. To …… The work of the agency was found to be …… (1-Poor, 2-Average, 3 good, 4 Very good, and 5 –Excellent) and the contract has been renewed on ……. for a period of……. to….. for……. The……. Work……./ was…….. not…… renewed because…….

The scale of rating is be based on Quality of work, financial soundness, Technical Proficiency, Resource Facilities, General Behavior and Dispute/Litigation.

Sd/-

Head of Facilities
Name of the company
Address

Contractor's Seal and Signature

RELATED PARTY CERTIFICATE

This is to state that I/we are participating in the tender namely "CLASS ROOM INTERIOR WORKS OF NEW ACADEMIC BLOCK, NLSIU". I/We further state that as per the criteria laid down under the Companies Act 2013 the following are related party/ parties.

1. Name……. relation under the criteria....of the Companies Act 2013.
2. Name……. relation under the criteria....of the Companies Act 2013
3. Name……. relation under the criteria....of the Companies Act 2013

Sd/-

CEO/MD
Name of the Company
Address

Counter signed by Chartered Accountant/Company Secretary

This is to certify that only the above stated companies/ individuals/ trusts/ societies etc., are related party of the said agency/company M/s.....as per the Criteria of the related party under the Companies Act 2013.

Chartered Accountant/Company Secretary

SECTION 4: FORM OF TENDER, APPENDIX TO TENDER AND AGREEMENT FORM

FORM OF TENDER

To,
The Registrar,
NLSIU,
Bangalore.

Name of the Work: Proposed Classroom Interior Works, New Academic Block, NLSIU, Bangalore.

1.1 Having visited the site and examined the Conditions of Contract, & General Specifications for the above named works, we offer to execute the work and maintain the whole of the said works in conformity with the said Conditions of Contract, Specifications, for the sum stated in price bid of this Tender Document or such other sum as may be ascertained in accordance with the said Conditions of Contract.

1.2 We undertake to complete and deliver the whole of the works comprised in the contract within the time stated in the Appendix hereto.

1.3 We agree to abide by this Tender for the period of 90 days from opening of Tender or extension thereof as required by the University from the date fixed for receiving the same and it shall remain binding uponus and may be accepted at any time before the expiry of that period.

1.4 We confirm that the period and rates as referred in the agreement or general conditions of contract are given or summarized in the appendix hereto, to which we give our consent and agree to abide by the same.

1.5 If this tender is accepted, we undertake to enter into and execute at our cost, when called upon by the University to do so, a contract agreement in the prescribed form. Unless and until a formal Agreement isprepared and executed this tender together with your written acceptance thereof, shall constitute a binding contract between us.

1.6 We understand that if our Tender is accepted, we are to be jointly and severely responsible for the due performance of the contract.

1.7 We understand that you are not bound to accept the lowest or any Tender you may receive and may reject all or any tender, accept or entrust the entire work to one Contractor or divide the work to more than one contractor without assigning any reason or giving any explanation whatsoever.

Dated this …….date of ..... 2021.

Signature……. In the capacity of ……..

duly authorised to sign tenders for and on behalf of ……..

(IN BLOCK/CAPITALS)
(WITH COMPANY/FIRM'S SEAL)

Witness:
Signature……. Address of tenderer……..
Name …… ……..
Occupation…… ……

APPENDIX TO FORM OF TENDER

1. 2.	NAME OF THE UNIVERSITY OFFERING CONTRACT	National Law School of India University, Bangalore
3.	SITE ADDRESS	Gnana Bharathi Main Rd, Opposite NAAC, Teachers Colony, Nagarbhavi, Bengaluru, Karnataka – 560072.
4.	SCOPE OF WORK	Civil, Flooring, Carpentry, Fabrication, Electrical, Air Conditioning, Audio Video, Painting & Allied Works,
4.	NAME OF CONTRACTOR	……..
5.	ADDRESS OF THE CONTRACTOR	…… …… ……
6.	PERIOD OF COMPLETION	113 DAYS FOR VIRTUAL COMPLETION AND 7 DAYS FOR HANDING OVER FROM THE DATE OF WRITTEN ORDER
7.	EARNEST MONEY DEPOSIT	AMOUNT AS MENTIONED IN IFT, IN THE FORM OF D.D IN FAVOUR OF 'THE REGISTRAR' NLSIU, BANGALORE.
8.	DEFECT LIABILITY PERIOD	365 DAYS FROM DATE OF VIRTUAL COMPLETION
9.	INSURANCE TO BE UNDERTAKEN	125% OF CONTRACT VALUE BY THE CONTRACTOR (CONTRACTORS ALL RISK POLICY) AT HIS COST AND SHOULD BE IN THE JOINT NAME OF NLSIU & CONTRACTOR. FIRE INSURANCE UP TO 30 DAYS AFTER DATE OF VIRTUAL COMPLETION AND SHOULD BE IN THE JOINT NAME OF NLSIU & CONTRACTOR.
10.	LIQUIDATED DAMAGES	AS PER CLAUSE No. 41 OF CONDITIONS OF CONTRACT
11.	PERFORMANCE GUARANTEE	5%
12.	RETENTION AMOUNT ON RUNNING BILLS	3.5%
13.	VALUE OF INTERIM BILL (MIN)	NOT LESS THAN RS. 25,00,000/-
14.	DATE OF COMMENCEMENT	THE DATE WHEN NOTICE TO PROCEED IS ISSUED TO THE CONTRACTOR/OR THE DAY ON WHICH THE CONTRACTOR IS INSTRUCTED TO COMMENCE WHICH EVER IS LATER.
15.	PERIOD OF FINAL MEASUREMENT	ONE MONTHS FROM THE DATE OF THE VIRTUAL COMPLETION.
16.	MOBILIZATION ADVANCE	NO MOBILIZATION ADVANCE

Contractor's Seal and Signature

ARTICLES OF AGREEMENT

Articles of Agreement made on this .....day of.....2021 between the **National Law School of India University, Bangalore**(Hereinafter referred to as NLSIU) of the one part and_____(Herein after referred to as the Contractor which expression shall include his heirs, Executors, Administrators & Assigns) of the other part. Whereas NLSIU is desirous of **Classroom Interior Works of New Academic Block at NLSIU, Bangalore**, and has caused Drawings and Specifications describing the work to be prepared by **M/s Iris Global** (Hereinafter referred to as the Architects).

And WHEREAS the said Specifications and the Schedule of Quantities / Bill of Quantities have been signed by or on behalf of the parties hereto.

And WHEREAS the Contractor has agreed to execute upon and subject to the conditions set forth herein and to the conditions set forth in the Notice Inviting Tender, Instructions to Tenderer, Form of Tender, Special conditions, General Conditions, in the schedule of quantities / bill of quantities and conditions of contract (all of which are collectively hereinafter referred to as the said conditions and forming part and parcel of this articles of agreement) the work shown upon and described in the said drawings and/or described in the said specifications and included in the said schedule of quantities / bill of quantities at the respective rates therein set forth and amounting to the sum as therein arrived at or such other sum as shall become payable there under (hereinafter referred to as the said CONTRACT AMOUNT).

NOW IT IS HEREBY AGREED AS FOLLOWS:

1) In consideration of the said contract amount to be paid at the time and in the manner set forth in the conditions, the Contractor shall upon and subject to the conditions execute and complete the work shown upon the said drawings and described in the said specifications and the schedule of quantities / bill of quantities at the agreed rates.

2) NLSIU shall pay the Contractor the said contract amount or such other sum that may become payable at the times and in the manner hereinafter specified in the said conditions.

3) The following documents shall be deemed to form and be read and construed as part of this Contract, viz:

i. Letter of Acceptance;
ii. Notice to proceed with the works;
iii. Contractor's Tender;
iv. Contract Data;
v. Conditions of contract (including Special Conditions of Contract);
vi. Specifications;
vii. Drawings;
viii. Bill of Quantities; and
ix. Any other document listed in the Contract Data as forming part of the contract.

4) The term 'The Architects' (in the said conditions) shall mean the Architects/ Consultants engaged by the University for preparation of drawings and specifications for the purpose of this contract. In the event of their ceasing to be The Architects, for the purpose of this contracts such other person or persons as shall be nominated for that purpose by the University, shall be referred to as 'The Architects', provided always that no person/persons subsequently appointed to be the Architects under this contracts shall be entitled to disregard or over rule any previous decisions expressed in writing by the Architects for the time being.

5) The said conditions and appendix thereto shall be read and construed as forming part of this Agreement and the Parties hereto shall respectively abide by and submit themselves to the said conditions and perform the Agreement on their part respectively in the said conditions.

6) The contract is neither a fixed lump sum contract nor a piece work contract, but is a contract to carry out the work in respect of the entire works to be paid for according to actual measured quantities at the rates contained in the schedule of rates and probable quantities or as provided in the said conditions.

7) The contractor shall offer every reasonable facility for the carrying out of all works relating to installations of furnishings, fixtures, fittings, electrical installations / fittings, water & sanitary lines and fixtures, telephone, air-conditioning etc., in the manner laid down in the said conditions and shall make good any damages done to walls, floors, etc., at his cost after the completion of such works.

8) NLSIU reserves the right of altering the drawings and nature of the work by adding or omitting any items of work from the contract or having portions of the same carried out without prejudice to this contract.

9) Time shall be considered as of the essence of this Agreement and the Contractor does hereby agree to commence the work within three days from the date of issue of formal work order and immediately after handing over of site as provided for in the said conditions and to complete the entire works within the specified period subject nevertheless to the provisions for extension of times.

10) All disputes arising out of or in any way connected with this agreement shall be deemed to have arisen in **Bangalore** and only courts in **Bangalore** shall have jurisdiction to determine the same.

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

AS WITNESS OUR HANDS THIS.....DAY OF.....2021.

Signed by the said CONTRACTOR:

In the presence of:

Address:

Occupation:

Signed by the Vice-Chancellor, NLSIU:

In the presence of:

Address:

Occupation:

SECTION 5: CONDITIONS OF CONTRACT

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Conditions of Contract

A. General

Except where provided for in the description of the individual items in the schedule of quantities and in the specifications and conditions laid down hereinafter and in the Drawings, the work shall be carried out as per standard specifications and under the direction of University & Architects/ Consultants engaged by the University for the purpose of this contract.

1. Definitions

Bold letters are used to identify defined terms.

(a) **Bill of Quantities** means the priced and completed Bill of Quantities forming part of the Tender.
(b) **Compensation events** are those defined in Clause 38 hereunder.
(c) The **Completion Date** is the date of completion of the Works as certified by the University in accordance with Sub Clause 45.1.
(d) The **Contract** is the contract between the University and the Contractor to execute, complete and maintain the works. It consists of the documents listed in Clause 2.2 below.
(e) The **Contract Data** defines the documents and other information which comprise the Contract.
(f) The **Contractor** is a person or corporate body whose Tender to carry out the Works has been accepted by the University.
(g) The **Contractor's Tender** is the completed Tender document submitted by the Contractor to the University.
(h) The **Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.
(i) **Days** are calendar days; **Months** are calendar months.
(j) A **Defect** is any part of the Works not completed in accordance with the Contract.
(k) The **Defect Liability Period** is the period named in the Contract Data and calculated from the Completed Date.
(l) **Equipment** is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.
(m) The **Initial Contract Price** is the Contract Price listed in the University's Letter of Acceptance.
(n) The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the University by issuing an extension of time.
(o) **Materials** are all supplies, including consumables, used by the contractor for incorporation in the Works.
(p) **Plant** is any integral part of the works which is to have a mechanical, electrical, electronic or chemical or biological function.
(q) The **Site** shall mean the site where the works are to be executed
(r) **Specification** means the Specification of the Works included in the Contract and any modification or addition made or approved by the University.

(s) The **Start Date** shall be the date of issue of notice to proceed with the work. It is the date when the Contractor is asked to commence execution of the works. It does not necessarily coincide with any of the Site Possession Dates.

(t) A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract which includes work on the Site.

(u) The **University** is the party who will employ the Contractor to carry out the Works.

(v) A **Variation** is an instruction given by the University which varies the Works.

(w) The **Works** are what the Contract required the Contractor to construction, install, and turn over to the University, as defined in the Contract Data.

2. Interpretation

2.1 In interpreting those Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The University will provide instructions clarifying queries about the Conditions of Contract.

2.2 The documents forming the Contract shall be interpreted in the following order of priority:

(a) Agreement
(b) Letter of Acceptance, notice to proceed with the works
(c) Contractor's Tender
(d) Contract Data
(e) Conditions of Contract
(f) Specifications
(g) Drawings
(h) Bill of Quantities and
(i) Any other document listed in the Contract Data as forming part of the Contract.

3. Law Governing Contract

The law governing the Contract is the Laws of India supplanted by the Karnataka Local Acts.

4. University's Decisions

Except where otherwise specifically stated, the University will decide contractual matters between the University and the Contractor.

5. Delegation

The University may delegate any of its duties and responsibilities to other people after notifying the Contractor and may cancel any delegation after notifying the Contractor.

6. Communications

Communications between parties which are referred to in the conditions are effective only when in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act, 1872)

7. Subcontracting

The Contractor may subcontract specialized portions of the work with the approval of the University but may not assign the Contract without the approval of the University in writing. The entire work as a whole may not be Sub-contracted to one single agency. Subcontracting does not alter the Contractor's obligations.

8. Other Contractors

The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities and the University.

9. Personnel

9.1 The Contractor shall employ the technical personnel (of number and qualifications) as may be stipulated by NLSIU from time to time during the execution of the work. The technical staff so employed shall be available at site as may be stipulated by the University.

9.2 If the University asks the Contractor to remove a person who is a member of the Contractor's staff or its work force stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

10. University's and Contractor's Risks

10.1 The University carries the risks which this Contract states are University's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

11. University's Risks

11.1 The University is responsible for the excepted risks which are:

(a) rebellion, riots, commotion or disorder, unless solely restricted to employees of the Contractor or its Sub-Contractors arising from the conduct of the Works; or

(b) risks caused solely due to the design of the Works, other than the Contractor's design; or

(c) any operation of the forces of nature (in so far as it occurs on the Site) which an experienced contractor:

(i) could not have reasonably foreseen; or

(ii) could reasonably have foreseen, but against which he could not reasonably have taken at least one of the following measures;

(a) prevent loss or damage to physical property from occurring by taking appropriate measures or

(b) insure against such loss or damage

12. Contractor's Risks

12.1 All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor.

13. Insurance:

13.1 The Contractor shall prior to commencing the works, effect and thereafter maintain insurances, in the joint names of the University and the Contractor, (cover from the first working day after the Start Date to the end of Defect Liability Period), in the amounts stated in the Contract Data:

i. for loss of or damage to the Works, Plants and Materials and the Contractor's equipment;

ii. for liability of both Parties for loss, damage, death and injury to third parties or third property arising out of the Contractor's performance of the Contract including the

Contractor's liability for damage to the University's property other than the Works and

iii. for liability of both Parties and of any University's representative for death and injury to the Contractor's personnel except to the extent that liability arises from the negligence of the University, any University's representative or their Employees.

13.2 Policies and certificates for insurance shall be delivered by the Contractor to the University for its approval before the Start Date. All such insurance shall provide for compensation to be payable to rectify the loss or damage incurred. All payments received from insurers relating to loss or damage shall be held jointly by the Parties and used for the repair of the loss or damage or as compensation for loss or damage that is not to be repaired.

13.3 If the Contractor fails to effect or keep in force any of the insurances referred to in the previous subclasses or fails to provide satisfactory evidence, policies or receipts, the University may without prejudice to any other right or remedy, effect insurance for the cover relevant to such default and pay the premiums due and recover the same as a deduction from any other monies due to the Contractor. If no payments are due, the payment of the premiums shall be a debt due.

13.4 Alterations to the terms of insurance shall not be made without the approval of the University.

13.5 Both Parties shall comply with any conditions of the insurance policies.

13.6 **Fire Insurance**: Unless otherwise instructed by the University, the Contractor shall on signing the Contractor, insure the works and keep them insured up to one month after the virtual completion of the Contract against loss or damage by fire by taking out a Policy of Insurance from the office as approved by the University in the joint names of the University and the Contractor for full value of the contract. Such policy shall cover the property of the University only and the Consultant's fees in connection with its services generally in the reinstatement, and shall not cover any property of the Contractor or of any sub-contractor or employee. The contractor shall deposit the policy and receipt for the premium with the University within 15 days from the date of signing the Contract, unless otherwise instructed by the University. In default of the Contractor insuring as provided above, University on its behalf may so insure and may deduct the premium said from the monies due or which may become due to the Contractor. The Contractor shall as soon as the claim under the Policy is settled or the work reinstalled by the Insurance Officer, should they elect to do so, proceed with all due diligence with the completion of the works and in the same manner as though the fire had not occurred and in all respects under the same conditions of the contract. The Contractor in case of building or reinstatement after the fire shall be entitled to such extension of time for the completion as may be mutually agreed upon by the University and the Contractor.

14. Site Investigation Reports:

The Contractor, in preparing the tender, shall rely on any site investigation reports referred to in the Contract Data, supplemented by any information available to the Tenderer.

15. Queries about the Contract Data

The University will clarify queries on the Contract Data.

16. Contractor to construct the Works

The Contractor shall construct the Works in accordance with the Specification and drawings.

17. The Works to be completed by the Intended Completion Date

The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the program submitted by the Contractor, as updated with the approval of the University, and complete them by the Intended Completion Date.

18. Approval by the University:

18.1 The Contractor shall submit Specification and drawings showing the proposed Temporary Works to the University, who is to approve them if they comply with the Specifications and Drawings.

18.2 The Contractor shall be responsible for the design of Temporary Works.

18.3 The University's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

18.4 The Contractor shall obtain approval of third parties to the design of third parties to the design of the temporary Works where required.

18.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the University before their use.

19. Safety

19.1 The Contractor shall be responsible for the safety of all activities on the Site.

19.2 Personal protective equipment like helmets, safety belts, etc. should be provided by the Contractor.

19.3 The Contractor shall be responsible for the safety of pedestrians at the Site

19.4 The Contractor shall also ensure that face masks and sanitizers are provided to all personnel engaged in the works, ensure COVID appropriate behavior and protocols, as stipulated by Government Guidelines (as updated periodically). The Contractor shall be responsible for the health and medical treatment of all workers & his employees (due to infectious disease or otherwise) and shall indemnify NLSIU against any claims in this regard.

19.5 The Contractor shall abide by the safety codes (but not limited to) detailed under section 57 of the Special Conditions of contract.

20. Discoveries

Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the University. The Contractor is to notify the University of such discoveries and carry out the relevant activities.

21. Possession of the Site

The University shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Contract Data the University is deemed to have delayed the start of the relevant activities and this will be Compensation Event.

22. Access to the Site, Barricading of site and site infrastructure

22.1 The Contractor shall allow the University and any person authorized by the University

access to the Site, to any place where work in connection –with the Contract is being carried out or is intended to be carried out and to any place where materials or plant are being manufactured/ fabricated/ assembled for the works.

22.2 The Contractor shall provide safety barricades and provide security at the entrance. All barricading and safety works should be done by the contractor and is deemed to be included in the quoted rates

22.3 The cost of Site infrastructure items listed below are to be borne by the Contractor.

- Site office with lights, furniture , fans , drinking water facilities and A4 size printer / copier / scanner with PC / Laptop.
- QC lab/material test from approved labs or getting tests done from approved labs.

23. Instructions

The Contractor shall carry out all instructions of the University which comply with the applicable laws where the Site is located.

24. Procedure for resolution of Disputes:

24.1 If the Contractor is not satisfied with the decision taken by the University, the dispute shall be referred by either party to Arbitration within 30 days of the notification of the University's decision.

24.2 If neither party refers the dispute to Arbitration within the above 30 days, the University's decision will be final and binding.

24.3 The Arbitration shall be conducted in accordance with the arbitration procedure stated in the Special Conditions of Contract.

B. Time Control

25. Program of Construction

25.1 Within the time stated in the Contract Data the Contractor shall submit to the University for approval a Program showing the general methods, arrangements, order, and timing for all activities in the Works.

25.2 The University's approval of the Program shall not alter Contractor's obligations. The Contractor may revise the Program and submit it to the University again at any time. A revised Program is to show the effect of Variations and compensation Events.

26. Extension of the Intended Completion date.

26.1 The University shall extend the Intended Completion date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date.

26.2 The University shall decide whether and by how much to extend the intended completion date within 21 days of the Contractor asking the University for a decision upon the effect of a compensation event or variation and submitting full supporting information.

27. Delays ordered by the University

The University may instruct the Contractor to delay the start or progress of any activity within the works.

28. Management meetings

28.1 The University may require the Contractor to attend a management meeting. The business of a management meeting shall be to review the progress achieved and the plans for remaining work.

28.2 The responsibility of the parties for actions to be taken is to be decided by the University either at the management meeting or after the management meeting and stated in writing to be distributed to all who attended the meeting.

C. Quality Control

29. Identifying defects

The University shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The University may instruct the Contractor to search for a Defect and to uncover and test any work that the University considers may have a defect.

30. Tests

30.1 The following tests are to be carried out as per the ISI specifications by the Contractor at his cost, through and approved testing laboratory as approved by the University / Architect.

a) Cement Test
b) Concrete Block/Brick test
c) Steel Test (For fabrication works)
d) Plywood/ Wood sections Test
e) Any other tests as per the relevant code if so required by the University / Architect if the work in not found to be satisfactory.

30.2 If the University instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a defect and the test shows that it does, the Contractor shall pay for the test and any samples.

31. Correction of Defects

The Contractor shall rectify any defects brought to their notice within the time specified in the University's notice.

32. Uncorrected defects

If the Contractor has not corrected a Defect within the time specified in the University's notice, the University will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

D. Cost Control

33. Bill Of Quantities (BOQ)

33.1 The BOQ shall contain items for the construction, installation, testing and commissioning work to be done by the contractor.

33.2 The BOQ is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the BOQ for each item

33.3 The calculations made by the Tenderer should be based upon probable quantities of the

several items of work which are furnished for the Tenderer's convenience in the schedule of probable quantities, but it must be clearly understood that the Contract is not Lump Sum Contract, that neither the probable quantities nor the value of the individual items nor the aggregate value of the entire tender will form part of the Contract and that the Owner or the Architects do not in any way assure the Tenderer or guarantee that the work would correspond thereto.

33.4 The quantities shown in the schedule/bill of quantities are intended to cover the entire work indicated in the drawings but the University reserves the right to execute only a part or the whole or any excess thereof without assigning any reason there for.

34. Variations

34.1 The University shall have power to order the Contractor to do any or all of the following as considered necessary or advisable during the progress of the work by him.

(a) Increase or decrease of any item of work included in the Bill of Quantities.(BOQ);
(b) Omit any item of work
(c) Change the character or quality or kind of any item of work;
(d) Change the levels, lines, positions and dimensions of any part of the work;
(e) Execute additional items of work of any kind necessary for the completion of the work.
(f) Change in any specified sequence, methods or timing of constriction of any part of the work.

34.2 The Contractor shall be bound to carry out the work in accordance with any instructions in this connection, which may be given to him in writing by the University and such alteration shall not vitiate or invalidate the contract.

34.3 Variations shall not be made by the Contractor without an order in writing by the University, provided that no order in writing shall be required for increase or decrease in the quantity of an item appearing in the BOQ so long as the work executed conforms to the approved drawings.

34.4 The contractor shall promptly request in writing the University to confirm verbal orders and if no such confirmation is received within 15 days of request, it shall be deemed to be an order in writing by the University.

35. Payments for Variations

35.1 Payment for increase in the quantities of an item in the BOQ up to 25% of that provided in the Bill of Quantities shall be made at the rates quoted by the Contractor.

35.2 For the quantities in excess of 125% of the tendered quantity of an item as given in the BOQ , the Contractor shall be paid at the rate entered in or derived from in the Schedule of rates (applicable for the area of the work and current at the time of award of contract) plus or minus the overall percentage of the original tendered rates over the current Schedule of Rates prevalent at the time of award of contract.

35.3 If there is no rate for the additional, substituted or altered item of the work in the BOQ, efforts would made to derive the rates from those given in the BOQ or the Schedule of Rates (applicable for the area of the work and current at the time of award of contract) and if found feasible the payment would be made at the derived rate for the item plus or minus the overall percentage of the original tendered rates over the current Schedule of Rates prevalent at the time of award of contract.

35.4 If the rates for additional, substituted or altered item of work cannot be determined either as at 35.1 or 35.2 or 35.3 above, the Contractor shall be requested to submit his quotation for the items supported by analysis of the rates or rates claimed, within 7 days, 15% will be allowed for overheads and profit only.

35.5 If the Contractor's quotation is determined unreasonable, the University may order the Variation and make change in the Contract price which shall be based on University's own forecast of the effects of the variation on the Contractor's cost.

35.6 If the University decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and Variation shall be treated as a Compensation Event.

35.7 Under no circumstances the Contractor shall suspend the work on the plea of non-settlement of rates for items falling under this Clause.

36. Submission of bills for payment

36.1 The Contractor shall submit to the University monthly bills of the value of the work completed less the cumulative amount paid previously.

36.2 The University shall check the Contractor's bill and determine the value of the work executed which shall comprise of (i) value of the quantities of item in the BOQ completed and (ii) valuation of Variations and Compensation Events.

36.3 The University may exclude any item paid in a previous bill or reduce the proportion of any item previously paid in the light of later information.

36.4 All bills will be admitted if they are submitted along with pre-measurement sheets duly signed by the Contractor and University's Authorized Representative.

37. Payments

37.1 The Contractor shall, on a monthly basis, raise a tax invoice for Work done under this Contract, which shall expressly include details of all applicable taxes, duties, charges and levies of State or Central Governments as applicable, GST, insurance, service taxes etc.

37.2 NLSIU shall process the payment raised on the invoice within 60 days of the approval of the invoice by Authorised Representative of the University. The Contractor shall be responsible for obtaining the approval of the Authorised Representative of the University.

37.3 Payments shall be adjusted for deductions for advance payments, other recoveries in terms of the contract including Retention Amount, and taxes at source, as applicable under the law.

37.4 Items of works for which no rate or price has been entered in will not be paid for by the University and shall be deemed covered by other rates and prices in the Contract.

38. Compensation events.

38.1 The following are Compensation events unless they are caused by the contractor.

(a) The University does not give access to a part of the site by the site possession date stated in the Contract Data.

(b) The University orders a delay or does not issue drawings, specifications or instructions required for execution of work on time.

(c) The University instructs the Contractor to uncover or to carry out additional tests upon work which is then found to have no defects.

(d) The University gives an instruction for dealing with an unforeseen condition, caused by the University, or additional work required for safety or other reasons.

(e) The effect on the Contractor of any of the University's risks.
(f) The University unreasonably delays issuing a Certificate of Completion.
(g) Other Compensation Events listed in the Contract Data or mentioned in the Contract.

38.2 If a compensation Event would cause additional cost or would prevent the work being completed before the Intended completion Date, the Contract price shall be increased and / or Intended Completion Date is extended. The University shall decide whether and by how much the Contract price shall be increased and whether and by how much the intended completion date shall be extended.

38.3 As soon as information demonstrating the effects of each Compensation event upon the Contractor's forecast cost has been provided by the Contractor, it is to be assessed by the University and the Contract price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the University shall adjust the Contract price base on University's own forecast. The University will assume that the Contractor will react competently and promptly to the event.

38.4 The Contractor shall not be entitled to compensation to the extent that the University's interests are adversely affected by the Contractor not having given warning or not having cooperated with the University.

39. Tax

The rates quoted by the Contractor shall be deemed to be inclusive of GST and other taxes/statutory levies that the Contractor will have to pay for the performance of this Contract. The University will perform such duties in regard to the deduction of such taxes at source as per applicable law.

40. Price Adjustment – Not applicable

41. Liquidated Damages

41.1 The Contractor shall pay liquidated damages to the University at the rate of 0.5% of the Contract value per week of delay of the Completion Date The total amount of liquidated damages shall not exceed the amount of 5% of the total contract value. The University may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages does not affect the Contractor's liabilities.

41.2 If the Intended Completion Date is extended after liquidated damages have been paid, the University shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment of bill.

42. Advance Payments: Not applicable

43. Performance Guarantee:

43.1 The Performance Guarantee shall be provided to the University no later than Thirty (30) days from the date of issuance of the Letter of Acceptance and shall be issued in an amount and form and type of instrument acceptable to the University. The Performance Guarantee shall be valid upto Sixty (60) days beyond the stipulated date of completion. The Contractor shall get the validity of the PG extended to cover any extended time for the completion of work plus sixty (60) days.

43.2 In the event that (i) the Contract is terminated by the University for a fundamental breach of contract under Clause 50, or (ii) the Contractor fails to get extended the validity of the

Performance Guarantee as stipulated above, the University shall encash the Performance Guarantee.

43.3 Liability Period and the additional security for unbalanced tenders shall be valid until a date 30 days from the date of issue of the certificate of completion.

44. Retention Amount

44.1 The University shall deduct an amount equivalent to 3.5% (Three point Five percent) of all money payable for work done under the contract, at the time of making such payments to him/them and to hold such deductions as "**Retention Amount**".

44.2 The Retention Amount will also be deducted for Additional works or Non tender items.

44.3 The Retention Amount paid by a Contractor shall be refunded to him 30 days after 365 days, from the date of completion of the work and issue of virtual completion certificate, during which period the work should be maintained by the Contractor in good order and all reported defects should have been rectified/repaired whichever is later.

44.4 In the event the Contract is terminated by the University for a fundamental breach of contract under Clause 50, the Contractor shall forfeit the Retention Amount.

45. Cost of Repairs:

Loss or damage to the works or materials to be incorporated in the works between the Start date & the end of the defects correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omission.

E. Finishing the Contract

46. Completion

The contractor shall request the University to issue a Certificate of Completion of the works and the University will do so upon deciding that the work is completed.

47. Taking Over

The University shall take over the site and the works within seven days of issuing a certificate of completion.

48. Final account

The Contractor shall supply to the University a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The University shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 90 days of receiving the Contractor's account if it is correct and complete. If it is not, the University shall issue within 90 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the University shall decide on the amount payable to the Contractor and make payment within 60 days of receiving the Contractor's revised account.

49. As built drawings and / or Operating and Maintenance Manuals

49.1 If "as built" Drawings and / or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract data.

49.2 If the Contractor does not supply the Drawings by the dates stated in the Contract data, or they do not receive the University's approval, the University shall with hold the amount

stated in the Contract data from payments due to the Contractor.

50. Termination

50.1 The University or the contractor may terminate the contract if the other party causes a fundamental breach of the contract.

50.2 Fundamental breaches of Contract include, but shall not be limited to the following:

(a) The Contractor stops work for 45 days when no stoppage of work is shown on the current program and the stoppage has not been authorized by the University.

(b) The University instructs the Contractor to delay the progress of the works and the instruction is not withdrawn within 60 days.

(c) The Contractor becomes bankrupt or goes into liquidation other than for a reconstruction or amalgamation.

(d) The University gives notice that failure to correct a particular Defect is a fundamental breach of Contract and the contractor fails to correct it within a reasonable period of time determined by the University;

(e) The contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined in the Contract data; and

(f) If the Contractor, in the judgment of the University has engaged in corrupt or fraudulent practices in competing for or in the executing the contract. For the purpose of this paragraph : "corrupt practice" mean the offering, giving, receiving or soliciting of anyt hing of value to influence the action of a public official in the procurement process or in contract execution. "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Borrower, and includes collusive practice among Tenderers (prior to or after Tender submission) designed to establish Tender prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition."

50.3 When either party to the Contract gives notice of a breach of contract to the University for a cause other than those listed under Sub Clause 49.2 above, the University shall decide whether the breach is fundamental or not.

50.4 Notwithstanding the above, the University may terminate the Contract for Convenience upon 30 days prior written notice to the other Party.

50.5 If the Contract is terminated the Contractor shall stop work immediately, make the site safe and secure and leave the site as soon as reasonably possible.

51. Payment upon Termination

51.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the University shall prepare bill for the value of the work done less advance payments received up to the date of the bill, less other recoveries due in terms of the contract, less taxes due to be deducted at source as per applicable law and less the penalty amount to apply to the work not completed as indicated in the Contract data. Additional Liquidated Damages shall not apply. If the total amount due to the University exceeds the payment due to the Contractor the difference shall be a debt payable to the University.

51.2 If the Contract is terminated at the University's convenience or because of a Fundamental breach of Contract by the University, the University shall prepare bill for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the works, and the Contractor's costs of protecting and securing the Works and less advance payments received up to the date of certificate, less other recoveries due in terms of the contract, and less taxes due to be deducted at source as per applicable law and make payment accordingly.

52. Property

All material on the Site and Temporary Works are deemed to be the Property of the University, if the Contract is terminated because of a Contractor's default.

53. Release from performance

If the Contract is frustrated by any event entirely outside the control of either the University or the Contractor the University shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop works as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which commitment was made.

54. Warranty

The Contractor warrants and guarantees to the University that all Work will be in accordance with the Contract Documents and all applicable statutory and regulatory requirements, and will not be defective. If within one year after the date of Final Completion or such longer period of time as may be prescribed by laws or regulations or by the terms of any specific provision or applicable special guarantee in the Contract Documents, any Work is found to be defective, Contractor will promptly, without cost to University and in accordance with University's written instructions, promptly either correct such defective Work, or if it has been rejected by University, remove it and replace it with non-defective Work. If Contractor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, University may have the defective Work corrected or the rejected Work removed and replaced, and all direct, indirect and consequential costs of such removal and replacement (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) will be paid by Contractor.

55. Indemnity

The Contractor shall indemnify, defend and hold harmless NLSIU, its officers and employees from and against any and all claims, demands, liabilities, and reasonable attorney's fees but only in proportion to and to the extent such claims, liabilities, and attorney's fees arise from any errors and any act/ commission/ omission on part of the Contractor or in connection with any work, authority or jurisdiction delegated to the Contractor under this Contract.

56. Notices

All notices, including notices of address change, required to be sent hereunder shall be in writing and shall be deemed to have been delivered when mailed by Registered Post Acknowledgement Due (RPAD) or reputable courier service. Electronic communications are admissible provided these are sent with delivery confirmation receipt and followed by

physical copy mailed as set forth above.

Notices if to NLSIU:
National Law School of India University
Gnana Bharathi Main Road, Opposite NAAC,
Teachers Colony, Nagarabhavi, Bengaluru,
Karnataka – 560072, India
Attn: Finance Officer
Email: financeofficer@nls.ac.in

Notices if to the Contractor:
Name and Address of Contractor
Attn: _____name/designation__
Email: _____

F. Special Conditions of Contract

57. Labour:

57.1 The Contractor shall, unless otherwise provided in the Contract, make his own Arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

57.2 The Contractor shall, if required by the University, deliver to the University a return in detail, in such form and at such intervals as the University may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the University may require.

58. Compliance with Labour regulations:

During continuance of the contract, the Contractor and his sub-contractors shall always abide by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. The Contractor shall keep the University indemnified in case any action is taken against the University by the competent authority on account of contravention of any of the Provisions of any act or rules made there under, regulations or notifications including amendments. If the University is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/ Acts/ Rules/ regulations including amendments, if any, on the part of the Contractor, University shall have the right to deduct any money due to the Contractor including the Retention Amount. The University shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss of damage suffered by the University.

The employees of the contractor and the Sub-Contractor in no case shall be treated as the employees of the University at any point of time.

59. Protection of Environment:

The contractor shall take all reasonable steps to protect the environment on and off the site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation. During continuance of the contract, the contractor and his sub- contractors shall abide at all times by all existing enactments on environmental protection and rules

made there under, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government, or local authority.

60. Arbitration (Clause 24)

The procedure for arbitration shall be as follows:

60.1 In case of dispute or difference arising between the University and the Contractor relating to any matter arising out of or connected with this agreement it shall be settled in accordance with the Arbitration and Conciliation Act 1996. The disputes or differences shall be referred to a Sole Arbitrator. The Sole Arbitrator shall be appointed by agreement between the parties; failing such agreement, by the Appointing Authority (any one of the organizations as per list at Clause 56.5)

60.2 Arbitration proceedings shall be held at Bangalore, Karnataka, India.

60.3 The cost and expenses incurred by each party in connection with the preparation, presentation, etc., shall be borne by each party itself.

60.4 Performance under the contract shall continue during the arbitration proceedings and payments due the Contractor by the University shall not be withheld, unless they are the subject matter of the arbitration proceedings.

60.5 The List of Organizations who may be selected as the Appointing Authority:

(a) Indian Council of Arbitration, New Delhi;
(b) International Centre for Alternative Disputes Resolution (India);
(c) Indian Institute of Arbitration and Mediation

61. SAFETY CODES

61.1 **SCAFFOLDS:**

i) Suitable scaffolds shall be provided for workmen for all works that cannot safely be done from the ground or from solid construction except in the case of short duration work which can be done safely from ladders. When a ladder is used, 'it shall be of rigid construction made either of good quality wood or steel. The steps shall have a minimum width of 450 mm and maximum rise of 300 mm. Suitable hand holds of good quality wood or steel shall be provided and the ladder shall be given an inclination not steeper than 1/4to 1(1/4 horizontal and 1 vertical).

ii) Scaffolding or staging more than 4 m. above the ground floor, swung or suspended from an overhead support or erected with stationary support shall have a guard rail properly bolted, braced or otherwise secured, at least 1 m. above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffoldings or staging shall be so fastened as to prevent it from swaying from the building or structure.

iii) Working platforms, gang ways and the stairways shall be so constructed that they do not sag unduly or unequally and if the height of the platform, gangway or stairway is more than 4 m. above ground level or floor level, they shall be closely boarded and shall have adequate width and be suitably fenced as described in (ii) above.

iv) Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be 1 m. Wherever there are opened excavations in ground, they shall be fenced off by suitable railing and danger signals installed at night so as to prevent persons slipping into the excavations.

v) Safe means of access shall be provided to all working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 m. in length while the width between side rails in rung ladder shall in no case, be less than 290 mm, for ladder up to and including 3 m in length. For longer ladders this width shall be increased at least 20 mm for each additional meter of length.

vi) A sketch of the ladders and scaffolds proposed to be used shall be prepared and approval of the Engineer obtained prior to construction.

61.2 **OTHER SAFETY MEASURES**

i) All personnel of the contractor working within the plant site shall be provided with safety helmets. All welders shall wear welding goggles while doing welding work and all metal workers shall be provide with safety gloves. Persons employed on metalcutting and grinding shall wear safety glasses.

ii) Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sides of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public.

iii) Temporary Lighting should be fluorescent fittings and no incandescent bulbs should be used.

iv) The contractor shall take all measures on the site of the work to protect the public from accidents and shall be bound to bear the expenses of defence of every suit, action or other proceedings at law that may be brought by any persons for injury sustained owing to neglect of the above precautions and to pay any such persons or which may with the consent of the contractor, be paid to compromise any claim by any such person.

61.3 **DEMOLITION**

Before any demolition work is commenced and also during the process of the work:

i) All roads, open areas adjacent to the work site shall either be closed or suitably protected.

ii) No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by the operator shall remain electrically charged.

iii) All practical steps shall be taken to prevent danger to persons employed from the risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so ever loaded with debris or materials as to render it unsafe.

iv) Adequate care shall be taken by the contractor during demolition and avoid use for heavy mechanical equipment for demolition work in internal area of the site. Any damage or defect that may develop in the superstructure due to demolition works shall be rectified by the Contractor to the entire satisfaction of the Architect and the consultants at his own risk and cost.

v) Structural members shall not be cut or drilled.

61.4 **PERSONAL SAFETY EQUIPMENTS**

i) All necessary personal safety equipment as considered adequate by the Engineer should be kept available for the use of the person employed on the site and maintained in a condition suitable for immediate use, and the contractor should take steps to ensure proper use of equipment by those concerned.

ii) Those engaged in white washing and mixing or stacking of cement bags or any materials which is injurious to the eyes shall be provided with protective goggles.

iii) Those engaged in welding works shall be provided with welder's protective eyesight lids.

iv) The contractor shall not employ men below the age of 18 years and women on the work of painting with products containing lead in any form. Wherever men above the age of 18 are employed on the work of lead painting the following precautions should be taken:

v) No paint containing lead or lead products shall be used except in the form of paste or readymade paint.

vi) Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scrapped.

vii) When the work is done near any public place where there is risk of drowning all necessary equipment's should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

61.5 **HOISTING MACHINES**

Use of hoisting machines and tackle including their attachments anchorage and supports shall conform to the following standards or conditions:

i) These shall be of good mechanical constructions should material and adequate strength and free from patent defect and shall be kept in good repair and in good working order.

ii) Every rope used in hoisting or lowering materials or as means of suspension shall be of durable quality and adequate strength and free from patent defects.

iii) Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years shall be in charge of any hoisting machine including any scaffolding winch or give signals to operator.

iv) In case of every hoisting machine and of every chain ring hook, shackle shovel and pulley block used in hoisting or as means of suspension the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load. In case of a hoisting machine having a variable safe working load, each safe working load and the conditions under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to

above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

v) In case of departmental machines, the safe working load shall be notified by the Engineer. As regards contractor's machine, the contractor shall notify the safe working load of the machine to the Engineer whenever he brings any machinery to site of work and get it verified by the Engineer concerned.

vi) Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards, hoisting appliances should be provided with such means as will reduce to the minimum of the risk of any part of a suspended loan becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, wearing apparel, such as gloves, sleeves and boots as may be necessary, should be provided. The workers should not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

vii) All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.

viii) These safety provisions should be brought to the notice of all concerned by display on a notice board at a prominent place at work spot. The person responsible for compliance of the safety code shall be named herein by the contractor.

ix) To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangements made by the contractor shall be open to inspection by the Labour Officer, Engineers of the Department or their representatives.

x) Notwithstanding the above clause from (i) to (xviii) there is nothing in these to exempt the contractor from the operations of any other Act or Rules in force in the Republic of India.

62. PREVENTION OF SPOIL DUMPING:

The contractor shall take all reasonable steps at his cost to prevent spoil, rubbish, debris, surplus materials etc. arising from the work being dumped on an area other than a recognised or approved tipping area and the Contractor will be held responsible for and shall indemnify the Owner against any claim or loss arising therefrom.

63. LEAVE PERFECT:

The Contractor shall remove all rubbish and superfluous material at his cost from the site of the works with all reasonable speed from time to time and at completion.

64. DAMAGE TO PERSON AND PROPERTY ETC.

64.1 The contractor shall be responsible for all injury to the work or workmen to persons, animals or things and for all damages to the structural and/or decorative part of property which may arise from the operations or neglect of himself or of any sub- contractor or of any of his or a sub-contractor's employees, whether such injury or damage arise from carelessness, accident or any other cause whatsoever in any way connected with the carrying out of this contract. The clause shall be held to include any damage to buildings whether immediately adjacent or otherwise, and any damage to roads, streets, foot paths or ways as well as damages caused to the buildings and the University and

hold harmless in respect of all and any expenses arising from any such injury or damages to persons or property as aforesaid and also in respect of any claim made in respect of injury or damage under any acts of compensation or damage consequent upon such claim.

64.2 The contractor shall reinstate all damage of every sort mentioned in this clause, so as to deliver the whole of the contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damages to the property or third parties.

64.3 The contractor shall indemnify the University entirely from all responsibility in this respect. The contractor shall also be responsible for anything which may be excluded from damage to any property arising out of incidents, negligence or defective carrying out of this contract.

65. CLEARING SITE ON COMPLETION

On completion of the work the contractor shall clear away and remove from the site all constructional plant, surplus materials, rubbish and temporary works of every kind and leave the whole of the site and the works clean and in a work like condition to the satisfaction of the University/Consultants.

SECTION 6: CONTRACT DATA

Items marked "N/A" do not apply in this Contract.

1. The following documents are also part of the Contract:

	Clause Reference
• The Schedule of Operating and Maintenance Manuals	[49]
• The Methodology and Program of Construction	[25]
• Site Investigation Report	[14]
• The Schedule of Key and Critical Equipment to be deployed on the work as per agreed program of construction.	[25]

2. The University is:

   Name: **National Law School of India University (NLSIU)**, Bangalore.

3. Name of authorized Representative: The Registrar, NLSIU.

4. The name and identification number of the Contract is:

   The Proposed Classroom Interior Works of New Academic Block, NLSIU, Bangalore.

5. The start date shall be the date of issue of notice to proceed with the work. [1.1]

6. The Defects Liability Period is 365 days from the handing over of the completed work fromthe Contractor to the University as certified by the Architect

7. Insurance requirement are as under:

	Type of Cover	Minimum cover for Insurance
(i)	Works and of Plant and materials	The sum stated in the Agreement plus 25%
(ii)	Personal injury or death insurance (a) for Third Party	In accordance with the statutory requirements applicable to Karnataka.
	(b) for Contractor's employees or labour	In accordance with the statutory requirements applicable to Karnataka.
(iii)	Fire Insurance	Up to 30 days after Virtual Completion.

8. The liquidated damages for the whole of the works is **0.5%** (Half percent) per week.
   The maximum amount of liquidated damages for the whole of the works is **5 %** (five percent) of final contract price after which NLSIU is at liberty to either extend the term on mutual agreement or terminate the contract at the contractor's risk & cost. [41]

9. The date by which "as-built" drawings (in scale) in 3 sets are required is within 30 days of issue of certificate of completion of Whole or Section of the Work as the case may be. [49]

10. The date by which Operating and Maintenance Manuals are required is within 30 days of issue of certificate of completion of Whole or Section of the Work as the case may be. [49]

11. The amount to be withheld for failing to supply "as built" drawings or supply of Operation and Maintenance Manuals by the date required is 10% of that item for which manuals are required.

12. The following events shall also be fundamental breach of the contract: [50.2]

    a. The contractor has contravened Sub-clause 7.1 and Clause 9 of CC.

13. The penalty amount representing the University's additional cost for completing the Works shall be equivalent to 30 percent of the value of the work not completed. [51.1]

SECTION 7 : FORMAT OF BANK GUARANTEE FOR SECURITY DEPOSIT

To:
The Registrar,
National law school of India university (NLSIU)
Nagarabhavi Post,
Bangalore-560072.

WHEREAS ..... (name and address of contractor) has undertaken, in pursuance of Contract No……. dated…… to execute Proposed Classroom Interior Works of New Academic Block, NLSIU AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THERERFORE we hereby affirm that we are Guarantor and responsible to you, on behalf of the Contractor, upto a total of Rs……(amount of guarantee)…… Rupees……(in words) and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of ..... (amount of guarantee) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until 30days from the date of expiry of the Defects Liability Period.

Signature and seal of the guarantor……
Name of Bank……
Address……..
……
Date…….

SECTION 8: TECHNICAL SPECIFICATIONS

PART 1 – TECHNICAL SPECIFICATIONS FOR CARPENTRY WORKS AND CIVIL WORKS

Preamble:
In this specification, wherever specified the approval of S.O /superintending engineer, it also includes the Project Manager/Architect.

1.0 SUSPENDED CEILING

The work to be carried out as per drawings and as per manufacturers specifications- Contractor shall provide all material, labour, equipment, scaffolding, suspensions and system, accessories etc. necessary to complete the work.

1.1 GYPSUM BOARD SUSPENDED CEILING

Make: India Gypsum or equivalent approved
The suspended ceiling system is proposed with fixing one layer of 12.5mm thick tapered edge plasterboard manufactured by India Gypsum or equivalent to the underside of the metal suspension grid to provide a flush, seamless ceiling which shall be finished as required.
The metal grid used to suspend the ceiling is to be made using Gl perimeter channels of 0.55 mm thick having one flange of 20 mm & another flange of 30 mm and a web of 27 mm along perimeter of the ceiling fixed to brick wall / partition / block work with the help of nylon sleeves & screws at 610 mm c/c. Then suspending Gl intermediate channels of size 45 mm, 0.9 mm thick with two flanges of 15mm each from the soffit at 1220mm centers with ceiling angle of width 5mm X 10mm X 0.55 mm thick fixed to soffit with Gl cleat & steel expansion fasteners. Ceiling section of 0.55 mm thickness having knurled web of 51.5 mm &2 flanges of 26 mm each with lips of 10.5 mm are then fixed to the intermediate channel with connecting clip & in the direction perpendicular to the intermediate channel at 457 mm centers. As directed by the S.O or his representative.

12.5 mm tapered edge Gypsum board (conforming to IS: 2095 - 1982 and 2542 - 1981) is fixed to ceiling section with 25 mm drywall screws at 230 mm c/c.
Finally gypsum boards are joined & finished so as to have a flush look which includes filling & finishing the tapered &. square edges of the boards with jointing compound, fibre glass joint paper tape & 2 coats of drywall top coat suitable for gypsum board (as per specifications of India gypsum or equivalent).
Fixing of luminaries, Air-condition units, Supply/ return air grilles and other ceiling mounted fixtures in the suspended ceiling to be done after marking the positions of these as indicated on the drawings and as approved by S.O or his representative. After the cut-outs are made & the respective fixtures are fixed the edges of the cut-out are to be finished properly as per manufacturers recommendations or as per the instructions of SO. Additional frame work to fix the fixtures mentioned above shall be provided by the contractor as per the requirements of the manufacturer.
Finish: Ceiling to be finished with 2 coats of acrylic emulsion of approved make, shade and colour on top of priming coat.

1.0 FLOORING:

The contractor shall provide all materials and labour along with all necessary tools and machinery etc., required to complete the work.
Flooring to be laid using tiles, marble / granite slabs of approved make, quality and colour. Flooring shall be laid to the pattern as specified in the drawings to true horizontal level or to a slope as shown on drawings or as directed by the SO.

The rates quoted shall include the following:
Final preparation of base, sub-base, or sub-floor including minor trimming of the base to remove undulations. Providing with layer of mortar as specified in the case of slabs, tiles to correct levels or slopes as required.
Work at all heights and depths.
Keeping the surface wet for a minimum period of one week.

2.1 TILE FLOORING

Ceramic/ Vitrified tiles of approved manufacturer and approved colour to be laid wherever indicated on the drawings. Tiles should be well soaked, washed clean before fixing with grey cement slurry @ 4.4 kg /m2 by taping the tile with wooden mallet till it is properly bedded and in level with the adjoining tiles. Tiles shall be fixed on to under layer of 10 mm to 25 mm thickness of cement mortar 1:4 (one cement : four Coarse sand). The joints shall be kept as thin as possible and in straight line or to suit the required pattern. Flooring shall be laid to true horizontal level or to the specified slopes as shown on the drawings or as directed by the SO. The joints shall be cleaned of the grey cement grout with a wire brush or a trowel and all dust and loose mortar removed. Joints shall then be pointed flush with white cement / colour pigment to match the colour of tiles. Flooring should be kept wet for a period of 14 days. After curing, the surface shall be washed with mild hydrochloric acid and clean water. Finished flooring shall not sound hollow when tapped with the wooden mallet. The rate will include the cost of the underlay of cement mortar. In the exposed corners the tiles should be chamfered to 45 degrees and joined together so that the thickness of the tile is not seen and the Ceramic surface looks continuous or shall be provided with PVC edge profile as directed by the Engineer. Wherever full tile cannot be used the tiles shall be cut using machine, care shall be taken that the cut edge is straight.

2.2 CERAMIC TILE DADOING

Dadoing wherever shown on drawings shall be done with Ceramic tiles conforming to IS 777-1970 of approved manufacturer, shade and colour. The contractor shall provide materials, labour and required tools and machines etc. required for execution of work. The sample of the tile shall be approved before procuring.

Tiles shall be well soaked, washed clean before fixing with grey cement slurry @ 4.4 kg /m2 by taping the tile with wooden mallet till it is properly bedded and in level with the adjoining tiles. Tiles shall be fixed on to under layer of 12mm average thickness of cement mortar 1:3 (one cement: three coarse sand). The joints shall be kept as thin as possible and in straight line or to suit the required pattern. Dadoing to be fixed only after the flooring is fixed.

The joints shall be cleaned of the grey cement grout with a wire brush or a trowel and all dust and loose mortar removed. Joints shall then be pointed flush with white cement and colour pigment to match the colour of the tile. Dadoing shall be kept wet for a period of 14 days. After curing, the surface shall be washed with mild hydrochloric acid and clean water. Care should be taken not to damage the tile finish. Finished dadoing shall not sound hollow when tapped with the wooden mallet. The rate will include the cost of the underlay of cement mortar. In the exposed corners of the dadoing the tiles should be chamfered to 45 degrees and joined together so that the thickness of the tile is not seen and the Ceramic surface looks continuous or shall be provided with PVC edge profile as directed by the Engineer. Wherever full tile cannot be used the tiles shall be cut using machine, care shall be taken that the cut edge is straight.

2.0 WOODWORK

The woodwork shall include the furnishing of all materials, labour, transport, kiln seasoning, impregnation, tools and machinery required for execution of work for doors, partitions, fixed furniture, panelling, skirting, counters, panelling, storage units, etc. Both on and off site, including of hardware / ironmongery in accordance with the drawings & detail or instruction of the S.O compete with finishing including glazing, painting, polish etc.,

3.1 TIMBER

Timber shall be superior class Burma Teak Wood, Beech wood, Malaysian Sal wood of best quality. The choice shall lie with the SO. Individual hard and round knot shall not be more than 12mm in diameter and the aggregate area of all the knots shall not exceed one half percent of the area of the piece. It shall be close and straight grained and there shall not be less than 2 growth rings per 10mm width.

Timber shall be free from large loose knots, cracks, warp, twists, bends, shakes, sap wood splits, evidence of insect and fungus attack and shall be uniform in texture (there shall be no knot of any description on exposed surfaces, unless specifically agreed, plugging will not be permitted).

The colour of timber shall be consistent & to the approval of the SO. All timber shall be of the same species as specified and only the best quality of timber shall permitted on the work. Timber shall be of approved origin and shall be well seasoned.

3.2 MOISTURE CONTENT

The Timber will be considered well- seasoned if the moisture content does not exceed the limits as per IS 287. The moisture content shall be determined as per IS 287 whether air or kiln dried. The tolerance shall not exceed provisions in IS 4021&1003-I & El.

Timber used for	Maximum percentage of
Doors frames, moulding and headings	Moisture content.
50mm & above in thickness	12
Thinner than 50mm	10

All timber for woodwork shall be kiln seasoned. Tests shall be carried out on each lot. Test certificate from approved laboratories shall be submitted to the S.O upon delivery of each lot, for acceptance.

3.3 SAMPLES

The contractor before proceeding with any work, shall submit samples of timber and get the approval of the SO. Mock-ups shall be done and shall be approved by the S.O before executing the actual work.

3.4 FLUSH DOORS

All flush doors shall be factory made and shall be of Grenply/ Archid/ Century Ply or equivalent make. Flush doors are used for door shutters and finished as shown on drawings. Flush door shall be of 32mm thick solid core confirm to IS 2202 and IS 1659 (except for fire resistant doors). The finished thickness of the shutters shall be as shown on the drawings i.e. the thickness of the solid core plus the thickness of veneers and or laminates. Face veneers /laminates shall be of pattern and colour as shown on the drawings.

The core of flush door shall be prepared from good quality kiln seasoned and treated wood, of one specie, having straight grains faced with marine ply using Phenol formaldehyde synthetic resign conforming to BWP type specified in IS: 848-1957to bond the core wood and the marine ply. (All edges of the core shall be lipped externally with first class Beech wood lipping of 6 mm minimum thickness or as specified in the drawings.

3.5 MARINE PLYWOOD

Marine ply used for the woodwork shall be of Grenply/ Archid/ Century Ply or equivalent manufactures and shall confirm to IS 710. The standard thick ness of the ply shall be as specified on the drawings.
The ply shall be free from borer insects, fungi and termite resistant. The ply should be treated with permanent preservative treatment as per manufactures specifications.
The Ply shall be bonded with high quality BWP type Phenol formaldehyde synthetic resin confirming to IS 848:1974. Ply shall be given preliminary and permanent preservative chemical treatment by impregnation as per I.S 5539:1969 to make it all weather, all-purpose plywood for high quality interiors & furniture works.

3.6. VENEER.

Veneer used for panels, door shutters, sill coverings, counters, storage units, custom made furniture's and wherever shown on drawings shall be From URO or TIMEX industries or equivalent make.
The veneer shall be made using natural wood veneer that is pressed under high-pressure and laminated to phenolic core.

The total thickness of veneer with Bakelite backing shall be 1 mm and should be uniform. The veneer shall be 100% borer and termite resistant. The veneer procured shall be of the same group match and shall be approved by the SO.
The veneer shall be glued to the surfaces of ply, flush door, MDF etc. using synthetic resin or Rubber based resin as recommended by the manufacturer and as per the manufacturer's specifications.
The veneer shall be fixed with grains and patterns as specified on the drawings / approved.

3.6 LAMINATE.

Laminate used for panels, door shutters, sill coverings, counters, storage units, custom made furniture's and wherever shown on drawings shall be of Greenlam industries/ Century laminates or equivalent make confirming to IS 2046:1995,BS EN -438.
The Laminate shall be made by base paper to match natural wood, which is pressed under high-pressure, and temperature.
The thickness of laminates shall be 1mm and should be uniform. The laminate procured shall be of the same group match and shall be approved by the SO.
The Laminate shall be glued to the surfaces of ply, flush door, MDF etc. using synthetic resin or Rubber based resin as recommended by the manufacturer and as per the manufacturer's specifications.
The Laminate shall be fixed with grains and patterns as specified on the drawings / approved by the SO.

3.7 JOINERY & CARPENTRY

All joinery work shall be securely joined, using appropriate method of joining as applicable like dowel, dove-tail, Mortise and Tenon, tongue and groove, fixed properly with best quality adhesive suitable for the joints like FEVICOL or glue -epoxy resin, like "Araldite" or approved equivalent.
Timber pins shall be used where directed.
All woodwork in contact with masonry shall be painted with approved wood preservative paint.

3.8 FRAMES

The sections of the frames shall be as shown on the drawings. Beech wood door frames shall be properly framed and joined with mortise and tenon joint together and set in masonry by means of hold fast, anchor fasteners as per drawings, or as directed by SO The rebate and Cover mould on the frames shall be as per drawings or as approved by the SO. The mortise and tenon joint shall fit tight without wedging or filling. The joint shall be glued, screwed, framed. Put timber pins not less than 10mm dia, after the frames are put together in position by means of a press. The joints of the doorframes shall have visible miter joints. Frames for fire resistant doors shall have heat activated intumescent fire seal strip (imported) of size 10 mm x 4 mm provided in grooves on all three sides of the frame with one coat of approved brand of fire resistant primer (clear) and melamine polish conforming to BS-476 for a fire rating for 30 minutes.

Before any frame is fixed in position it shall be inspected and approved. The frame shall be placed in proper position and secured to Brick masonry walls /Concrete block walls / partition wall as the case may be as per drawings.
All timber frames and rough grounds shall be kept in plumb with necessary spacers as required.

3.9 MOULDING, TRIMS, BANDS ETC.

Architraves, mouldings, headings wherever indicated in all work like doors, panelling, partitions, furniture etc. shall be of superior quality Beech wood, true to detail, clear and sharply defined. It shall be securely fastened with screws or nails, well set, and screw/nail holes finished with putty and melamine polish to match the colour of the wood.

3.10 HOLDFASTS & ANCHOR FASTNERS

Holdfasts shall be of mild steel flat 25 mm x 3 mm x 300 mm long (overall) with one end split and other end bent at right angle as per IS: 7196-1974. The number of holdfasts used per doorframes shall be as shown on drawings / approved by the SO. Expansions type anchor fasteners of Fischer or equivalent of approved size and number shall be used where holdfasts are not allowed for fixing frames.

3.11 GLAZING

The contractor should provide materials, labour, sealant, EPDM gaskets, fixtures, fittings, accessories, tools and machines required for execution of work.
All glass shall be of thickness and specifications as specified on the drawings and shall be free from air bubbles, speaks scratches, flaws, waves or other defects. All glasses shall be cut to fit the sizes as per drawings to the members as required. All glasses shall be properly bedded, securely fixed and finished as indicated on the drawings using necessary beadings, patch fittings, sealant as specified. All the stains and marks shall be removed from the surfaces of the glass.

3.12 INTERNAL PARTITION GLAZING

Glass shall be of Modi Float/ Saint Gobain or approved manufacturer to BS 952:Part 1, without any defect.
Permanent identification markings on individual panes shall be made & removed after fixing. Glazing shall be protected from damages at all times.

3.13 to 3.15 (Not Included)

3.16 MIRRORS

The Mirrors used shall be 6mm thick of Modi Float/ Saint Gobain or equivalent manufacturers. The contractor shall provide 12 mm thick marine ply backing, edge beading of teak wood and other accessories as specified on the drawings.

The mirror shall be untarnished and free from flaws, warp, scratches and blemishes.
The mirror shall be fixed with Stainless steel edge beading using screws with chrome cover caps. The mirror shall be fixed square and plumb and shall not be stressed or distorted when tightening fixtures.

3.17 FILM TREATMENT

Anti -shatter film 300 microns thick of 3M or equivalent make conforming to BS 6206 class A shall be fixed to the existing glazing as per manufacturers recommendations. The contractor shall provide all necessary staging, ladder etc required to fix the film on to the existing glazing wherever shown on the drawings.

3.0 BLINDS

The contractor shall provide all materials, fixtures and other accessories and skilled trained and approved labours, scaffolding, ladder, tools etc., required to execute the work.,

4.0 PAINTING/ FINISHES

The painting work covers the painting and finishing of all surfaces throughout the interiors and exterior of the building, Refer to schedule of finishes, for type of finish, interior and exterior. The contractor shall supply all labour, material, tools, ladders, scaffolding and other equipment necessary for the completion and protection of the work,
The workmanship shall be of the very best, all material evenly spread and smoothly flowed on without runs or sags, using good quality tools, brushes, etc. as required, Only skilled painters shall be employed a properly qualified foreman shall be constantly on the job whilst the work is proceeding,

5.1 MATERIALS

Materials to be from approved manufactures/suppliers.
All materials shall be obtained from approved manufacturers of the building paints, like Asian Paints or ICI.
The list of suppliers shall be submitted to the S.O. for approval. Paint containers shall not exceed 5 litres capacity.
All paint, etc. shall be delivered in sealed containers bearing the following information in addition to any statutory requirement.
Containers of materials other paints listed shall bear as much of the above information as is appropriate.
No paint shall be used beyond a period of 6 months from the date of manufacture. If this period is exceeded, the paint shall be removed from the site until tested, and approved.

5.2 PAINTS FROM ONE MANUFACTURER

The priming coat, undercoats and finishing coat of paint in anyone system shall all be obtained from the same manufacturer.

5.3 SAMPLES

Samples for testing may be taken from the sealed containers, spray gun containers or from the workmen's kettles on the works. In addition the S,O. may require that unopened sealed containers be set aside for subsequent test.

Any work coated with unsatisfactory materials shall be re-executed. Likewise any work on which the paint is found to be unduly thin shall be prepared again and repainted, all to the satisfaction of the S.O.
If any paint delivered is considered detective or unsatisfactory its use shall be suspended and the manufacturer and the S.O. notified immediately.

5.4 COLOURS

Paints, etc. generally for exterior and interior decorating shall be to the colours directed by the S.O. blending or paints or tint shall not be permitted.
The contractor shall assume that multi-colour schemes decoration will be adopted in which changes of colour will occur at internal or external angles of wall and ceilings.

5.5 PRIMING PAINTS

Priming paints for steel work shall be lead priming paint.

5.6 SEALERS

The alkali resisting primer sealer shall be applied prior to decorating dry plaster.

5.7 WOOD PRESERVATIVE

Wood preservative solution for general use shall be of approved manufacturer.

5.8 HARD STOPPING

For stopping holes and cracks in woodwork shall be composed of white lead paste, suitable proportioned and well mixed as approved.

5.9 FILLER

Interior plaster shall be Plaster of Paris, anhydrous gypsum. As per I.S 2547.

5.10 WAX POLISH

Wax polish shall consist of a suitable admixture of bleached beeswax and genuine turpentine.

5.11 FRENCH POLISH

French polish shall consist of a suitable solution of shellac in methylated spirits.

5.12 MELAMINE POLISH

Melamine polish shall be of high quality in Matt/ Glossy finish with primer of ASIAN PAINTS/equivalent make and applied as per manufacturer's instruction.

5.13 SOAP POWDERS AND DETERGENTS

Soap Powders and Detergents shall be an approved proprietary brand.

5.14 PREPARATION OF SURFACES GENERALLY

All surfaces shall be thoroughly prepared and shall be clean, free from loose and prudery, material, and sufficiently dry for the subsequent decoration treatment.

5.14.1 CEMENT RENDERING, CONCRETE, BRICK AND CLAY BLOCK

Surface shall be brushed down thoroughly to remove all dust and loose material. Mortar droppings and nibs shall be removed and defects made good.
Efflorescence shall be brushed off as it appears and all decoration deferred until it ceases.
The application of gloss or semi-gloss paints PVA emulsion (semi-gloss) paint shall be delayed until thorough or sufficient drying to the satisfaction of the SO. has taken place.

5.15.2 CEILING

Surfaces shall be brushed down to remove loose material and dust. Minor defects, cracks and holes, after cutting out as necessary, shall be made good as appropriate and rubbed down flush with the surrounding surface.

5.15.3 SOFTWOOD & HARDWOOD

All surfaces shall be rubber down smooth with tine abrasive, and dusted off: Nails are to be punched well below the surface.
After priming, defects such as open joints or nail holes shall be stopped with hard stopping. All such repairs shall be primed before undercoating is applied.
Plywood and similar open-grained surfaces shall be face-filled over the whole surface after priming and rubbed down smooth.
Hardwood containing an excess of natural oil shall be degreased with white spirit immediately prior to priming

5.15.4 IRON & STEEL WORK

All pipes/hollow section/rods shall be CRC.
Bare iron and steelwork including sheeting and pipes shall be thoroughly prepared by removing all dirt, rust and loose mill scale to the satisfaction of the P.M.
Preparation shall include the use of chipping hammers, scrapers, mechanical wire brushes and grinding discs. The use of mechanical chisels and other impact tools may exceptionally be ordered if in the opinion of the S.O. their use is necessary.
All rivets, welds, angles, joints and opening shall be properly cleaned.
All tools shall be operated in such a manner that no sharp ridges or burrs are left and no cuts made in the steel.
Dust and other loose material shall be removed after cleaning. Oil and grease shall be removed with white spirit.
The priming coat shall be applied before any contamination or rusting occurs.
Steelwork primed before delivery and damaged in transit shall have all damaged areas cleaned and patch primed immediately upon delivery. Areas damaged during erection shall be similarly dealt with.
All surfaces shall be washed with mineral spirits to remove any dirt or grease before applying paint. Where rust or scale is present, it shall be wire brushed and emery prepared clean.
Shop coats of paint that have become marred shall be cleaned off, wire brushed, and spot primed over the affected areas.

5.15.5 BOARD, HARDBOARD, PLASTERBOARD

All boards, slabs and sheets be dry and the surfaces well brushed down to remove loose material, dirt and dust.

5.16 APPLICATION OF PAINTING MATERIAL

5.16.1 GENERALLY

All brushes, paint rollers, spraying equipment, kettle, etc. used in carrying out the work shall be clean and shall be thoroughly re-cleaned before being used for a different type or class of material.
No paint is to be applied externally during inclement weather. Cutting in shall be neatly and accurately performed.

5.17 PREPARATION OF PAINT.

A) MIXING

All liquid paints shall be thoroughly stirred to a uniform consistency when containers are opened and before being transferred to paint kettles.
Paste paints shall be beaten up thoroughly as directed by the manufacturer, prior to thinning.

B) THINNING

i) For oil paints shall be permitted only exceptionally when by agreement with the S.O. upto 5% of white spirit by volume may be added to maintain the paint in a working consistency
II) PVA emulsion paints shall be thinned with clear water for the first coat according to the porosity of the surface to be painted, but in any case not exceeding 50% by volume; subsequent coats shall not be thinned.

C) STRAINING

Any paint showing bittiness in application shall be strained through fine gauge.

D) ADDITION OF OTHER MATERIALS

With the exception of the thinners given in (B) above, no other materials shall be added.

E) MIXING OF DIFFERENT PAINTS TOGETHER

The mixing of different paints together shall not be permitted.

5.18 METHOD OF APPLICATION

5.18.1 BRUSH OF PAINTING

Paint shall be applied so that the finished surface is free from avoidable brush marks. All areas or parts shall be laid off correctly.

5.18.2 SPRAY PAINTING

Spray painting will be permitted with approved machines but in no case will it be allowed in application of the following.
Priming paints
First Coat of bituminous paint on bare metal.
First Coat of PVA Emulsion paint
Where soiling of adjacent surfaces cannot be prevented.
Surfaces adjoining those being sprayed shall be carefully and closely masked.
The coating shall be even and adequate and the finish shall be free from orange peel appearance, runs, sags, curtaining and other defects.

5.18.3 ROLLER PAINTING

Roller painting will be permitted with mohair or short pile sheepskin rollers, but in no case will it be allowed in the application of the following. ,
External Work. Priming Coat. Work other than that or a straightforward plain character.

5.18.4 GENERAL

Paint shall be applied only to properly prepared clean, sound and dry surfaces.
Each coat of paint shall be thoroughly dry before the next coat is applied and the surfaces of primers and undercoats shall be rubbed down and dusted of coats shall be applied at proper intervals to secure maximum adhesion where two hard gloss-finishing coats are scheduled, the second coat shall be applied within 48 hours.

5.19 PRIMERS

Priming coats shall be applied by brush to give a coat of adequate thickness with no misses and to satisfy the porosity of the surface, The priming shall be well worked into the surface, joints, angles and other places where moisture is likely to collect.
Steelwork surfaces shall be primed on the same day as cleaning, priming coats applied off site that have suffered from exposure on the site or in transit shall be touched up or re-primed as necessary before undercoating,
Where there is a doubt as to the adequacy of the primer to fully satisfy the porosity of the surface the S.O shall be informed and his directions taken.

5.20 SEALERS

Sealers and first coats of PVA shall satisfy the porosity of the surface and/or seal in materials, which are likely to adversely affect the subsequently applied painting system. If this cannot be achieved by one full coat, the S.O. shall be informed and his directions taken

5.21 UNDERCOATS

Undercoats shall be applied evenly over the whole surface to give a solid film, care being taken to avoid uneven thickness of paint at edges and angles.

5.22 FINISHING COATS

Finishing coats shall be applied evenly over the whole surface to give a solid film free from brush marks, sags, runs, peeling or other defects, finished work shall be uniform, of approved colour, smooth, and free from runs, sags, defective brushing and clogging. Make edges of paint adjoining other materials or colours sharp and clean without overlapping.

5.23 PAINTS

5.23.1 EMULSION PAINT

Emulsion paint shall be Asian Paints, ICI Dulux or approved equivalent.

5.23.2 SYNTHETIC ENAMEL

Synthetic enamel shall be ICl Dulux Gloss or approved equivalent.

5.23.3 OILING HARDWOOD

Surfaces scheduled to be oiled shall be rubbed down to a smooth surface, filled as necessary dusted off and twice oiled with raw linseed oil (Mineral oil in the case of teak) applied with a flannel and well rubbed in. Filling shall be with approved wood filler tinted to match tile colour of the wood.

5.24 WAX POLISHING

Surfaces to be was polished shall be rubbed down to a smooth surface, filled as necessary, dusted off and rubbed over with oil, as specified at a rate of 22 m2 Per litre well rubbed in with a circular motion, the surface afterwards being wiped dry. After an internal of at least 48 hours wax polish shall be applied in two coats and shall be polished to an approved finish.

5.25 FRENCH POLISHING

Surfaces to be French polished shall be rubbed down evenly with fine abrasive paper and filled as necessary. Filling shall be with approved wood filler, tinted to match the colour of the wood, rubbed down and dusted off.
The work shall be properly bodied in with the number of coats necessary and polished to a bright or dull finish as scheduled including spiriting off as necessary
Samples of the work shall be submitted to the P.M for approval before commencement Brush polishing will not be permitted.
Wood preservative shall be applied as specified in manufacturer's instructions to all surfaces of timber coming in contact with masonry, concrete, etc. or within enclosed spaces, ceiling etc.

5.26 PIPES AND CONDUITS

Pipes and conduits shall be finished in with the surfaces to which they are attached unless otherwise scheduled.

PROTECTION OF HANDRAILS, WALL, CEILING AND FLOOR FINISHES

Protection shall be provided by suitable covering, which shall be left in position to completion.

PRECAUTIONS

Old brush 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 in bread periods to prevent the paint from hardening on the brush.
In the preparation of surfaces for plastic emulsion painting, no oil base puttees shall he used in filling cracks, holes etc.

Splashes on floors etc. shall be cleaned out without delay and definitely everyday, as they will be difficult to remove after hardening.
Washing of surfaces treated with emulsion paints shall not be done within- 3 to 4 weeks of application.

PART 2 - TECHNICAL SPECIFICATIONS FOR ELECTRICAL SERVICES

A. WIRING SYSTEM

SCOPE

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

1.2 STANDARDS APPLICABLE

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

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

All standards and codes mean the latest.

1.3 POINT WIRING FOR LIGHTS, FANS, EXHAUST FANS & 5A CONVENIENCE SOCKETS

1.3.1 A point wiring shall consist of the branch wiring from the distribution board together with a switch/fan regulator as required, including providing conduit and accessories, the ceiling rose or pendant holder or a swan holder, or ceiling fan hook box or socket etc., with suitable termination. Point wiring shall include, in addition, the earth continuity conductor/wire from the distribution board to the earth pin/stud of the outlet/switch box and to the outlet points. The point wiring shall be carried out in the under mentioned manner:
a) Supply, installation, fixing of conduits and GI pull wire with necessary accessories, junction/pull/inspection/switch boxes and outlet boxes/Fan hook box etc. Switches, switch plates and switch boxes are not required for the lights which are controlled directly from the MCB DB's.

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

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

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

1.3.2 POINT RATE

For purposes of measurements and payments the rate for point wiring for lights/fans etc., is divided into two parts.
a) Circuit Main
b) Point Wiring.
a) Circuit Main for Light/Fan Point
The circuit main for lights/fan/6A sockets (where 6A sockets connected to light circuit) shall include the wiring from the MCB distribution boards upto the first switch/light point/fan point. This is measured in linear meter. The scope of work under this section shall include.

i) Supply and wiring in concealed/surface conduit from DB's to first switch/light/fan point.
ii) Providing and installing PVC insulated copper conductor earth wire.
iii) Providing and installing GI fish wire (pull wire) in the conduit.
iv) Termination of wires in DB's and switches using proper tinned copper lugs of crimping type.
v) Providing and installing necessary pull/junction boxes where necessary.
b) Point Wiring
The rate for point shall include supply, installation, and connection, testing and commissioning of point wiring in conduit. The points shall be measured in No/sets for the

set/group of lights controlled as mentioned in SOQ. The exact scope of work included in the point wiring for the purposes of measurement is enumerated as stated below
i) Wiring starting from the first switch/light/fan point, where the circuit main is terminated to the various lights/fans/sockets (where 6A sockets connected to light circuit loop), and then looping between the switches/lights/fans/6A sockets etc.,
ii) Providing and installing all necessary switches, switch plates, sockets, pull/junction/fan hook boxes etc. as called for.

iii) Providing and installing insulated earth continuity wire in each conduit along with the wiring system.
iv) Providing and installing G.I. fish wire (pull wire) in the conduits.
v) Providing and installing ceiling roses, lamp holders where necessary.
vi) Providing and installing PVC insulated, PVC sheathed flexible three core 1.5 sq.mm extension cords including flexible conduits from light/fan outlet points mounted at ceiling point to the light/fan outlet. Wiring for 6A Sockets, 16A Power Sockets for Equipment Wiring Except where 6A sockets connected to the lighting loop which are measured in Number of points, the measurement for wiring of 6A/16A sockets and wiring for power outlets is done as follows :
i) Length of circuit wire including conduit, accessories and earth wire for power wiring is measured
together in linear meter.
ii) The socket outlet with outlet box is measured in Numbers.

1.4.0 SYSTEM OF WIRING

1.4.1 Unless otherwise mentioned on the drawings, the system of internal wiring shall be as follows :
The system of wiring shall consist of single core, PVC insulated, 650/1100 Volt grade, stranded copper conductor wires/cables laid through concealed or exposed PVC/GI/MS conduits as mentioned elsewhere or as directed by owner/consultant.

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

1.4.3 Type of Installation
Unless otherwise specified all conduits for surface wiring shall be heavy gauge rigid GI/MS conduits and all concealed installation including conduits running above false ceiling shall be heavy gauge rigid PVC. All conduits buried in grade or in damp wet areas shall be heavy gauge G.I. conduits.

a) Concealed Wiring shall be done using PVC conduits in the following areas
i) Staircase area lighting.
ii) Wiring inside bulding.
iii) Wiring in the false ceiling area.
iv) All other areas where surface conduit is not specifically mentioned.

b) Surface Wiring shall be done using Heavy Gauge G.I/Black Enamelled M.S. Conduit.
i) Wiring installation in the electrical sub-station room, D.G.room.
ii) Pump room, sewage treatment plant room.
iii) Ventilation fan room, AHU room, electrical room.

c) Conduit Installation in False Ceiling Area
The PVC conduits shall run exposed using above false ceiling.
1.5 MATERIALS:
1.5.1 CONDUITS

Type of Conduit

All conduits for fire alarm system irrespective of surface or concealed shall be of G.I/M.S. Generally concealed electrical wiring installation shall be in PVC conduits and surface wiring in G.I/M.S. conduits.
a) PVC CONDUITS :
Non-metallic conduits and accessories shall conform to IS 9537 (part 3) - 1983, IS 2509 & IS 3419 and each conduit shall bear the ISI Mark. PVC conduits shall be of the black, round, heavy gauge polyvinyl chloride (PVC). The conduit shall be plain end type as specified in IS 2509-1973/IS 2537-1983. The conduit internal surface shall be smooth. Only approved quality factory made bends/accessories shall be used. Minimum size of conduits shall be 20mm diameter. PVC conduits
shall be rigid unplasticised, heavy gauge having minimum wall thickness of 2.0mm upto 25mm dia conduit and 2.5mm wall thickness for all sizes above 25mm diameter.

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

PVC / INSPECTION/JUNCTION/PULL BOXES
The Inspection/pull box/junction box, where used, with relevant PVC conduit installation shall be of heavy gauge PVC and conform to IS specification and shall match with the conduit sizes. The box shall be round/square rectangular with conduit stub projection for termination of conduit. The box shall be of minimum 50mm deep and the size of box shall be suitable to pull/make necessary joints of wires inside the boxes. Extra deep boxes are preferred. The

boxes shall have flush type cover. The colour of plate shall match the colour of paint of the surface where installed. The boxes shall have concealed screwed socket for fixing the ceiling rose.

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

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

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

LIGHT OUTLET BOXES :
For concealed PVC conduit installation the light outlet box shall be of PVC round/square with knock-out holes. Conduit projection shall be suitable to terminate the conduit to the box. The box shall be made of heavy gauge PVC and the sample to have the approval of Construction Manager before use. The boxes shall have concealed screwed socket to fix the ceiling rose. The boxes shall be minimum 50mm deep. For surface conduit installation the light outlet box shall be of G.I/black enameled M.S. boxes. The boxes shall have threaded stub projection having internal threading to terminate the conduits of different sizes. The boxes shall have concealed screwed socket for fixing the ceiling rose. The boxes shall be minimum 50mm deep.

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

SWITCHES

Switches shall conform to IS : 3854, and IS : 4615. Switches shall be single pole, single or two way
as shown on the drawings. They shall be of the molded type rated for 250V, 5/15A. They shall be
provided with insulated dollies and covers. The switches shall be rocker operated with a quiet operating mechanism with bounce-free, snap acting mechanism in an arc resistant chamber. The switches shall have pure silver and silver cadmium contacts. The switches shall be of approved make as indicated in the `List of Approved Makes'. Switches installed outdoors shall be industrial, metal clad type, and shall be provided in weather-proof enclosure, complete with weather proof gasketed covers.

COVER PLATES FOR SWITCHES & OUTLETS

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

COVER PLATES FOR INSPECTION/JUNCTION/PULL BOXES

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

RECEPTACLES

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

INDUSTRIAL TYPE SOCKETS

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

CONDUCTORS :

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

PVC INSULATED WIRES (FOR LIGHT & SMALL POWER WIRING)

The PVC cables shall conform to IS : 696/1977. For all internal wiring PVC insulated cables of 650/1100V grade, single core shall be used. The wires shall have the approval of Tariff Advisory

Committee. The conductors shall be plain, circular stranded annealed copper conductors complying with BS : 6360. The minimum number and diameter of wires for circular stranded conductor shall meet the requirements set out in the relevant British Standards.

The insulation shall be PVC compound complying with the requirements of BS : 6746. It shall be

applied by an extrusion process and shall form a compact homogeneous body. The PVC compound shall comply with the requirements of IS 5831-84. The cores of all cables shall be identified by colours in accordance with the following sequence.

Single phase - Red

Three phase - Red, Yellow, Blue

Neutral - Black

Earth -Green or Green/Yellow.

A means of identifying the manufacturer shall be provided throughout the length of cable. Unless otherwise specified in the drawings, the sizes of the cables/wires used for internal wiring shall be as follows : In case of circuit wiring for lights, exhaust fans, ceiling fans, bells, convenience socket outlet points:- 2.5 Sq.mm - For Lights/fans/5A socket wiring from DB's upto the outlet points including control wiring where the circuit length from the DB's to 1st outlet is less than 40 m. In case of power socket outlet circuit.

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

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

The earth continuity conductor size as indicated in the drawing/SOQ shall be drawn through conduit along with other circuit cables/wires. The size of the earth continuity conductor shall be as follows :- UNLESS OTHERWISE SPECIFIED MINIMUM SIZE OF EARTH CONTINUITY CONDUCTOR

WIRES NOT FORMING PART OF THE SAME CABLE AS THE ASSOCIATED CIRCUIT CONDUCTOR.

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

35.0	10.0
50.0	10.0

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

1.6 INSTALLATION OF CONDUIT

1.6.1 CONCEALED CONDUIT SYSTEM

Unless otherwise Specified, all wiring shall be in heavy gauge rigid PVC conduit embedded in wall, or ceiling and concealed in the false ceiling. The size of the conduit shall be selected in conformity with I.S. code and as specified in the table given below. Factory made conduit bends and accessories shall be used. PVC Conduit shall be jointed using Solvent Cement as recommended by the conduit supplier. The conduit in ceiling slab shall be straight as far as possible. Before the conduits are laid in the ceiling, the position of the outlet points, controls, junction boxes shall be set out clearly as per the dimensions and to minimize off-sets and bends. Before the reinforcement rods are kept in position electrical contractor shall mark in paint the position of outlet points and conduit drop on the shuttering. When the outlet boxes are kept in position and before pouring the concrete, all outlet boxes shall be filled with paper to avoid entry of concrete into the box. Conduits in ceiling shall be bonded to the reinforcement rods with G.I. bonding wire at intervals not more than 1000mm, to secure them in position. PVC deep light outlet / pull boxes shall be provided as required. The conduit in ceiling slab shall be laid above the first layer of reinforcement rods to avoid cracks in the ceiling surface. In general the conduit shall not be laid directly on the shuttering surface to avoid cracks in the ceiling surface. Conduits concealed in the wall shall be secured rigidly by means of steel hooks / staples at min. 750 mm intervals. Before conduit is concealed in the walls, all chases, grooves shall be neatly made to proper required dimensions using electrically operated groove cutting tools to accommodate number of conduits. The outlet boxes for control switches, inspection and draw boxes shall be fixed as and when conduits are being fixed. The recessing of conduits in walls shall be so arranged as to allow at least 12mm plaster cover on the same. All grooves, chases etc. shall be refilled with 1:4 cement mortar and finished up to wall surface before plastering of walls is taken up by the general civil contractor.

Horizontal chases in walls are not allowed. Where unavoidable, prior permission of owner/consultant shall be obtained before making any chasing. Where conduits pass through expansion joints in the building, adequate expansion fitting or other approved devices shall be used to take care of the relative movement. Whenever the conduits terminate into control boxes, distribution boards etc. conduits shall be rigidly connected to the boxes/boards with check nuts on either side of the entry. After conduits, junction boxes, outlet boxes etc. are fixed in position, their outlets shall be properly plugged with PVC stoppers or any other suitable materials, so that water, mortar, vermin or any other foreign materials do not enter into the conduit system. All conduit ends terminating into an outlet shall be provided with bushes of PVC or rubber after the conduit ends are properly filed to remove burrs and sharp edges. Necessary G.I. pull wires shall be inserted into the conduit for drawing wires before concreting. Insulated earth wires shall be run in each conduit originating from the panel board upto the Light, Socket and Switch boxes. If the Electrical Contractor forgets to install any

conduit/boxes etc., before the plastering/painting work is done by other agencies, he may be permitted to install the same with prior permission of owners/ consultant and he shall be liable to make good the wall, floor, ceiling etc. at his own cost. Conduits shall be so arranged as to facilitate easy drawing of wires through them. Entire conduit layout shall be done in such a way as to avoid additional junction boxes other than light points. The wiring shall be done in a looping manner. All the looping shall be done in either switch boxes or outlet boxes. Joints in junction or pull boxes are strictly not allowed. Where conduits cross building expansion joints, adequate expansion fittings or other approved devices shall be used to take care of any relative movement.

All conduits shall be installed so as to avoid touching of steam and hot water pipes. Conduits shall be installed in such a way that the junction and pull boxes shall always be accessible for repairs and maintenance work. The location of junction/pull boxes shall be marked on the shop drawings and approved by the owner/consultant. A minimum separation of 200mm shall be maintained between electrical conduits and hot water lines in the building.

No run of conduit shall exceed ten meters between adjacent draw-in points nor shall it contain more
than two right angle bends, or other deviation from the straight line. Caution shall be exercised in using the PVC conduits in locations where ambient temperature is 50 degree celsius or above. Use of PVC conduits in places where ambient temperature is more than 60 degree C is prohibited. The entire conduit system including boxes shall be thoroughly cleaned after completion of installations and before drawing of wires. Conduit system shall be erect and straight as far as possible. Traps where water may accumulate from condensation are to be avoided and if unavoidable, suitable provision for draining the water shall be made. All jointing methods shall be subject to the approval of the owner/consultant. Separate conduits shall be provided for the following system.

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

CONDUIT JOINTS

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

BENDS IN CONDUIT

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

BUNCHING OF CABLES

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

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

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

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

WIRING :

All final branch circuits for lighting and appliances, shall be single conductor cables run inside conduits. Branch circuit conductor sizes shall be as shown in the load analysis of drawing and conforming to the requirements of the I.E. Regulations and I.S. Code. Home runs indicated on the drawings for the final branch circuits shall be kept in a separate conduit upto the panel board via switches wherever called for. No other wiring shall be bunched in the conduit unless the other circuit main of same phase runs in the same conduit. For each lot of wire supply, Contractor shall supply a certificate issued by the Manufacturer stating its origin, date of manufacture, constitution and standards to which it complies and the test certificates. Looping system of wiring shall be used. Wires shall not be jointed inside the conduit or pull boxes. Where joints are unavoidable, they shall be made through approved mechanical connectors with prior permission of owner/consultant. Control switches shall be connected in the phase conductors only and shall be 'ON' when knob is down. Switches shall be fixed in galvanised steel boxes. Chromium plated screws shall be used. Power wiring shall be distinctly separate from lighting wiring. Each circuit phase wire from the distribution boards should be followed with a separate neutral wire of the same size as the circuit wire.

BUNCHING OF WIRES :

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

DRAWING CONDUCTORS :

The drawing and jointing of PVC insulated copper conductor wires and cables shall be executed with

due regard to the following precautions. While drawing wires through conduits, care shall be taken

to avoid scratches and kinks which cause breakage of conductors. There shall be no sharp bends.Insulation shall be shaved off like sharpening of a pencil and it shall not be removed by cutting it square. PVC insulated copper conductor wire ends shall be soldered (atleast 20 mm length). Strands of wires shall not be cut for connecting terminals. The terminals shall have sufficient

cross sectional area to take all strands and shall be soldered. Connecting brass screws shall have flat ends. All looped joints shall be soldered and connected through block/connectors. The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less. Conductors of all sizes shall always be terminated using cable sockets. At all bolted terminals, brass flat washers of large area and approved steel spring washers shall be used. Brass nuts and bolts shall be used for all connections. Only certified wiremen and cable jointers shall be employed to do jointing work. All wires and cables shall bear the manufacturer's label and shall be brought to site in original packing. For all internal wiring, PVC insulated wires of 650/1100 volts grade shall be used. The sub-circuit wiring for point shall be carried out in loop system and no joints shall be allowed in the length of the conductors. If the use of joint connections are unavoidable due to any specific reason, prior permission, in writing, shall be obtained from the owner/consultant. No wire shall be drawn into any conduit, until all work of any nature, that may cause injury to wire, is completed. Care shall be taken in pulling the wires so that no damage occurs to the insulation of wire. Before the wires are drawn into the conduits, the conduits shall be thoroughly cleaned of moisture, dust, dirt or any other obstruction by forcing compressed air through the conduits. The minimum size of PVC insulated conductor wires for all sub-circuit wiring for light points shall be 2.5 sq.mm.

JOINTS :

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

MAINS AND SUB-MAINS :

Mains and sub-mains cables or wires where called for shall be of the rated capacity and approved make. Every main and sub-main wire shall be drawn through an independent adequate size conduit. An independent earth wire of the proper rating shall be provided for every single phase submain. For every 3-phase submain, 2 nos. earth wires of proper rating shall be provided alongwith the submain. The earth wires shall be drawn inside the conduits

along with the circuit main. Where mains and submains cables are connected to switchgear, sufficient extra lengths of cables shall be provided to
facilitate easy connections and maintenance.

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

COLOUR CODE OF CONDUCTORS :
Colour code shall be maintained for the entire wiring installation: red, yellow, blue for three phases, black for neutral, green/yellow green for earthing. The control wire from light control switches to the light/fan points shall be the same colour as that of the phase/circuit wires feeding that particular loop.

EARTHING
All earthing system shall be in accordance with IS 3043 - 1985 Code of practice for Earthing. The type and size of earthing wire shall be as specified under the heading of cables. Each conduit originating from the DB to various outlets shall have one earth wire (PVC insulated green colour wire).

TESTING OF INSTALLATION
Before a completed installation is put into service, the following tests shall be complied with : INSULATION RESISTANCE The insulation resistance shall be measured by applying 500 Volt megger with all fuses in place, circuit breaker and all switches closed. The insulation resistance in megohms of an installation measured shall not be less than 50 megohms. divided by the number of points in the circuit. The insulation resistance shall be measured between
Earth to Phase
Earth to Neutral
Phase to Neutral

EARTH CONTINUITY PATH
The earth continuity conductors shall be tested for electrical continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance or earth leakage circuitbreaker, measured from the connection, with the earth electrode to any point in the earth continuity conductor in the completed installation and shall not exceed one ohm.

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

COMPLETION CERTIFICATES
All the above tests shall be carried out in presence of Construction Manager and the results shall be

recorded in prescribed forms. Any default during the testing shall be immediately rectified and that section of the installation shall be retested. The completed test result forms shall be submitted to the

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

MEASUREMENTS

Mode of measurement is as follows :

For purposes of measurement the point wiring for lights/fans/6A sockets (where 6A sockets are

connected to lighting circuit loop) is divided into two parts.

a) Point Wiring

b) Circuit Main

a) POINT WIRING

The wiring for light/fan/6A socket (where 6A sockets are connected to lighting circuit loop) point starting from first light/switch/fan and looping between switches/ fans/sockets etc., shall be measured either in `Number' or `Set'. One light/fan point controlled by one switch is measured in Number (No.) Set of Two or more light points controlled by one switch is measured in `Sets'. Where set of light points wired and controlled directly from MCB DB shall be measured in `Sets'. The rate for this item shall not include the cost of switch & switch box. 6A socket wiring where connected to the lighting circuit loop is measured in Number (No.)

b) CIRCUIT MAIN

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

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

Length of circuit wire including conduit starting from MCB DB to outlets and looping between outlets

shall be measured in linear metres (Rm).

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

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

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

B. M.V.DISTRIBUTION BOARDS

SCOPE :

This section covers the design, manufacture, assembly, testing at manufacturer's works, inspection, packing for transportation, delivery at site, installation, connection, testing and commissioning of 415V switch boards with guarantee of performance for a period of twelve

(12) months from the date of commissioning. The contractor shall provide all materials, labour, equipment, scaffolding etc., as required for the completion of the job.

STANDARDS APPLICABLE

The following standards and rules shall be applicable : The Distribution Boards shall comply with the latest edition of relevant Indian Standards and Indian Electricity rules and regulations. The following Indian Standards shall be complied with : IS 4237-83 General requirements for switch gear and control gear for voltages not exceeding 1000V. IS 5578-85 Guide for marking of insulated conductors.

IS 11353-85 Guide for uniform system of marking and identification of conductors and apparatus terminals.

IS 2147-62 Degree of protection provided by enclosures for low voltage switch gear and control gear.

IS 2675-83 Enclosed distribution fuse boards and cutouts for voltages not exceeding 1000V.

IS 2551-82 Danger notice plates.

IS 2516 Circuit breakers Part 1. Requirements (Part I/Sec 1):and tests : Section 1. Voltages not exceeding 1000V ac or 1200V dc.

IS 4064-78 Air break switches, air break disconnectors, air break switch disconnectors and fuse combination units for voltages not exceeding 1000V ac or 1200V dc.

IS 1818-72 Alternating current isolators (disconnectors) and earthing switches.

IS 8623-77 Factory built assemblies of switchgear and control gear for voltages upto and including 1000V AC & 1200V DC.

IS 8828-78 Miniature air break circuit breakers for voltages not exceeding 1000V.

IS 9926-81 Fuse wires used in rewireable type electric fuses upto 650 Volts.

IS 8544-79 Motor starters for voltages not exceeding 1000 Volt A.C. or 1200 Volt D.C.

IS 2959-85 Contactors for voltages not exceeding 1000 Volt A.C or 1200 Volts D.C

IS 9224-79 Low Voltage fuses.

IS 12640-89 Residual current operated circuit breakers.

IS 1248-83 Direct acting indicating analogue (all parts) electrical measuring instruments and their accessories.

IS 2705-81 Current transformers. (all parts)

IS 4201-83 Application guide for voltage transformers.

IS 8197-76 Terminal markings for electrical measuring instruments and their accessories.

Indian Electricity Act and Rules.

415V SWITCH BOARDS

The 415 volt switchboard shall be metal-clad, dead front totally enclosed, indoor type, forming a self-supporting continuous board. The front portion of the board shall have individual compartments arranged in tier formation to accommodate draw-out type air- circuit-breakers. The back portion of the board shall contain three-phase and neutral air- insulated busbars, cable terminations, instrument transformers, etc. The busbars and all other outgoing live terminals shall be protected to prevent accidental contact while carrying out maintenance work.

DISTRIBUTION ARRANGEMENT

For single transformer load-centres, the panel shall accommodate one transformer secondary circuit breaker and specified number of outgoing circuit-breakers all connected to the common busbar. For two transformer load-center, the 415 volt bus shall be sectionalised and each transformer shall be connected to the corresponding bus-section over its secondary circuit-breakers. Bus-tie circuit breaker shall be provided between adjacent bus sections and the outgoing switchgear distribution on each bus-section shall be as specified.

415 VOLT MAIN BUSBARS

Copper / Aluminium bus-bars shall be used. Busbars shall be made from rectangular sections of high wrought aluminium alloy and the current density shall not exceed 0.8 A / sq.mm and where copper sections are used the current density shall not exceed 1.4 A / sq.mm. The continuous current rating and the short circuit values which the main busbars are able to withstand shall be as follows :-

TRANSFORMER RATING CONTINUOUS CURRENT RATING SHORT CIRCUIT CURRENT RMS SYMMERICAL

kVA A A

400 630 15000

630 1000 21600

1000 1600 36000

1600 2500 36000

2000 3200 50000

The neutral bus bars shall be designed to carry 50 percent continuous current rating of the main busbars.

415 VOLT CIRCUIT-BREAKERS

The circuit-breakers shall be triple-pole, air-break draw-out type. All current carrying contacts of the breakers shall be silver plated. Arc-chute fitted on each pole shall be easily removable for inspection of the main contacts. Inter-phase barriers of proper design shall also be incorporated.

The plug connections of main and auxiliary circuit shall be fitted with self-aligning contacts. The fixed position of the plug connections shall be easily accessible for maintenance. Automatically operated shutters shall be provided to screen the fixed portion of the plug when the breaker is fully withdrawn from the cubicle.

The continuous current ratings of the various Circuit-Breaker units at specified ambient temperature shall be as specified. The RMS Symmetrical breaking capacity of the different air circuit-breakers shall be as follows, unless otherwise specified :-

TRANSFORMER RATING	CONTINUOUS CURRENT RATING	SHORT CIRCUIT CURRENT RMS SYMMERICAL
kVA	A	A
400	630	15000

630	1000	21600
1000	1600	36000
1600	2500	36000
2000	3200	50000
kVA	A	A

OPERATING MECHANISM

The Circuit-breakers shall be either manually or electrically operated as specified. For emergency closing and testing, the electrically operated breaker shall be capable of manual closing. For manually operated breakers, manual, independent-type closing mechanism shall be provided. If manual dependent mechanism is provided then the breakers shall compulsorily have electrical closing and tripping devices. All types of operating mechanisms shall be trip-free throughout the breaker travel and designed to reduce mechanical shock to a minimum during operation. All electrically operated breakers shall be provided with mechanical/electrical anti-pumping device. Each breakers shall be equipped with visible 'ON' and 'OFF' position indicator on the front door of the compartment, mechanically connected to the circuit- breaker mechanism. Separate ON and OFF indicating lamps also shall be provided. For electrically operated circuit-breakers, satisfactory operation shall be guaranteed for closing the circuit-breakers with the operating voltage of the drive, in the range of 85 to 110 percent of the rated voltage. The electrical closing shall be either by solenoid or motor operated spring charged mechanism suitable for 240 V AC. The circuit-breaker shunt trip coil provided shall operate satisfactorily with the operating voltage within the range of 70 t0 120 per cent of the rated voltage. The shunt trip coil shall be suitable for 240 V AC. No separate control source will be available as such capacitor trip Circuit shall be provided where shunt tripping is proposed with protective relay so that ability to trip is not impaired by momentary drop in voltage at the time of a fault.

Each circuit-breaker shall be provided with four (4) normally open and four (4) normally closed spare auxiliary contacts in addition to the ones already used for various control purposes. All auxiliary contacts shall be wired internally up to the terminal block.

INTERLOCKS

The switchgear shall be provided with all necessary interlocks designed to prevent incorrect operation and to ensure safety of operating personnel and also the equipment. The moving portion of the circuit-breakers shall be so interlocked that with the breaker closed it shall not be possible to isolate it from the connected position or to plug it in from the isolated position. Interlocking shall be provided to prevent operation of the circuit-breaker unless it is fully plugged in or fully isolated and is locked correctly in either position. The circuit-breaker compartment doors shall be so interlocked as to prevent access to a breaker

which is in an energized and plugged in position. Special means shall however be provided for undoing this interlock in an emergency. Inadvertent withdrawal of a circuit-breaker movable unit too far beyond its supports shall be prevented by a suitable mechanical stop. The unit shall be provided with "test" position in which the circuit-breaker main contacts are in the fully disconnected position with only the secondary circuits remaining connected. All secondary connections including control, signaling and metering circuits between the fixed and removable sections shall be by means of flexible able and plug and socket arrangement.

PROTECTIVE DEVICES

The circuit-breakers shall be provided on each pole with any combination of the following protective devices with ratings as called for in the specification:

i) Direct acting over current tripping device with long time element having inverse time current characteristic for protection against overloads and instantaneous element for shortcircuit tripping with alarm contact.

ii) Direct acting over current tripping device with long time element having inverse time current characteristic for protection against overloads and short time element with definite time delay for short-circuit protection with alarm contact.

iii) Shunt tripping device with alarm contact.

iv) Non-directional IDMT earth fault relay.

v) The under voltage tripping device when specified shall be designed for the following operating

conditions:

a) The circuit-breakers shall trip for voltage value set between 70 and 35 per cent of rated system voltage.

b) The under voltage relay shall not prevent manual closing of the circuit-breaker above 85 percent of rated system voltage.

vi) The CTs provided for protective devices shall have adequate VA capacity and accuracy class of 10P10.

INSTRUMENTS AND METERS

Instruments, meters and relays shall be of flush-mounted design, housed in dust-proof casing located in an accessible position on the breaker panel. All incoming circuit-breaker units shall be provided with a voltmeter and changeover switch on the live side for indicating the three-phase voltages and ammeter with a changeover switch complete with C.Ts for measuring the currents in all three phases. Ammeters with C.Ts and selector switches shall also be provided for all outgoing feeders. For motor feeders the ammeter shall be provided with a normal scale up to full-load value and a suppressed scale beyond full-load for indication of motor starting current. C.Ts provided for ammeter shall have accuracy Class of 1.0 KWH meters, 15-minute maximum demand indicators shall be provided, where specified.

CABLE TERMINALS

The cable terminal arrangement for incoming 415 volt circuit-breaker from 200 KVA transformer secondary and for all outgoing feeders shall be suitable for single-core and multi-core aluminium conductor PVC insulated cables of number, type and sizes as specified. The termination arrangement of multiple cables shall permit connection and disconnection of each individual cable without disturbing the other cables. For termination of cables suitable lugs of proper size shall be provided. Where armoured cables are to be terminated suitable armour clamps shall be provided.

LOW VOLTAGE BUS-DUCTS

Bus-ducts with 3 phase and neutral busbars shall be able to withstand the short-circuit currents as specified in item 1.04 above. It shall be designed for a rated voltage of 1,000 volts.

The bus-duct shall be of metal-enclosed, dust and vermin proof type divided into factory made sections suitable for easy assembly at site. It shall be complete with mounting arrangement and all necessary accessories required to make the installation complete. The bus-duct shall have suitable side covers where required for easy access to all the busbars. Space shall be provided within the bus-duct for taking secondary wiring as required, The bus- bar supports and their terminal connections shall be designed to permit expansion and contraction of the bar with a variation in the site ambient temperatures. Throat connection with links shall be provided at the transformer terminal for easy removal of transformer, when necessary.

ALARM AND INDICATION

Each load-centre substation shall be provided with static audible and visible alarm indication with alarm accept and cancellation device. The system shall have arrangement for repeat alarm facilities as well as testing the alarm circuits. The scheme shall be designed to give the following indications:

i) When any circuit-breaker trips on fault only
ii) Temperature rise of winding
iii) Earth fault indication

Provision shall be made for transmitting signals if required to remotely located signaling system to indicate tripping of incoming circuit-breaker on fault and operation of earth fault relay provided in the transformer neutral circuit. Provision shall also be made to transmit the alarm and tripping signals to 33 kV switchboard from which the transformer is fed or to a remote signaling panel.

REMOTE CONTROL SCHEME FOR BREAKERS

For electrically operated circuit-breakers in addition to ON-OFF control switch provided on the front side of the panel, provision shall be made where required for remote closing and tripping of circuit-breakers from an external control desk with arrangement to prevent closing of the breaker by the control switch mounted on the front of the circuit-breaker cubicle.

OTHER CONSTRUCTIONAL FEATURES

All operating handles, control switches, push-buttons, indicating lamps, instruments, meters etc shall be mounted on the front of the cubicles. The auxiliary relays for temperature alarm and tripping shall be mounted on the incoming breaker panels. Terminal boards shall be provided at the transformer sections for all control circuit taken out from the transformers. All wiring from these terminal boards to the switchgear sections shall be provided with the equipment. All wiring within the cubicles shall be with PVC insulated cables and shall be effectively protected from possible damage by electrical flashover. As far as possible each essential control circuit shall be contained in the respective cubicle. All wiring shall be such that it is easily identifiable and accessible for maintenance. For equipment earthing a suitable copper earthing bus shall be provided for the complete length of the switch board and bonded to all the units including the transformer and high tension cubicles. Proper terminals shall be provided for external earth connections to be fully in conformity with IER.

A suitable universal type truck shall be provided with each load-centre substation for withdrawing the breakers from the board. The trucks shall have platforms of adequate

mechanical strength for bearing the weight of the circuit-breaker units and shall be provided with necessary guide rails and stops. The height of the platform shall be adjustable to suit the levels at which the different circuitbreakers are mounted on the switchboard. Identification labels shall be provided for each circuit-breaker and control devices to be located in readily visible positions. All steelwork of each load-center substation shall undergo rust removal procedure before application of primer and shall be given epoxy paint finish of Aircraft Grey colour as per ISS Shade 693 or any other colour of approved shade. The busbars of each unit substation shall be painted as per following norms:

A Phase - Red
B Phase - Yellow
C Phase - Blue
Insulated neutral - White
Earthed neutral - Black
ABC are the three phases of AC circuit with anti-clockwise vector rotation.

TEST
All equipment shall be tested in accordance with the relevant clauses of applicable standards. All internal wiring shall be checked for correct operation before dispatch.

C. M.V. CABLES AND CABLE TRAYS

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

STANDARDS APPLICABLE
The following standards and rules shall be applicable.
IS 1554-88 PVC insulated (heavy duty) electric cables Part I for working voltages upto and including 1100V.
IS 8130-84 Conductors for insulated electric cables and flexible cords.
IS 3961-67 Recommended current ratings for cables: (Part 2): PVC insulated and PVC sheathed heavy duty cables.
IS 5831-84 PVC insulation and sheath of electric cables.
IS 7098-89 Cross linked polyethylene insulated PVC sheathed cables.
The individual cores shall have continuous numbering of the core all along its length and also be provided with identification ferrules at both ends. Individual control cables shall have 20% spare cores. FRLS cables shall be used for fire protection system controls to prevent flame propagation, smoke reduction and to avoid toxic gas emission in the event of a fire. FRLS compound shall be tested rigorously for oxygen index as per ASTM D2863, acid gas generation to IEC 754-1, smoke density to ASTM D 2843 and flammability to SS 424 1475 class F3, IEEE

383 and IEC 332-1. Manufacturer's name, ISI Mark, cable size and type shall be clearly embossed at regular intervals on all cables.

TYPE AND QUALITY

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

The cables shall conform to IS:1554 part-I in all respects. M.V power cables shall have 3, 3.5 or 4 cores, as required and shall have conductors made from electrical purity aluminium conductors conforming to IS : 8130 - 84.

Conductors shall be insulated with high quality PVC base compound. Insulation and outer sheathing compounds shall conform to IS 5831 - 84.

A common covering shall be applied over the laid-up cores by an extruded sheath of un-vulcanised
rubber compound.

Armouring of galvanised round steel wires or galvanised flat steel strips shall be provided over the inner sheath. Outer sheath of PVC shall be extruded over the armouring. Cables shall be manufactured and tested in accordance with IS 1554.

Unless otherwise specified, all control cables shall be multicore, 1100V grade PVC insulated,

armoured and overall PVC sheathed with stranded copper conductors of 2.5 sq.mm, conforming to IS
1554. Cores shall be identified by colour scheme of PVC insulation.

RATING :

The cables shall be rated for a voltage of 650/1100 Volts. Core Identifications : Cores shall be provided with the following colour scheme of PVC insulation :

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

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

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

JOINTING BOXES FOR CABLES : Cable joint boxes shall be of appropriate size, suitable for PVC insulated armoured cables of particular voltage rating.

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

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

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

CABLE MARKERS

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

TERMINATION OF CABLES

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

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

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

INSTALLATION OF CABLES

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

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

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

GENERAL

All cables shall be adequately protected against any risk of mechanical damage to which they may be liable in normal conditions of service. When cables pass through holes in metal work, precautions shall be taken to prevent abrasion of the cables on any sharp edges.

In every vertical cable ladder, channel, duct, trunking or cable trench containing cables and exceeding three meters in length, internal barriers shall be provided so as to prevent the air at the top of the unit from attaining an excessively high temperature.

In every vertical cable shaft, cable trench or any passage of cable through wall, ceiling, floor barriers against spread of fire and smoke shall be provided for compliance with IEE regulations. Where cable passes through walls, ceiling, floor, it shall run through sleeves of PVC pipes or Hume pipes of adequate diameter. After pulling the cable through sleeves, both the ends of the sleeves shall be sealed water tight with fire-resistant material to prevent spread of fire and seepage of water.

Generally along each cable route either in trench or in cable trays/ladders or in pipe separate Two Nos. of earth strips/wires shall run exposed. Where an installation comprises medium voltage cables as well as extra low voltage circuits, precaution shall be taken in accordance with IEE regulations and shall be physically separated by minimum of 300mm distance.

Metal sheaths and armour of all cables, metal conduits, ducts, trunking, and bare earth continuity conductors associated with such cables, which might otherwise come into fortuitous contact with other fixed metal work shall be effectively bonded there to earth so as to prevent appreciable potential difference at such possible points of contact. If it is necessary to install cables in a situation where flammable and/or explosive dust, flammable volatile liquid/vapor/gas is likely to be present or where explosive materials are handled or stored, the cabling shall be as per IEE regulations.

UNDERGROUND INSTALLATIONS

The cables shall be laid in an excavated trench. The depth of the trench shall be minimum 750mm.below the final ground level but shall be decided on the number of cables to be laid in the trench so that the vertical distance between two adjacent layers of cables shall not be less than 350mm.

The width of the trench shall be decided on the number of cables to be laid in the trench so that the distance between two adjacent cables shall not be less than one able diameter. Before laying cables the bottom of the trench shall be well compacted and the cables shall be laid on a 100mm fine sand bedding. The second layer of 150mm of fine sand then be spread over the cable and shall be further covered by 150mm of compacted soil. For the second layer of the cable same procedure shall be repeated.

The cables shall be protected by placing precast concrete tiles or burnt bricks over the cables on top layer of sand and for the full length of underground cables. Where more than one cable is running in the same trench, the concrete tiles/bricks shall cover all the cables and shall project a minimum of 80mm on either side of the cables. In any case the top layer of the cables shall be minimum 600mm below the finished level of the ground. The top of the cable trench shall be well compacted till the finished level of the ground and shall be approved by the Construction Manager. If required a laboratory compaction test shall be carried out in presence of the Construction Manager. H.V., M.V., cables shall not be laid in the same trench/cable tray and/or alongside of water main. Cables under road crossings and any surfaces subjected to heavy traffic shall be protected by running them through Hume pipes of suitable size.

The relative position of the cables laid in the same trench shall be preserved and the cables shall not cross each other as far as possible. At all changes in direction in horizontal and vertical planes, the cable shall be bent smooth with a radius of bend not less than 15 times the diameter of the cable. Minimum 3 meters long loop shall be provided at both sides of every straight joint and 5 meters at each end of the cable. Distinguishing marks shall be made at the cable ends for identification. Insulation tapes of appropriate voltage and in red, yellow, and blue colours shall be wrapped just below the sockets for phase identification.

All the excavation and back fill including timbering, shoring, and pumping required for the installation of the cables shall be carried out as indicated on the drawing and as per requirements laid down elsewhere or as per Construction Manager's direction. Trenches shall be dug true to line and grades. Back fill for trenches shall be filled in layers not exceeding 150mm. At each layer compaction test shall be carried out in presence of Construction Manager. Each layer shall be properly rammed and consolidated before laying the next layer. The contractor shall restore all surfaces, roadways, side walls, curbs, walls, landscaping or other works cut for excavation to their original condition, the satisfaction of the Construction Manager. Suitable approved type cable markers shall be installed along the cable route & where change of direction takes place.

CABLES INSTALLED INSIDE THE BUILDING

The cables inside the building shall be installed in one of the following manner, as indicated in the drawing and approved by the Construction Manager.

INSTALLED IN BUILT-UP TRENCH

The cables laid on the bottom of the structural trenches shall not lie freely upon the trench bottom. They shall be raised to prevent the possibility of their coming into contact with deleterious materials. The cables laid in the trench shall be laid on angle iron brackets/cable tray/cable ladder/cable troughs/cable racks as indicated on the drawings, and as approved by the Construction Manager. Where cables are clamped to the wall a minimum clearance of 100mm shall be maintained between wall and cable and minimum 150mm vertical clearance shall be maintained between two cables. Where cables are laid on brackets the brackets shall not be fixed more than 500mm apart to avoid sag in the cables, where the cables are laid on cable tray/ladder/troughs/racks, minimum 300mm distance shall be observed between adjacent tier of tray/ladder/ troughs/racks, and cable shall be fixed minimum 25mm away from the wall, and minimum of one cable diameter distance shall be observed between two adjacent cables. Cables shall be properly fixed with the tray/ladder/troughs/racks with cable tie or saddles or straps.

CABLES ON CABLE TRAYS/LADDERS UNDER THE CEILING OR ON WALL

Where cables are installed under/above suspended ceiling or below ceiling or on wall, they shall be laid on a perforated G.I. cable tray/ladder type cable tray and shall be run in such positions that they are not liable to be damaged by contact with the floor or the ceiling or other fixtures. The cable tray/ladder shall be properly fixed with tie rod to the ceiling. The concrete inserts for fixing the tie of shall be put in place while casting the slab. If insert plates are not placed in position, Anchor fasteners shall be fastened to support cable trays. The cable tray route shall be co-ordinated with other services to avoid crisscross of all the services. While laying the cables on the tray minimum one cable diameter distance shall be observed between two adjacent cables. 25% space shall be kept spare for any future installation. The trays shall be made of 16 SWG/12 SWG G.I. perforated sheet having minimum 50mm depth. The width of perforation shall be maximum 10mm spaced at maximum 20mm distance. The width of the cable tray shall be selected so as to accommodate required number of cables to be laid on it, with minimum separation of minimum one cable diameter between two adjacent cables. The cables shall be tied with the cable tray with nylon strip.

CABLES INSTALLED IN THE MECHANICAL ROOM

The cable reaching the motors in the mechanical room or plant room or machines room or service area shall be laid on cable tray except where indicated in masonry underground trenches. The cable reaching the motors shall be protected by rigid galvanized conduits up to a height of 300mm above the floor. Above that height, the cable shall be protected by means of oil tight flexible metallic G.I. conduits to the terminal box of the motor. The connection between the rigid conduit and the flexible conduit shall be done by a rewett coupling of an approved type. The flexible conduit shall be properly fixed with the terminal box of the motor by means of double hexagonal check nut.

CABLE TRAY/LADDER

GI Cable tray shall be manufactured to comply with the specifications of National Electrical Code (NEC) and National Electrical Manufacturer's Association (NEMA). Cable trays shall be of steel as per IS 226 and galvanised and the thickness of galvanisation shall be not less than 110 microns. All bolts nuts and washers shall also be galvanised and shall conform to IS 1363- 60 for quality, threading and dimensions before galvanising. Hot dip galvanising shall conform to IS 2633 Galvanising of each member shall be carried out in one complete immersion. The galvanising shall be uniform, clear, smooth, continuous and free from acid spots. Quality of zinc used for galvanising shall be of 98.8% purity.

Cable trays shall generally be of the following type :

i.	for power cables of medium voltage and high voltage -	ladder type with slotted angles.
ii .	for control cables and low voltage cables -	perforated sheet extra steel slotted angle type.

Perforated cable trays shall be generally of channel type and the perforations in the trays shall be either 8 x 15mm or 10 x 20mm oval holes. Control cables, extra low voltage cables and instrument cables shall be laid on perforated cable trays.

Ladder type cable trays shall be made out of 50 x 50 x 6mm slotted M.S. angles for the rungs and channels for the side rails. Pitch of the rungs shall be not more than 250mm centre to centre. Rungs shall be welded to the side rails.

Cable trays shall be of standard sizes :

Length	2500mm
Width	300/450/600/800/1000mm as required.
Flange of perforated tray	75/100mm
Height of side rail (ladder type)	100/150mm
Thickness of sheet steel -	2.0mm to 3.0mm as per width of tray.

The flange and width of the cable trays shall be decided based on the diameter and the number of cables running through each section of the cable tray.

Accessories for Cable Trays

Following accessories of cable trays, as required, shall be supplied with the cable trays.

Coupler plates
90 deg bends - Horizontal and Vertical.
Tees - Horizontal and Vertical.
Reducers
4-way cross
Tray covers
Fasteners.

Accessories also shall be hot dip galvanized, thickness of galvanizing being not less than 110 microns.

TESTING

Prior to laying cables, and prior to energizing the cables, following tests shall be carried out :- Insulation Resistance test between phases and phase to neutral and phase to earth. Continuity test of all the phases, neutral and earth continuity conductor. Sheathing continuity test. Earth resistance test of all the phases and neutral. All tests shall be carried out in accordance with relevant Indian Standard Code of practice and Indian Electricity Rules. The Contractor shall provide necessary instruments, equipments and labour for conducting the above test and shall bear all expenses in connection with such tests. All tests shall be carried out in the presence of the Construction Manager and results shall be recorded in the prescribed forms.

STORING :

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

MEASUREMENT

Mode of measurement is as follows :

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

Power cable terminations are measured in Number (No)

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

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

D. LIGHT FITTINGS AND ACCESSORIES :

SCOPE

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

STANDARDS APPLICABLE :

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

Electric light fittings General and safety requirements - IS - 1913.

Industrial lighting fittings with metal reflectors - IS - 1777

Decorative lighting outposts - IS - 5077

Flood Lights - IS - 1947

Luminaries for street lighting - IS - 2149

Bayonet lamp holders - IS - 1258

Bi-pin lamp holders for tubular fluorescent lamps - IS - 3323

Ballasts for use in fluorescent light fittings - IS - 1534
Starters for fluorescent lamp - IS - 2215
Ballast for HP MV lamps - IS - 6616
Capacitors for use in fluorescent, HPMV & LP sodium Vapour lamps circuits - IS - 2215
Tubular Fluorescent lamps - IS - 2418 (Part I)
High pressure mercury vapour lamps - IS - 2183
Tungsten filament general electric lamps - IS - 418
High pressure sodium vapour lamps - IS - 9974 (Part -I)

Light Fittings - General Requirements:

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

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

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

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

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

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

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

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

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

DECORATIVE TYPE FITTINGS

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

ACCESSORIES FOR LIGHT FITTINGS REFLECTORS:

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

LAMP/STARTERS HOLDERS:

Lamp holders shall have low contact resistance, shall be resistant to wear. They shall hold lamps in position under normal conditions of shock and vibration prevalent in an industrial atmosphere. Lamp holders for fluorescent lamps shall be of spring loaded BI-pin rotor type. Live parts of the lamp holder shall not be exposed during insertion or removal of the lamp or after the lamp has been taken out. Lamp holders for incandescent and mercury vapour lamps shall be bayonet type upto 100 W and Edison screw type for higher wattage. Starter holders for fluorescent lamps shall be so designed that they are mechanically robust and shall be capable of withstanding shocks during transit, installation and use.

BALLASTS:

The ballasts shall be designed for long life and low power loss. They shall be mounted using self-locking, anti -vibration fixtures and shall be easy to remove without demounting the fittings. The enclosures shall be dust tight and non-combustible. Ballasts shall be inductive, heavy duty type, filled with thermosetting, insulating, moisture repellent polyester compound filled under pressure or vacuum. Ballasts shall be provided with taps to set the voltage. The ballast wiring shall be of copper and they shall be free from dust. Separate ballast shall be provided in case of multi-lamp fittings, except in case of 2 x 20 W fittings. Starters shall have bi- metal electrodes of high mechanical strength. Starters shall be replaceable without disturbing the reflector of lamps and without use of any tool. Starters shall have brass contacts and radio interference suppression capacitor.

CAPACITORS:

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

LAMPS:

Incandescent lamps shall be clear type unless otherwise specified. Fluorescent lamps shall be "day-light colour" type unless otherwise specified and shall be provided with features to avoid blackening of lamp ends. Mercury vapour lamps shall be of high pressure, colour corrected type. Lamps shall be capable of withstanding vibrations prevalent in an industrial atmosphere, the filament/electrodes shall not break under such circumstances. PL Lamps shall be energy effective compact single ended light sources in 9 to 11W ratings consisting of two narrow glass tubes welded together. The lamp shall be complete with integral glow switch starter and capacitor and two pin electrical connection The lamp shall be colour rendered to give warm colour impression. The compact lamp shall have a long life and shall be energy efficient.

INSTALLATION:

The light fixtures and fittings shall be assembled and installed in position complete and ready for service,

in accordance with details, drawings, manufacturer's instructions and to the satisfaction of the Construction Manager. Pendent fixtures specified with overall stem lengths are subject to change and shall be checked with conditions on the job and installed as directed.

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

<u>MEASUREMENT</u>

MODE OF MEASUREMENT IS AS FOLLOWS:

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

E. EARTHING SYSTEM

SCOPE
This section covers the requirements for providing "Earthing" connection to metal parts of equipment etc., The contractor shall supply all materials, labour, tools, plant etc., and everything necessary for the complete Earthing installation".

STANDARDS APPLICABLE
The following standards shall be applicable:
IS 3043 -Code of practice for earthing.
IEEE - 80:86.
IEEE - 142:92.

GENERAL
All the non-current carrying metal parts of electrical installation shall be earthed as per IS: 3043. All equipment, metal conduits, rising main cable armour, switch gear, distribution boards, meters, all other metal parts forming part of the work shall be bonded together and connected by two separate and distinct conductors to earth electrodes. Earthing shall be in conformity with the provisions of Rules 32, 61, 62, 67 and 68 of IER 1956.

G.I.PIPE EARTH STATION:
Electrodes shall be made of G.I. pipe of internal diameter of 100mm dia. The pipe electrode shall be as far as practicable embedded below permanent moisture level. The length of the pipe electrode shall not be less than 2.5 m. Except where rock is encountered, pipes shall be driven to a depth of at least 2.5mtr where rock is encountered at a depth of less than 2.5mtr. The electrode may be buried inclined to the vertical and the inclinations not more than 30 deg C from the vertical. The pipe electrode shall be made of one piece. Earth leads to the electrode shall be laid in a heavy duty GI pipe and connected to the pipe electrode with brass bolts, nuts and washers. GI pipe shall be terminated in a wire meshed funnel. The funnel shall be enclosed in a masonry chamber of 450mm x 450mm dimensions. The chamber shall be provided with C.I. frame and CI inspection cover. The earth station shall also be provided with a suitable permanent identifications label tag. The earth electrode shall conform to IS:3043 latest edition. The soil around the earthing electrode shall be treated to reduce the resistivity of the soil by filling the complete depth of electrode with alternative layers of charcoal and salt.

PLATE EARTH STATION
Plate electrodes shall be made of copper (CU) plate of 3mm thick and 600 x 600mm size. The plate shall be buried vertically in ground at a depth of not less than 2.5 meters to the top of the plate, the plate being encased in charcoal to a thickness of 300mm all round. It is preferable to bury the electrode to a depth where subsoil water is present. Earth leads to the electrode shall be laid in a heavy duty GI pipe and connected to the plate electrode with brass bolts, nuts and washers. A GI pipe of not less than 19mm dia shall be clamped with bolts vertically to the plate and terminated in a wire meshed funnel. The funnel shall be enclosed in a masonry chamber of 450mm x 450mm dimensions. The chamber shall be provided with GI

frame and CI inspection cover. The earth station shall also be provided with a suitable permanent identifications label tag. The earth electrode shall conform to IS:3043.

EARTHING CONDUCTORS

All earthing conductors shall be of high conductivity copper and shall be protected against mechanical damage and corrosion. The connection of earth electrodes shall be strong secure and sound and shall be easily accessible. The earth conductors shall be rigidly fixed to the walls, cable trenches, cable tunnel, conduits and cables by using suitable clamps. Main earth bus shall be taken from the main medium voltage panel to the earth electrodes. The number of electrodes required shall be arrived at taking into consideration the anticipated fault on the medium voltage network. Earthing conductors for equipment shall be run from the exposed metal surface of the equipment and connected to a suitable point on the
sub main or main earthing bus. All switch boards, distribution boards and isolators disconnect switches shall be connected to the earth, bus. Earthing conductors shall be terminated at the equipment using suitable lugs, bolts, washers and nuts. All conduits cable armouring etc., shall be connected to the earth all along their run by earthing conductors of suitable cross sectional area. The electrical resistance of earthing conductors shall be low enough to permit the passage of fault current necessary to operate a fuse/protective device or a circuit breaker and shall not exceed 2 ohms.

PRECAUTIONS

Earthing system shall be mechanically robust and the joints shall be capable of retaining low resistance even after subjection to fault currents. Joints shall be tinned, soldered and/or double rivetted. All the joints shall be mechanically and electrically continuous and effective. Joints shall be protected against corrosion.

TESTING

On the completion of the entire installation, the following tests shall be conducted:
i) Earth resistance of electrodes
ii) Impedance of earth continuity conductors as per is 3043.
iii) Effectiveness of earthing as per is 3043.
All meters, instruments and labour required for the tests shall be provided by the contractor. The test
results shall be submitted in the prescribed tabulated form in triplicate to the consultants for approval.

MEASUREMENT

Mode of measurement is as follows:
Earth strips (GI/Cu), earth conductor are measured in linear meter (Rm).
Earthing station with all associated works (G.I pipe or copper plate) is measured in number (No).

DRAWINGS TO BE SUBMITTED BY BIDDER

The supplier shall submit the following drawings, documents and technical manuals in four sets in Four (4) weeks from the date of placement of LOI for approval of purchaser / consultant. Descriptions of drawings/documents.

- Certified GA LT Board, Main Distribution Board, Sub distribution Boards, lighting distributions boards, power distribution boards, auxiliary boards. Wiring diagram, shop drawings, load details and foundation drawings shall be submitted for approval before the start of installation work.
- Bill of materials for the above.
- Power and control schematics.
- Earthling scheme with bill of materials.
- Any other drawing/document required for the system.

The bidder shall submit "as made" drawings of the above in soft copy in CDs and 3 sets of hard copies, six sets of operation and maintenance manuals and six sets of type and routine test certificates of major equipment's.

NATIONAL LAW SCHOOL OF INDIA UNIVERSITY

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TENDER DOCUMENT

NAME OF THE WORK

PROPOSED CLASSROOM INTERIOR WORKS OF NEW ACADEMIC BLOCK, NLSIU CAMPUS, NAGARBHAVI, BANGALORE

PART B

BILL OF QUANTITIES

SECTION 9 : BILL OF QUANTITIES

PREAMBLE TO BILL OF QUANTITIES

1.0 All items of work shall be executed strictly in accordance with the description of the item in the bill of quantities, equipment schedule, drawings and standard specifications read in conjunction with the appropriate IS and conditions of Contract.

1.0 The rate for each item of work included in the Bill of Quantities shall unless expressly stated otherwise include cost of:

a. All materials, transport, lead & lift, fixing materials, accessories, hardware, operations, tools, equipment, consumables, civil works wherever involved and incidentals required in preparation for in the full and entire execution and completion of the work called for in the item and as per specifications and drawings completely.

b. Wastage on materials and labour.

c. **All** taxes and duties, GST, works contract tax, sales tax, etc., transit insurance, packing and forwarding charges, loading, transportation, unloading, handling, hoisting, to all levels, setting and fixing in position, disposal of debris and all other labour necessary in accordance with contract documents, good practice and recognised principles.

d. Liabilities, obligations and risks arising out of conditions of contract.

e. Liaison service charges.

2.0 All requirements of system whether such requirements are mentioned in the item or not. The specifications and drawings are to be read as complimentary to and part of the schedule of quantities and any work called for in one shall be taken as required for all.

3.0 In the event of conflict between the bill of quantities and other documents, the most stringent shall apply and interpretation of the Architect / Consultant shall be final and binding.

4.0 The installation price of switchboards, metering panels, DB's or any other items shall include supply and fixing of supporting steel structures / MS channels grouting of the same civil works etc. as required.

5.0 No change in unit rate shall be allowed for any change in quantity or for any other reason whatsoever.

6.0 Supply of materials shall mean supply of materials at site. The rate for supply shall include all taxes & duties, GST, Insurance, Packing and Forwarding charges, and transportation, unloading at site, all lead & lift.

7.0 The successful contractors shall submit the Schematic diagrams, fabrication drawings with details of all equipments wirings diagrams etc. to the Architects or Consultants for approval prior to supply / commencement of such works. The approval of these drawings will be general and will not absolve to contractor of the responsibility of the

correctness of these drawings. At least four copies of the approved drawings shall be supplied to Architects for their distribution to various agencies at site at no cost to the owner.

8.0 The Tenderers must see the site conditions, location etc. and take all factors into consideration while quoting the rates as no extra cost will be allowed on any ground arising out of or relating to the site conditions.

9.0 Any error in description or in quantity or omission of items from the contract shall not vitiate this contract but shall be corrected and deemed to be a variation required by the consultants / owners.

10.0 The Liaison service charges shall include the following:

a) Follow up with the respective departments for the sanctions and servicing the installation.

b) Preparation of detailed drawings required by the Departmental Inspector.

c) Obtaining approval of drawings, and installation.

d) Renewals of any temporary power supply connection during construction.

e) All incidental charges / expenses associated with the above work.

Official deposits, fees etc. if any to be paid to the above agencies will be reimbursed separately at actuals by the University.

11.0 All testing charges for the equipment shall be included in the installation price of the respective equipment / item.

12.0 The rate quoted shall be firm and NO PRICE VARIATION CLAUSE WILL BE ENTERTAINED.

Note :

(1) Item for which no rate or price has been entered in will not be paid for by the University when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities (refer : ITB Clause 11.2 and CC Clause 37.2)
(2) Unit rates and prices shall be quoted by the Tenderer in Indian Rupees.
(3) Where there is a discrepancy between the rate in figures and words, the lower of the two will govern. (ITT Clause 24.1(a))
4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate quoted shall govern (ITT Clause 24.1 (b))