INSTITUTE WORKS DEPARTMENT
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

E-TENDER DOCUMENT

For

"Supply, Installation, Testing & Commissioning (SITC) of Treated Fresh Air System for Lecture Halls connected with VRF Air-conditioning system in APJ Abdul Kalam Block (LHC-II) at IIT Roorkee"

Indian Institute of Technology Roorkee
Roorkee-247667, Tel.no. 01332-28-4955/5386

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INSTITUTE WORKS DEPARTMENT
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

No. IWD/IE/25-26/E-tender/Re/135 **Dated: 16 May, 2025**

NOTICE INVITING TENDER

On behalf of BOG, I.I.T. Roorkee, online Tenders (Percentage Rate) are invited in two Bid systems (Technical and Financial) from eligible bidders having experience of working in Central / State Government, Public Sector Undertaking / Autonomous Organization of Central / State Government who fulfil the PQ criteria for the following work:

Name of the Work	Estimated Cost	Completion Period (Months)
"Supply, Installation, Testing & Commissioning (SITC) of Treated Fresh Air System for Lecture Halls connected with VRF Air-conditioning system in APJ Abdul Kalam Block (LHC-II) at IIT Roorkee"	**Rs. 82.52 Lacs including 06 years CAMC (inclusive of GST & BOCWW Cess)**	**06 Months**

1. Interested eligible Bidders may obtain further information from IIT Roorkee website: www.iitr.ac.in (http://mm.iitr.ac.in/mmweb/tenders) or from Central Public Procurement Portal (CPPP) https://eprocure.gov.in/eprocure/app.

2. Intending bidders are advised to visit IIT Roorkee website www.iitr.ac.in (http://mm.iitr.ac.in/mmweb/tenders) and Central Public Procurement Portal (CPPP) https://eprocure.gov.in/eprocure/app regularly till closing date of BID submission of tender for any corrigendum / addendum/ amendment.

Critical Data Sheet

Sr. No.	Name of Organization	Indian Institute of Technology Roorkee
1	Tender Type (Open/Limited/EOI/Auction/Single)	Open
2	Tender Category (Services/Goods/Works)	Works
3	Type/Form of Contract (Work/Supply/ Auction/ Service/ Buy/ Empanelment/ Sell)	Work Contract
4	Product Category (Civil Works/Electrical Works / Fleet Management / Computer Systems)	Electrical Works
5	Date of Issue/Publishing Original Tender	16.05.2025 (18:00 Hrs.)
6	Document Download / Sale Start Date	16.05.2025 (18:00 Hrs.)
7	Pre-bid Meeting	N/A
8	Seek Clarification Start Date	16.05.2025 (18:00 Hrs.)
9	Seek Clarification End Date	23.05.2025 (13:00 Hrs.)
10	Bid Submission Start Date	30.05.2025 (13:00 Hrs.)
11	Bid Submission Closing Date	06.06.2025 (13:00 Hrs.)
12	Bid Opening Date	09.06.2025 (15:30 Hrs.)
13	Tender Fee (Non-refundable)	**Rs. 1180 (including GST @18%)**
14	EMD (2%)	**Rs. 1,66,000/-**

15	Mode of Submission of EMD and Tender Fee	By RTGS, NEFT in below mentioned account no.: 1. **Name of Bank**- State Bank of India 2. **Branch**- IIT Roorkee 3. **Account No**.- 43508683377 4. **Account Name**- IITR EMD AND TENDER FEE ACCOUNT (Account Type – Saving Account) 5. **IFS Code** - SBIN0001069 6. **MICR Code** – 247002094 The bidders shall be required to upload the scanned copies of transaction of payment of Tender Fee/ EMD including e-receipt (clearly indicating UTR No. & Tender Reference i.e. NIT No. must be entered in the remark at the time of online transaction of payment, failing which payment may not be considered) at the time of online bid submission on e-tendering website. **OR** 1. **Tender Fee:** In shape of Demand Draft in favour of **Registrar, IIT Roorkee** payable at Roorkee. 2. **EMD:** In the form of Bankers Cheque / Demand Draft / FDR in the name of **Institute Engineer, IIT Roorkee**. Scanned copy of Tender Fee/ EMD to be uploaded in Cover-1 and original Tender Fee/ EMD in a sealed envelope should reach on or before the last date and time of bid submission to the address mentioned below: **Contract Cell** **Institute Works Department** **James Thomason Building (Main Building)** **IIT Roorkee, Roorkee** **Haridwar Uttarakhand-247667.** **Instructions for submission of Tender Fee & EMD (in case of Bankers Cheque / Demand Draft / FDR).** 1. NIT number & Name of the Work should be clearly super scribed on the top of the envelope with firm's/ bidder's name & address. Bids may be rejected if NIT number & Name of the Work is not mentioned on the Envelope. 2. Bids shall be considered as UNRESPONSIVE and shall be summarily rejected in the case of non-submission of original EMD and Tender fee as per stipulated date & time OR if any discrepancy is found at any stage.
16	Performance Guarantee (5%)	5% of awarded value (Part-A) shall be submitted in the form of Bankers Cheque / DD / FDR / Bank Guarantee in the name of Institute Engineer, IIT Roorkee after issue of Letter of Acceptance (LOA).
17	Security Deposit (5%)	5% of awarded value (Part-A) shall be submitted in the form of Bankers Cheque / DD/FDR / Bank Guarantee in the name of Institute Engineer, IIT Roorkee after issue of Letter of Acceptance (LOA).
18	No. of Covers (1/2/3/4)	02 (Cover-1 for Technical+ Cover-2 for Financial)
19	Bid Validity Days (180/120/90/60/30)	90 days (from last date of opening of financial bid)
20	Price Bid	To be uploaded only on CPP Portal (http://eprocure.gov.in/eprocure/app) in excel sheet.
21	Address for communication.	**Institute Engineer, Institute Works Department, James Thomson Building, IIT Roorkee, Roorkee-247667 (India), Tel. No. 01332-284955 / 5386**
22	Email Address	tntiwari.eem2019@iitr.ac.in/neeraj.aee2018@iitr.ac.in

2. Eligibility Criteria for submission of bid documents:

a. Intending bidder should not be a joint venture (Copy of relevant documents clearly establishing the status of bidder to be uploaded in Cover-1).

b. Experience of having successfully completed similar work individually costing not less than as stated below during the last 7 years ending previous day of last date of submission of bids.

(i) Three similar works, each of value not less than 40% of the estimated cost,

OR

(ii) Two similar works, each of value not less than 60% of the estimated cost,

OR

(iii) One similar works of value not less than 80% of the estimated cost,

Completion certificate issued by Competent Authority will only be considered. Competent Authority means officer of not below the Rank of Executive Engineer/ Equivalent would be acceptable.

The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum, calculated from the date of completion to last date of receipt of applications for this tender. (Copy of work completion certificate to be uploaded as proof of eligibility criteria in Cover-1).

c. Similar work means: - **Supply, installation, testing & commissioning of Centralized HVAC / VRF System.**

Turnover: The Average Annual Turnover CA Certificate preferably with UDIN should be at least **50%** of estimated cost during the last three consecutive Financial Years, balance sheet duly audited by Charted Accountant. (Scanned copy of Certificate from CA preferably with UDIN Number to be uploaded). The year in which no turnover is shown would also be considered for working out the average.

3. Institute reserves the right to cancel any or all tenders without assigning any reason.

4. No exemption in tender fee and EMD shall be applicable for firms registered under MSE/NSIC/Udyog Adhaar. Therefore, all the bidders are required to submit the EMD and Tender fee as mentioned in Tender documents.

List of Documents to be scanned and uploaded under Cover-1 on e-tendering website to the last date and time mentioned in Critical data sheet:

Note: Physical submission of these documents (except tender fee and EMD) is not required at the time of uploading of tender by bidders, however these documents should be submitted by bidder if asked by the institute subsequently for verification of documents.

1. Affidavit (on Rs.10 non judicial stamp with notarized) regarding establishment of proprietorship firm / partnership deed / letter of incorporation for private ltd / ltd firm with written power of attorney (in case of bidder is owner, not required) of the authorized signatory.
2. Self-certified copy of work orders along with work completion certificate as per eligibility criteria. Proof of online deposit of tender fee and EMD.
3. Should have valid solvency certificate of the amount at least 40% of the estimated cost of the work issued by a scheduled bank which is not more than one year old from the last date of tender submission (including extension time). Certified copy of original solvency certificate to be uploaded in Cover-1 and Annexure-I.
4. Turnover certificates from CA preferably with UDIN Number, GST registration certificate, PAN Card, ESI registration certificate & EPF registration certificate.
5. Project specific authorization from OEM of outdoor unit mentioning full back support including spares during the usable life of the units.
6. Filled Annexure-II (duly signed by the Bidder and OEM) and Technical brochure.
7. Qualifying information (Annexure-A) & Notarized undertaking on Rs. 100 non-judicial stamp paper as per the NIT.

Sd/-
Institute Engineer,
IWD, IIT Roorkee

INSTRUCTIONS FOR ONLINE BID SUBMISSION

As per the directives of Department of Expenditure, this tender document has been published on the Central Public Procurement Portal (URL: https://eprocure.gov.in/eprocure/app). The bidders are required to submit soft copies of their bids electronically on the CPP Portal, using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP Portal. More information useful for submitting online bids on the CPP Portal may be obtained at: https://eprocure.gov.in/eprocure/app .

1.0 Registration

1.1 Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal (URL: https://eprocure.gov.in/eprocure/app) by clicking on the link "Click here to Enroll". Enrolment on the CPP Portal is free of charge.

1.2 As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.

1.3 Bidders are advised to register their valid email address and mobile numbers as part of the registration process. These would be used for any communication from the CPP Portal.

1.4 Upon enrolment, **the bidders will be required to register their valid Digital Signature Certificate (Class II or Class III Certificates with signing key usage) issued by any Certifying Authority recognized by CCA India (e.g. Sify/TCS/nCode/eMudhra etc.) with their profile.**

1.5 Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSCs to others which may lead to misuse.

1.6 Bidder then logs in to the site through the secured log-in by entering their user ID/password and the password of the DSC/eToken.

2.0 Searching for Tender Documents

2.1 There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, organization name, location, date, value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as organization name, form of contract, location, date, other keywords etc. to search for a tender published on the CPP Portal.

2.2 Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective 'My Tenders' folder. This would enable the CPP Portal to intimate the bidders through SMS / e-mail in case there is any corrigendum issued to the tender document.

2.3 The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.

3.0 Preparation of Bids

3.1 Bidder should take into account any corrigendum published on the tender document before submitting their bids.

3.2 Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents - including the names and 4 content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.

3.3 Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document / schedule and generally, they can be in PDF/XLS/RAR/DWF formats. Bid documents may be scanned with 100 dpi with black and white option.

3.4 To avoid the time and effort required in uploading the same set of standard documents which are required to be submitted as a part of every bid, a provision of uploading such standard documents (e.g. PAN card copy, annual reports, auditor certificates etc.) has been provided to the bidders. Bidders can use "My Space" area available to them to upload such documents. These documents may be directly submitted from the "My Space" area while submitting a bid, and need not be uploaded again and again. This will lead to a reduction in the time required for bid submission process.

3.5 If any cell is left blank the same shall be treated as "0". Therefore, if any cell is left blank and no rate is quoted by the bidder, rate of such item shall be treated as "0" (ZERO). However, if a tenderer quotes nil rates against each item in item rate tender or does not quote any percentage above/below on the total amount of the tender or any section / sub head in percentage rate tender, the tender shall be treated as invalid and will not be considered as lowest tenderer.

4.0 Submission of Bids

4.1 Bidder should log into the site well in advance for bid submission so that he/she upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay due to other issues.

4.2 The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.

4.3 Bidder shall submit tender fee as per critical data sheet.

4.4 A standard BOQ format has been provided with the tender document to be filled by all the bidders. Bidders are requested to note that they should necessarily submit their financial bids in the format provided and no other format is acceptable. Bidders are required to download the BOQ file, open it and complete the white coloured (unprotected) cells with their respective financial quotes and other details (such as name of the bidder). No other cells should be changed. Once the details have been completed, the bidder should save it and submit it online, without changing the filename. If the BOQ file is found to be modified by the bidder, the bid will be rejected.

4.5 The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission.

4.6 All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128 bit encryption technology. Data storage encryption of sensitive fields is done.

4.7 The uploaded tender documents become readable only after the tender opening by the authorized bid openers.

4.8 Upon the successful and timely submission of bids, the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.

4.9 Kindly add scanned PDF of all relevant documents in a single PDF file of compliance sheet.

5.0 Assistance to Bidders

5.1 Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority to the address provided in Critical Data Sheet for a tender or the relevant contact person indicated in the tender.

5.2 Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24x7 CPP Portal Helpdesk. The contact number for the helpdesk is 0120-4001062 / 0120-4001002 / 0120-4001005 / 0120-6277787

6.0 General Instructions to the Bidders

6.1 The tenders will be received online through portal http://eprocure.gov.in/eprocure/app. In the Technical Bids, the bidders are required to upload all the eligibility criteria documents in .pdf format.

6.2 Possession of a Valid Class II/III Digital Signature Certificate (DSC) in the form of smart card/etoken in the company's name is a prerequisite for registration and participating in the bid submission activities through https://eprocure.gov.in/eprocure/app. Digital Signature Certificates can be obtained from the authorized certifying agencies, details of which are available in the web site https://eprocure.gov.in/eprocure/app under the link "Information about DSC".

6.3 Tenderer are advised to follow the instructions provided in the 'Instructions to the Tenderer for the e-submission of the bids online through the Central Public Procurement Portal for e Procurement at https://eprocure.gov.in/eprocure/app.

INFORMATION AND INSTRUCTIONS TO BIDDERS

1. On behalf of BOG, I.I.T. Roorkee, online Tenders (Percentage Rate) are invited in two Bid systems (Technical and Financial) from eligible bidders having experience of working in Central / State Government, Public Sector Undertaking / Autonomous Organization of Central / State Government who fulfil the PQ criteria for the work of **"Supply, Installation, Testing & Commissioning (SITC) of Treated Fresh Air System for Lecture Halls connected with VRF Air-conditioning system in APJ Abdul Kalam Block (LHC-II) at IIT Roorkee''.**

1.1 The work is estimated to cost as mentioned in the NIT. The estimate, however, is given merely as a rough guide.

1.2 Intending bidder is eligible to submit the bid provided, if he has definite proof from the appropriate authority, which shall be to the satisfaction of the competent authority, of having satisfactorily completed similar works of magnitude specified below:

1.2.1 Criteria of eligibility for submission of bid documents:

1. Agreement shall be drawn with the successful bidder on prescribed format.

2. The time allowed for carrying out the work will be as per the NIT from the date of start as defined in Award of Work or from the first date of handing over of the site, whichever is later, in accordance with the phasing, if any, indicated in tender documents.

3. The site for the work is available / shall be made available for start of the work.

4. The Tender document consisting of plans, specifications, the schedule of quantities of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents can be seen / downloaded from IIT Roorkee website: www.iitr.ac.in (http://mm.iitr.ac.in/mmweb/tenders) or from Central Public Procurement Portal (CPPP) https://eprocure.gov.in/eprocure/app.

5. While submitting the bids, bidder can revise the rate, but before last date and time of submission of bids as notified. In this case, the last submitted bid before the last date and time will only be considered.

6. The scanned copies of documents as per critical data sheet shall be uploaded under Cover-1 on the e-tendering website.

7. Online Financial Bids submitted by intending bidders shall be opened only of those bidders, whose bid found technically qualified.

8. The bid submitted shall become invalid and cost of bid & tender processing fee shall not be refunded if: (i) the bidder is found ineligible. (ii) The bidder does not provide all the documents (including PAN No., GST registration etc.) as stipulated in the bid document.

9. Intending bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their bids as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their Tender. A bidder shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charge consequent upon any misunderstanding or otherwise shall be allowed. The bidder shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a tender by a bidder implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and rates at which stores, tools and plant, etc. will be issued to him by the Institute and local conditions and other factors having a bearing on the execution of the work. Cost of site visit shall be borne by the bidder.

10. All tenders in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the bidder shall be summarily rejected.

11. Canvassing whether directly or indirectly, in connection with bidders is strictly prohibited and the Tenders submitted by the bidders who resort to canvassing will be liable to rejection.

12. The bidder shall not be permitted to tender for works in the IWD, IIT Roorkee, if his near relative is posted as an officer in any capacity between the grades of Dean Infrastructure and Junior Engineer (both inclusive). Any breach of this condition by the bidder would render him liable to be removed from the Tendering process.

13. No Engineer of gazetted rank or other Gazetted Officer employed in Engineering or Administrative duties in an Engineering Department of the Government of India is allowed to act as a bidder within a period of one year after his retirement from Government service, without the previous permission of the Government of India in writing. This contract is liable to be cancelled if either the bidder or any of his employees is found any time to be such a person who had not obtained the permission of the Government of India as aforesaid before submission of the tender or engagement in the bidder's service.

14. The notice inviting bid shall form part of the contract document. The successful bidder, on acceptance of his bid by the Accepting Authority, have to sign the contract consisting of "The Notice Inviting bid, all the documents including Special Conditions, General Specifications/ Particular Specifications and drawings, if any, forming part of the bid as submitted at the time of invitation of bid and the rates quoted online at the time of submission of bid and acceptance thereof together with any correspondence leading thereto within 15 days from the stipulated date of start of the work.

15. The bid for the works shall remain open for acceptance for a period of 90 days from the date of opening of financial bids. If any bidder withdraws his bid before the said period or issue of letter of acceptance, whichever is earlier, or makes any modifications in the terms and conditions of the bid which are not acceptable to the Indian Institute of Technology Roorkee, then Indian Institute of Technology Roorkee, without prejudice to any other right or remedy, be at liberty to forfeit of the said earnest money as aforesaid. Further, the bidder(s) shall not be allowed to participate in the re-bidding process of the work.

2. **Composite Tender (if applicable)**

2.1 The competent authority is calling this bid for the composite work. The Earnest money is fixed with respect to the combined estimated cost put to tender for the composite tender.

2.2 The eligible bidders have to quote rates for all items given in the schedule of quantity.

2.3 After acceptance of the bid by competent authority, **Institute Engineer, IWD, IIT Roorkee** shall issue letter of Acceptance (LoA) on behalf of the Institute. After issue of LoA, the bidder will have to enter into one agreement with **Institute Engineer**.

2.4 Entire work under the scope of composite tender including major and all minor components shall be executed under one agreement.

2.5 Security Deposit will be worked out separately for each component corresponding to the quoted/accepted cost of the respective component of works. The Earnest Money will become part of the security deposit of the respective projects under the head Mega projects in ratio of the corresponding estimated value of these projects.

2.6 The bidder may associate agency(s) for minor component(s) conforming to eligibility criteria as defined in the tender document and has to submit detail of such agency(s) to Dean Infrastructure. Name of the agency(s) to be associated shall be approved by Dean Infrastructure. Before engaging such associate agencies bidder has to inform to Dean Infrastructure along with his past experience and all credential's and got the approval of the same from him.

2.7 In case the bidder intends to change any of the above agency/ agencies during the operation of the contract, he shall obtain prior approval of respective Dean Infrastructure. The new agency/ agencies shall also have to satisfy the laid down

eligibility criteria. In case Dean Infrastructure is not satisfied with the performance of any agency, he can direct the bidder to change the agency, and this shall be binding on the bidder.

2.8 The main bidder has to enter into agreement with bidder(s) associated by him for execution of minor component(s). Copy of such agreement shall be submitted to Engineer-in-charge In case of change of associate bidder, the main bidder has to enter into agreement with the new bidder associated by him.

2.9 The composite work shall be treated as complete when all the components of the work are complete. The completion certificate of the composite work shall be recorded by Engineer-in-charge of major component after record of completion certificate of all other components. Final bill of whole work shall be finalized by IWD, IIT Roorkee.

2.10 It will be obligatory on the part of the bidder to sign the tender documents for all components before the first payment is released.

A: GENERAL INSTRUCTIONS

1. Scope of Tender.

1.1 Indian Institute of Technology Roorkee (referred to as Owner in these documents) invites Tender as defined in these documents and referred to as "the works" detailed in the table given in the Notice Inviting Tenders (NIT).

1.2 The successful Bidder shall complete the works within the completion date specified in the Notice Inviting Tenders (NIT).

1.3 Those makes of items will be used which are approved by the Institute Engineer.

2. Non-Association / Relation

2.1 All bidders shall provide in the bid tender and Qualification Information, a statement that the Bidder is not associated, nor has been associated in the past, directly or indirectly, with the Indian Institute of Technology Roorkee or any other entity that has prepared the design, specifications, and other documents for the Project.

3. Qualification of the Bidder

3.1 All Bidders shall provide tender qualification information.

3.2 All Bidders shall include the following information by submitting relevant documents and certificate with their tenders: The Bidder must be registered with the GST Department and should submit the registration certificate of GST, ESI, EPF, Labour License (if applicable) etc.

4. Cost of tendering

4.1 The Bidder shall bear all costs associated with the preparation and submission of his tender, and the Owner will in no case be responsible and liable for those costs.

4.2 The Bidder, at its own responsibility and risk is encouraged to visit and examine the Site of Work and its surroundings and obtain all information that may be necessary for preparing the tender. The costs of visiting the Site shall be at the Bidder's own expense.

B: DOCUMENTS INVITING TENDERS

5. Invitation: Tenders are hereby invited on behalf of Indian Institute of Technology Roorkee.

6. Contents of documents as mentioned in the relevant clauses mentioned:

The Bidder shall be deemed to have examined all instructions, forms, terms, and specifications in the Documents. Failure to furnish the information required in the Tender Document or submission of a Bid not substantially responsive to the Tender Documents in every respect will be at the Bidder's risk and may result in the rejection of the bid.

The several documents forming the contract are to be taken as mutually explanatory of one another, detailed drawings being followed in preference to small scale drawing and figured dimensions in preference to scale and Special Conditions in preference to General Conditions.

In case of any discrepancy between the Schedule of Quantities, the specifications and/ or the drawings, given in the tender document the following order of preference shall be observed:

1. Description of Schedule of Quantities.
2. Particular Specification and Special condition, if any.
3. Drawings.
4. C. P. W. D. specifications/ IWD, IIT ROORKEE specification.
5. Latest edition Indian Standard Specifications of B. I. S.

7. Amendment of Tendering Documents

7.1 Before the deadline for submission of bids, the Indian Institute of Technology Roorkee may modify the Tender documents by issuing addenda/corrigendum.

7.2 Any addendum thus issued shall be part of the Tendering documents and shall be uploaded on e-Tendering website https://eprocure.gov.in/eprocure/app and Institute website http://mm.iitr.ac.in/mmweb/tenders.

7.3 To give prospective Bidders reasonable time in which to take an addendum / corrigendum into account in preparing their bid, the IIT Roorkee may extend if necessary the deadline for submission of tenders.

C: PREPARATION OF DOCUMENT

8. **Tender fee :** Tender fee in favour of Registrar, Indian Institute of Technology Roorkee payable at Roorkee must be submitted as mentioned in critical data sheet. Bids not accompanying with Tender fee will be summarily rejected. Tender fee is nonrefundable.
9. **Earnest Money Deposit (EMD):** EMD as per critical data sheet must be submitted. Bids not accompanying with EMD will be summarily rejected. The EMD of the unsuccessful Bidders will be discharged / returned within Thirty (30) days from the date of opening of the financial bids. The EMD of the successful Bidder shall not be adjusted or converted as Security deposit. The EMD may be forfeited and further the bidders shall not be allowed to participate in the re-bidding process of the work, if the Bidder withdraws his bid during bid validity period or in case of successful fails to sign the contract/ fails to deposit security amount and performance guarantee.
10. **Period of validity of bid:** The bids shall remain valid for a period of 90 days after the date of financial bid / price bid opening. A bid valid for a shorter period shall be rejected by the Indian Institute of Technology Roorkee as non-responsive.
11. **Language of Bid:** The document shall be written in English/Hindi language. The total amount should be written in the same language.
12. **Document comprising the E-Tender:** No page of this tenders document shall be removed and the set must be submitted as it is. Each page of the tenders document form is to be signed by the Bidder and must bear the Seal of the Company/Firm.

The tender submitted by the Bidder shall comprise as mentioned above in the relevant sections.

13. **Tender Prices**

13.1 The contract shall be for the whole works as described in priced Schedule of Quantities submitted by the Bidder.

13.2 The tender submitted on behalf of firm shall be signed by a person who has the proper legal authority on behalf of the firm to enter into the contract; otherwise, the bid is liable to be rejected. Each page of the tender document and each drawing accompanying is required to be signed by the authorized person submitting the bid, with the company seal as the token of their having examined and acquainted themselves with the General conditions of contract, drawings, specifications, special conditions of contract etc. The forms of tender are to be filled in completely. Any bid with any of the documents not signed is liable to be rejected.

13.3 The notation R.O. written against items of BOQ means 'rate only" and the bidder is to quote only unit rate in such cases.

13.4 The Bidder shall fill in the percentage rate/in rates for items of the Works described in the Schedule of Quantities along with total bidding price. In case if the rates are not filled for any of the Items of Schedule of Quantities, in such cases the tender shall be summarily rejected. Failure to comply with either of these conditions will make the bid liable for rejection.

13.5 **Taxes:** All duties, taxes, and other levies payable by the Bidder under the contract, or for any other cause, shall be included in the rates, prices and total Bidding Price submitted by the Bidder. Bidders must include in their rates, the cost of transportation of materials to site, GST, labour cess as per Building & other construction workers cess act, excise duty, octroi, and any other tax and duty levied by the Central / State Government. None of the above taxes & levies will be entertained by the Owner and no tax exemption forms will be issued by the Owner.
Estimate has been prepared on current applicable GST rate. However actual payment will be done on the basis of prevailing GST rates at the time of execution of work and its payment.

13.6 **Labor Cess or BOCWW Cess**: Labour cess @1% shall be deducted from each bill.

13.7 The work shall be carried out by the Bidder in a manner complying in all respect with the requirement of relevant bye-laws/orders of the Local/Municipal bodies and pay all fees and charges which may be leviable at his own cost. The completion/ occupancy certificates including clearance from fire committee or any other statutory obligation shall be arranged by the bidder. Any official fees shall be paid by the Owner. All other cost of liasoning shall be borne by the bidder.

13.8 Bidder should also take a Group Insurance Policy for his Workmen, Supervisors and Engineers working on site for an adequate insurance cover. Indian Institute of Technology Roorkee shall not be responsible for any accident or happening of any untoward/unforeseen event involving workmen, labour, supervisor or engineer or any person directly or indirectly associated with the execution of work. The insurance policy to be obtained by the successful Bidder must be comprehensive and shall cover all associated risks (known and unknown).

13.9 The rates quoted in the tender shall include cost of electrical power supply, water supply, cost of all materials, labour, telephone, rent and call charges, water and meter rent charges, temporary electric wiring / lighting for execution of work at site, hire for any tools and plants, shed for materials, marking out and clearing of site, transportation complete in all respects. The rates quoted in the tender shall be treated as rate for finally completing the item of work.

13.10 The quantities furnished in the schedule of quantities are only probable quantities and are liable to alterations, by omission, deductions or additions to any extent at the discretion of Indian Institute of Technology Roorkee. Payments will be regulated on the actual quantities of work done at accepted rates.

13.11 Errors in the Schedule of Quantities shall be dealt with in the following manner:

i. In the event of a discrepancy between the rates quoted in words and the rates in figures, rate quoted in words shall be considered to be correct.

ii. In the event of an error occurring on account of arithmetical calculations the same shall be corrected according to rates written in words and quantities in B.O.Q.

iii. All the errors in totaling in the amount column and in carrying forward the totals shall be corrected. The tender total shall be accordingly amended. If the bidder doesn't accept the corrected amount, then his bid will be rejected.

13.12 The calculations made by the bidder should be based upon quantities of the items of work which are furnished in the Schedule of Quantities, but it must be clearly understood that the contract is not a lump sum contract. The Owners do not in any way assure, represent or guarantee that the said probable quantities are correct or that the work would correspond thereto. The items of work irrespective of the quantities which may vary shall be carried out at the same accepted bidding etender rates and no escalation in the rates will be entertained whatsoever. Any item of work may be omitted from the schedule of quantities and may be awarded to another agency at any time / stage of the work.

13.13 The bidders must obtain for themselves on their own responsibility and their own expenses all the information which may be necessary, including risks, contingencies and other circumstances to enable them in making a proper bid and for entering into a contract, and must examine the drawings, specifications and conditions and inspect the site of the work, nature of the work, availability of power, water, shelter for workmen and all the matters pertaining thereto before submitting the bid. They can also get any clarifications required from the Owner, before tendering, by contacting them at their office during working hours.

14. Format and signing of Tender document

14.1 The bid 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 Bidder. All pages of the tender where entries or amendments have been made shall be initialed by the person or persons signing the tender.

14.2 The tender shall contain no alterations or additions, except those to comply with instructions issued by the Owner, or as necessary to correct errors made by the Bidder, in which case such corrections shall be initialed by the person or persons signing the bid. ANY CONDITIONAL BID WILL BE SUMMARILY REJECTED.

D: MODE OF SUBMISSION OF BID DOCUMENT

15. Sealing and marking of bids.

15.1 The entire document to be put in cover-1 and 2 should be scanned and uploaded under cover-1 and 2 respectively on the e-tendering website. No hard copy of any document (financial or technical) should be submitted. In case any hardcopy is submitted then the same will not accepted by the department.

16. Deadline for submission of bid: - As per Critical Data Sheet.

E: TENDER OPENING AND EVALUATION

17. Tender opening: The tender will be opened on the date and the place specified in the critical data sheet. In case of any unavoidable circumstances or unforeseen event on the specified date and time of tender opening, the bids will be opened at the appointed time and location on the next working day.

18. Clarification of Tenders: To assist in the examination, evaluation and comparison of bids, the Owner may, at his discretion, ask any Bidder for clarification of his bid, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by email, but no change in the price or substance of the tendering shall be sought, offered, or permitted.

19. Examination of Bids and Determination of Responsiveness:

19.1 Prior to the detailed evaluation of bids, the Owner will determine whether each bid

a) Meets the eligibility criteria defined
b) Has been properly signed and meets the requirements mentioned
c) is accompanied by the required securities and;
d) is responsive to the requirements of the tendering documents.

19.2 A responsive bid is one which conforms to all the terms, conditions and specifications of the tendering 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 Indian Institute of Technology Roorkee rights or the Bidders' obligations under the contract; or
c) Whose rectification would affect unfairly the competitive position of other Bidders presenting responsive bids.

19.3 If a bid is not responsive, it will be rejected by the Indian Institute of Technology Roorkee, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.

20. Evaluation and Comparison of Bids:

20.1 The Owner along will evaluate and compare only the bids determined to be substantially responsive.

20.2 In evaluating the bids, the Owner will determine for each bid the evaluated bids Price by adjusting the bid. Price as follows:

a) Making any correction for errors; or

b) Making an appropriate adjustment for any other acceptable variations, deviations; and

c) Making appropriate adjustments to reflect discounts offered.

21. The Owner reserves the right to accept or reject any variation, deviation, or alternative offer and other factors which are in excess of the requirement of the tender.

F: AWARD OF TENDER

22. Award criteria:

22.1 The acceptance of bid will rest with the Owner, which does not bind itself to accept the lowest bid and reserves to itself the authority to reject completely / partially, any or all of the bid/s received without the assignment of a reason.

22.2 The owner reserves to itself the right of accepting the whole or any part of the Bid and the Bidder shall be bound to perform the same at the rate quoted.

22.3 The Owner reserves to itself the right of omission of any item of work from the awarded tender at any time / stage during the execution of work and awards the same to another agency / bidder.

23. Notification of award: The successful Bidder will be issued a Letter of Acceptance (LoA) by the Owner. The issuance of LoA shall not constitute an award of work.

24. Performance Guarantee: Within ten (10) days of LoA the successful Bidder shall furnish the performance guarantee @ 5% of value of work in the form of DD/FDR/ Bankers cheque /Bank Guarantee from Scheduled bank provided in the tender document. The Performance Guarantee must be valid two months beyond the work completion period. It may be further extended. The Performance guarantee shall be returned / refunded to the bidder on completion of the work and recording of the completion certificate. In case the bidder fails to deposit it the said performance guarantee within the period as indicated, the Earnest Money deposited by the bidder shall be forfeited automatically without any notice to the bidder.

25. Signing of contract form: On the acceptance of LoA and Performance Bank Guarantee of the successful Bidder whose tender has been accepted in writing, the Indian Institute of Technology Roorkee will sign an agreement. Article of agreement shall be as per IIT Roorkee.

G: DURING EXECUTION

26. During Execution: The Bidder shall carry out all the works strictly in accordance with the drawing, details and instructions of the Owner. If in the opinion of the Owner, changes have to be made in the design, and they desire the bidder to carry out the same, the Bidder shall be bound to comply. The Owner decisions in such cases shall be final.

The Bidder is bound to carry out any items of work necessary for the completion of the job even though such items are not included in the schedule of quantities and rates. Schedule of instructions in respect of such additional items and their quantities with the prior consent from the Owner. Rates for such items of work will be approved by the Owner on the basis of Analysis of Rates which will be derived from actual prevailing market rates of similar item along with 15% as bidder's profit & overhead (or service charge as quoted by the bidder). The rates approved by the Owner in such cases will be final.

The Bidder shall get the quality of work done inspected for material and workmanship at different stages of execution as per instructions given by the Owner or their representative time to time. Any item of work done which is found not conforming to the Contract shall be rejected by the Owner. The decision of the Owner in such cases shall be final.

The Owner may instruct at any stage of execution for testing of samples of any material taken at random. The Owner will decide the testing laboratory / agency and the cost of testing including the expenses for sending the samples to the laboratory / agency and receipt of test reports shall be borne by the Bidder. The material shall be rejected in case the test reports are not within the permissible limits.
The Bidder shall have to present the invoice for purchased material from the manufacturer or from the dealer along with the certificate from the manufacturer. In case material is found to be of substandard quality, the same shall be rejected by the Owner. The decision of the Owner in such cases shall be final.

The Bidder shall not be entitled to any compensation for the Loss suffered by him on account of delays in commencing or executing the work whatever the cause of delay may be, including delays arising out of modifications to the work entrusted to him or in any subcontracts connected therewith or delays in awarding contracts for other trades of the project or in commencement or completion of such other works or in procuring Government controlled or other building materials for any other reasons whatsoever. The Owner shall not be liable for any sum besides the e-tender amount, subject to such variations as are provided for herein and as instructed by Owner. However, necessary time extension will be given if the delays are not attributed to the Bidder.

ANNEXURE - A

QUALIFYING INFORMATION

Please furnish the following information along with documentary evidence only in this format (as eligibility criteria)

1.	Name of the bidder		
2.	Legal Status of the bidder		
3.	Place of registration and registration of the bidder		
4.	Year of establishment of the firm.		
5.	Permanent Address		
6.	Email id		
7.	Contact Numbers		
8.	Principal place of the registration		
9.	PAN No.		
10.	GST No.		
11.	EPF		
12.	ESI		
13.	Tender fee details		
14.	Solvency certificate details		

16. Average annual financial turnover during the last 3 consecutive years, ending 31st March of previous financial year, should not be less than 50% of the estimated cost. CA certificate be enclosed as documentary proof. Copies of balance sheets duly certified by ***CA preferably with UDIN Number*** to be submitted.

Sl. No.	Financial Year	Amount (in Lakhs)
1		
2		
3		

17. PROFORMA FOR LIST OF WORKS EXECUTED BY THE BIDDER DURING THE LAST 5 YEARS AND ABOVE

Sl. No	Name of work/ project with address	Name & postal address of the owner & contact person	Contract Value	Date of Start	Date of Completion	Actual Date of Completion

Note: Bidder may furnish the above information in separate sheet if the space is not sufficient.

18. PROFORMA FOR LIST OF WORKS IN HAND

Sl. No	Name of work/ project with address	Name & postal address of the owner & contact person	Published Value	Date of Start	Stipulated date of completion	Present Progress

Note: Bidder may furnish the above information in separate sheet if the space is not sufficient

19. DETAILS OF KEY PERSONNEL

Sl. No	Name & Designation	Qualification	Experience	Nature of Works Handled	Date from which employed in your organization

Note: Bidder may furnish the above information in separate sheet if the space is not sufficient.

20. List of equipments, tools and tackles (in applicable).

GENERAL CONDITIONS OF CONTRACT(GCC)

A: GENERAL

1.0 Definitions :

1.1 In this contract, the following terms shall be interpreted as indicated:

a. "The Contract" means the agreement entered into between the Owner and the Bidder, as recorded in the contract form signed by the parties, including all the attachments and appendices thereto and all documents incorporated by reference therein.
b. "The Contract Value" means the amount payable to the Bidder under the contract for the full and proper performance of its contractual obligations.
c. "Contract Data" means any information provided in the tender document and agreed to by the Bidder.
d. "The Work" means all labour, materials, tools and plant, equipment including government taxes and transport that may be required in preparation of and for and in the full and entire execution and completion of "the Work".
e. "Services" means services ancillary to the execution of the work such as transportation and insurance, and any other incidental services, such as installation, commissioning, provision of technical assistance, training and other obligations of the Bidder covered under the contract.
f. "GCC" mean the General Conditions of Contract contained in this section.
g. "SCC" means the Special Conditions of Contract.
h. "The Owner" means the Indian Institute of Technology Roorkee or its representative.
i. "The Owner" means the Owner/Project Management Consultant appointed by the Owner for preparing all the drawings, details and specifications of items required for the execution of the work and supervise and monitor the execution at site along with checking and verifying Bidder's bill. The Bidder shall offer the Engineer or any representative of Owner every facility and assistance for examining the works and materials. The Engineer or any representative of the Owner shall have power to give notice to the Bidder or to his staff, of non-approval of any work or materials and such work shall be suspended or the use of such materials shall be discontinued until the decision of the Owner. Such examinations shall not in any way exonerate the bidder from the obligations to remedy any defects which may be found to exist at any stage of the work or after the same is completed.
j. "The Bidder" means the individual or the firm executing the work.
k. "The Project Site" where applicable, means the place or places named in SCC.
l. "Day" means calendar day.
m. "Engineer-in-charge (EIC)" means Assistant Executive Engineer.

2.0 Interpretation and Application

2.1 These general conditions shall apply to the extent that provisions in other parts of the contract do not supersede them.

2.2 In interpreting these 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 Owner will provide instructions clarifying queries about the Conditions of Contract.

2.3 If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion Date, and the Intended completion date are for the whole of the Works.

3.0 Standards

3.1 The works executed by the Bidder should be carried out in most professional manner, both as regards material and otherwise, in every respect, in strict accordance with the Technical Specifications. All materials and workmanship shall so far as procurable be of the respective kinds described in the priced schedule of quantities and/ or specifications and in accordance with the Owner' instructions, and the Bidder shall upon the request of the Owner, furnish them with all invoices, accounts; receipts and other vouchers to prove that the material procured complies therewith. When no applicable standard is mentioned, the work shall be carried out as per the directions of the Owner. The Bidder shall at his own cost arrange for and/or carry out any test of materials which the Owner may require. In case of discrepancies in tender wording as regards the specifications of materials, workmanship etc., written instructions will supersede the tender wording unless otherwise mentioned.

3.2 The Owner in their absolute discretion from time to time shall issue further drawings and/ or written instructions, details, directions and explanations which are hereafter collectively referred to as "the Owner's instructions" in regard to: -

a. The variation or modification of the design quality or quantity of works or the addition or omission or submission on any work.
b. Any discrepancy in the drawings or between the schedule of quantities and / or drawings and /or specifications/ dimensions etc.
c. The removal and / or re-execution of any works executed by the Bidder.
d. The removal from the site of any materials brought thereon by the Bidder and the substitution of any other materials therefore / or rejection of the material brought on site.

4.0 Use of Contract Documents and Information

4.1 The Bidder shall not, without the Owners' prior written consent, disclose the contract or any provision thereof, or any specifications, plan, drawing, pattern, sample or information furnished by or on behalf of the Owner in connection therewith, to any person other than a person employed by the Bidder in performance of the contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far, as may be necessary for purposes of such performance.

4.2 The Bidder shall not, without the Owner's prior written consent make use of any document or information enumerated in Para 4.1 except for the purposes of performing the contract.

4.3 All documents included but not limited to contract agreement shall remain the property of the Owner and shall be returned (in all copies) to the Owner on completion of the Bidder's performance under the contract, if so required by the Owner.

5.0 Owner's Decisions: Except where otherwise specifically stated, the Owner will decide contractual matters between the Owner and the Bidder, in the role of representing the Owner.

6.0 Performance Guarantee: The proceeds of the performance guarantee shall be payable to the Owner as compensation for any loss or dues resulting from the Bidder's failure to complete its obligations under the contract.

7.0 Program and Reporting

7.1 The bidder shall furnish to the Indian Institute of Technology Roorkee a bar chart laying down weekly financial and physical targets to complete the project within stipulated time for approval within fifteen days from the date of receipt of notification of award. Weekly progress report shall be furnished to the owner showing the progress.

7.2 The bidder must submit every week the following information to the Owner in writing:

i. Number of men employed, trade wise;
ii. Progress achieved;
iii. Expected dates for completion of work;
iv. Any actual or potential delay in completion schedule.

8.0 Assignment and Sub-contracting

8.1 The whole of the works included in the Contract shall be executed by the bidder and the bidder shall not directly or indirectly transfer, assign or underlet the contract or any part, share or interest therein without the written consent of the Owner.

8.2 No sub-contracting shall relieve the Bidder from the full and entire responsibility of the Contract or from the active superintendence of the work during their progress.

9.0 Bidder to provide everything necessary for proper execution of work

9.1 The Bidder shall provide everything necessary for the proper execution of the works according to the intent and meaning of the drawings, priced schedule of quantities and specifications taken together whether the same may or may not be particularly shown or described therein provided that the same can reasonably be inferred there from. If the Bidder finds any discrepancy therein he shall immediately and in writing refer the same to the Owner whose decision shall be final and binding. Further, if any sample(s) of material(s), fittings, fixtures or finished item(s), to be used in the construction work, has/have been called for from the bidder, no work related to it/these shall be executed unless the same has/ have been

approved by the Owner failing which no payment shall be made to the bidder on this account. Any sample, duly approved by the Owner shall become part of the supply to be used in "the works".

9.2 IIT Roorkee will provide water and power supply at site free of cost for the entire work.

9.3 The Bidder shall supply fix and maintain at his cost, during the execution of any works, all the necessary power supply, water supply, centering, scaffolding, watching and lighting by night as well as by day, required not only for the proper execution but also for protection of the public and the safety of any adjacent roads, streets, pavements, walls houses, building and other erections, matters or things. The Bidder shall take down and remove any or all such centering, scaffolding, staging, planking, timbering, strutting, shoring pumping, fencing, hoarding, watching and lighting by night as well as by day, required not only for the proper execution but also for protection of the public and the safety of any adjacent roads, streets, pavements, walls houses, building and other erections matters or things. The bidder shall take down and remove any or all such centering, scaffolding, staging, planking, timbering, strutting, shoring etc. as occasion shall require or when ordered so to do so and shall fully reinstate and make good all matters and things disturbed during the execution of the works, to the satisfaction of the Owner.

9.4 Throughout the execution of the work, the Bidder or his representative duly authorized and fully responsible and technically conversant with the work under this agreement, acting on his behalf shall be available at the site for supervising the work. The Bidder shall make adequate arrangements for watchmen to guard the materials brought by them to the site and shall ensure the safety, breakage and any theft of materials fixed or unfixed by him. Any material, T & P brought to the site for bonafide use of the Project shall not be removed/ shifted from the site without the prior written permission of the Engineer/Owner.

9.5 The bidder has to provide at his cost leveling pipe, steel/ metallic tapes etc. required by the supervising staff of the Owner's/Owner' representative during execution of the work.

9.6 Whenever required by the Owner, the Bidder shall provide electrical drawings / details before execution of work and get them approved by the Owner.

9.7 Wherever the specification of any item indicates the usage of approved equivalent of any material, the Bidder shall get the sample of the equivalent material approved from the Owner before execution. The approval of the equivalent material is entirely at the discretion of the Owner.

10.0 Infrastructure: For storage of materials, bidder has to provide at his own cost sufficient fenced and covered appropriate area on site for storage of above materials with lock and key arrangement. For arranging meetings suitable sized table and chairs shall be provided by Bidder. Temporary space shall be provided to the Bidder for construction of stores for storage of materials /site office/ labour hutments for the project period.

11.0 Site Establishment: The bidder shall provide all stores, workmen and materials. All materials likely to deteriorate in the open shall be stored under suitable cover. The security of the bidder's equipment and materials is his own responsibility. The Owner accepts no liability for loss or damage to the bidder's plant tools or materials. The materials issued to the bidder by the Owner will remain under the custody of bidder as a trustee. However, title on the same will remain with the Owner. The bidder will be responsible for loss or damage to such materials and shall preserve them in good working conditions as required for the contract and good construction practices till such time that they are incorporated in the works and erected, aligned and fully installed in position and handed over to the Owner. In case the Owner feels that arrangements made by the bidder are not adequate he shall so advice the bidder and the bidder shall promptly take corrective action. In case the bidder fails to take corrective action, Owner shall take such corrective actions and recover the cost thereof from the bidder's bills. Accounts of such material on completion of work shall be rendered and surplus material returned to the Owner as per instructions of Owner. The bidder shall clear away periodically or as instructed by Owner any rubbish, scrap materials, etc. and dump the same in the authorized dump sites notified by local authority/area indicated by the Owner. All construction materials shall be neatly stacked in an orderly manner as directed by the Owner and care shall be taken to allow proper access to workmen and easy movement of men, vehicles, cranes and materials. The bidder shall maintain all the drawings carefully mounted on the board of appropriate size and well protected from the ravages of weather, termites and other insects. The bidder shall not permit the entry to the site of any person not directly connected/concerned with the work without first having obtained the written permission of Owner. The bidder shall submit a list of plants, equipments, tools, tackles, etc. which he will use, to perform the work. These tools, etc. shall not be removed from the site till the completion of job. A gate pass must be obtained from the Indian Institute of Technology Roorkee, chief proctor office, in order to remove from site any plant equipment, tools and materials. All items such as instructions and other pertinent data regarding erection/commissioning and maintenance should be typed and classified for transmittal in a manner approved by the Owner. For all employees of Owner, the bidder shall conform for no misconduct from any of his workforce; failure of this will be sufficient cause for removal of such person from the site.

12.0 Messing & Accommodation: The bidder will make his own arrangements for messing and accommodation. No accommodation and messing shall be provided by the Owner.

13.0 Procurement, Consumption and Storage of Materials

13.1 The bidder shall at his own expenses, provide all materials including cement & steel required for the works. Adequate stocks of all materials required for the work are to be maintained at site. No material (unless as provided elsewhere in this document) shall be supplied by the Owner.

13.2 All materials to be provided by the bidder shall be in conformity with the detailed specifications laid down in the contract and the bidder have to prove that the materials conform to the laid down specifications, if requested by the Indian Institute of Technology Roorkee.

13.3 All materials required for execution of work must be got approved by the site representative of the Owner before they are actually put to use. All facilities for prior inspection of materials and subsequent inspection of work by the Site Engineer must be made available.

13.4 The bidder shall, at his own expenses and without delay, supply to the Owner samples of materials proposed to be used in the work. The Owner shall within seven days of supply of samples, or within such further period as Owner may require and intimate the bidder in writing, whether samples are approved by Owner, or not. If samples are not approved, the bidder shall forthwith arrange to supply, for their approval, fresh samples complying with the specification laid down in the contract.

13.5 The Owner shall have full powers to require removal of any or all the materials brought to site by the bidder which are not in accordance with the contract specifications or do not conform in character or quality to the samples approved Owner. In case of default on the part of the bidder in removing rejected materials, the Owner shall be at liberty to have them removed by other means. The Owner shall have full powers to direct other proper materials to be substituted for rejected materials and in the event of the bidder refusing to comply. Owner may cause the same to be supplied by other means. All risks and costs which may attend upon such removal and/or substitution shall be borne by the bidder.

13.6 Bidder shall be responsible for procurement of all materials/ equipments etc. No delay due to non availability of any material equipment will be entertained by Owner.

14.0 Method of storing the materials

14.1 The bidder shall at his own cost, provide for all necessary storage on the site in specified areas for all materials such as steel, cement and such other materials which are likely to deteriorate by the action of sun, wind, rain, dampness or other natural causes due to exposure in the compounds or in stores in such a manner that all materials, tool etc. shall be duly protected form damage by weather or any other cause.

14.2 Materials required for the works, by the bidder be stored by the bidder only at places approved by the Owner. Storage and safe custody of materials shall be the responsibility of the bidder. All the materials including bidder's Tools & Plants brought by the bidder to the site shall become and remain the property of the Owner and shall not be removed off the site without prior written approval of the Owner/Owner. But whenever the works are finally completed and advances, if any, in respect of such materials are fully recovered, the bidder shall at own expenses forthwith remove from the site all surplus materials supplied by him and upon such removal, the same shall revert in and become the property of the bidder.

15.0 Shuttering and Scaffolding Materials: It shall be desirable to have adequate amount of shuttering and scaffolding materials to complete the work speedily and Owner decision so as to the quantum of these desirable/ resources of the site shall be final and binding.

16.0 Completion of Work: Before finally leaving site, all the Bidders stores, plant, tools and rubbish shall be removed and the site left clean and tidy. The space allocated by Owner shall be vacated and handed over to the Owner.

17.0 Water and Electricity for Construction work : Water & Electricity as per relevant section's mentioned above

18.0 Employment of Labour

18.1 The bidder shall comply with the requirement of statutory provisions and shall be solely responsible for fulfillment of all legal obligations under Contract Labour (R&A) Act, Inter State Migrant Workmen (Registration of Employment and

condition of Service Act, Payment of Wages Act., Minimum Wages Act, Workmen's Compensation Act, Factories Act, Employee's Provident Fund & Miscellaneous Provisions Act, Payment of Bonus Act, Payment of Gratuity Act, Industrial Disputes Act and all other Industrial/Labour enactments and Rules made there under as applicable from time to time. In case Owner incurs any liability towards payment of any dues, compensation, cost of any other liability of any kind whatsoever, due to non-fulfillment of statutory provisions under any industrial/labour laws by the bidder, the same shall be made good by the bidder and Owner shall have full right to recover and claim the same against the bidder from his outstanding bills or otherwise. No labour to stay at site.

18.2 The bidder will be expected to employ on the work only his regular skilled employees with experience of this particular work. The permission of the Owner must be obtained before tradesman are recruited locally for the work. This rule does not apply to unskilled labour. No female labour shall be employed in dark hours/ i.e. hours prohibited under the applicable law. No person below the age of eighteen years shall be employed at any point of time. The bidder shall pay, to each person, the wages as per minimum Wages Act of the State Government.

18.3 All traveling expenses including provision of all necessary transport to and from site, lodging allowances and other payments to the bidder's employees are his own responsibility. The hours of work on the site shall be decided by the Owner and bidder shall adhere to the same. All bidders employees shall wear safety helmet and such identifications marks as may be provided by bidder on work site and duly approved by Owner. All notices displayed on the site and any instructions issued by the Owner shall be strictly adhered to by the Bidder's and/or his sub-bidders employees. The bidder shall be required to maintain employment records as covered in relevant Acts and produce documentary evidence to the effect that he has discharged his obligations under the Employees Provident Fund Act 1952, and ESI Act, 1948 Group Insurance and other Acts for the workmen working at site.

18.4 The bidder shall comply with the provisions of the Apprentices Act 1961, and the rules and orders issued there under from time to time. If he fails to do so, his failure will be a breach of the contract and the Dean Infrastructure/Executive Engineer may in his discretion, without prejudice to any other right or remedy available in law, cancel the contract. The bidder shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the said Act.

19.0 Working and Safety Regulations: The bidder shall observe all statutory safety and legal requirements regulations issued by Central and State Governments applicable to the work as well as any local regulations applicable to the site issued by the Owner or any other authority.

20.0 Particular attention is drawn to the following: In case of accident, the Owner shall be informed in writing forthwith and First-Aid, Hospitalization shall be provided by the Bidder. The bidder shall strictly follow regulations laid down by Govt. and State authorities in this regard and all cases are to be defended by the bidder. The Owner shall not refund any insurance claims. Bidder shall fence his plant, platforms, excavations etc. Compliance with all electricity regulations. Compliance with statutory requirements for inspection and test of all lifting appliances and auxiliary lifting gear. Staircase, doors or gangways shall not be obstructed in any way that will interfere with means of access of escape. Where it is necessary to provide and/or store petroleum products or petroleum mixtures and explosive, the bidder shall be responsible for carrying out such provision and/or storage in accordance with the rules and regulation laid down in Petroleum Act 1934. Explosive Act 1948 and Petroleum and Carbide of Calcium Manual Published by the Chief Inspector of Explosive of India. All such storage shall have prior approvals of the Owner. In case any approval or clearance from Chief Inspector of Explosive or any statutory authorities is required, the bidder shall be responsible for obtaining the same.

The bidder shall have his own Fire Fighting Extinguishers and Equipment. The bidder shall be responsible for the provision of all safety notices safety equipments including the safety gadgets for his workmen required by both the relevant legislation and such as the Owner may deem necessary. While working at heights, safety belts and safety helmets shall necessarily be used.

21.0 Owner's and Bidder's Risks: The Owner carries the risks, which this Contract states are The Owner risks, and the Bidder carries the risk, which this Contract states are The Bidder's risks.

21.1 Owner's Risks: The Owner is responsible for the accepted risks which are :

a. In so far as they directly affect the execution of the Works. These include war, hostilities, invasion, act of foreign enemies, rebellion, revolution, insurrection of military or usurped power, civil war, riot commotion or disorder (unless restricted to the Bidder's Employees), and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive, or
b. A cause due solely to the design of the Works, other than the Bidder's design.

21.2 Bidder's Risks: All risks of loss 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 accepted risks of the owner.

21.3 The Bidder shall be responsible for all injury 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-bidder or of any of his or sub-bidder's employees whether such injury or damage arises from carelessness accident or any other causes whatsoever in any way connected with the carrying out to the Contract. This clause shall be held to include interalia any damage to buildings, whether immediately adjacent or otherwise and any damage to roads, footpaths, or ways as well as all damage caused to the buildings and the work forming the subject to this Contract by frost, rain or other inclemency of the weather. The Bidder shall indemnify the Owner and hold him harmless in respect of all and any expenses arising from any such injury or damage to persons or property as aforesaid and also in respect of any claim made in respect of injury or damage under any acts of Government or otherwise and also in respect of an award of compensation or damages consequent upon such claim. The bidder shall make good all damages of every sort mentioned in the Clause, as to deliver up the whole of the Contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of third parties.

22.0 Insurance

22.1 The Bidder shall provide, in the joint names of the Owner and the Bidder, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the Contracted Data for the following events which are due to the Bidder's risks and shall be covered under respective policies as under :

a. Workmen Compensation Policy;
b. Bidder's All Risk Policy;
c. Third Party Insurance.

22.2 Policies and certificates for insurance shall be delivered by the Bidder to the Owner for the approval before the Date of Start of work i.e. dates of execution of the contract. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

22.3 If the Bidder does not provide any of the policies and certificates required, the Owner may affect the insurance which the Bidder should have provided and recover the premiums the Owner has paid from payments otherwise due to the Bidder or if no payment is due, the payment of the premiums shall be a debt due.

22.4 Alterations to the terms of the insurance shall not be made without the approval of the Owner.

22.5 Both parties shall comply with the conditions in the insurance policy.

23.0 Setting out Works: The bidder shall set out the works and responsible for the true and perfect setting out of the same and for the correctness of the positions, levels, dimensions and alignment of all parts thereof, if at any time any error shall appear during the progress of any part of works the bidder shall at his own expenses rectify such error, if called upon to the satisfaction of the Owner.

24.0 Bidder to remove all offensive matter, non-suitable material etc immediately.

24.1 All debris, excavated soil, filth or other matter or an offensive nature taken out of any trench, sewer, drain cesspool or other place shall not be deposited on the surface but shall be at once carted away by the bidder out of the premises/ site under intimation to concerned authorities.

24.2 Any material brought on site if found unsuitable shall be removed from site at once by the Bidder under intimation to the concerned authorities.

25.0 Inspections by Owner

25.1 The representative of the Owner at all times have free access to the works and /or to the workshops, factories or other places where materials are being prepared or constructed for the Contract and also to any place where materials are lying or from which they are being obtained. No person except the representatives of Public authorities shall be allowed on the work at any time without the written permission of the Owner. If any work is to be done at a place other then the site of the works, the Bidder shall obtain written permission of the Owner for doing so.

25.2 The Owner and their representatives shall have the right to test and/ or inspect the works to confirm their conformity to the contract, at all times, whenever in progress either on the site on the Bidder's premises wherever situated or any firm or

company where work in connection with this contract may be in hand. All records, registers or documents relating to the works including materials used on works shall be kept open to the inspection of the Owner or his Authorized representative when so called for in writing.

25.3 The Bidder shall get the quality of work done inspected for material and workmanship at different stages of execution as per instructions given by the Owner or their representative time to time. Any item of work done which is found not conforming to the Contract shall be rejected by the Owner. The decision of the Owner in such cases shall be final.

25.4 The inspections and tests may be conducted on the premises of the Bidder or at the Project site. When carried out on the premises of the Bidder or its sub-Bidder(s), all reasonable facilities and assistance including access to drawings and production data shall be furnished to the inspectors at no charge to the Owner.

25.5 Should any inspected items of work fail to conform to the specifications, the Owner shall communicate them and the Bidder shall either replace them or make all alterations necessary to meet specification requirements free of cost to the Owner.

25.6 The Bidder shall permit the Owner/Architect to inspect the Bidder's accounts and records relating to the performance of the Bidder and to have them audited by auditors appointed by the Owner, if so required.

26.0 Covering Up/Uncovering of Works

26.1 No part of the works shall be covered up without the approval of Owner and the Bidder shall afford full opportunity for examination and inspection by the Owner. The bidder shall give due notice to the EIC about the work to be covered up for its measurements and examination. The EIC shall within a reasonable time attend for the purpose of examining such work, unless the EIC specifically advises the Bidder in writing of his unwillingness not to attend for such examination in which case the Bidder may proceed further with the Contract work.

26.2 Should the Owner consider it necessary in order to satisfy himself as to the quality of the work, the Bidder shall at any time during the continuance of the contract pull down or cut into any part of the work and make such opening into and to such an extent through the same, as the Engineer may direct and the Bidder shall make good the whole to the satisfaction of the Engineer, should the work prove to be faulty or in any respect not in accordance with the terms of the contract documents, the Engineer shall be at liberty to order such further removal as he may consider necessary and the whole of the expenses incurred shall be borne by the bidder. If however, the work proves to be sound and in accordance with the contract document, the actual expenses incurred in such examination will be borne by the Owner.

26.3 Rates charged by the Bidder for works performed under the contract shall not vary from the rates quoted by the Bidder in its bid, with the exception of any price adjustments authorized in SCC or in the Owner's request for bid validity extension, as the case may be.

26.4 If requested by the Owner, the Bidder shall provide the Owner with a detailed cost breakdown of any rate in the Schedule of Quantities.

26.5 The Owner may at any time / stage of execution demand for the Analysis of Rates for any item / items of work which in their opinion is / are abnormally high / low rates or required for the Analysis of Rates of other Publish / extra item / items. The Bidder is bound to present the same and if the Bidder is unable to present a justified Analysis of Rates for any item / items, the rate / rates for such item may be adjusted accordingly and the decision of the Owner in such cases shall be final.

27.0 Change in the order/ Extra items of work

27.1 The Owner may at any time, by written order given to the Bidder, make alterations in, omissions from, additions to, or substitutions for, in drawings, designs or specifications or quantities of the items of work.

27.2 Owner reserves to itself the right of omission of any item of work from the awarded Publish at any time / stage during the execution of work and award the same to another agency / bidder.

27.3 The Owner may at any time by written order given to the Bidder, increase the scope of work or include any new item of work. The Bidder shall be bound to carry out such works, the rates for which shall be arrived as below:

a. In the case of Extra Item(s) being the schedule item(s) (Delhi Schedule of Rates item), these shall be paid as per the schedule rate (at the time of tender) plus/minus percentage above/below quoted contract amount. Payment of Extra Item(s) in case of non-schedule item (Non-DSR item) shall be made as per the prevailing market rate.

b. In the case of Substituted item(s) being the schedule item(s) (Delhi Schedule of Rates item), these shall be paid as per the schedule rate (at the time of tender) plus/minus percentage above/below quoted contract amount. Payment of substitute in case of non-schedule item (Non-DSR item) shall be made as per the prevailing market rate.

28.0 Payment

28.1 The method and conditions of payment to be made to the Bidder under the contract shall be specified in SCC.

28.2 Payment shall be made promptly by the Owner within thirty (30) days of certification of the bill by the Owner.

28.3 All intermediate running payments to the bidder shall be regarded as payments by way of advance against the final payment and shall not preclude the requiring of bad, unsound and imperfect or unskillful work to be removed, taken away and reconstructed or re-erected.

29.0 Variations and Provisional Cost(If applicable):

29.1 Where work cannot be measured and valued properly, the Bidder shall be allowed day work rates on the prices prevailing when such work is carried out (unless otherwise provided in the contract): a. At the rates if any inserted by the Bidder in the priced Schedule of Quantities or b. If no such rates have been inserted then at the rates prevailing in the market for material and labour and at the control rates for the controlled materials including in all cases the rate for delivery of the material at the work.

29.2 Provided that in any case voucher specifying the time daily spent upon the work (and if required by the Owner the workman's names) and the materials used shall be delivered for verification to the Owner, or his authorized representative not later than the end of the week following that in which the work has been executed. Effect shall be given to the measurement and valuation of variations in interim Certificates and by adjustment of the total Contract Value.

30.0 Claims for Extra or for Deductions

30.1 The Owner shall not be responsible for the payment of any claim for extra work not included in the contract nor the Bidder shall be entitled to claim any addition to the contract sum in respect of any changes or alterations in the materials used unless the same shall have been ordered or sanctioned, as the case may be, in writing by the Owner.

30.2 The Bidder has to submit a monthly return by 10th of the ensuing month for any extra work which in his opinion is not covered by the contract agreement through the Owner's/ Owner's representatives and obtain a receipt from the authorized signatory of the Owner. Failing this, he shall have no right to any such claim, whatsoever may be the circumstances, later on.

30.3 In the event of any dispute arising either as to validity of the claim or as to the account to be paid or allowed in respect thereof, the decision of the Owner shall be final and binding on the bidder. In the meantime, the Bidder may either proceed with the work in question or suspend the same as may be determined by the Owner.

30.4 All extra works (those permitted by Owner) of every description shall be executed by bidder on site of work in pursuance of any of the provision of the contract, shall be measured up, and shall be paid according to actual quantities ascertained by such measurements and the prices as finalized by the Owner based on the priced schedule of quantities so that such priced schedule of quantities shall include all such operations and accessories as appear in the said schedule of prices or specification to be or shall in the opinion of the Owner the contingencies upon the works mentioned in such schedule of prices or required to make such works perfect and fit for use.

30.5 Provided also that if any work shall be ordered by the Owner and executed by the Bidder for the payment of which no provision in the opinion of the Owner have been made in the priced schedule of quantities or the specifications, the Owner shall fix and determine such prices for the same based on the prices appearing in the priced schedule of quantities, such allowance being made as may seem to the Owner sufficient for any difference in the character of conditions of the work. However, rates for extra items shall be fixed on the basis of actual rate analysis.

30.6 If, it shall appear that the work has been executed with unsound, imperfect or unskilled workmanship, or with material of any imperfect or any inferior quantity or otherwise not in accordance with the contract documents the Bidder shall at his own cost rectify, reform, remove, or reconstruct the same, wither in the whole or in part, as may be directed by the EIC, whether or not the value of any such work or materials shall have been included in any payment made to the Bidder.

30.7 The Bidder shall remove all malba etc., wash and clean the floors and hand over the site quite clean on the completion of the work.

31.0 Delay in the Bidder's performance

31.1 Execution of the work and performance of the services shall be done by the Bidder in accordance with the time schedule specified by the Owner in the Notice inviting tender.

31.2 If, at any time during performance of the contract, the Bidder should encounter conditions impending timely execution of the works and performance of services, the Bidder shall promptly notify the Owner in writing of the fact of the delay, its likely duration and its cause(s). As soon as possible, after receipt of the Bidder's notice, the Owner shall evaluate the situation and may, entirely at its discretion, extend the Bidder's time for performance with or without liquidated damages

32.0 Liquidated Damages: If the Bidder fails to execute any or all of the works or to perform the services within the period(s) specified in the contract, the Owner shall deduct from the contract value, as liquidated damages, a sum specified in the SCC for each week or part thereof delay until actual completion or performance, up to a maximum deduction of the percentage specified in SCC. Once the maximum is reached, the Owner may consider termination of the contract.

33.0 Termination by Default

33.1 The Owner may without prejudice to any other right or remedy, by written notice (of fifteen days) of default sent to the Bidder, terminate the contract in whole or part: a) if the Bidder fails to complete any or all of the works within the period(s) specified in the NIT or any amendment thereof, or within any extension thereof granted by the Owner, or for any cause including unsatisfactory performance or violation of the terms and conditions of the contract whatsoever or b) if the Bidder fails to perform any other obligation(s) under the contract.

33.2 In the event, the Owner terminates the contract in whole or in part, the Owner may procure, upon such terms and in such manner as it deems appropriate, works or services similar to those unexecuted and the Bidder shall be liable to the Owner for any excess costs for such similar work or services. However, the Bidder shall continue the performance of the contract to the extent not terminated.

33.3 The owner may terminate the contract bond without prejudice due to financial malpractice/ misbehavior/ verbal or physical assault / theft / forgery etc. and the bidder may be debarred for two years for participating in any tender of IIT Roorkee. Termination of the contract shall not relieve the agency/bidder from any of his obligation imposed by the contract with respect to the work performed by the bidder prior to such termination.

In case of termination of the contract, IIT Roorkee reserves the right to get the work done by deploying other agencies. Cost incurred for the same will be recovered from bidder's bill / Security Deposit / Performance Guarantee.

For unsatisfactory performance / poor quality of work / violation of the terms and conditions of the contract whatsoever, the contract is liable to be terminated and the bidder may be debarred for two years for participating in any tender of IIT Roorkee and Security Deposit / Performance Guarantee submitted by the bidder shall be forfeited.

34.0 Force Majeure

34.1 The Bidder shall not be liable for forfeiture of its performance guarantee, liquidated damages or termination by default, if and to the extent that, its delay in performance or other failure to perform its obligations under the contract is the result of an event of Force Majeure.

34.2 For purposes of this clause, "Force Majeure" means an unforeseeable event beyond the control of the Bidder and is not because of the Bidder's fault or negligence. Such events may include acts of the Owner either in its sovereign or contractual capacity, wars or revolutions, fires, floods, epidemics.

34.3 If a Force Majeure situation arises, the Bidder shall promptly notify the Owner in writing of such conditions and the cause thereof. Unless otherwise directed by the Owner in writing, the Bidder shall continue to perform its obligations under the contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

35.0 Termination for Insolvency: The Owner may at any time terminate the contract by giving written notice to the Bidder, if the Bidder becomes bankrupt or otherwise insolvent. In this event, termination will be without compensation to the Bidder, provided such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the Owner.

36.0 Termination for Convenience: The Owner, by written 30 days prior notice sent to the Bidder may terminate the contract, in whole or in part, at any time for its convenience. The notice shall specify that the termination is for Owner's convenience, the extent to which performance of the Bidder under the contract is terminated, and the date upon which such termination becomes effective. The items of work that are complete and ready within (1) month after the Bidder's receipt of notice of termination shall be accepted by the Owner at the contract terms and values. For the remaining works, the Owner may elect;

a) to have any portion completed at the contract terms and value and/or

b) to cancel the remainder and pay to the Bidder an amount, finalized by the Owner, for partially completed works and for materials and parts previously procured by the Bidder.

37.0 Resolution of Disputes

37.1 The Owner and the Bidder shall make every effort to resolve amicably by direct informal negotiations any disagreement or dispute arising between them under or in connection with the contract. If, after thirty (30) days from the commencement of such informal negotiations, the Owner and the Bidder have been unable to resolve amicably a contract dispute, either party may require that the dispute be referred for resolutions to the formal mechanisms specified in the SCC. These mechanisms may include but are not limited to, Arbitration in accordance with rules of Arbitration Act and award made in pursuance thereof shall be binding on both the parties.

37.2 All disputes should be under the Jurisdiction of civil court Roorkee.

38.0 Governing language: The contract shall be written in Hindi or English language. All correspondence and other documents pertaining to the contract that are exchanged by the parties shall be written in the same language.

39.0 Governing law: The contract shall be governed by the laws of The Union of India for the time being in force. All disputes are subject to jurisdiction of courts at Roorkee or Honorable High Court Uttrakhand at Nainital.

40.0 Notices: Any notice given by one party to the other pursuant to this contract shall be sent to other party in writing by e-mail or letter and confirmed in writing to the other party's address specified in SCC. A notice shall be effective on the date on which it is delivered, or on the notice's effective date, whichever is later.

41.0 Discoveries: Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the Owner. The Bidder is to notify the Owner of such discoveries and carry out the Owner' instructions for dealing with them.

42.0 Dismissals of workmen: The bidder on request from the Owner, immediately dismiss from the works any person employed by him who may be found in the opinion of the client to be unsuitable or incompetent or who has shown misconduct.

43.0 Working Hours: Normal working hours shall be from 08:45 a.m. to 05:30 p.m. No construction work of important structural nature shall be carried out on Sundays, Holidays and during nights. However, working hours can be extended in case of urgency with prior approval of IIT Roorkee.

B. TIME CONTROL

44.0 Program

44.1 Within the time stated in the Contract Data the Bidder shall submit to the Owner for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the works, along with weekly cash flow forecast. An update of the Program shall be a programme showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities.

44.2 The Bidder shall submit to the Owner, for approval, an updated Program at intervals no longer than the period as stated in the clause no. 7.1. If the Bidder does not submit an updated Program within this period, the Owner may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue program has been submitted.

44.3 The Owner's/Owner's approval of the Program shall not alter the Bidder's obligations. The Bidder may revise the Program and submit it to the Owner again at any time. A revised Program is to show the effect of Variations at any stage of work, Owner award any item/part of item of work to bidder's workman/ external agency, if in their opinion, the progress of work is suffering because of that. The work done will be added to the Bidder's bill and the amount paid for the job will be deducted from the Bidder's account.

45.0 Delay and Extension of time

If in the opinion of the Owner the work be delayed

a) by force majeure or
b) by reason of any exceptionally inclement weather or
c) by reason of proceedings taken or threatened by or disputes with adjoining or neighboring owners or public authorities or
d) by delays of other bidder or Tradesmen engaged by the Owner or the Owner and the works not referred to in the Schedule of Quantities and/or specification or
e) by reasons of Owner's instruction or
f) by reason of civil commotion, local combination of workmen or strike or lockout affecting any of the building trades or
g) in consequence of the bidder not having received in due time necessary instructions from the Owner for which he shall have specially applied in writing or
h) from other cause which the Owner may certify as beyond the control of the bidder or
i) by reason of nonpayment of interim certificate at specified time, the Owner shall grant for approval by the Owner a fair and reasonable extension of time for completion of the Contract. In case of strike or lockout the bidder shall as soon as may be given written notice thereof to the Owner, but the bidder shall nevertheless constantly use his endeavors to prevent delay and shall do all that may reasonably be required to the satisfaction of Owner to proceed with the work.

C. QUALITY CONTROL

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

47.0 Correction of Defects

47.1 The Owner shall give notice to the Bidder of any Defects before the end of Defects Liability Period, which begins at Completion and is defined in the Contract Data. The Defects Liability period shall be extended for as long as Defects remain to be corrected.

47.2 Every time notice of Defect is given, the Bidder shall correct the notified Defect within the length of time specified by the Owner' notice.

48.0 Uncorrected Defects: If the Bidder has not corrected a Defect within the time specified in the Owner' notice. In case, it is felt by the Owner that undue delay is being done by the bidder, the same will be got done by the Owner at the risk and cost of the contractor.

D. COST CONTROL

Schedule of Quantities

48.1 The Schedule of Quantities shall contain items for the construction work, installation, testing, and commissioning work to be done by the Bidder.

48.2 The Schedule of Quantities is used to calculate the Contract Price. The Bidder is paid for the quantity of the work done at the rate in the priced Schedule of Quantities for each item.

49.0 Variations: All variations in the program pursuant to clause no. 7.0 of GCC shall be included in the updated program produced by the Bidder.

50.0 Payments for Variations

50.1 The Bidder shall provide the Owner with a quotation (with breakdown of unit rates) for carrying out the Variation when requested to do so by the Owner. The Owner shall assess and finalize the quotation, which shall be given within seven days of the request or within any longer period stated by the Owner and before the Variation is ordered.

50.2 If the Bidder's quotation is unreasonable, the Owner may order the Variation and make a change to the Contract Price which shall be based on Owner' own forecast of the effects of the Variation on the Bidder's costs.

50.3 If the Owner 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 shall be treated as a Variation.

50.4 The Bidder shall not be entitled to additional payment for costs, which could have been avoided by giving early warning.

E: FINISHING THE CONTRACT

51.0 Completion Certificate: The Bidder shall request the Owner to issue a Certificate of Completion of the Works will do so upon deciding that the Work is completed.

52.0 Taking Over: The Owner shall take over the Site and the Works within seven days of the Owner issuing a certificate of Completion. Before handing over the site, the bidder must obtain a site clearance certificate from the Owner.

53.0 Final Account: The Bidder shall supply to the Owner a detailed account of the total amount that the Bidder considers payable under the Contract before the end of the Defects Liability Period. The owner shall issue a Defect Liability Certificate and certify any final payment that is due to the Bidder within 5-6 days of receiving the Bidder's account if it is correct and complete. If it is not, the Owner shall issue within 5-6 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 Owner shall decide on the amount payable to the Bidder and issue a payment certificate within 5-6 days of receiving the Bidder's revised account.

SPECIAL CONDITIONS OF CONTRACT (SCC)

The following Special Conditions of Contract are supplementary to the General Conditions of Contract. Whenever there is a conflict, the provisions herein shall prevail over those in the General Conditions of Contract. The corresponding clause number of the General Conditions of Contract is indicated in parentheses.

1. Definition (SCC clause 1.0)

a) Owner means: IIT Roorkee.
b) Site means the project site situated in IIT Roorkee Main Campus & Saharanpur Campus.

2. (i) **Security Deposit**: As per Critical Data Sheet.
(ii) Release of Security Deposit: Security Deposit will be refunded by the Owner after completion of Defect Liability Period i.e. 12 months from date of work completion.

3. Performance Guarantee: As per Critical Data Sheet. Performance guarantee shall be valid for a period of 60 days after completion.

4. Warranty (Defective Liability Period):

(a) Minimum warranty period of complete system will be **one year (excluding outsourcing)**. However, for outsourcing services an undertaking for statutory payment liability shall be taken from the Contractor. Equipment warranty certificate as per OEM will be submitted to the department.

(b) During warranty period, all elements of the system which fail due to manufacturing defects or operational wear & tear shall be replaced / repaired by the bidder without any charges. In case it is felt by the department that undue delay is being caused by the bidder in doing this, the same will be got done by the department at the risk and cost of the bidder. The decision of Dean Infrastructure in this regard shall be final.

(c) The bidder shall warranty the performance of the system. If it is not achieved, the necessary additions/modifications shall be done by the bidder without charging any extra price. However, the owner reserves the right to have this job done by other manufacturers if the bidder does not get the work done within 15 days of issuing the notice to the bidder. The cost for the same shall be borne by the bidder.

(d) Bidder will be fully responsible for trouble free and smooth operation of VRV AC as per the norms of OEM during warranty period. On breakdown of any machine, call should be attended within 24 hours after registering the complaint through email/ telephone failing which Rs. 1000/- will be imposed for each defaulted day. Penalty may be deducted from the Security Deposit or Security Deposit shall not be released until the penalty amount is deposited to IIT Roorkee.

(e) Faulty compressor must be replaced within 7 days failing which Rs. 1000/- will be imposed for each defaulted day. Penalty may be deducted from the Security Deposit or Security Deposit shall not be released until the penalty amount is deposited to IIT Roorkee.

(f) A quarterly preventive maintenance service must be carried out during DLP failing which preventive maintenance shall be carried out through third party at the risk and cost of the bidder. The amount so incurred may be deducted from the Security Deposit or Security Deposit shall not be released until the incurred amount is deposited to IIT Roorkee.

5. Payment:

5.1 No advance payment shall be made.

a) **For Part-A:** 70% on successful delivery of material at site in good condition, 20% on installation and 10% after testing & commissioning.

b) For Part-B: Payment shall be made quarterly, after successful completion of each quarter service.

c) Part of the payment can be withheld by the department.

5.2 Payment shall not be released against 1st R/A bill until submission of following documents by bidder to the Owner:

a) Copy of attendance of deployed manpower (for outsourcing services).
b) Measurement Book (MB).
d) GST Invoice with revenue stamp.
e) EPF & ESI deposit proof (of one month prior to the month of invoice).
f) Attendance and salary deposit proof of deployed manpower (for outsourcing services).
g) Insurance – Bidder's All Risk (CAR) Policy, Workmen compensation policy and Third-Party Liability Insurance.

5.3 Basis of Payment in RA bills

Payment in RA bills shall be based on quantity of work/ service/ supply executed at site (as per the item of work/ service/ supply) & verified by Owner as per the item rate in work orders. Owner is authorized to allow payment for part rate/reduced rate/full rate for any item(s) in the Schedule of Quantity. Further owner is authorized to allow different part rates/ reduced rate for different item(s).

5.4 Disallowance of payment

If payment has been made in RA bill for any item of work but later some defect is noticed, Owner/Architect is authorized to disallow the payment in the subsequent bills till rectification of the work.

5.5 Final bill

The final bill complete in all respect shall be submitted by the bidder within 60 days from the date of completion of work. The total quantity may vary as per actual work/ service/ supply execution/site requirement/and user suggested changes during execution.

The bill should be accompanied with the following documents.

a) Completion certificate.
b) Site clearance status (only for works).
c) Indemnity certificate towards labour payment and all statutory payments.
d) Certificate of test on materials etc. (if applicable/ if conducted).
e) Certificate of measurement sheets.
f) Original quality control record (if applicable), measurement records and any other joint site records maintain at site (if applicable). No claim shall be entertained after receipt of final bill.
g) Warranty certificate (if applicable).

Settlement of final bill shall be made subject to deduction of all dues payable by bidder, settlement of all disputes and furnishing of all required documents/clarifications and grant of extension of time, if any, by Owner's competent authority.

The Contractor will arrange safety gear. such as safety shoes, safety helmets. gloves, etc., for the manpower deployed at his own cost. If the manpower is found not wearing safety gear, a penalty of Rs. 200 per violation will be imposed by the EIC.

5.6 Manpower Engagement.

The Contractor shall engage required manpower separately in order to ensure timely execution of works.

6. Liquidated Damages

The quantum of work with stipulated time (as per discretion of EIC) will be communicated to the firm via email, hard copy or telephonically. In case of delay/partial completion, 0.5% per week of balance / unattended work subject to a maximum of 5% (Five percent) of the Contract value from the stipulated date of completion.

7. Resolution of Disputes

In case the parties don't agree to the advice of owner, then the Director, IIT Roorkee shall appoint a sole arbitrator within 30 days of receipt of request forthwith. The arbitration shall be governed by Arbitration and Reconciliation Act 1996.

8. Notices

For the purpose of all notices, the following shall be the address of the Owner and the Bidder.

Owner: Dean Infrastructure,
Institute Works Department,
Indian Institute of Technology
Roorkee

Bidder: _____

(To be filled in at the time of Signing of the Contract)

9. Resolution of Disputes & Arbitration

Except where otherwise provided in the contract all questions and disputes relating to the meaning of the specifications, design, drawings and instructions here in before mentioned and as to the quality of workmanship or materials used on the work or as to any other question, claim, right, matter or thing whatsoever in any way arising out of or relating to the contract, designs, drawings, specifications, estimates, instructions, orders or these conditions or otherwise concerning the works or the execution or failure to execute the same whether arising during the progress of the work or after the cancellation, terminations, completion or abandonment thereof shall be dealt with as mentioned hereinafter.

If the bidder considers any work demanded of him to be outside the requirements of the contract or disputes any drawings, record or decision given in writing in connection with or arising out of the contract or carrying out of the work, he shall promptly within 15 days request the Owner in writing for written instruction or decision.

If the Bidder is dissatisfied with this decision, the Bidder shall within a period of 30 days from receipt of the decision, give written notice to the IIT Roorkee for appointment of Arbitrator failing which the said decision shall be final binding and conclusive and not referable to adjudication by the Arbitrator.

Except where the decision has become final, binding and conclusive in terms of Sub Para (i) above disputes or difference shall be referred for adjudication through arbitration by a sole arbitrator appointed by The Director, IIT Roorkee. If reason whatsoever another sole arbitrator shall be appointed in the manner aforesaid. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor. It is a terms of this contract that the party invoking arbitration shall give a list of disputes with amounts claimed in respect of each dispute along with the notice for appointment of arbitrator. It is also a term of this contract that no person other than a person appointed by such IIT Roorkee as aforesaid should act as arbitrator and if for any reason that is not possible, the matter shall not be referred to arbitration at all.

It is also a term of this contract that if the contractor does not make any demand for appointment of arbitrator in respect of any claims in writing as aforesaid within 30 days of receiving the intimation from the Owner that the final bill is ready for payment, the claim of the bidder shall be deemed to have been waived and absolutely barred and IIT Roorkee shall be discharged and released of all liabilities under the contract in respect of these claims. The arbitration shall be conducted in accordance with the provisions of the Arbitration and Conciliation Act, 1996 (26 of 1996) or any statutory modifications or reenactment thereof and the rules made there under and for the time being in force shall apply to the arbitration proceedings under this clause.

10. Protection of environment

10.1 The Bidder 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.

10.2 During continuance of the contract, the Bidder and his sub-bidders shall at all times abide by all existing enactment on environmental protection and rules made there under, regulations, notifications and bye-law of the State or Central Government, or local authorities and any other law, by-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority.

10.3 Salient features of some of the major laws that are applicable are given below:

(i) The Water (Prevention and Control of Pollution) Act, 1974 This provides for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. 'Pollution' means such contamination of water or alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms.

(ii) The Air (Prevention and Control of Pollution) Act, 1981, This provides for prevention, control and abatement of air pollution, 'Air Pollution' means the presence in the atmosphere of any air pollutant', which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.

(iii) The Environment (Prevention and Control of Pollution) Act, 1986 This provides for the protection and improvement of environment and for matters connected to herewith, and the prevention of hazards to human beings. Other living creatures, plants and property, 'Environment' includes water, air and land and the interrelationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property.

(iv) The Public Liability Insurance Act 1991. This provides for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986, and exceeding such quantity as may be specified by notification by the Central Government.

11. Specifications to be followed for execution for execution of works are:

For Civil Works: CPWD Specifications 2019 Vol. 1 and Vol. 2 with up-to-date correction slips and Specification mentioned in This Publish document for each project.

For Electrical Works: CPWD General Specifications for Electrical Works, Part-I (Internal) 2023 and CPWD General Specifications for Electrical Works, Part-I (External) 2023 with up-to-date correction slips and Specification mentioned in this bid document for each project.

For HVAC Works: CPWD General specification for HVAC Works 2017 with up-to-date correction slips and specification mentioned in this bid document.

12. If the bidder wants to offer any unconditional rebates on their offer that should be clearly mentioned.

13. In case any information furnished by the bidder is found to be false / forged / incorrect at any stage, their bid shall be rejected, and the bidder shall not be allowed to participate in the re-bidding process of the work.

14. Clarification of Bids/ Shortfall Documents: IIT Roorkee may, at its discretion, ask the bidder for clarifications / shortfall documents related to his bid. The request for clarification shall be given in writing. Depending on the reply of the bidder, his bid shall be ignored or considered further.

15. Tender will be awarded on overall L1 basis (including BoQ1, BoQ2, BoQ3 etc.).

16. Abnormally High and Low Bids:

a) Tender evaluation committee (TEC) will observe the rates and seek justifications if that are abnormally high/low. Threshold value over which the rates would be judged high/low shall be decided by the TEC looking into the nature of work and their specification on case-to-case basis.

b) If required necessary for high bids negotiation will be done with the approval of the Competent Authority. However, if the rates will be found abnormally low additional performance guarantee shall be got deposited as per the following formula:
i) Up to 30% less than the estimated cost: nil
ii) Above 30% and less than up to 50%: 20%
iii) Above 50% and less than up to 70%: 40%
The Additional Performance Guarantee will be released with the Performance Guarantee.

17. The bidder who has two ongoing General Repair & Maintenance/Routine works in-hand for electrical works and three ongoing General Repair & Maintenance/Routine works for civil works shall not be allowed to participate in another fresh tender of General Repair & Maintenance/Routine works.

18. Working/Running Contractor who have completed their work upto/ above the awarded value of contract bond duly verified by the Engineer-in-charge shall be considered as work completed and such contractors shall be allowed to participate in tenders.

19. Only 'Class-I local supplier' and 'Class-II local supplier', as defined in the Public Procurement (Preference to Make in India), Order 2017 shall be eligible to bid in the tender. For more details please refer: Order No.: P-45021/2/2017-PP (BE-II), DPIIT, Ministry of Commerce and Industry issued Dated: 16th Sept. 2020. Self- certificate has to be provided in this regard that the item offered meets the local content requirement for 'Class-I local supplier' & 'Class-II local supplier' (as per Annexure-I).

20. Estimate is based on DSR-2022 (E&M) + Non-scheduled rates with 18% GST and 1% BOCWW Cess.

21. In case the GST rate is changed by the GOI then the item rate in the estimate shall be changed on pro-rata basis.

Undertaking

(On Non-Judicial stamp paper of Rs. 100/-)

Name of the address of the bidder: …….

NIT No……

Name of the work: ……..

Due Date: ……

I/We have read and examined the Tender document for the work. I/We hereby submit bid for the execution of the work specified for the Institute within the time specified in NIT of quantities and in accordance with the specifications, designs, drawing and instructions in writing referred to the conditions of contract and with such materials as are provided for, by, and in respect of accordance with such conditions so far as applicable.

I/We agree to keep the Bid open for ninety (90) days from the due date of its opening and not to make any modification in its terms and conditions.

Earnest Money as mentioned in the critical data sheet is hereby forwarded in Bankers' Cheque / Demand Draft / Fixed Deposit Receipt issued by scheduled bank. If I/We, fail to furnish the prescribed performance guarantee within prescribed period. I/We agree that the Institute has to right to forfeit the said earnest money absolutely. Further, if I/We fail to commence work as specified, I/We agree that the Institute has to right to forfeit the said performance guarantee absolutely. The said performance guarantee shall be a guarantee to execute all the works referred to in the Tender documents upon the terms and conditions contained or referred to those in excess of that limit at the rates to be determined in accordance with the provision contained in NIT. Further, I/We agree that in case of forfeiture of Earnest Money or Performance Guarantee as aforesaid, I/We shall be debarred for participation in the re-Tendering process of the work.

I/We undertake and confirm that eligible similar work(s) has/have not been got executed through another bidder on back to back basis. Further that, if such a violation comes to the notice of owner, then I/we shall be debarred for tendering in IWD, IIT Roorkee in future forever. Also, if such a violation comes to the notice of owner before date of start of work, the Engineer-in-Charge shall be free to forfeit the entire amount of Earnest Money Deposit/Performance Guarantee.

I/We hereby declare that I/We shall treat the tender documents drawings and other records connected with the work as secret/confidential documents and shall not communicate information/derived there from to any person other than a person to whom I/We am/are authorized to communicate the same or use the information in any manner prejudicial to the safety of the State.

I/We hereby declare that I/We have no near relative connection by marriage to any staff of the Institute.

The information given in the tender form is correct and best of my knowledge.

Dated: Signature of Bidder

Witness: Postal Address

Occupation:

PERFORMANCE GUARANTEE BOND

In consideration of the Indian Institute of Technology Roorkee having agreed under the terms and conditions of agreement No…… dated…….. made between ……. And……(hereinafter called "the contractor(s)")…… for the work……(hereinafter called "the said agreement") having agreed to production of a irrevocable Bank Guarantee for…… (Rupees……only) as a security/guarantee from the contractor(s) for compliance of his obligations in accordance with the terms and conditions in the said agreement,

1. We ..... (.hereinafter referred to as "the Bank") hereby undertake to pay to IIT Roorkee (Indicate the name of the bank) an amount not exceeding Rs…….. (..... only) on demand by the Indian Institute of Technology Roorkee.

2. We ……..do hereby undertake to pay the amounts due…… and payable (Indicate the name of the Bank) under this Guarantee without any demur, merely on a demand from the Indian Institute of Technology Roorkee stating that the amount claimed is required to meet the recoveries due or likely to be due from the said contractor(s). Any such demand made on the bank shall be conclusive as regards the amount due and payable by the bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding (Rupees only).

3. We, the said bank further undertakes to pay to the Institute any money so demanded notwithstanding any dispute or disputes raised by the contractor(s) in any suit or proceeding pending before any court or tribunal relating thereto, our liability under this present being absolute and unequivocal.

The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the contractor(s) shall have no claim against us for making such payment.

4. We ……further agree that the guarantee herein contained shall (Indicate the name of the Bank) remain in full force and effect during the period that would be taken for performance of the said agreement, and it shall continue to be enforceable till all the dues of the Indian Institute of Technology Roorkee under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged or till Engineer-in-charge on behalf of the Institute certified that the terms and conditions of the said agreement have been fully and properly carried out by the said contractor(s) and accordingly discharges this guarantee.

5. We .....(indicate the name of bank) further agree with the Indian Institute of Technology Roorkee that Indian Institute of Technology Roorkee shall have the fullest liberty without our consent and without effecting in any manner our obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Indian Institute of Technology Roorkee against the said contractor(s) and to forebear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said contractor(s) or for any forbearance, act of omission on the part of the Institute or any indulgence by the Indian Institute of Technology Roorkee to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the contractor(s).

7. We …… (Indicate the name of the Bank) lastly undertake not to revoke this guarantee except with the previous consent of the Indian Institute of Technology Roorkee in writing.

8. This guarantee shall be valid up to .....unless extended on demand by Indian Institute of Technology Roorkee. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to ……(Rupees……only)and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this guarantee all our liabilities under this guarantee shall stand discharged. Dated the ..... day of…… for..... (Indicate the name of the Bank).

List of Approved Makes

List of Approved Makes of Electrical & Mechanical (E&M) Materials		
S.No.	**Materials/ Equipments**	**Manufacturer/ Make**
A	**I.E.I., MCBDB & MCB, Cables & Wires**	
1	MCB, Isolator, Industrial Plug Socket, RCCB, RCBO'S	Schneider Electric / Legrand / Lauritz Knudsen (L&T)) / ABB / Siemens
2	MCBDB & Loose Wire Box	Legrand/ Lauritz Knudsen (L&T)/ Schneider / Siemens
3	Change Over Switches	Asco/ Russel/ Socomac/ ABB/ Lauritz Knudsen (L&T)/ schneider / Havells
4	Automatic Transfer Switch (ATS)	Asco/ Russel/ Socomac/ ABB/ Lauritz Knudsen (L&T)/ schneider / Havells
5	FRLS PVC insulated copper conductor single core cable/ Control Cables for wiring (ISI marked)	Finolex/ RR Kabel/ KEI/ Havells/ Polycab/Grandlay
6	MS Conduit (ISI marked) with heavy duty MS Conduit pipe accessories	BEC/ NIC/ AKG/ RMCON / MK (Honeywell) (**Note:** The make of accessories will be same that of conduit pipe & will comply to IS:4768 part 2 2003)
7	PVC Conduit/ Batten (ISI marked) with havy duty PVC conduit pipe accessories	AKG/ BEC/ Precision/ MK(Honeywell)/ Legrand
8	Modular Switch, Socket/ Telephone Socket/ Cable TV Socket/ Data Outlet Socket/ Fan Regulator/ G.I. Boxes Etc. (Wiring accessories)/ Regulator etc.	Havells (Murano)/ Havells (Crabtree) / Legrand (Arteor)/ Scheinder Electric (Zencelo) / Honeywell-MK (Blenze Plus)/ ABB (Millenium)
9	Selector Switch & Toggle Switch	Salzer (L&T)/ Siemens/ Kaycee
10	PVC Trunking	Legrand/ Schneider/ MK(Honeywell)/ AKG/ Precision
11	G.I. Pipe	Tata/ Jindal (Hissar)/ Prakash Surya
12	Terminals Blocks and Connectors	Elmax/ Wago/ Hensel/ Connectwell
13	Phenolic Laminated Sheet/ Bakelite Sheet	Hylam/ Formica/ (P-I Grade)/ Mylam/ Greenlam
14	Piano Type Switch/ Socket	Anchor/ Cona
15	Ceiling Rose/ Holder/ Call Bell/ Buzzer etc.	Anchor/ Cona
16	Advanced Lightning Protection/ Surge Protection Devices	LPI/ Erico/ Nimbus/ Indelec/ Duval Messien/ ABB –Pulsar
17	Raceway	Legrand/ Schneider/ MK(Honeywell)/ Lauritz Knudsen (L&T)
B	**Fans & Fitting**	
1	LED Fittings	Wipro/ Phillips/ Crompton Greaves/ Havells /Jaquar
2	Sensor based LED Light Fittings	Wipro/ Phillips/ Crompton Greaves/ Havells /Jaquar
3	Exhaust / Ceiling / Wall Fan	Havells/ Usha/ Almonard/ Atomberg / Bajaj
4	Geysers	Racold / CG/ Havells/ Usha/ Jaquar
C	**Street Lighting Poles & Boxes**	
1	Ornamental / HDGI / MS pole (Factory Finish) /	Phillips/ Crompton Greaves/ Wipro/ Bajaj/ Havells
2	Polycarbonate Juction Box/ Enclosure	Hensel/ Spelsberg/ Naptune- Bals/ Cape Electric
3	XLPE insulated PVC Sheated Alum./ Copper conductor Armoured cable of 1.1KV Grade	Finolex/ Universal/ Polycab/ RPG Cable/ KEI/ Havells/ Grandlay/ Gemscab
D	**Sub Station Equipments**	
1	LT Panel (Meter Panel Board/ Outdoor & Indoor Feeder Panel)	Tricolite Elecrical Industries/ Control & Switchgears Pvt. Ltd./ Adlec Control System Pvt. Ltd./ Advance Panels & Switchgears Pvt. Ltd./ S.S. Enterprises/ A.R. Engineers/ Salabh (India) Industries

2	Main LT Panel (TTA) at Substation	Tricolite Elecrical Industries/ Control & Switchgears Pvt. Ltd./ Adlec Control System Pvt. Ltd/ Legrand/ Lauritz Knudsen (L&T)/ Schneider/ABB
3	Air Insulated Rising Main	C&S/ Lauritz Knudsen (L&T)/ Schneider/ Legrand
4	Sandwich type Bus Trunking	C&S/ Lauritz Knudsen (L&T)/ Schneider/ Legrand
5	Moulded Case Circuit Breaker (MCCB) Thermal Release/ Microprocessor Based (Ics=Icu=100%)	Schneider Electric (NSx Series)/ Siemens (VL Series)/ Lauritz Knudsen (L&T) (D-Shine)/ Legrand (DPX3)/ ABB (Tmax)/ C&S (Winbreak-1/2)
6	Power/ Aux. Contactor 3/4 pole	Schneider Electric/ Lauritz Knudsen (L&T)/ Siemens/ Legrand/ ABB/ C&S
7	Potential Transformer/ Current Transformer	Automatic Electric / Precise/ Kappa / CGL / Mehru / BHEL
8	LED type indicating lamps/ Push Button	Schneider Electric/ Lauritz Knudsen (L&T)/ Siemens/ C&S/ GE
9	Protection Relays	Schneider Electric/ Lauritz Knudsen (L&T)/ Siemens/ C&S/ ABB/GE
10	Conventional Analogue / Electronic Digital Meters (A/V/PF/Hz/KW/KWH)	Conzerv/ Lauritz Knudsen (L&T) / Secure/ AE/ C&S/ Siemens/ Schneider/ ABB/ Rishabh
11	Timer	Siemens/ Lauritz Knudsen (L&T)/ Legrand/ ABB/ Schneider Electric/ C&S
12	Fasteners/ G.I. Clamps	Hilti/ Fischer/ Jyoti Engineering / BAGADIA INDUSTRIAL
13	D.W Corrugated HDPE Pipe (ISI marked)	REX/ Dura plast/ Zenduct/ Triputi/ Duraline
14	Transformer (Oil/ Dry type)	Crompton/ ABB/ Schneider/ Voltamp/ Kirloskar / Alstom / BHEL
15	HT Panel/ Ring Main Unit	Siemens/ ABB/ Lauritz Knudsen (L&T)/ Schneider
16	H.T Cable (ISI marked)	CCI/ Polycab/ Universal/ KEI/ Havells/ RPG Cables/Grandlay (upto 11 kV)
17	LT Cable Straight Through Joint Kit	ReychemRPG / Cabseal/ 3M
18	HT Cable Straight Through / End Termination Joint Kit	ReychemRPG / Cabseal/ 3M
19	ACBs (with display)	Siemens (3WL)/ Lauritz Knudsen (L&T) (U-Power)/ ABB (Emax)/ C&S (WiNmaster) / Legrand (DMX3)/ Schnieder (Master Pact - MVS)
20	Rubber Mat	Jyoti/ Deep Joyti/ Premier (duly ISI marked)
21	Capacitors & Reactors/ APFC Relay	EPCOS/ Lauritz Knudsen (L&T)/ ABB/ Siemens/ Schneider
22	APFC Panel (Accessories make will be as per manufacture's standards)	Lauritz Knudsen (L&T)/ Schneider/ ABB/ Siemens/ Legrand/ C&S
23	Cable Glands & Lugs	Comet/ Cosmos/ Dowells/ Gripwell/ Jainson / Hax Brass (Copper Alloy India)
24	MS / GI Cable Tray	Pilco/ Slotco/ Pasco/ MEM/ BEC/ Steelways/ Legrand
25	Programmable Logic Controller (PLC)	Siemens / Woodward/ Allen Bradley / Delta / Mitsubishi / Deep Sea / DEIF
E	**DG Sets**	
1	Diesel oprated power Generating Engine	Cummins India/ Caterpillar/ Ashok Leyland/ Kirloskar/ Mahindra/ Perkins
2	Alternator	Stamford/ Lerroy Sommer/ Kirloskar Electric Caterpillar/ Crompton Greaves/ Toyo Denki
3	DG Set Canopy/ Enclosure & AMF Panel	As per OEM/ OEA of respective DG Set Manufacturer
4	Alarm Annunciator	As per OEM/ OEA of respective DG Set Manufacturer
F	**Fire Fighting Equipments**	
1	Fire Extinguishers	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
2	MS Pipe	Tata/ Jindal(Hisar)/ Prakash Surya

3	GI Pipe	Tata/ Jindal(Hisar)/ Prakash Surya
4	Forged Steel Fitting/ Flanges	Johnson Industries/ VS Forge/ JK Forging/ Trueforge
5	Forged Steel Fitting & Flanges (for welding joints)	VS Forge/ Rohini/ Kanwal Forge/ Johnson/ Trueforge
6	Pipe Hangers	Chilli/ Hilti/ GMGR/ Fischer
7	Gun Metal/ Brass Valve (ISI marked) (Full way Globe valve/ Non Return Valve)	Sant/ Leader/ Advance/ Zoloto/ Kirlosker / Kartar
8	Butterfly/ Sluice Valve (ISI marked)	Sant/ Leader/ Advance/ Audco/ Zoloto/ Kirlosker/ Kartar
9	Check Valve (ISI marked)	Sant/ Leader/ Advance/ Audco/ Zoloto/ Kirlosker/ Kartar
10	Foot Valve (Cast Iron/ Gun Metal)	Sant/ Leader/ Advance/ Audco/ Zoloto/ Kirlosker/ Kartar
11	Y-type Strainer	Sant / Audco / Kirloskar / Leader / Zoloto/ Kartar/ Advance
12	Fire/ Sprinkler Pump/ Terrace Fire Pump / Jockey Pump	Kirloskar/ KSB/ Grundfos/ Mather & Platt/ Wilo
13	Electrical Motor	ABB/ Siemens/ Kirloskar/ Grundfos/ Crompton/ NGEF
14	Diesel Enginer for Fire Pump	Kirloskar/ Ashok Leyland/ Cummins
15	Coupling (Tyre-Type)	Lovejoy/ Fenner/ Dunlop
16	Anti Vibration Mountings	Kanwal Industrial Corporation/ Dunlop/ Resistoflex
17	Pressure Switch (ISI marked)	System Sensor/ Danfoss/ WIKA/ General Instrumentation/ Seimens/ Honeywell
18	Pressure Gauge (ISI marked)	H Guru/ Fiebig/ Dwyer / General Instrumentation
19	Double/ Single Headed Landing Valve (ISI marked)	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
20	Male Female Fire House Coupling (SS 304) (ISI Marked)	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
21	First Aid House Drum/ Fire Hose Reels/ Shut off Nozzle (Gunmetal/ ABS) (ISI marked)	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
22	SS 304/ Gun metal Branch Pipe & Nozzle (ISI Marked)	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
23	Fireman Axe	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
24	Water Flow Switch (FM/ UL listed)	System Sensor/ Danfoss/ WIKA/ General Instrumentation/ Seimens/ Honeywell
25	Rust preventive polymeric 4mm thick tape for pipes directly buried in groung Pipe Protection Wrapping (ISI marked)	Pypcoat/ Makphalt/ Rustech/ Safex
26	Level Controller & Indicator (Water)	Auto Pump/ Cirrus Engineering/ Techtrol/ Lauritz Knudsen (L&T)/ Entes
27	Fire Brigade Inlet Connection (ISI marked)	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
28	Thermoplastic pipe for First Aid Hose Reel (ISI marked)	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
29	Fire Sealent	Promat/ Birla 3 M/ Hilti
30	Overload relays with built in Single Phase Preventer	Schneider Electric/ Lauritz Knudsen (L&T)/ Siemens/ ABB/ C&S
31	Power/ Aux. Contactor 3 / 4 Pole	Schneider Electric/ Larsen & Toubro/ BCH/ Siemens/ Legrand/ ABB/ C&S
32	RRL Hose Pipe (ISI marked)	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
33	Dry Battery	Exide/ Standard/ Amar Raja/ Rocket/ HBL/ Pulse/ Amco
34	Battery Charger	Statcon/ Amarraja/ CDC/ AE/ Expofyn/ Thycon India
35	Epoxy Paint	Dulux/ Berger/ Asian/ Nerolac
36	Air Release Valve	Rb/ Tbs/ Cimbrio/ Zoloto
37	Aluminium/ Copper power cable / Control Cable (Armoured/ Unarmoured)	Finolex/ Universal/ Polycab/ RPG Cables/ KEI/ Havells/Grandlay
38	Solenoid Valve/ Spray Nozzle	Parker/ HD Fire Protect/ Tyco/ Emersion
39	Sprinkler	HD Fire Protect/ Tyco/ Reliable/ Wormald/ Viking
40	Sprinkler Heads/ Water Curtain Nozzle	Tyco/ Viking/ Omex/ Newage
41	Steel Flexible Extension	Omex/ Newage/ Tyco

42	Vibration Eliminator	Resistoflex/ D waren/ Kanwal
43	Welding Electrodes	Advani/ ESAB/ Lauritz Knudsen (L&T)
44	Deluge Valve	Tyco/ Viking/ HD
45	Cast Iron Valve	Kirloskar/ Kartar/ Kalpana
G	**Fire Alarm & Public Addressing System**	
1	Addressable manual call box	Notifier (Honeywell)/ Johnson Control (Simplex)/ Siemens/ Bosch/Edwards/Advanced/Apollo
2	Addressable type fault isolator	Notifier (Honeywell)/ Johnson Control (Simplex)/ Siemens/ Bosch/Edwards/Advanced/Apollo
3	Strobe lights cum hooter	Notifier (Honeywell)/ Johnson Control (Simplex)/ Siemens/ Bosch/Edwards/Advanced/Apollo
4	Addressable control modules	Notifier (Honeywell)/ Johnson Control (Simplex)/ Siemens/ Bosch/Edwards/Advanced/Apollo
5	Addressable monitor module	Notifier (Honeywell)/ Johnson Control (Simplex)/ Siemens/ Bosch/Edwards/Advanced/Apollo
6	Addressable type fire alarm control panel	Notifier (Honeywell)/ Johnson Control (Simplex)/ Siemens/ Bosch/Edwards/Advanced/Apollo
7	Network repeater panel	Notifier (Honeywell)/ Johnson Control (Simplex)/ Siemens/ Bosch/Edwards/Advanced/Apollo
8	Addressable multi sensing fire detector (Combination of optical type smoke detector and ROR type heat detector)	Notifier (Honeywell)/ Johnson Control (Simplex)/ Siemens/ Bosch/Edwards/Advanced/Apollo
9	Response Indicator (Adddresable)	Notifier (Honeywell)/ Johnson Control (Simplex)/ Siemens/ Bosch/Edwards/Advanced/Apollo
10	Speakers (For PA System)	Notifier (Honeywell)/ Johnson Control (Simplex)/ Siemens/ Bosch/Edwards/Advanced/Apollo
11	Digital Voice Evacuation System	Notifier (Honeywell)/ Johnson Control (Simplex)/ Siemens/ Bosch/Edwards/Advanced/Apollo
12	Fire Figter Jack & Fire Fighter Handset	Notifier (Honeywell)/ Johnson Control (Simplex)/ Siemens/ Bosch/Edwards/Advanced/Apollo
13	Interactive Fire Fighter Display	Notifier (Honeywell)/ Johnson Control (Simplex)/ Siemens/ Bosch/Edwards/Advanced/Apollo
14	Fire Survival copper conductor Cable	Finolex/ RR Kabel/ KEI/ Havells/ Polycab/Grandlay
H	**Water Supply System**	
1	Mono Submersible pump Set	KSB/ CG/ Kirloskar/ Grundfos/ Amrut
2	Submersible Pump Set	KSB/ CG/ Kirloskar/ Grundfos/ Amrut
3	G.I. Pipe	Tata / Jindal Hisar (ISI mark) / Prakash Surya
4	Sluice Valve/ Check Valve/ Butterfly Valve/ Non Return Valve etc.	Zoloto/ Bharat/ Kalpana/ Kirloskar/ Sant/ KSB
5	Submersible Cable	Finolex/ Polycab/ Havells/ KEI/Grandlay
6	G.I. Fittings (e.g. union, plug, elbow, tee, socket etc.)	Unik/ AVR/ Zoloto/ Eye/ HB/ KKR/ Prakash Surya (ISI mark)
7	PPR/ CPVC/ UPVC Pipe and Fittings	Astral/ Supreme/ Ashirwad/ Finolex/ Ajay Flow Guard/ Prince/ SFMC (ISI mark)/KPT
8	Starter and Motor Controller	Lauritz Knudsen (L&T)/ ABB/ Siemens
9	Water Flow Meter	ABB/ Lauritz Knudsen (L&T)/ Siemens/ Supreme Technology

I	**Air Conditioner & Water Purifier**	
1	Split/ Window/ Cassette Air Conditioner	Mitshubshi Electric/ Mitshubshi Heavy Industries/ Toshiba/ O-General/ Daikin/Carrier/Hitachi
2	R.O./ Water Purifier	Kent/ Ion Exchange/ Aquaguard/Blue Star
3	Drinking Water Cooler/Dispenser	Voltas/ Blue Star/ Usha/ Climatrol (Sidwal)/Eureka Forbes
4	Compressor AC/ Water Cooler	HIGHLEY/TOTALINE/ DAIKIN / As per OEM
J	**Solar Water Heating System**	
1	Solar Water Heating System	Racold/ Electrotherm/ V-Guard/ Bosch/EMVEE/Photon energy
K	**Uninterrupted Power Supply (UPS)**	
1	Online/ Offline UPS	Numeric/ Eaton/ APC/ Vertiv/ ABB
L	**Solar Power Generation System**	
1	Solar PV Module	Waaree/ Vikram/ Adani/Tata Solar Power/ CEL
2	Junction Box	As per OEM of SPV Modules
3	SPV Inverter	Delta / Solar edge / Fronius / Goodwe / ABB/ Growatt/ SMA
4	Module Mounting Structure	As per MNRE/ Manufactures Standards
5	Solar Cable XLPO Insulated (DC)	RR Kabel/ Polycab/ Havells/ Finolex/Grandlay
M	**a. VRV / VRF AC & TFA**	
1	Variable Refrigerant Volume System	O-General/ Toshiba/ Daikin/ Mitsubishi Electric/ Mitsubishi Heavy Industry/Hitachi
2	TFA Unit	Zeco/ Edgetech/ Citizen / Systemair / Bryair or OEM of VRF/ VRV
-	**b. Ducting, Grilles etc.**	
1	Grilles/ Diffusers/ Fire Dampers	Airflow/ Systemair / Tristar/ Servex/ Dynacraft/ Caryaire / Pineair/ Airmax Air System
2	Fire Dampers motors	Belimo/ Siemens/ Honeywell
3	G.I. Sheet Metal for duct	Jindal/ Tata/ SAIL
4	Factory fabricated duct (TDC) - Rectangular / Round	Ductofab/ RSP Air/ Zeco / GP Spiro/ Atco
5	Self Adhesive Sealing Gasket for Ducts	Prima Seal/ Air Flow/ Trocellen
6	Stick Pins	Prima Seal/ Air Flow/ Trocellen
7	VCD/ Gravity louvers/ Exhaust & fresh air louvers	Airflow/ Systemair / Tristar/ Servex/ Dynacraft/ Caryaire / Pineair
8	Electronic controller/ actuator for smoke exhaust fan	Belimo/ Siemens/ Honeywell
9	Round Flexible Duct	Atco/ UP Twiga/ Carryair
	c. Pipes & Fittings	
1	PVC Drain Pipe	Supreme/ Finolex/ Astral/ Polycab
2	Refrigerant Copper Pipe	Rajco Metal/ Mandev/ Maxflow / Uniflow
3	Copper Fittings(Y-Joints)	AS per OEM of VRF/ VRV
	d. Insulation	
1	Expanded Polystyrene (TF Quality) (Pre-moulded pipe section / slab)	Beard Sell / Armacell/ K-flex/ Kaimann
2	Cross Linked Polyethylene (Fire resistant quality)	Trocelene/ Supreme/ Paramount / K-flex/Kaimann/ Aerolam
3	Glass Wool	Owens Corning/ U.P. Twiga/ Lloyd insulation

4	Closed Cell Elastomeric Thermal Insulation (Nitrile rubber)	Beard Sell / Armacell/ K-flex/ Kaimann
5	Pre-moulded PUF section for pipe & pipe supports	Epack/ Lloyd / Kingspan Jindal
6	Aluminium Tape	Johnson/ Hindalco/ 3M
7	Protective Coating over Closed Cell Elastomeric – Fiber glass Woven cloth	Polybond/ UP Twiga/ Owens Corning
	e. Accessories/ Controls	
1	Filters	Airtech/ Purolater/ Spectrum/ Thermodyne
2	Thermometers (with brass encasing)	Emerald/ Taylor/ Japsin
3	Room Thermostat/ AHU & FCU Thermostat	Honeywell/ Siemens/ Danfoss
4	Humidistat	Honeywell/ Siemens/ Danfoss
5	VFD with sensors	ABB/ DANFOSS/ Siemens
	f. Fans	
1	Inline/ Propeller Fans	Systemair/ Nicotra/ Kruger/ Greenheck/ Airflow/ Caryaire/ Alstom/ Khaitan/ Crompton Greaves/ GE
Note: Due to compatibility of items, for replacement purpose existing brand shall be considered subject to availability.		

Annexure-I

(to be submitted by the vendor/firm on its official letter

head) Self-Certificate for Local Content

Tender No: **Dated**

We hereby certify that the items quoted by us against above mentioned tender no. has the local content as per below:

Local Content (in %): …….

Local Supplier Class: .....

The details of the Make in India items/parts used in the quoted products is/are as under:

1.

2.

3.

The details of the location(s) at which the local value addition made/manufactured is/are as under:

1.

2.

3.

We also understand, false declarations will be in breach of the code of integrity under rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151(iii) of the General Financial Rules along with such other actions as may be permissible under law.

Signature:

Name:

Designation:

Seal of the Firm/Organization:

Annexure-II

Sl. No.	Item descriptions	Offered Capacity and configuration	Offered Brand	Offered model	COP at 100% load	COP at 50% Load
1	VRV AC Unit as per BoQ					
2	Treated Fresh air unit (TFA)AHU					

Note: Above information is mandatory, if any additional sheets required to provide the requested information, then bidder can submit.

Signature of the bidder **Signature of the OEM**

Annexure-III

PERFORMA FOR DIRECT PAYMENT/ TRANSFER TO BANK ACCOUNT BY IIT ROORKEE

S. No.	Particulars	Information
1	Firm (Beneficiary) Name	
2	Address	
3	Complete Bank Account No. of the Firm (Beneficiary) (In case of change in Bank Account vendor write to Account Office)	
4	Bank Name	
5	Branch Address	
6	IFSC Code No.	
7	Permanent Account No.	
8	Mobile No. (for SMS)	
9	Email ID (For Information)	
10	Enrolment No. (for student)	

We undertake that all the information provided above is correct and IIT Roorkee will not be responsible in case of any error on the part of firm.

Verification by Bank (one time only) Information given at 1,4,5,6&7 verified by Bank Seal and Signature of the Bank	 Seal and Signature of the Firm

Scope of Work

For Part-A : Supply, Installation Testing & Commissioning (SITC)

SECTION – 1

1. **OBJECTIVE**

The object of air conditioning system is to create safe and comfort environment in respect to temperature humidity, dust and odor etc. Considering the site condition and heat load calculations VRV/ VRF system is to be installed at the said location. The VRV unit consists of indoor unit which have fan, cooling coil, fan motor etc., and outdoor unit consist of inverter compressor, condenser coil fan etc.

2. SCOPE OF WORK

Scope of work covers the provision of labour, tools, plants, materials, and performance of work necessary for the design, manufacture / procurement / supply, quality assurance, quality control, shop assembly, shop testing, delivery at site, loading, unloading, site storage and preservation, installation including incidental civil and electrical work, commissioning, performance testing, acceptance testing, training of owner personnel, handing over to IIT Roorkee. The VRV / VRF system shall be installed as per the specifications here under, each complete with all auxiliaries, accessories like acoustic lining, canvas connections, silencers, vibration isolators, volume control dampers, ~~smoke dampers~~, supports and fire sealant around ducts / pipes & cables when passing through wall / floor and other openings etc. where ever required for trouble free safe operation of the installation. The Heating, Ventilation and Air-Conditioning (HVAC) system shall comprise of procurement, design, installation, testing and commissioning of VRV/ VRF technology with minor civil and electrical work as following:

i. The work proposed under this tender includes providing and fixing, air-conditioning systems for specified areas of the buildings and as mentioned in tender drawings.
ii. Providing and fixing at site all main equipment's associated with A.C. system asked under these technical specifications and in BOQ.
iii. To execute all incidental work at site including material supply at site associated with A.C. asked in the technical specifications. Nature of such will be sheet metal duct/grill work, refrigerant piping, drain, external insulation, acoustic lining, canvas connections, silencers, vibration isolators, volume control dampers, ~~smoke dampers~~, supports and fire sealant around ducts / pipes & cables when passing through wall / floor and other openings etc.,
iv. Incidental electrical Engineering work, cables, control panels, earthing etc. erection work at site for all manufactured items at work and also items fabricated at site.
v. Foundation of equipment's, cutting holes, chases and the like through all types of nonstructural walls, and finishing for all services crossings, including sealing, frame work, fire proofing, providing sleeves, cover plates, making good structure and finishes to an approved standard.
vi. Routine testing, pressure testing of fabricated components, commissioning of complete system at site.
vii. Required civil works like gypsum boxing with POP finishing for covering of all services like refrigerant pipe, drainpipe, cabling wherever required (are not part of this tender).
viii. Performance testing of complete air-conditioning system at site as per various technical requirements as stipulated.
ix. Shop drawing for routing of piping, VRV layout, Cable / conduit route, preparation and submission to EIC for its approval.
x. Provide 'as built' electrical line diagram, structure installation drawings, wiring and earthing diagrams, control room installation drawing.

3. TERMINOLOGY

3.1 Air Conditioning

The process of treating air so as to control simultaneously its temperature, humidity, purity, distribution and air movement and pressure to meet the requirements of the conditioned space.

3.2 Coil By Pass

The coil by pass factor is the percentage of air passing over the coil that is not affected by the coil.

3.3 SHGC

The SHGC is the friction of incident solar radiation admits through a window both directly and absorbed and subsequently released. SHGC is express as a number between 0 to 1. The lower a window solar heat coefficient the less solar heat is transmitted.

3.4 Relative Humidity

Ratio of the actual water vapor in the air as compared to the maximum amount of water that may be contained at its dry bulb temperature. When the air is saturated, dry bulb, wet bulb and dew point temperatures are all equal.

3.5 Dry-Bulb Temperature

The temperature of air as registered by an ordinary thermometer.

3.6 Wet-Bulb Temperature

The temperature registered by a thermometer whose bulb is covered by a wetted wick and exposed to a current of rapidly moving air.

3.7 Dew Point Temperature

The temperature at which condensation of moisture begins when the air is cooled at same pressure.

3.8 Humidity

It is the amount of water vapor present in a certain volume of air.

3.9 Enthalpy

A thermal property indicating the quantity of heat in the air above an arbitrary datum in kilo joules per kg of dry air (or in Btu per pound of dry air).

3.10 Psychrometry

Psychrometry is the science involving thermo dynamic properties of moist air and the effect of atmospheric moisture on materials and human comfort. It also includes methods of controlling thermal properties of moist air.

3.11 Psychometric Chart

A Psychometric chart graphically represents the thermodynamic properties of moist air. If two properties are known, all the other properties can be determined with the help of psychometric chart.

3.12 Positive Ventilation

The supply of outside air by means of a mechanical device, such as a fan.

3.13 Atmospheric Pressure

The pressure of air exerted on the surface of earth by the atmospheric column is called atmospheric pressure. At sea level, the atmospheric or barometric pressure is 760mm column of mercury (29.92 in Hg/ 406.8-inch water column/ 101.325 Kpa).

Generally atmospheric pressure is used as a datum for indicating the system pressures in air-conditioning and accordingly, pressures are mentioned above the atmospheric pressure or below the

atmospheric pressure considering the atmospheric pressure to be zero. A `U' tube manometer will indicate zero pressure when atmospheric pressure is measured.

3.14 **Indoor Air Quality (IAQ)**

Indoor air quality refers to the nature of conditioned air that circulates throughout the space/ area where one works or lives, i.e. the air we breathe when we are indoors. IAQ refers not only to comfort which is affected by temperature, humidity and odours but also to harmful biological contaminants and chemicals present in the conditioned space.

Bad Indoor Air Quality can be a serious health hazard. Carbon dioxide (CO2) has been recognized by ASHRAE as the surrogate ventilation index or the only measurable variable for the indoor air contaminants.

3.15 **Thermal Transmittance**

Thermal transmission through unit area of the given building unit divided by the temperature difference between the air or some other fluid on either side of the building unit in `steady state' conditions.

3.16 **Thermal Energy Storage**

Storage of `Cold Energy' sensible, latent or combination for use in central system for air-conditioning or refrigeration is called thermal energy storage. It uses a primary source of refrigeration for cooling and storing 'Cold Energy' for reuse at peak demand or for backup as planned.

3.17 **Shade Factor**

The ratio of instantaneous heat gain through the shading device to that through a plain glass sheet of 3mm thickness.

3.18 **Sensible Heat Factor (SHF)**

Sensible heat factor is the ratio of sensible heat to total heat, where total heat is the sum of sensible and latent heat.

3.19 **Supply Air**

The air that has been passed through the conditioning apparatus and taken through the duct system and distributed in the conditioned space is termed as supply air.

3.20 **Return Air**

The air that is collected from the conditioned space and returned to the conditioning equipment is termed as return air.

3.21 **Re-Circulated Air:**

The return air that has been passed through the conditioning apparatus before being re- supplied to the space is called re-circulated air.

3.22 **Duct System**

A continuous passageway for the transmission of air which in addition to the ducts, may include duct fittings, dampers, plenums and grilles & diffusers.

3.23 **Plenum**

An air compartment or chamber to which one or more ducts are connected and which forms part of a distribution system.

3.24 **Supply and Return Air Grilles & Diffusers**

Grilles and diffusers are the devices fixed in the air-conditioned space for distribution of conditioned supply air and return of air collected from the conditioned space for re-circulation.

3.25 **Fire Damper**

A closure which consists of a normally held open damper installed in an air distribution system or in a wall or floor assembly and designed to close automatically in the event of a fire in order to maintain the integrity of the fire separation.

3.26 **Smoke Damper**

A smoke damper is similar to fire damper. However, it closes automatically on sensing presence of smoke in air distribution system or in conditioned space.

3.27 **Fire Separation Wall**

The wall provides complete separation of one building from another or part of a building from another part of the same building to prevent any communication of fire of any access or heat transmission to wall itself which may cause or assist in the combustion of materials of the side opposite to that portion which may be on fire**.**

3.28 **Refrigerant**

The fluid used for heat transfer in a refrigerating system, which absorbs heat at a low temperature and low pressure of the fluid and rejects heat at a higher temperature and higher pressure of the fluid, usually involving changes of state of the fluid.

3.29 **Global Warming Potential (GWP):**

Global Warming can make our planet and its climate less hospitable and more hostile to human life. It is, therefore, necessary to reduce emission of greenhouse gases such as Co2, Sox, NOx and refrigerants. The potential of a refrigerant to contribute to Global Warming is called its GWP. Long atmospheric life time of refrigerants results in Global Warming unless the emissions are controlled.

4. ABBREVATIONS

DB : Dry bulb
WB: Wet bulb
BF : By pass factor
DP : Dew Point
SHF: Sensible heat factor
RH: Relative humidity
NBC: National building Code-2016
SHGC: Solar heat gain coefficients
U Values: Over all heat transfer
CFM: Cubic feet per minute
DX: Direct Expansion.
F : Fahrenheit degree
T: Temperature.

SECTION – 2

VARIBALE REFRIGERANT VOLUME/ FLOW SYSTEM:

The system selected is a modular system, with number of indoors connected to centrally located outdoor units. The system should control at single point at each building.

General Description

All the VRV/ VRF air conditioners shall be fully factory assembled, wired, internally piped & tested. The outdoor unit shall be pre-charged with first charge of refrigerant. Additional charge shall be added as per refrigerant piping at site. The system should facilitate the operation & control of individual room. The system shall be able to cater the partial load which can be as low as 10% of the total load, thereby the operation of indoor & outdoor units is minimized. Proposed AC system will be microprocessor controlled inclusive of safety devices. Operation temperature range will be **16-31 deg C.** The Variable Refrigerant Flow system should be energy efficient for least power consumption. The system should provide efficient cooling and heating (by reverse cooling cycle). Independent climate (temperature and humidity) control in each rooms should be provided. Also, independent temperature control (remote) for each room should be provided.

All the units shall be suitable for operation with 415 V +/- 10%, 50 Hz + 3%, 3 Phase supply for outdoor units; & 220 V +/- 10%, 50 Hz +/- 3%, 1 Phase supply for indoor units. **The outdoor unit shall be installed as decided by the Indian Institute of Technology Roorkee.**

Specifications of Outdoor units:

- Outdoors units of the VRV/VRF system shall be compact air-cooled type.
- The outdoor unit should comprise of Inverter controlled DC Twin Rotary compressor / Inverter Scroll Compressor.
- Each module of outdoor unit must have at least 50 % variable compressor which can work on part load suitable to operate at heat load proportional to indoor requirement.
- **The each ODU must deliver COP of minimum 5.7 at 50 % load and 3.45 at 100%** load
- ~~The outdoor units must be suitable for up to 225 m refrigerant piping between outdoor unit & the farthest indoor units. Allowable level difference between outdoor unit & indoor units shall be 50 m in case of outdoor unit on top & 40 m in case of outdoor unit at bottom.~~
- ~~Allowable level difference between various indoor units connected to one out door unit shall be up to 15 m.~~
- The outdoor units shall be suitable to operate within an ambient temperature range of 5 Deg C to 43 Deg C in cooling mode; & -20 DegC to 15 Deg C in heating mode.
- The unit shall deliver the rated capacity at AHRI Conditions and work even at 50°C ambient temperature without tripping.
- The entire operation of outdoor units shall be through independent remotes of indoor units. No separate Start/ Stop function shall be required.
- Starter for the Outdoor Unit compressor shall be Direct Online type.
- Inverter compressor of the unit shall start first & at the minimum frequency, to reduce the inrush current during starting.
- Complete refrigerant circuit, oil balancing/ equalizing circuit shall be factory assembled & tested.
- Outdoor units shall be air cooled, variable refrigerant flow/volume air conditioner of R-410A gas- based consisting of one outdoor unit and multiple indoor units. Each indoor unit shall have the capability to cool or heat independently for the requirement of the rooms.
- The indoor units on any circuit should be controlled individually as well as central control unit.

- Compressor installed in outdoor unit shall be equipped with inverter compressors of suitable capacity. The system shall be capable of changing the rotating speed of inverter compressor by inverter controller to follow variations in cooling and heating load.
- Outdoor unit shall be suitable for mix -match connection of all type of indoor units.
- Both indoor units and outdoor unit shall be factory assembled, tested and filled with first charge of refrigerant before delivering at site.
- The outdoor unit shall be factory assembled unit housed in sturdy weatherproof casing, constructed from heavy gauge mild steel panels and coated with standard paint finish. The unit should be completely factory wired tested with all necessary controls and switch gears:
- All outdoor units **above 14 HP shall have a minimum of two scroll/ dc rotary compressors** and be able to operate even in case one of compressor is out of order.
- All outdoor units must be equipped with optimized heat exchanger.
- It should be provided with duty cycling for switching starting sequence of multiple outdoor units.
- The outdoor unit shall be modular in design and should be allowed for side-by-side installation.
- The unit shall be provided with its own microprocessor control panel.
- The outdoor units shall be complete with safety devices namely high / low pressure switch, fan driver overload protector, over current relay, inverter overload protector, fusible plug.
- The oil mechanism shall be capable of oil film control by high thrust mechanism.
- The heat transfer circuit should perform super cooling before the expansion process in the indoor units.
- The outdoor units side panel and outer panel shall be alloyed hot-dip zinc coated steel plate with powder polyester resin coating on the inner and outer surfaces in the thickness of 32 microns.
- The outdoor unit's bottom frame shall be hot-dip aluminum or zinc or silicone coated steel plate.
- The outdoor unit should be fitted with low noise, aero spiral and aero asymmetrical design fan with multiple speed DC motor. The fan shall be coated with styrene-acrylo nitrile resin (glass fiber filled). The fan shall be covered with aero smooth grille which shall be three-dimensional, integrated, soft woven steel covered with plastic coating. The fan protective net shall be coated with weather resistant polypropylene resin.
- The condensing unit shall be designed to facilitate fail safe operation when connected to multiple indoor units.

INVERTER COMPRESSOR

- The compressor shall be highly efficient inverter scroll/ DC twin rotary type and capable of inverter control. It shall change the speed in accordance to the variation in cooling or heating load requirement:
- The inverter shall be IGBT type for efficient and quiet operation.
- All outdoor units shall have multiple steps of capacity control to meet load fluctuation and indoor unit individual control. All parts of compressor shall be sufficiently lubricated. Forced lubrication may also be employed.
- Oil heater shall be provided in the compressor casing.
- The compressor shall be with in-built crankcase heater.

HEAT EXCHANGER

- The heat exchanger shall be constructed with copper tubes mechanically bonded to aluminum fins to form a cross fin coil.
- The aluminum fins shall be covered by anti-corrosion resin film of special acrylic resin.
- The unit shall be provided with necessary number of direct driven low noise level propeller type fans arranged for vertical discharge. Each fan shall have a safety guard.

REFRIGERANT CIRCUIT

The refrigerant circuit shall include liquid & gas shut-off valves and a solenoid valve at condenser end. All necessary safety devices shall be provided to ensure the safe operation of the system.

OIL RECOVERY SYSTEM

Unit shall be equipped with an oil recovery system to ensure stable operation with long refrigeration piping. The system must be provided with oil balancing circuit to avoid poor lubrication.

INDOOR UNIT

This section deals with supply, installation, testing, commissioning of various ceiling mounted cassette type / ductable units / wall mounted indoor units confirming to general specification and suitable for the duty selected. The type, capacity and size of indoor units shall be as per site requirement.

GENERAL

Indoor units shall be as per BoQ. These units shall have electronic control valve to control refrigerant flow rate in response to load variations of the room.

a) The address of the indoor unit shall be set automatically in case of individual and group control.

b) In case of centralized control, it shall be set by liquid crystal remote controller

The fan shall be dual suction, aerodynamically designed turbo, multi blade type, statically & dynamically balanced to ensure low noise and vibration free operation of the system. The fan shall be direct driven type, mounted directly on multispeed motor shaft having supported from housing.

The cooling coil shall be made of seamless copper tubes and have continuous aluminum fins. The fins shall be spaced by collars forming an integral part. The tubes shall be staggered in the direction of airflow. The tubes shall be hydraulically/ mechanically expanded for minimum thermal contact resistance with fins. Each coil shall be factory tested at 21kg/sqm air pressure under water.

Unit shall have washable synthetic media pre-filter fixed to an integrally moulded plastic frame. The filter shall be slide away type and neatly inserted.

Each indoor unit shall have computerized PID control for maintaining design room temperature. Each unit shall be provided with microprocessor thermostat for cooling and heating.

The unit shall have automatic force shut down provision in case of fire on receiving signal from BMS System. The cooling capacity of indoor unit will be at air inlet conditions of 27 Degree C DB and 19 Degree C WB temperature.

CEILING MOUNTED CASSETTE TYPE UNIT (FOUR WAY TYPE)

The unit shall be ceiling mounted type with four directional flow. The unit shall include pre-filter, fan section and DX- copper coil section. The housing of the unit shall be powder coated galvanized steel. The body shall be light in weight and shall be able to suspend from four corners.

Unit shall have provision of connecting fresh air without any special chamber & without increasing the total height of the unit (320 mm maximum).

Unit shall have an external attractive panel for supply and return air. Unit shall have four way supply air grilles on sides and return air grille in center.

Each unit shall have high lift drain pump, fresh air intake provision, low gas detection system and very low operating sound.

The compact cassette unit should perfectly fit into ceilings and match the standard architectural modules, without the need to cut ceiling tiles.

All the indoor units should have same panel size for harmonious aesthetic point of view. The sound absorbing thermal insulation material shall be polyurethane foam.

The unit must have in-built drain pump, suitable for vertical lift of 750 mm.

Unit must be insulated with sound absorbing thermal insulation material, Polyurethane foam. The sound pressure level of unit at the highest operating level shall not exceed 46 dB (A).

WALL MOUNTED TYPE UNIT (if required)

The unit shall be high wall mounted type. The unit shall include pre-filter, fan section and DX-copper coil section. The housing of the unit shall be powder coated galvanized steel. The body shall be light in weight and shall be able to suspend from four corners.

Each unit shall have drain arrangement, fresh air intake provision (if specified). The fans shall be aerodynamically designed diffuser turbo fan type.

All the indoor units should have same panel size for harmonious aesthetic point of view. The sound absorbing thermal insulation material shall be polyurethane foam or equivalent as per OEM specifications.

REFRIGERANT PIPING FOR VRV/VRF SYSTEM

- Refrigerant lines shall be laid concealed / on cable tray as per site requirement.
- The pipes and fittings shall be connected by means of welded joints. The connections to gauges, controls etc. (if any) shall be with soft copper tubing and flare fittings.
- Refrigerant piping routing shall be decided by Engineer – in – Charge.
- The refrigerant piping installation shall be as per site requirement.
- All refrigerant piping for the air conditioning system shall be constructed from soft seamless upto 19 mm and hard drawn seamless copper refrigerant pipes for 19 mm and above with copper fittings and silver-soldered joints.
- All refrigerant pipes and fittings shall be type 'L' hard drawn copper tubes and wrought copper fitting suitable for connection with silver solder.
- The refrigerant piping arrangements shall be in accordance with good practice within the air conditioning industry, and are to include expansion valves, charging connections, suction line insulation and all other items normally forming part of proper refrigerant circuits.
- All joints in copper piping shall be swaged joints using low temperature brazing and or silver solder. Before joining any copper pipe or fittings, its interiors shall be thoroughly cleaned by passing a clean cloth via wire or cable through its entire length. The piping shall be continuously kept clean of dirt etc. while constructing the joints. Subsequently, it shall be thoroughly blown out using nitrogen.
- The air-conditioning system supplier shall design sizes and erect proper interconnections of the complete

refrigerant circuit.

- The thickness of copper piping and insulation shall not be less than that specified in the BOQ.
- The suction line pipe size and the liquid line pipe size shall be selected according to the manufacturers specified outside diameter. All refrigerant pipes shall be properly supported on the cable tray, which in turn be supported to the building structure using steel hangers, anchors, brackets and supports which shall be fixed to the building structure by means of inserts or expansion shields of adequate size and number to support the load imposed thereon.
- After the refrigerant piping installation has been completed, it shall be evacuated, for carrying out the air tightness test. After the refrigerant piping installation has been completed the refrigerant piping system shall be pressure tested using Freon mixed with nitrogen at a pressure of 20 Kg per Sq. cm. (High side) and 10 Kg per Sq. cm (Low side). Pressure shall be maintained on the system for 24 hours. If there is no pressure drop, the system will be considered as having passed the test. If a drop in pressure is detected, search for the leak site by applying soapy water to surface of the piping connections (flares, brazed joints etc.) and charge the hose connections.
- The system shall then be evacuated to a minimum vacuum of 70 cm. of mercury and held for 24 hours, during which time; change in vacuum shall not exceed 12 cm of mercury.
- After completing the vacuum drying, charge the calculated additional refrigerant from the gas cylinder via the liquid side stop valve service port using pressure difference. The refrigerant must be charged in a liquid state. Digital scale shall be used for measuring the additional refrigerant quantity.

CENTRALIZED TYPE REMOTE CONTROLLER

- A multifunctional compact centralized controller shall be provided with the system. The controller should be LCD remote controller to act as an advanced air-conditioning management system to give complete control of VRV/VRF air-conditioning equipment. It should have ease of use for the user and must have a user friendly LCD display. It shall be able to control up to minimum 64 indoor units with the following functions: -
- Starting/stopping of air-conditioners as a zone or group or individual unit.
- Temperature settling for each indoor unit or zone.
- Switching between temperature control modes, switching of fan speed and direction of airflow, enabling/disabling of individual remote controller operation.
- Monitoring of operation status such as operation mode & temperature setting of individual indoor units, maintenance information, troubleshooting information.
- OPTIONAL-Display of air conditioner operation history.

DRAIN PIPING

- The indoor units shall be connected to drainpipe made of hard PVC conforming to IS: 4985 as specified in BOQ.
- The pipes shall be laid in proper slope for efficient drainage of condensate water. A downward gradient of at least 1/100 will be provided for the drain piping.
- For proper drainage of condensate, U Trap shall be provided in the drain piping (wherever required). All pipe supports shall be of prefabricated & pre-painted slotted angle supports, properly installed with clamps etc.
- The main drainpipe should be connected to the vertical drainpipe through a Y-joint or T-joint. A vent pipe should be installed at the top of the vertical to improve the drain water flow. Vent pipe should be provided with insect screen. Cost for these accessories is deemed to be included in the rates quoted by the tenderer.

PIPE INSULATION

a. Refrigerant Pipe Insulation

The whole of the liquid and suction refrigerant lines including all fittings, valves and strainer bodies, etc. shall be insulated with 19 mm and 25 mm thick elastomeric nitrile rubber / XLPE insulation. The joints shall be properly sealed with synthetic glue to ensure proper bonding of the ends. To protect nitrile rubber insulation associated with exposed copper piping from degrading due to ultraviolet rays & atmospheric conditions, it shall be covered with protective coating. Fiberglass tape shall be helically wrapped & applied with two coats of resin with hardener to give smooth finish.

b. Drainpipe Insulation: Drainpipes carrying condensate water shall be insulated with 6mm thick elastomeric nitrile rubber / XLPE insulation.

c. Nitrile rubber must have a 'K' value of 0.035 W/m K at a mean temperature of 20 º C and a minimum density of 55 Kg/cu. m.

d. Thermal insulation of all refrigerant piping shall be finally covered with lagging fabrics viz., fiber cloth, a non-flammable lagging fabric and finally finished with thermal insulation protective coating.

e. The joints shall be properly sealed with synthetic glue to ensure proper bonding of the ends.

f. All refrigerant and condensate drainpipe shall be insulated in the manner specified herein. An air gap of 100mm shall be present between adjacent insulated surfaces carrying chilled refrigerant and between the insulated surface and the wall to allow natural ventilation without affecting its external surface coefficient of heat transfer before applying insulation, all pipes shall be brushed and cleaned. All pipe surfaces shall be free from dirt, dust, mortar, grease, oil, etc.

g. Nitrile rubber insulation shall be applied as follows:

i) Insulating material in tube form shall be sleeved on the pipes.

ii) On existing piping, slit opened tube of the insulating material (slit with a very sharp knife in a straight line) shall be placed over the pipe and adhesive shall be applied as suggested by the manufacturer.

iii) The adhesive must be allowed to tack dry and then press surface firmly together starting from ends and working towards centre.

iv) Wherever flat sheets shall be used, it shall be cut out in correct dimension. All longitudinal and transverse joints shall be sealed as per manufacturer recommendations.

v). The insulation shall be continuous over the entire run of piping, fittings, and valves.

TESTING, COMMISSIONING AND FORMAL ACCEPTANCE:

Connecting, Commissioning and Adjustments

The testing, commissioning, and adjustment of each item of equipment shall be recorded in a report, which shall be included with the as-built documentation.

The adjustment and testing operations shall comprise at least the following operations:

- Checking the operation of all the limit switch contacts, levels, etc.
- Operating tests with the installation running permanently for two days under nominal monsoon, summer and winter conditions:
- Compliance with specified temperatures during occupied periods (temperatures measured at the

center of the rooms using a sling psychomotor.

Formal acceptance

After the technical acceptance tests, the Engineer-in-charge will inspect the installation and may grant formal acceptance, provided that:

- The works are completed.
- The technical acceptance inspection has given satisfactory results.
- The premises have been cleaned.

If differences between the expected technical results and those obtained are not numerous, they may be listed as reserves at handover. If they are general, handover shall be delayed while awaiting corrective measures to be implemented by the constructors.

Handover shall be confirmed if the inspection report by the official organizations responsible for checking that the installation complies with safety requirements does not include major reserves.

Documentation

The contractor shall submit the following document at the completion stage of work.

- Floor shop drawing preparation for copper pipe, drain, duct etc. and put up for approval before execution of work.
- Project completion schedule submission.
- The as-built drawings
- The technical instructions / manuals for the Operation & Maintenance of equipment installed.
- A set of maintenance documentation (regular systematic work to be carried out on the equipment and its frequency).

Training of operating staff

- The staff responsible for the operation and maintenance of the installation must be advised how it works. They must be given suitable training, which may require the participation of specialist staff and of the suppliers of the equipment.

PAINTING

Painting of all supports and fittings shall be included with the cost of these items. Nothing extra shall be paid for this work.

LIST OF BUREAU OF INDIAN STANDARD CODES

- National Building Code of India -2016
- ECBC -2019
- ASHRAE (American Society of Heating Refrigerating & Air Conditioning Engineers) Handbooks

  Application-2019 Refrigeration -2018 Fundamentals -2017 Systems & Equipment -2016

- ISHRAE (Indian Society of Heating Refrigerating & Air Conditioning Engineers) HVAC Handbook-2017
- Duct construction standards as per relevant BIS codes & SMACNA standards.
- Air filters as per ASHRAE Standard 52.1 -1992
- Indoor Air Quality as per ASHRAE Standard 62.1 - 2019
- ASHRAE Standard 90.1-2007
- Motors, cabling, wiring and accessories as per BIS codes / IE Rules / IS codes
- IS:277-1992 - Galvanised steel Sheet (plain and corrugated)IS:544-1985 – Dimension for pipe Threads (Reaffirmed 1996)
- IS:778 - Valves (gate/globe/check type)
- IS:659-1964 - Air-conditioning (safety codes)
- IS:1239-1990/92- Mild Steel Pipes
- IS:325 - 3 phase induction motor
- IS:822 - Code of procedure for inspection of welds
- IS:900 - Code of practice for installation and maintenance of motors
- IS:6392 - Steel Pipe Flanges
- IS:1822Motor starters for voltage not exceeding 650 Volts
- IEC- Relevant Sections
- IS:996 - Single phase small A.C. Motors
- IS:4894-1987 - Centrifugal Fans
- IS:4985-2000 u-PVC Pipes
- IS:7098 - XLPE Insulated (heavy duty) electric cables for working - Voltage up to and including 1100 V
- IS:8828-1996- Miniature Circuit Breakers
- IS:9537-1981 Part II- Rigid steel conduit for electrical wiring
- IS: 1554 PVC Cables
- IS: 694 Copper Conductor Wires
- IS: 10617 Spec for hermatic compressor
- IS:10810-1989 -Method of Test of Cables
- IS:13947-1989 -Circuit Breakers
- IS:13947-1993 -Switches, disconnectors, fuse combination units
- IS:139-1993(Part IV)- Contactors & Motor Starters
- BS-2871 Part-I- Copper Tubes for water, gas & sanitation
- BS-2837- Methods of test for Air filter used in Air-conditioning and general ventilation.
- JISH-3300 : 1997 Copper Refrigerant pipes.

SECTION – 3

AIR DISTRIBUTION

SHEET METAL WORK AND INSULATION:

1.0 GENERAL

The scope of this section comprises of design, supply, fabrication, installation and testing of all sheet metal ducts and supply, installation, testing and balancing of grilles and diffusers, in accordance with these specifications. The duct work will conform to IS standards/codes and relevant ASHRAE Guidelines. For this purpose, it is bidder's responsibility to arrange at site all necessary equipment's like drilling machine, welding machine, etc. and necessary work force. Cost of ducting work is part of the contract and inclusive of all necessary items such as nuts, bolts, sheets, supports, gaskets etc. No additional cost will be provided for any type of job. It is the bidder's responsibility to visit the site prior and quote the bid as per site conditions.

DUCT MATERIAL

The material for various application of air distribution ducting shall be as follows:

Application	*Material*
1) Air Conditioning.	Cold rolled sheets continuous galvanized with a zinc coating of 120GSM as per IS: 277 – 1977.
2) Supports & Duct Flanges.	Mild Steel Structural Steel Sections.
3) Gasket.	Foamed rubber.
4) Bonding	Mastic Sealant.

The thickness of sheets for fabrication of rectangular ductwork shall be as under. The thickness required corresponding to the larger side of the rectangular section shall be applicable for all the four sides of the ducts.

	Gauge	Thickness (mm)
Ducts upto 750mm	24	0.63
751 mm and upto 1500mm	22	0.80
1501mm and upto 2250mm	20	1.00
2251mm and above	18	1.25

Factory fabricated ducts shall have the thickness of the sheet as above and should have beading at every 300mm.

1.1 Duct Fabrication

The ducts shall be fabricated from galvanized steel sheets (GSS) class VIII conforming to ISI:277 – 1962 (revised) or aluminum sheets conforming to IS:737 – 1955 (for aluminum ducts, if any). All

duct shall be fabricated and installed unless otherwise stated as per IS: 655 — 1963 with amendment — 1 (1971 edition.). The steel sheet shall be hot dipped galvanized with coating of minimum 120 grams per square meter (GSM) of Zinc.

Ducts shall be straight and smooth on the inside with neatly finished joints. All joints shall be made airtight. The internal ends of slip joints shall be made in the direction of air flow. Ducts larger than 1000 mm shall be cross broken. Duct sections upto 1200mm length may be used with bracing angles omitted. Tapering angle should not be more than 30 degree. Change in dimensions and shape of ducts shall be gradual. Curved elbows shall have a center line radius equal to one and half of the duct. All air turns of 45 degree or more shall be installed in all abrupt elbows and shall consist of curved metal blades or vanes arranged to permit the air to make the turns without appreciable turbulence. Guide vanes shall be fabricated out of 0.63 mm (24 SWG) thick G. S. sheets and equally spaced on side runner to be riveted /bolted to duct sheets. Guide vanes shall be securely fastened to prevent noise or vibration. GI splitter dampers complete with brass metal lever shall be installed at each bifurcation/trifurcation point of duct for proper flow of air quantity in each duct. Joints, seams sleeves, splitters, branches, takeoffs and supports are to be as per duct details as specified.

1.2 Duct Installations

1.2.1 All ducts shall be installed as per site requirements and in strict accordance with approved for construction drawings prepared by the contractor.

1.2.2 Duct should be acoustic insulation for reducing the noise.

1.2.3 During the construction the contractor shall temporarily close duct openings with sheet metal covers / polyethylene sheets to prevent debris-entering ducts and maintain them clean.

1.2.4 All necessary allowances and provisions shall be made by the contractor for beams, pipes or other obstructions in the buildings. Where it becomes necessary to avoid beams or other structural work, plumbing or other pipes and / or conduits, the ducts shall be transformed, divided or curved to one side, the required area being maintained as approved or directed by the EIC.

1.2.5 All duct work shall be of high quality approved galvanized steel sheet, guaranteed not to crack or peel on bending or fabrication of ducts.

1.2.6 All ducts shall be rigid and shall be supported from the ceiling / slab by means of GI Rods of 10 mm dia with MS angles at the bottom as shown in the drawing. The rods shall be anchored to RC slab using anchor/dash fasteners. A rubber gasket of 5 mm thickness shall be provided between duct and angle to avoid metal-to-metal contact and vibration. Double nuts will be provided under angle supports.

1.2.7 The hanger spacing for duct supporting shall not be more than 2 meters.

1.2.8 Where ducts touch with wall or ceiling or beams or columns or floor, a rubber gasket of 5 mm thickness shall be provided between them.

1.2.9 All flanges, bracing and supports are to be mild steel and are to be essentially given a coat of red oxide primer.

1.2.10 Fire retarding flexible canvas / rexene connections not less than 100 mm and not more than 200 mm are to be fitted to the delivery of all IDU's.

1.3 Volume Control Damper (VCD) & Duct damper

1.3.1 The Volume Control Dampers & Duct Dampers shall be lever operated and complete with locking devices, which will permit the dampers to be adjusted and locked in any position, and clearly indicating the damper position.

1.3.2 The dampers shall be of splitter, butterfly or louver type. The damper blade thickness shall not be less than 1.25 mm (18 gauge).

1.3.3 Manual volume opposed blade dampers shall be complete with frames and bronze bearings as per drawings. Dampers and frames shall be constructed of 1.6 mm thick galvanized steel sheets and blades shall not be more than 225 mm wide.

1.3.4 For air balancing an opposed blade damper with quadrant and thumbscrew lock should be provided.

1.3.5 At the junction of each branch duct with main duct VCD's must be provided. At the delivery of all IDU's VCD's must be provided.

1.3.6 The dampers shall be of extruded aluminium.

1.3.7 Installation of VCD's shall be as per site requirements.

1.4 Fire Damper (If required)

1.4.1 Dampers could be fusible link type.

1.4.2 Fire dampers shall be provided at the delivery of all IDU's.

1.4.3 The dampers shall be of multiple blade type. The blades shall be constructed with minimum 1.8 mm thick aluminium sheets. The frame shall be 1.6 mm thick. Other materials shall include return spring, locking device and temperature sensor.

1.4.4 Installation of fire damper shall be as per site requirements.

1.5 Standard Grilles and diffusers

1.5.1 The supply and return air grille/diffuser shall be fabricated from extruded aluminium sections of thickness not less than 1.5 mm. The supply air grille/diffuser shall have single / double louvers. The front horizontal louvers shall be of adjustable type. The rear vertical louvers shall be of aluminium extruded sections and adjustable type. The return air grille shall have single horizontal extruded section fixed louvers.

1.5.2 The damper blades shall also be of extruded aluminum. The grille flange shall be fabricated out of aluminum-extruded section. Grilles longer than 450 mm shall have intermediate supports for the horizontal louvers.

1.5.3 The ceiling type square/circular diffusers shall be of aluminum-extruded section with flush or step down face.

1.5.4 All supply diffusers shall be provided with extruded aluminum dampers, with arrangement for adjustment from the bottom. (The center portion should be spring loaded for easy removal and fitting).

1.5.5 All grilles and diffusers shall be epoxy powder coated of 15 Micron in approved colour.

1.5.6 Diffuser and grille shall be installed as per site requirements.

1.5.7 The linear grilles shall be provided with End Pieces at ends.

2. Testing and Balancing

After completion of the installation of the complete air distribution system all ducts shall be tested for air leaks. All dampers of supply air diffuser and supply air grille shall be balanced as per user's requirements. The entire air distribution system shall be balanced using approved anemometer.

3. Acoustic & Thermal Insulation for GI Duct

The scope of this section comprises of supply, fabrication, installation and testing of Acoustic Material and Thermal insulation as per specification.

3.1 **Duct Thermal Insulation**

The ducts shall be insulated with 19mm thick Al foil faced nitrile rubber (Class: O). All joints shall be sealed with 50 wide adhesive based aluminum tape. The thermal conductivity of the material shall be not more than 0.032 W/(mK) and density not less than 33 kg/m3.

3.2 **Duct Acoustic Insulation**

a) Acoustic insulation of duct shall be with 15 mm thick open cell cross linked polyethylene of density 30-60±3kg/m3and covered with 32 G Perforated Aluminium sheet and fastened with sheet by screw and washer with pitch not less than 12 inches.

b) Acoustic insulation shall be as per site requirements after cleaning the internal surface of the duct to make it free from dirt and dust.

INSPECTION AND TESTING

- Duct dimensions shall be checked based on the duct dimension / layout drawings duly approved by the EIC.
- The ducts, branches, elbow etc. shall be inspected and the joints and connection shall be checked properly before these are assembled in position. After assembly the system shall be checked for tightness of male/ female joints to avoid the leakage.
- Climaver Al. tape of 75mm thickness shall be applied on each male / female joint to avoid the leakage of air.
- Full sized standard dimension sheet as specified are to be used and any patched or made-up pieces of duct work are liable to be rejected. Joints between male/ female connections shall be fitted properly and Al. tape of 75 mm thickness shall be applied on joints.
- Test points shall be provided at the discharge of each air handling unit and at each individual zone of the duct work system. Test points shall consist of 25mm diameter sockets fitted with sealing plugs which can be removed for the fitting of measuring devices. Test points shall be insulated as for the duct work and shall be provided with identification labels.
- Rectangular risers should be free supported by angles or channels secured to the sides of the duct flanges with bolts or sheet metal screws or blind rivets. The supporting angle or channel should be freely resting over the slab cut-out. Riser support intervals should be limited to one storey height.
- The entire air distribution system shall be balanced to supply the air quantity as required in various areas and the final tabulation of air quantity through each outlet shall be submitted to the Engineer-In-Charge for approval.

CIVIL WORKS related to VRF (shall be in the scope of contractor):

- Chasing, cutting and semi-finishing with chicken wire mesh of the brick work or floor for laying the drainpipe and copper pipe.
- The drain point of each unit shall be connected to the common drain point.
- Drain points be tested for 24 hours after blocking one end. Drain piping will be plugged at both ends by appropriate method after completing the drain test to avoid choking due to foreign material.
- Installation of the system should not tamper with the waterproofing of roofs and any kind of existing electrical wiring or plumbing.
- The contractor shall be responsible for any leakage / seepage due to poor installation of HVAC drain till the DLP and CAMC period.
- Any damage done to the building during the installation should be restored immediately.
- The structural design for the system will require approval from IIT Roorkee before installation.
- Civil works including wall openings for pipes, ducting, cabling etc. as required and making good, sealing of those. Final finishing shall be under scope of contractor.
- Space like toilets, stairs, and lifts should be pressurized as per standard practice.
- Top floor roof shall be exposed to sun without any insulation.
- Shafts for AC piping work may be used as per site condition.
- The VRF / VRV ODU may be installed on ground or terrace for which both options with merits and demerits be offered by the bidders.
- As the AC systems are being installed on existing buildings, care and planning need to be done to minimize the disturbances, by working on Saturdays, Sundays and during off hours. Necessary time provision be made by bidder for such care.
- Any masonry or construction work must be carried out with full precaution as the site is already inhabited. The construction area should be kept clean and tidy.

SECTION - 4
ELECTRICAL WORK

SCOPE

This chapter covers the requirements for the electrical works associated with heating, air conditioning, ventilation system, namely, switch boards, power cabling, control wiring, earthing, p.f. capacitors and remote control-cum-indicating panels. Electric motors are not covered here, as these are covered as part of the respective equipment specifications.

GENERAL

- Unless otherwise specified in the tender specifications, all equipments and materials for electrical works shall be suitable for continuous operations on 415 V / 240 V ± 10% (3-phase/1-phase), 50 Hz AC system. Where the use of high voltage equipments is specified in a particular work, all the respective equipments shall be suitable for continuous operation on such specified high voltage.
- All electrical works shall be carried out complying with the Indian Electricity Rules, 1956 as amended to date and rules issued thereunder, regulations of the Local Fire Insurance Association and Indian Standard code of practice No. IS: 732- 1963 (revised).
- All parts of electrical works shall be carried out as per appropriate CPWD General specifications for Electrical works, namely, Part I (Internal) 2023, Part II (External) 2023, and Part IV (Sub-station), 2013 all as amended to date.
- All materials and components used shall conform to the relevant IS specifications amended to date.
- The cabling supporting shall be done as per instruction EIC.

PAINTING

All panels shall be supplied with the manufacturer's standard finish painting or as indicated in the Schedule of Work.

SECTION – 5

INSPECTION AND TESTING

All equipment and components supplied may be subjected to inspection and tests by the Consultant/ Owner's representative during manufacture, erection/installation and after completion. The inspection and tests shall include but not be limited by the requirements of this contract document. Prior to inspection and testing, the equipment shall undergo pre-service cleaning and protection.

Bidder shall state and guarantee the technical particulars listed in the Schedule of Technical Data. These guarantees and particulars shall be binding and shall not be varied without the written permission of the Owner's representative.

No tolerances shall be allowed other than the tolerances specified or permitted in the relevant standards, unless otherwise stated.

If the guaranteed performance of any item of equipment is not met and / or if any item fails to comply with the specification requirement in any respect whatsoever at any stage of manufacture, test or erection, the Owner's representative may reject the item, or defective component thereof, whichever he considers necessary; and after adjustment or modification as directed by the Owner's representative, the bidder shall submit the item for further inspection and /or test.

The approval of the Owner's representative of inspection and/or test results shall not prejudice the right of the Owner's representative to reject an item of equipment if it does not comply with the contract document when erected, or doesn't prove satisfactory in service.

The Contractor shall be responsible for the timely transmission of the relevant and appropriate sections of the contract document to manufacturers and sub-contractors for the proper execution of all tests at their works as per contract specifications.

PERFORMANCE TESTS AT MANUFACTURER'S WOKS

All equipment may be subjected to routine performance tests at the Manufacturer's Works in accordance with the relevant ANSI, ASME, ASTM, BIS standard including operating tests of complete assemblies to ensure correct operation of apparatus and components.

Pumps, fans, compressor, and other rotating equipment shall be given full load tests and run to 15% over speed for 5 minutes to check vibration. Main and auxiliary gear boxes shall be subjected to shock load tests and a six-hour endurance run at rated speed and maximum torque.

The Contractor shall submit single line diagrams including the layout of the plant together with the location of test instrumentation and the principal dimensions of the layout. All calculations to derive performance data shall be made strictly in accordance with format given in the approved standards. Any alterations or deviations from the approved standard test layout or formulae shall be subjected to the prior approval of the Owner's Representative.

The performance test shall be conducted over the full operating range of the pump to a closed valve condition and a minimum of five measurement points covering the full range shall be taken. Curves indicating Quality vs. Head, Quantity vs. Power absorbed, and Quantity vs. Pump efficiency shall be provided. In addition, a curve of the NPSH required vs. Quantity shall be provided except when the suction conditions do not require this test. Any proposal for the omission of this test shall be to the approval of Owner's representative.

On completion of the tests the Contractor shall submit a report showing the test results obtained together with the curves corrected to the site operating conditions. A test certificate from prototype factory tests will be acceptable.

Scope of work (For Part B):

Comprehensive Annual Operation and Maintenance Contract (CAMC):

1. The bidder will be fully responsible for trouble free and smooth functioning of VRV Centralized AC system as per norms of manufacture during contract period.
2. This contract covers attending to any number of breakdown calls during normal working hours except for all National/Public holidays.
3. A quarterly preventive maintenance service must be carried out during the tenure of the contract by the OEM or its authorized representative.
4. Repair/ replacement of all parts including compressor, PCB, Cooling Coil, Evaporator Coil, Sensor, blower fan motor (in IDU), condenser fan motor, swing motor (in IDU), front grill assembly / plastic cover/ panel, all air filter, thermocol parts, expansion valve, expansion motor, magnetic switch, transformer and other electrical parts of AC system etc. which requires repair/ replacement due to normal wear and tear during the contract.
5. The make of spare parts shall be the same as the original part or as per the OEM or as approved by EIC.
6. This contract also includes repair/ replacement of refrigerant piping, drain piping, ducting, insulation which requires repair/ replacement due to normal wear and tear during the contract.
7. This contract does not cover the repair/ replacement of electricity distribution boards, MCCB/ MCB/ ELCB, ancillary work such as masonry work, cabinet sheet metal panels, shifting of units in part or as a whole.
8. In case there is need for any anti-corrosive coating same shall be provided/ arranged by customer.
9. Cleaning of Air filters, Condenser Coil, Evaporator Coil, grill/diffuser etc. during preventive maintenance service.
10. The blower motor will be checked, and any defects noticed will be attended and rectified.
11. Any defect in the control wiring will be attended and rectified.
12. Refrigerant gas refilling/topping up in the system as and when required shall be under the scope of contract.
13. Canvas connection of the unit will be checked and if any defect is found, the same will be repaired / replaced.

General Conditions:

1. IIT Roorkee is a Tobacco free campus, therefore consumption / possession of tobacco or alcoholic substance by the manpower deployed is strictly prohibited. EIC shall impose penalty @ Rs. 2000/- for each violation which shall be deducted from the bidder's bill or from the Performance Guarantee.
2. The personnel deployed shall be of good health and moral character, well behaved, obedient, experienced, and skillful in their respective tasks.
3. At the time of V.I.P. visit, any function, or any emergency, bidder will be bound to provide the services without any delay and no reason shall be entertained for delay in services.
4. The successful bidder shall be solely responsible for accommodation, remuneration, omissions / commissions of service personnel deployed at the Institute premises.
5. In case of theft of any material from the offices / residences on account of the negligence on the part of the manpower deployed, value of loss / theft item(s) will be deducted from the bidder's bill or from the Performance Guarantee.
6. EIC reserves the right to impose or wave off penalty fully or partially if justified on the request of the bidder and has the right to forfeit the Performance Guarantee / Bank Guarantee and / or blacklist the firm.
7. The bidder shall ensure compliance of all statutory and mandatory requirements, including all labour laws requirements. The bidder shall also keep IIT Roorkee indemnified against any liabilities that may arise on this account.
8. Bidder will be fully responsible for any accident or mishaps involving workers engaged by them and the bidder would pay claims made on this part. Institute will not pay any compensation in this regard.
9. The Institute shall not be responsible for any loss, breakage or theft of Bidder's material for which he has to make his own arrangements for storage.

Additional Penal conditions:

1. Notwithstanding contained anything above, on breakdown of any machine, call should be attended within 24 hours after registering the complaint through email/ telephone failing which Rs. 1000/- will be deducted from the bill for each defaulted day.
2. Faulty equipments / components will be replaced within 7 days failing which Rs. 1000/- will be deducted from the bill for each defaulted day.
3. In case of continued non-performance and inability to meet service requirements, IIT Roorkee reserves the right to terminate the contract after giving 15 days' notice in writing. In addition, action may be taken for blacklisting / debarring of the bidder for future tenders / works.

INSTITUTE WORK DEPARTMENT
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Schedule of Quantities

Name of Work : **Supply, Installation, Testing & Commissioning (SITC) of Treated Fresh Air System for Lecture Halls connected with VRF Air-conditioning system in APJ Abdul Kalam Block (LHC-II) at IIT Roorkee.**

BoQ:

PRICE SCHEDULE

(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevent columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)

Sl. No.	Item Description	Quantity	Units	Estimated Rate in Rs. P	TOTAL AMOUNT With Taxes in Rs. P	TOTAL AMOUNT In Words
1	2	4	5	6	54	55
1	**PART-A Supply, Installation, Testing & Commission(SITC).**					
2	Supply Installation, Testing & Commissioning of modular type Variable Refrigerant Flow/Variable Refrigerant Volume air cooled Outdoor units suitable for cooling and heating, having all hermetically sealed inverter type Scroll Compressor(s), minimum two compressors for above 14 HP modules, microprocessor based Controller, top discharge type condensing unit(s), with R 410 A Refrigerant, vibration isolators, with suitable foundation etc. complete as required. The unit shall deliver the rated capacity at AHRI Conditions and work even at 50°C ambient temperature without tripping. The unit shall be suitable to work on 400V +/- 10%, 3 Phase, 50Hz AC power supply. The unit shall be filled with first charge of the refrigerant and ready for use as required.The COP at AHRI conditions shall not be less than 3.45 on 100% loadand 5.7 on 50% load.	70	HP	29604.00	**2072280.00**	INR Twenty Lakh Seventy Two Thousand Two Hundred Eighty & Paise Zero Only
3	Ceiling Suspended DX AHU (TFA)					

4	AHU Construction: - Supply, installation, testing and commissioning of factory built Ceiling Suspended double skin type DX Air Handling Units made of 48+/-2 mm thick panels (Density:40+/-2 KG/Cu.m.) consisting of G.I. Casing of thickness 0.8 mm pre-coated outside layer and 0.8 mm thick plain GI sheet inside layer with polyurethene foam (PUF) insulation factory injected between them by injection moulding machine, complete with plug fan suitable for static pressure as detailed below, cooling coil section with machanically bonded aluminium finned copper tubes (tube thickness not less than 0.3 mm) cooling coil, filter section with filter having filteration efficiency and particle size matching to MERV-8 Pre filters and MERV-13, TEFC drive motor suitable for 415+10% volts, 50 + 3% Hz, 3 phase, A.C. supply, minimum IP 55, drain connections, with stainless steel drain pan made out of SS grade 304 sheet. duly insulated , and necessary vibration isolation arrangement etc. complete as per specifications of following capacities.					
5	The unit shall be supplied with electronic expansion valve/s (Dx), thermostat/s, control wiring & all accessories as required for completing the installation. The price shall be inclusive of these items. AHUs shall be of following design parameters:					
6	Pre filter section					
7	Pre filter section shall be with Non-woven synthatic media down to 10 micron particles size of 90% (MERV-8)					
8	Fine filter section					
9	Fine filter section shll be with Non-woven synthatic media down to 5 micron particles size of 95% (MERV-13)					
10	Cooling Coil					
11	Copper tubes and Al fins 11-13 Fin/inch and copper header, coil size shall be selected for air velocity of 500 feet/minutes and velocity across filter at 500 feet per minutes. Water side pressure drops should not exceed 10 PSIG.					
12	Fan and Motors: - AHU must have Airfoil design Plug type centrifugal Fan with IE3 energy efficiency motor. Fan motors shall be energy efficient with IE-3 grade with IP-55 protection. Motors shall be especially designed for quiet operation. Drive to fan					

13	Plug type SISW Centrifugal direct driven plug fan with IE-3 energy efficiency motor and shall be 415+- 10% volts, 50 cycles 3 phase totally enclosed fan-cooled class-F with IP-55 protection. Drive to fan shall be provided through direct drive arrangement. Frequency converter (VFD for energy saving and smooth regulation of air flow shall be supplied by the AHU manufacturer for AHU's with direct drived plug fan. Fan impeller shall be selected for mimimum efficiency of 62.0% plug fan in fan array shalll have individual VFD's for every motor fan set.					
14	Accessories:					
15	LED light with cable view port and cable gland should provide in fan sections by manufacturer. AHU sound pressure level should not be more than 65 db(A) at a distance of 1M from the unit.					
16	UV lamps shall be installed in each AHU and density of UV light should be as required to kill medium of COVID-U19 virus.					
17	Total static pressure of AHU & row deep of cooling coil shall be checked by Vendor as mentioned below:					
18	Dehumidifier Air CFM 1200, cooling coil row deep 8, Static pressure 75 MMWC, Motor KW 1.1 KW.	7	Nos	263239.00	**1842673.00**	INR Eighteen Lakh Forty Two Thousand Six Hundred Seventy Three & Paise Zero Only
19	SITC of 3 phase DOL (Direct online) motor starter 1 to 4 HP, relay range 1.5 to 6.5 Amp, along with all acessories complete with all connection as required .	7	Nos	3281.00	**22967.00**	INR Twenty Two Thousand Nine Hundred Sixty Seven & Paise Zero Only
20	Supply Installation, Testing and commissioning of fittings (Ref Net) Y-joints etc.	4	Pair	5039.00	**20156.00**	INR Twenty Thousand One Hundred Fifty Six & Paise Zero Only
21	Supply Installation, Testing and commissioning of Corded remote controls with holder etc. As required.	7	Nos	2880.00	**20160.00**	INR Twenty Thousand One Hundred Sixty & Paise Zero Only
22	Supply, Installation, testing and commissioning including vaccumiazation and Nitrogen testing of following nominal sizes of soft/hard drawn copper refrigerant piping for VRV/VRF system, complete with fittings, with suitable adjustable ring type hanger supports, jointing/brazing including accessories, insulated with XPLE Class-O tubular insulation/with Class-O closed cell elastometric nitrile rubber tubular sleeves sections of specified thickness as given below for Suction and Liquid lines, all accessories as per specifications etc. as required :					
23	6.35-6.5 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm with 19 mm thick insulation	1	mtr.	285.00	**285.00**	INR Two Hundred Eighty Five & Paise Zero Only

24	9.5 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm with 19 mm thick insulation	1	mtr.	433.00	**433.00**	INR Four Hundred Thirty Three & Paise Zero Only
25	12.7 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm with 25 mm thick insulation	150	mtr.	629.00	**94350.00**	INR Ninety Four Thousand Three Hundred Fifty & Paise Zero Only
26	15.86-15.9 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm with 25 mm thick insulation	10	mtr.	787.00	**7870.00**	INR Seven Thousand Eight Hundred Seventy & Paise Zero Only
27	19.0-19.1 mm dia (OD) (Hard drawn) with tube thickness 1.2 mm with 25 mm thick insulation	5	mtr.	945.00	**4725.00**	INR Four Thousand Seven Hundred Twenty Five & Paise Zero Only
28	22.2 mm dia (OD) (Hard drawn) with tube thickness 1.2 mm with 25 mm thick insulation	150	mtr.	1089.00	**163350.00**	INR One Lakh Sixty Three Thousand Three Hundred Fifty & Paise Zero Only
29	28.58-28.70 mm dia (OD) (Hard drawn) with tube thickness 1.2 mm with 25 mm thick insulation	10	mtr.	1390.00	**13900.00**	INR Thirteen Thousand Nine Hundred & Paise Zero Only
30	34.9 mm dia (OD) (Hard drawn) with tube thickness 1.62 mm with 25 mm thick insulation	1	mtr.	2191.00	**2191.00**	INR Two Thousand One Hundred Ninety One & Paise Zero Only
31	41.20-41.50 mm dia (OD) (Hard drawn) with tube thickness 1.62 mm with 25 mm thick insulation	1	mtr.	2589.00	**2589.00**	INR Two Thousand Five Hundred Eighty Nine & Paise Zero Only
32	Supply and applying of fibre glass cloth equal to Parafab-GFC (7mil) used protection of exposed pipe insulation with two coat of starbond 30-36 thermal insulation coating.	20	Sqm	844.00	**16880.00**	INR Sixteen Thousand Eight Hundred Eighty & Paise Zero Only
33	Supply, Installation, testing and commissioning of 10 KG Presure PVC pipe 25 mm dia size with 6 MM Nitrile insulation, complete with fittings, supports accessories in surface/recess as per specifications & site requirments	10	mtr.	238.00	**2380.00**	INR Two Thousand Three Hundred Eighty & Paise Zero Only
34	Supply, Installation, testing and commissioning of 10 KG Presure PVC pipe 32 mm dia size with 6 MM Nitrile insulation, complete with fittings, supports accessories in surface/recess as per specifications & site requirments	80	mtr.	241.00	**19280.00**	INR Nineteen Thousand Two Hundred Eighty & Paise Zero Only

35	Supply, installation, balancing and commissioning of fabricated at site GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports etc. as per approved drawings and specifications of following sheet thickness complete as required.					
36	Thickness 0.63 mm sheet	10	Sq.M	1136.00	**11360.00**	INR Eleven Thousand Three Hundred Sixty & Paise Zero Only
37	Thickness 0.80 mm sheet	20	Sq.M	1320.00	**26400.00**	INR Twenty Six Thousand Four Hundred & Paise Zero Only
38	Supply, installation, balancing and commissioning of factory fabricated GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports etc. as per approved drawings and specifications of following sheet thickness complete as required					
39	Thickness 0.63 mm sheet	260	Sq.M	1160.00	**301600.00**	INR Three Lakh One Thousand Six Hundred & Paise Zero Only
40	Thickness 0.80 mm sheet	10	Sq.M	1356.00	**13560.00**	INR Thirteen Thousand Five Hundred Sixty & Paise Zero Only
41	Supplying and fixing of 19 mm thick duly laminated aluminum foil of mat finish closed cell Nitrile rubber (Class "O") insulation on existing duct after applying suitable adhesive for Nitrile rubber. The joints shall be sealed with 50 mm wide and 3 mm thick self adhesive nitrile rubber tape insulation complete as per specifications and as required.	300	Sqm	810.00	**243000.00**	INR Two Lakh Forty Three Thousand & Paise Zero Only
42	Supplying & fixing of powder coated extruded aluminium Return Air Grills with louvers but without volume control dampers complete as required.	1	Sq.M	6347.00	**6347.00**	INR Six Thousand Three Hundred Forty Seven & Paise Zero Only
43	Supplying & fixing of powder coated extruded aluminium Supply Air Grills with aluminium volume control dampers as per specifications.	1	Sq.M	9778.00	**9778.00**	INR Nine Thousand Seven Hundred Seventy Eight & Paise Zero Only
44	Supplying, fixing testing commissioning of supply air diffusers of powder coated aluminium with aluminium volume control dampers with anti smudge ring & removable core.	10	Sqm	13085.00	**130850.00**	INR One Lakh Thirty Thousand Eight Hundred Fifty & Paise Zero Only
45	Supplying, fixing testing commissioning of Return air diffusers of powder coated aluminium without volume control dampers with anti smudge ring & removable core.	1	Sqm	8721.00	**8721.00**	INR Eight Thousand Seven Hundred Twenty One & Paise Zero Only

46	Supply, installation, testing and commissioning of GI volume control duct damper complete with neoprene rubber gaskets, nuts, bolts, screws linkages, flanges etc, as per specifications.	2	Sqm	7567.00	**15134.00**	INR Fifteen Thousand One Hundred Thirty Four & Paise Zero Only
47	Supply and fixing of double layer Canvas connection for ductable uniit	7	Nos	6555.00	**45885.00**	INR Forty Five Thousand Eight Hundred Eighty Five & Paise Zero Only
48	Supply, erection, testing and commissioning of factory fabricated metal clad dust and vermin proof- floor/wall mounted/ recessed/ surface feeder pillar / Panel double/ Single door , 200-250 mm depth duly powder coated spray painted with suitable Busbar up to 250 Amp capacity as required and separate chamber for instruments (e.g. Ampere meter, Volt meter, frequency meter, KWH meter etc.) & switch gears (like I/C & O/G MCB'sE&MCCB's, C/o switch with extentionable/rotary handle etc.) as required. The feeder pillar/ panel shall have nonhygroscopic supports with detachable side with hinge and locking. The panel/ feeder pillar should be made with 1.6 CRCA sheet. The panel shall be comprised of indicator and feeder nomenclature (if required) as per direction of site-in-charge.	30	Sqft	2463.00	**73890.00**	INR Seventy Three Thousand Eight Hundred Ninety & Paise Zero Only
49	Providing and fixing 150 A, 16 KA,TPMCCB rating and breaking capacity and pole MCCB with thermomagnetic release and terminal spreaders in existing cubicle panel board including drilling holes in cubicle panel, making connections, etc. as required.	1	Nos	6435.00	**6435.00**	INR Six Thousand Four Hundred Thirty Five & Paise Zero Only
50	Supply and laying of following sizes Copper conductor, XLPE insulated, armoured, PVC sheathed cable, 1100V grade on existing cable tray with M.S. clamps etc. of suitable size or as directed by the Engineer-In-charge, complete in all respects. The armouring of the cable shall be properly connected with the earth conductor as required etc.					
51	4 core 10 Sq mm	10	RM	938.00	**9380.00**	INR Nine Thousand Three Hundred Eighty & Paise Zero Only
52	4 core 6 Sq mm	280	RM	591.00	**165480.00**	INR One Lakh Sixty Five Thousand Four Hundred Eighty & Paise Zero Only
53	4 core 4 Sq mm	230	RM	431.00	**99130.00**	INR Ninety Nine Thousand One Hundred Thirty & Paise Zero Only
54	2C x 1.5 Sq mm.	25	RM	168.00	**4200.00**	INR Four Thousand Two Hundred & Paise Zero Only

55	3 core 1.5 Sq mm.	10	RM	194.00	**1940.00**	INR One Thousand Nine Hundred Forty & Paise Zero Only
56	Supply and laying of Copper conductor, XLPE insulated, Un-armoured, PVC sheathed cable, 1100V grade, 2 core 1.5 mm2 on existing RCC / HUME / METAL Pipe. of suitable size or as directed by the Engineer-In-charge, complete in all respects. The armouring of the cable shall be properly connected with the earth conductor as required etc.	200	RM	128.00	**25600.00**	INR Twenty Five Thousand Six Hundred & Paise Zero Only
57	Supplying and drawing following sizes of FRLS PVC insulated copper conductor, single core cable 2 X 6.0 Sq mmin the existing surface/ recessed steel/ PVC conduit as required.	10	RM	232.00	**2320.00**	INR Two Thousand Three Hundred Twenty & Paise Zero Only
58	Supply and laying of aluminium conductor, XLPE insulated, armuored, PVC sheathed cable, 1100V grade, 4 core 70 mm² at a depth of 750mm below ground level including excavation and refling the trench over a cushion of 75mm thick sand alround and protected with burnt bricks on sides and on top as directed by the Engineer-Incharge, complete in all respects. The armouring of the cable shall be properly connected with the earth conductor by clamps etc. The cable shall be laid by boring the road as required and compaction of soil & repairing of surface in prior shape shall be done properly.	10	RM	1141.00	**11410.00**	INR Eleven Thousand Four Hundred Ten & Paise Zero Only
59	Supply and laying of aluminium conductor, XLPE insulated, armoured, PVC sheathed cable, 1100V grade, 4 core 70 mm² on existing RCC / HUME / METAL Pipe of suitable size or as directed by the Engineer-In-charge, complete in all respects. The armouring of the cable shall be properly connected with the earth conductor as required etc.	60	RM	790.00	**47400.00**	INR Forty Seven Thousand Four Hundred & Paise Zero Only
60	Supplying and making end termination with brass compression gland and aluminium lugs for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required.					
61	4.0 c x 70 sq.mm (38 mm)	2	Each	503.00	**1006.00**	INR One Thousand Six & Paise Zero Only
62	4 X 10 sq. mm (25mm)	1	Each	289.00	**289.00**	INR Two Hundred Eighty Nine & Paise Zero Only
63	Supplying and fixing of 25 MM of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit as required.	50	RM	156.00	**7800.00**	INR Seven Thousand Eight Hundred & Paise Zero Only

64	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray (Galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, inconvenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required.					
65	150 mm width X 50 mm depth X 1.6 mm thickness	90	RM	769.00	**69210.00**	INR Sixty Nine Thousand Two Hundred Ten & Paise Zero Only
66	300 mm width X 50 mm depth X 1.6 mm thickness	100	RM	1034.00	**103400.00**	INR One Lakh Three Thousand Four Hundred & Paise Zero Only
67	Earthing with G.I. earth plate 600 mm X 600 mm X 6 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 Meter long etc. with charcoal/ coke and salt as required	2	Set	8024.00	**16048.00**	INR Sixteen Thousand Forty Eight & Paise Zero Only
68	Providing and fixing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required.	80	RM	262.00	**20960.00**	INR Twenty Thousand Nine Hundred Sixty & Paise Zero Only
69	Providing and fixing 6 SWG dia G.I. wire on surface or in recess for loop earthing as required.	40	RM	75.00	**3000.00**	INR Three Thousand & Paise Zero Only
70	Supplying and fixing 40 to 63 amp 4 Pole MCB rating , 240/415 volts, "C" curve, miniature circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required.	11	Nos	2404.00	**26444.00**	INR Twenty Six Thousand Four Hundred Forty Four & Paise Zero Only
71	.....do..... but 5 to 32 amp 4P MCB	9	Nos	1319.00	**11871.00**	INR Eleven Thousand Eight Hundred Seventy One & Paise Zero Only
72	Supplying and fixing following rating, four pole, (three phase and neutral), 415 volts, residual current circuit breaker (RCCB), having a sensitivity current 30 mA in the existing MCB DB complete with connections, testing and commissioning etc.					
73	40 Amp	11	Nos	3424.00	**37664.00**	INR Thirty Seven Thousand Six Hundred Sixty Four & Paise Zero Only

74	Supplying and fixing 4 way (4 + 12), Double door, horizontal type three pole and neutral, sheet steel, MCB distribution board, 415 V, on surface/ recess, complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, interconnections, powder painted including earthing etc. as required. (But without MCB/RCCB/Isolator)	1	each	4393.00	**4393.00**	INR Four Thousand Three Hundred Ninety Three & Paise Zero Only
75	Structural steel work riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete.	100	Kg	133.70	**13370.00**	INR Thirteen Thousand Three Hundred Seventy & Paise Zero Only
76	**PART-B : Comprehensive Annual Maintenance Contract of 70 HP VRF/VRV AC after completion of DLP(i.e. one years after commissioning & handover)SITC OF TREATED FRESH AIR SYSTEM FOR LECTURE HALLS CONNECTED WITH VRF AIRCONDITIONING SYSTEM IN A.P.J. Abdul Kalam Block (LHC-II) AT IIT ROORKEE. including replacement of spares.**					
76.1	First Year CAMC	1	Job	307146.00	**307146.00**	INR Three Lakh Seven Thousand One Hundred Forty Six & Paise Zero Only
76.2	Second Year CAMC	1	Job	337861.00	**337861.00**	INR Three Lakh Thirty Seven Thousand Eight Hundred Sixty One & Paise Zero Only
76.3	Third Year CAMC	1	Job	371647.00	**371647.00**	INR Three Lakh Seventy One Thousand Six Hundred Forty Seven & Paise Zero Only
76.4	Fourth Year CAMC	1	Job	408812.00	**408812.00**	INR Four Lakh Eight Thousand Eight Hundred Twelve & Paise Zero Only
76.5	Fifth Year CAMC	1	Job	449693.00	**449693.00**	INR Four Lakh Forty Nine Thousand Six Hundred Ninety Three & Paise Zero Only
76.6	Sixth Year CAMC	1	Job	494662.00	**494662.00**	INR Four Lakh Ninety Four Thousand Six Hundred Sixty Two & Paise Zero Only
Total in Figures (PARTA+PART B)					**₹ 82,51,565.00**	INR Eighty Two Lakh Fifty One Thousand Five Hundred Sixty Five & Paise Zero Only

Quoted Rate in Figures (PARTA+PART B)		**Select**		**₹ 0.00**	INR Zero Only
Quoted Rate in Words (PARTA+PART B)	**INR Zero Only**				

Note:

1. In case the actual applicable GST rate in the BoQ is different from 18% then payment shall be made on the actual applicable GST rate while keeping the basic rate same.
2. Bidder or their representative (with notarized power of attorney) is bound to attend the meeting (as and when called by EIC) for contract management (or any other issue related to contract) at IIT Roorkee. Penalty @ Rs. 5000/- per non-compliance shall be deducted from the bidder's bill or from the Performance Guarantee. In case the representative does not possess an adequate position or is unable to conclude meeting with logical end then the bidder is bound to attend such meetings.
3. The lowest bid shall be evaluated on the basis of total cost of Part-A & Part-B.
4. Tender will first be allotted for Part-A & then for Part-B (on completion of DLP) on yearly basis (depending on the performance of the bidder).

Signature and stamp of the bidder

Sd-
Institute Engineer,
IWD, IIT Roorkee