



Institute Works Department
Indian Institute of Technology
Roorkee
Roorkee-247667

E-TENDER DOCUMENT

For

“Supply Installation Testing & Commissioning of Precision Air Conditioning System in Durability Lab Civil Department, IIT Roorkee with 05years CAMC”



Indian Institute of Technology Roorkee
Roorkee-247667, Tel. No. 01332-284955/4858



Institute Works Department
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**Institute Works Department
Indian Institute of Technology
Roorkee
Roorkee-247667**

No. IWD/DI/eTender/VRFAC/63

Dated: April 24 , 2023

NOTICE INVITING TENDER

On behalf of BOG IIT ROORKEE, IIT Roorkee invites open Percentage Rate e-Tenders in Two Bid system (1. Technical 2. Financial) from eligible bidders of appropriate class & category registered with CPWD, State PWD, MES, having experience of working in Central / State Government, Public Sector Undertaking / Autonomous Organization of Central / State Government and Working Contractors of IITR who fulfill the PQ criteria for the following work

Name of the Work	Estimated Cost (Approx.)	Completion Period (Months)
“Supply Installation Testing & Commissioning of Precision Air Conditioning System in Durability Lab Civil Department, IIT Roorkee with 05years CAMC”	₹33.60 Lacs Including GST@18% and 1 % labourCess but excluding CAMC cost.	03Month

Critical Data Sheet

Sr. No.	Approximately Cost	Rs. 34.00 lacs
1	Tender Type	Open
2	Tender Category	Works
3	Type/Form of Contract	Work Contract
4	Product Category	PAC
5	Date of Issue/Publishing Original Tender	24.04.2023 15:00 Hrs
6	Document Download / Sale Start Date	24.04.2023 15:00 Hrs
7	Seek Clarification Start Date	24.04.2023 15:00 Hrs
8	Seek Clarification End Date	30.04.2023 15:00 Hrs
9	Pre-bid Meeting	02.05.2023 11:00 Hrs
10	Bid Submission Start Date	05.05.2023 11:00 Hrs
11	Bid Submission Closing Date	13.05.2023 11:00 Hrs
12	Bid Opening Date	15.05.2023 11:00 Hrs
13	Tender Fee	Tender fee of Rs.1000.00 (Non-refundable), in the form of RTGS/NEFT transfer to IIT Roorkee Account No: 00000032685865515,

		State Bank of India, Branch, IIT Roorkee, IFSC Code: SBIN0001069, MICR Code:247002094 and copy of the deposit receipt shall be uploaded on e-tender.
14	EMD	<p>Rs. 68,000/-</p> <p>Payment of EMD can be made by RTGS, NEFT in below mentioned account No. The bidders shall be required to upload the scanned copies of transaction of payment of tender 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. Tender fee /EMD may be submitted on line as per details given below.</p> <ol style="list-style-type: none"> 1. Account Name- NON MHRD GOVERNMENT FUND IIT Roorkee. 2. Address- IIT Roorkee, Haridwar. 3. Account No.- 00000032685865515 4. Account Description- Regular SB Chq-Entities. 5. Branch- IIT Roorkee, 6. CIF No- 86531323246 7. IFS Code. - SBIN0001069, 8. MIC R Code. - 247002094 <p style="text-align: center;">Or</p> <p>NSIC/MSE certificate comprising relevant category of work should be uploaded for tender fee and EMD exemption. Also, the Bidder has to submit an undertaking regarding Bid Security declaration as per Annexure-I.</p>
15	Performance Guarantee (3%)	3% of awarded value 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).
16	Security Deposit (5%)	5% of awarded value 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	No. of Covers	02 (Cover-1 for Technical+ Cover-2 for Financial)
18	Bid Validity Days	90 days (from last date of opening of Financial Bid)
19	Documents to be uploaded on CPP Portal (http://eprocure.gov.in/eprocure/ap)(related to eligibility criteria) on or before due date of submission of tender.	1) Affidavit (on Rs.10 non-judicial stamp with notarized) regarding establishment of proprietorship firm / partnership deed / letter of incorporation for private ltd and Ltd firm with written power of attorney of the

		<p>authorized signatory</p> <p>2) Self-certified copy of registration certificate in appropriate class & category registered with CPWD, State PWD, MES or proof as Working Contractors of IITR</p> <p>3) Self-certified copy of work orders along with work completion certificate as per eligibility criteria.</p> <p>4) Proof of online deposit of tender fee and EMD. For tender fee / EMD exemption, NSIC/MSE certificate comprising relevant category of work and Annexure E should be uploaded. If relevant category not mentioned, then bid summarily rejected.</p> <p>5) Notarized undertaking on Rs. 100 non-judicial stamp paper as per NIT (Annexure B). Filled Annexure A, Annexure C, Annexure D and Annexure E must be submitted alongwith technical bid.</p> <p>6) Solvency certificate as per the tender document. Turnover certificate from CA preferably with UDIN Number, GST registration certificate, PAN Card, ESI registration certificate & EPF registration certificate.</p> <p>7) Valid project specific authorized from OEM (for PAC AC) and undertaking from concerned OEM on the letter head for confirmation of make and model & full back support including spares during CAMC period. Technical brochure with highlighting offered make, model and specifications.</p>
20	Price Bid	To be uploaded only on CPP Portal (http://eprocure.gov.in/eprocure/app) in excel sheet.
21	Address for submission of documents or other communication.	Institute Engineer, Estate & Works Department, James Thomson Building, IIT Roorkee, Roorkee-247667 (India), Tel. No. 01332-285266/ 4955 / 4858
22	Email Address	ie@iitr.ac.in, tntiwari.eem2019@iitr.ac.in, pradeepelectenggaad@iitr.ac.in

Special note for bidder:

Note: -

- Bidders are advised to keep visiting the above-mentioned websites from time to time (till the deadline for bid submission) for any updates in respect of the tender documents, if any. Failure to do so shall not absolve the applicant of his liabilities to submit the applications complete in all respect including updates thereof, if any. An incomplete application may be liable for rejection.
- Tender will be awarded on over all L-1 bases (including all BoQs).

3. 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. 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.
5. 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.
6. **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-D)".**
7. Kindly note that no physical submission of documents is required at this stage and it is to be uploaded only e-tendering website.

**Sd-
Institute Engineer,
IWD,IITRoorkee**

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: <http://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: <http://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: <http://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 consider 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.

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 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.

- 4.4 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.
- 4.5 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.
- 4.6 The uploaded tender documents become readable only after the tender opening by the authorized bid openers.
- 4.7 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.
- 4.8 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/procure/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:

On behalf of BOG IIT ROORKEE, IIT Roorkee invites open Percentage Rate e-Tenders in Two Bid system (1. Technical 2. Financial) from eligible bidders of appropriate class & category registered with CPWD, State PWD, MES, having experience of working in Central / State Government, Public Sector Undertaking / Autonomous Organization of Central / State Government and Working Contractors of IITR who fulfill the PQ criteria for the following work

“Supply Installation Testing & Commissioning of Precision Air Conditioning System in Durability Lab Civil Department, IIT Roorkee with 05years CAMC”

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

- 1.1 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:

1.1.1 Eligibility criteria for submission of bid documents:

- (a) **Bidder must be project specific authorized from OEM (for PAC).** Authorization certificates will have to be uploaded on e-procurement portal. General dealership / General authorization / General retailer ship / General channel partner will not be considered.
- (b) Intending bidder should not be a joint venture (Self Certified copy of relevant documents clearly establishing the status of bidder to be uploaded in Cover-1).
- (c) Similar work should have been successfully completed by bidder in State Govt., Central Govt. Autonomous Body, PSUs during last seven years ending last day of the month previous to the one in which applications are invited:

Three similar completed works costing not less than the amount equal to 40% of the estimated cost put to tender,

or

Two similar completed works costing not less than the amount equal to 60% of the estimated cost put to tender.

or

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

(Self-Certified photocopy of work order along with work completion certificate to be uploaded as proof of eligibility criteria in Cover-1)

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.

Explanation: 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.

- (d) Similar work means **“SITC of Precision AC system”**.
- (e) The Average Annual Turnover CA Certificate preferably with UDIN should be at least 50% of estimated cost during the immediate last 3 consecutive Financial Years (2019-20, 2020-21, 2021-22) –balance sheet duly audited by Chartered 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.
- (f) 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.
2. Agreement shall be drawn with the successful bidder on prescribed format.
3. 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.
4. The site for the work is available / shall be made available for start of the work.
5. 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: Institute website <http://mm.iitr.ac.in/mmweb/tenders>) or from Central Public Procurement Portal (CPPP) <http://eprocure.gov.in/app>.

6. 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.
7. The scanned copies of documents as per critical data sheet shall be uploaded under Cover-1 on the e-tendering website.
8. Documents as mentioned in critical data sheet shall be placed in an envelope with due mention of Name of work, date & time of opening of Tenders and is to be submitted in the office of Executive Engineer(E/M) , IIT Roorkee on or before last date and time of submission of bids. Kindly note that in case of any discrepancy regarding uploaded documents in cover-1 and physically submitted documents in the office, the uploaded documents shall be considered as final. Online Financial Bids submitted by intending bidders shall be opened only of those bidders, whose bid found technically qualified.
9. 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.
10. 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.
11. 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.
12. 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.
13. The bidder shall not be permitted to tender for works in the E&W, 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.
14. 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.
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 bidders shall not be allowed to participate in the re-bidding process of the work. For NSIC / MSE bidder, action will be taken as per Bid Security Declaration.
16. 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.

17. 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.
18. **Composite Tender (Not applicable)**
 - 18.1 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.
 - 18.2 The eligible bidders have to quote rates for all items given in the schedule of quantity.
 - 18.3 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.
 - 18.4 Entire work under the scope of composite tender including major and all minor components shall be executed under one agreement.
 - 18.5 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.
 - 18.6 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.
 - 18.7 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.
 - 18.8 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.
 - 18.9 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 E&W, IIT Roorkee.
 - 18.10 It will be obligatory on the part of the bidder to sign the tender documents for all components before the first payment is released.

**Sd-
Institute Engineer,**

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).

2. Non-Association / Relation

- 2.1 All bidders will 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 BOG 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/ E&W, 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. Earnest Money Deposit (EMD): Earnest Money Deposit (EMD): EMD / Bid Security Declaration as per critical data sheet must be submitted. Bids not accompanying with EMD / Bid Security Declaration 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 be converted as Security deposit. The EMD may be forfeited and further the bidders shall not be allowed to participate in the rebidding process of the work, if the Bidder withdraws his bid during bid validity period or

in case successful Bidder fails to sign the contract / fails to deposit security amount and performance guarantee. For NSIC / MSE bidder, action will be taken as per Bid Security Declaration.

9. **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.
10. **Language of Bid:** The document shall be written in English/Hindi language. The total amount should be written in the same language.
11. **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 relevant sections.

12. Tender Prices

- 12.1 The contract shall be for the whole works as described in priced Schedule of Quantities submitted by the Bidder.
- 12.2 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.
- 12.3 The notation R.O. written against items of BOQ means 'rate only' and the bidder is to quote only unit rate in such cases.
- 12.4 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.
- 12.5 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.
- 12.6 **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, labourcess 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. Estimated 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.
- 12.7 **Labourcess or BOCWW Cess:** Labourcess @1% shall be deducted from each bill.
- 12.8 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).
- 12.9 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.
- 12.10 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.
- 12.11 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.

- 12.12 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 tender 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.
- 12.13 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.

13. Format and signing of Tender document

- 13.1 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.
- 13.2 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

14. Sealing and marking of bids.

- 14.1 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 be accepted by the department.
- ~~14.2 All the envelopes/covers needed to be properly sealed by the bidder and shall indicate the name and address of the bidder.~~
- ~~14.3 If the envelopes/covers are not sealed and marked as above, the Owner will assume no responsibility for the misplacement of the bid document.~~
- 14.4 Financial/price bid is to be uploaded online only & no hard copy to be submitted.

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

E: TENDER OPENING AND EVALUATION

- 16. 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.
- 17. 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 fax, but no change in the price or substance of the tendering shall be sought, offered or permitted.
- 18. Examination of Bids and Determination of Responsiveness:**
- 18.1 Prior to the detailed evaluation of bids, the Owner will determine whether each bid
- Meets the eligibility criteria defined
 - Has been properly signed and meets the requirements mentioned
 - is accompanied by the required securities and;
 - is responsive to the requirements of the tendering documents.
- 18.2 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
- Which affects in any substantial way the scope, quality, or performance of the works; 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
 - Whose rectification would affect unfairly the competitive position of other Bidders presenting responsive bids.
- 18.3 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.
- 19. Evaluation and Comparison of Bids:**
- 19.1 The Owner will evaluate and compare only the bids determined to be substantially responsive.

19.2 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.

20. 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

21. Award criteria:

21.1 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.

21.2 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.

21.3 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.

22. 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.

23. Performance Guarantee (PG): Within ten (10) days of LoA the successful Bidder shall furnish the performance guarantee @ 3% of value of work in the form of DD/FDR/ Bankers cheque /Bank Guarantee from Scheduled bank provided in the tender document. The PG 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 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.

24. 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

25. 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.

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.	EMD details		
14.	Tender fee details		
15.	Solvency certificate details		

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

Sl. No.	Financial Year	Amount (in Lakhs)
1	2021-2022	
2	2020-2021	
3	2019-2020	

17. PROFORMA FOR LIST OF WORKS EXECUTED BY THE BIDDER DURING THE LAST 7 YEARS.

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:

1. 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 equipment's, 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 superseded 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 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 The Bidder shall arrange for water & power supply at site at his cost for the entire work. The water to be used for construction shall be free from excessive salts and minerals that are harmful to the construction work. Making arrangement of water good for construction either through external supply or through treatment at site shall be entirely the responsibility of the Bidder. The Bidder shall on demand of the Owner / PMC get any random water samples tested at the approved testing laboratories. No extra payment shall be made for arranging water good for construction under any circumstances. No excuse for / of Municipal water / electric supply shall be entertained. The bidder shall ensure provision

of electricity by generator and water by tanker transport if necessary. No claim shall be entertained on this account. In case the same will be provided by the Owner at any stage, then water/electricity charges shall be deducted from the Bidders running bills as per actual metered consumption.

- 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 shop 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 from 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 is 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. Insofar 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 interlaid 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. Erection cum storage risk Policy;
 - c. Bidder All Risk Policy;
- 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 than 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 after the approval of competent authority as below-
 - a. In the case of Extra Item(s) being the schedule items (Delhi Schedule of Rates items), 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 items in case of non-schedule items (Non-DSR items) shall be made as per the prevailing market rate.
 - b. In the case of Substitute Item(s) being the schedule items (Delhi Schedule of Rates items), 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 items (Non-DSR items) 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 impeding timely execution of the works and performance of services, the Bidder shall promptly notify the Owner in writing of the fact of the delay, it's 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

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.

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. The owner may terminate the contract bond without prejudice due to financial malpractice/ misbehaviour/ verbal or physical assault/ poor quality of work etc. Further to this the bidder shall 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 them 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 agency's bill /PBG/pledged FDR.

For any above-mentioned cause including unsatisfactory performance or violation of the terms and conditions of the contract whatsoever, the contract is liable to be terminated and the agency is liable to be blacklisted and security deposit/ Performance Bank Guarantee submitted by the agency shall be forfeited and bank guarantee will be encashed.

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 Honourable High Court Uttarakhand 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's 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, permission to work beyond normal working hours can be granted by the Owner in exceptional circumstances to achieve the target schedule of completion.

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 program 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's notice.

48.0 Uncorrected Defects: If the Bidder has not corrected a Defect within the time specified in the Owner's 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

49.0 Schedule of Quantities

- 49.1 The Schedule of Quantities shall contain items for the construction work, installation, testing, and commissioning work to be done by the Bidder.
- 49.2 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.

50.0 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.

51.0 Payments for Variations

- 51.1 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.
- 51.2 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's own forecast of the effects of the Variation on the Bidder's costs.
- 51.3 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.
- 51.4 The Bidder shall not be entitled to additional payment for costs, which could have been avoided by giving early warning.

E: FINISHING THE CONTRACT

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

53.0 Taking Over: Before handing over the site, the bidder must obtain a site clearance certificate from the Owner.

54.0 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.

**Sd-
Institute Engineer**

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 (GCC clause 1.0)

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

2. (i) Security Deposit: As per Critical Data Sheet.

- i) Release of Security Deposit: Security Deposit @ 5% for SITC and CAMC parts will be refunded by the Owner after completion of Defect Liability Period and CAMC period (i.e. after 72 months of the work completion). Accordingly, bidder will submit the security deposit.
- (ii) IIT Roorkee reserves the right to seek justification from the bidder for abnormally high/low bids.
- (iii) In case of abnormally high bids IIT Roorkee reserves the right to negotiate with the bidder.
- (iv) In case of abnormally low bids, successful bidder may be directed to deposit additional security as per the following formula:
 - i. Upto 30% below the estimated cost (including 30%) : Nil
 - ii. 30% to 50% below the estimated cost (including 50%) : 20%
 - iii. 50% to 70% below the estimated cost (including 70%) : 40%

3. Performance Guarantee: As per Critical Data Sheet. Performance guarantee shall be valid for a period of 30 days after completion.

4. Warranty (Defective Liability Period):

- (a) Minimum warranty period (Defective Liability Period) of complete works including all alliance services will be one year. Also, equipment warranty certificate as per OEM will be submitted to the department. Services any required as per OEM shall be in the scope of bidder during warranty period.
- (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.
- (c) Bidder will be fully responsible for trouble free and smooth operation of PAC AC as per norms of manufacture during the 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 deducted from the security deposit for each defaulted day.
- (d) Faulty compressor will be replaced within 7 days failing which Rs. 1000/- will be deducted from the bill for each defaulted day.
- (e) 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.
- (f) 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.
- (g) A quarterly preventive maintenance service has to be carried out during DLP also.

5. Payment:

5.1 Payments shall be made for repairing/replacement parts on percentage basis.

5.1.1 70% payments of the work can be released after successful delivery of the materials at site in good condition.

5.1.2 20% payments of the work can be released after successful installation.

5.1.3 10% payments of the work can be released after successful testing & commissioning of the system.

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

- a) Measurements
- b) GST Invoice with revenue stamp.
- c) Insurance – Bidder's All Risk (CAR) Policy, Workmen compensation policy and Third-Party Liability Insurance.

5.2.1 Basis of Payment in RA bills

Payment in RA bills shall be based on quantity of work executed at site (as per the item of work) & verified by Owner as per the item / percentage rate in work orders. Owner is authorized to allow part rate/reduced rate for any item of work.

5.2.2 Disallowance of payment

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

5.3 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 execution/site requirement/and user suggested changes during execution.

The bill should be accompanied with the following documents.

- a) Job completion certificate.
- b) Site clearance certificate.
- c) Indemnity certificate towards labour payment and all statutory payments.
- d) Certificate of test on materials etc. (if applicable.)
- e) Certificate of measurement sheets.
- f) Original quality control record, 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.
- h) AS built drawings.

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.

6. Liquidated Damages

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 Conciliation 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 IITRoorkeefor 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 term 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

8.1 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.

8.2 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.

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

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.

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.

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.

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. Specification to be followed for execution of works are:

- **For Civil Works:** CPWD Specifications 2009 Vol. 1 and Vol. 2 with up to date correction slips. (Hereinafter called CPWD specifications also) and Specification mentioned in This Publish document for each project
- **For Electrical Works:** CPWD Specifications for electrical works 2005 (Internal) and CPWD Specifications for electrical works 1995 (External) and Specification mentioned in this bid document for each project
- **For HVAC Works:** CPWD General specification for HVAC – 2017 & Amendments 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.

Sd-

Institute Engineer

Undertaking

(Notarized 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. Wedo 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 Roorkeestating 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 undertake 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. Wefurther 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 Roorkeewhere 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 RoorkeethatIndian Institute of Technology Roorkeeshall 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 Roorkeeagainst 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 Roorkeeto 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 Roorkeein 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 theday of..... for (Indicate the name of the Bank)

SECTION – 1

DESIGN OF THE SYSTEM

1. OBJECTIVE

The object of air conditioning design is to create safe and comfort environment in respect to temperature humidity, dust and odor etc. By keeping the all the design condition and heat load calculations, it is proposed to install PAC System for Durability Lab, Civil Engineering Department, IIT Roorkee.

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 PAC system shall be installed as per the specifications hereunder, 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 PAC technology with minor civil and electrical work as following:

1. 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.
2. Providing and fixing at site all main equipment's associated with A.C. system asked under these technical specifications and in BOQ.
3. 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.,
4. 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.
5. Foundation of equipment's, cutting holes, chases and the like through all types of non-structural 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.
6. Routine testing, pressure testing of fabricated components, commissioning of complete system at site.
7. Performance testing of complete air-conditioning system at site as per various technical requirements as stipulated.
8. Required civil works like gypsum boxing with POP finishing for covering of all services like refringent pipe, drain pipe, cabling wherever required, 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.
9. Routine testing, pressure testing of fabricated components, commissioning of complete system at site.
10. Performance testing of complete air-conditioning system at site as per various technical requirements as stipulated.
11. Shop drawing for routing of piping, VRV layout, Cable / conduit route, preparation and submission to EIC for its approval.
12. 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 fraction of incident solar radiation admitted through a window both directly and absorbed and subsequently released. SHGC is expressed 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 Psychrometric Chart

A Psychrometric 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 psychrometric 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, NO_x 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. ABBREVIATIONS

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.

5. BASIS OF DESIGN

5.1 OUTDOOR DESIGN CONDITION

Site Location: **INDIAN INSTITUTE OF TECHNOLOGY-ROORKEE (U.K.)**
CIVIL-DURABILITY - TEST LAB- GROUND FLOOR

Outdoor Design Conditions are based on Delhi Weather Data (Waco) published by Indian Society of Heating, Refrigerating and Air-conditioning Engineers (ISHRAE) for developing the year-round hourly AC load profile. However, peak outdoor design conditions shall be considered minimum as follows:

Design Conditions (°C)											
Heating DB		Cooling DB/MCWB				Evaporation WB/MCDB					
99.60%	99%	0.40%		1%		0.40%		1%		2%	
1.7	3	41.3	23.8	39.6	24.6	28.5	33.6	28.1	32.9	27.8	32.5

5.2 INDOOR DESIGN CONDITIONS

Following indoor design conditions for centrally air-conditioned space shall be adopted.

COOLING LOAD CALCULATION SHEET

<u>Address:</u>	CIVIL -DURABILITY-TEST-LAB					Estimated by:	SKS		Heat load for:	Summer
<u>Space used for:</u>						Peak load at:	4.00 PM			
<u>Area in sq.ft =</u>	1915	Length in Ft.		Height in ft.=	14.0			DESIGN CONDITIONS		
<u>Volume in cu.ft</u>	26810	Width in Ft.		Contact factor :	0.88	(British Units)	DBT	% RH	WBT	Gr/lb
Bypass factor :	0.12			Btu/hour		Outside	105	25	75	80
	Area x	Temp.diff. x	Factor	=Sensible Load	Latent Load	Inside	73	55	62	69

Performance Guarantee:

The above information is for the reference of the contractor. However, the contractor shall guarantee that the air-conditioning system shall maintain the designed inside temperature within $73 \pm 1^\circ\text{F}$ tolerance and the relative humidity shall not exceed the specified limit $50 \pm 5\%$.

The contractor shall guarantee that the capacity of various components as well as the whole system shall not be less than specified.

The contractor shall ensure, that the system shall be free of vibrations and disturbing sounds.

A. **TECHNICAL SPECIFICATIONS FOR PRECISION AC**

1. **SCOPE OF WORK**

The Scope of Work covers the supply, installation, commissioning and warranty of Precision Air conditioner (herein referred to as “product”) and services provided for the same.

1.1 **SITC of PAC & Fresh Air Assembly:**

- 1.1.1 Design, Detailed Engineering, Manufacture / SITC **Industrial precision AC** unit (microprocessor based air cooled units) complete with upward flow electronically commutated motor for evaporator , with scroll compressor working on R 410A in single refrigerant circuit ,comprising of indoor and outdoor units with all components Sequential controls ,communication port with suitable protocol to suit BMS compatibility, air cooled condenser with fans each directly driven by motors having a matching heat rejection duty with heat rejection coils constructed from copper tubes with expanded aluminium fins ,MCB"s, softy valves ,**pressure releasing valve / High pressure switch**, data communication cable between units etc.
- 1.1.2 Supply air grilles / Diffusers600x600MM, GSS frame for mounting of diffusers in false ceiling /flooring.
- 1.1.3 PAC units are to be installed in the Durability Lab. HEPA filters are required.
- 1.1.4 Motorized damper for standby mode fitted with motor etc.
- 1.1.5 Indoor unit shall be floor mounted.
- 1.1.6 Supply and Laying GI round / rectangle **type** duct required insulation and aesthetically good.
- 1.1.7 Foundation bolts, Grouting, Vibration Isolators, Base Frames etc. for mounting the outdoor condensing unit, indoor Cooling Unit and other equipment.
- 1.1.8 Providing M S structure fabricated out of MS Channels/Angles/ Flats etc. i/c cutting, welding, drilling holes, fixing on wall/floor, painting etc. for indoor and outdoor units as reqd.
- 1.1.9 Uniform air distribution is required through ducting.
- 1.1.10 Control panel for operation &auto synchronizing of each unit is provided by bidder.
- 1.1.11 Drain pipe shall be heavy duty type with insulation.
- 1.1.12 Test reports, list of recommended spares, as-installed drawings, operation and maintenance manual for the entire Precision Air Conditioning installation.
- 1.1.13 On completion of erection, the contractor shall thoroughly clean all the equipment, inspect and check the entire installation for correctness and completeness and furnish a detailed report of all components of the installation to Engineer-in-charge. The contractor shall also inspect and check the services required by him and provided by other agencies employed by the Client, and confirm the completeness and correctness of such services to the extent necessary.
- 1.1.14 Power supply for PAC unit will be provided by IIT Roorkee at single point only.
- 1.1.15 The supply should be complete with appropriate earthing as per IE Rules.
- 1.1.16 Each Unit should have a separate control panel. Depending on the number and capacity of units to be installed, each unit should have separate control through a main incoming switch with adequate capacity of approved makes.
- 1.1.17 All type of electrical cabling (power / control) should be done with armoured copper cable under the scope of except single point connection. Before laying of cable bidder shall offer to EIC for its inspection.
- 1.1.18 GI plate earthing (double) with connection under scope of contract.
- 1.1.19 Providing and fixing of 25 mm x 3 mm G.I. strip on surface or in recess for earthing connections etc. as required.

1.2 **Civil Works:**

- 1.2.1 All Minor Masonry, Carpentry and Civil works such as cutting opening in Masonry Walls, Internal Partitions, RCC Slabs etc. for Pipes and Cables and making them good the same to match existing works / décor shall be done by the Contractor, wherever asked for by the Engineer-in-Charge.
- 1.2.2 Cleaning of site & handing over the works.

1.3 **TESTING REQUIREMENTS AND PROCEDURES**

- 1.3.1 Balancing of all air systems and all tests as called for in the Specifications shall be carried out by the Contractor in accordance with the Specification, the Relevant Indian Standard Specification & Recommendation of the American Society of Heating, Refrigerating and Air-conditioning Engineers (USA). Certified manufacturer’s performance curves for each piece of equipment shall be submitted along with the test results. The contractor shall also provide to the EIC record of all safety and automatic control settings for the entire installation.
- 1.3.2 The contractor shall arrange for all necessary balancing and testing equipment and instruments. Any defect in testing shall be rectified by the contractor entirely at his own cost, to the satisfaction of the EIC. The installation shall be tested again after removal of defects and shall be commissioned only after approval by the EIC. All tests shall be carried out in the presence of the EIC.

- 1.3.3 Performance tests of individual equipment and control shall be carried out as per manufacturer's recommendation.
- 1.3.4 The whole system balancing shall be tested with microprocessor based hi-tech instruments with an accuracy +/- 0.5%.
- 1.3.5 The instrument shall be capable of storing data and then downloading into a P.C.

1.4 RUNNING-IN-PERIOD

- 1.4.1 After satisfactory final inspection as stated the contractor shall demonstrate the trouble-free running of the installation for a period of not less than 10 days before IIT Roorkee takes over. After the installation has operated for 10 days period without any breakdown or abnormal / unsatisfactory operation of any machinery during this period, the Precision Air Conditioning System shall be deemed to have run trouble-free. The contractor should include one year of free running maintenance after completion of 10 days of trouble-free running including replacement of defective parts etc. at his own cost.
- 1.4.2 The contractor shall arrange at his own cost for all staff, fuel, refrigerant gas and other consumables during trial run, commissioning and running-in-Period up to the date of acceptance. Nothing extra shall be paid on this account.

1.5 FINAL INSPECTION AND TESTING

- 1.5.1 The Contractor shall intimate in writing to Engineer-in -charge as and when individual components of the installation are ready for hydraulic / pneumatic / electrical, etc. tests required for further progress of erection. All such tests shall be carried out as per these specifications and/ or as directed by Engineer-in-charge and recorded in the presence of Engineer-in-charge / his representatives
- 1.5.2 The Contractor shall intimate in writing to Engineer- in-charge, the proposed date of initial startup and request for ancillary requirements such as permanent power etc. to be made available to him for initial operation of his installation.
- 1.5.3 The Contractor shall, on approval of Engineer -in-charge, proceed with necessary pre-commissioning activities and tests and put the installation on initial operation and start-up during which preliminary adjustments and balancing shall be carried out. Testing shall be carried out for all three seasons.
- 1.5.4 Based on preliminary observations during the initial operation described above, necessary modifications/ repairs/ replacements/ etc. if any shall be carried out by the Contractor to the entire satisfaction of Engineer-in-charge. On successful completion of initial operation, the Contractor shall proceed with trial runs.
- 1.5.5 Unless otherwise indicated, the trial runs shall be carried out for minimum period of 10 days, each of 24 hours duration. In case of interruptions of a duration of more than 4 hours at a time, the period of trial runs shall be extended by 1 (One) day.
- 1.5.6 After successful trial operations, the Contractor shall proceed with preliminary testing performed during static phase, i.e. rooms or facilities are complete and ready for operation, with all services connected and functional, but without full / any occupancy or equipment in the rooms/ facilities.
- 1.5.7 The performance tests for Precision Air Conditioning System shall be carried out during peak summer and monsoon seasons. However, if these systems are required to be put into operation for beneficial use of owner at a time other than peak summer or monsoon seasons, then, the equipment and overall installation shall be taken over by the owner and put into operation. The final performance tests, in any case, shall have to be carried out during peak summer and monsoon and witnessed by Engineer-in-charge or his representative.
- 1.5.8 All instruments for testing shall be arranged by the Contractor and suitable provision made in the piping and / or equipment for installing the same.

1.6 SEASONAL TESTS

- 1.6.1 The contractor shall carryout three Seasonal Tests for summer, Monsoon & Winter as soon as the ambient / outside conditions are suitable for that. All the three seasonal tests (summer, Monsoon & Winter) must be completed successfully during the Defects Liability Period of 12 months, otherwise Defects Liability Period will get extended till all the three Seasonal Tests are successfully completed. Nothing extra shall be paid on this account.

2. GENERAL DESCRIPTIONS

The AC Units should have high sensible heat ratios, to match **high sensible loads of the said lab, IIT Roorkee**. A Microprocessor controlled Precision package AC system with **R-410a refrigerant (compulsory) shall be suitable to take thermal and air quantity inputs and adjust its operation accordingly so as to achieve highest levels of performance and efficiency.**

THE AIR-COOLED PRECISION PACKAGE UNIT SHALL BE DESIGNED AS PER FOLLOWING CONDITIONS

- 1. Unit return air temperature : As per Design
- 2. Ambient air design temperature : 40°C - 45°C

3. Cooling Capacity : As per BoQ
4. Air Flow Direction : As per OEM
5. **Positive pressure ventilation module:** Pressure difference in the range of 0.05" WC (12.45 Pascal) to 0.10" WC (24.9 Pascal).
6. Air inlet Temp & RH : Set point $\pm 1^{\circ}\text{C}$ (DB) & Set point $\pm 5\%$ (Return Air)
7. Air Quantity : Modulating as per requirements
8. Units should be able to provide 1 SHR (Sensible heat ratio) at part load
9. Units should be able to work on return air logic.
10. The Units shall be designed for 68-69 dBA at 1.5 meter from the unit outlet for quiet operation with all moving parts mounted on anti-vibration mounting and carefully balanced to ensure minimum vibration.
11. If required, the unit shall be tested at site for performance rating before acceptance. Performance test shall be a heat load test using heater supplied by the Precision unit supplier.
12. It's mandatory to submit software selection output of the proposed unit.
13. Precision Air Conditioning system has been designed to maintain inside conditions of $23^{\circ}\text{C} \pm 1^{\circ}\text{C}$ and RH 50% $\pm 5\%$ year-round.

3. CONSTRUCTION OF UNIT:

3.1 Design Requirements

The environmental control system shall be Factory assembled unit. It shall be floor mounted, optimized for maximum cooling capacity in a minimum footprint. It shall be specifically designed for service from the front of the unit. The system shall be designed for draw-through air arrangement to insure even air distribution to the entire face area of the coil. The unit shall modulate cooling capacity and airflow based on requirements.

The unit shall be ready to allow the installation of shackles for top handling. Forklift handling should be possible as well.

3.2 Quality Assurance

The specified system shall be factory end of line tested (functionality test) before shipment and designed to meet CE requirements. The system shall be designed and manufactured according to world-class quality standards.

3.3 Cabinet

The cabinet is manufactured from galvanized steel sheet, externally painted with RAL 7021 or as approved by EIC colour epoxy-polyester powder paint and assembled using stainless steel screws and high tensile rivets.

The rear and the fans section panels are double-skinned, with 20mm (frontal fan section panel with 40mm) Class 'O' (A1 EU) fireproof insulation sandwiched between the skins to reduce noise emission and heat loss. The side panels, which are isolated from the inside of the unit to form a complete double-skinned cabinet, the small service panel for electrical heaters, are also lined with 10mm Class 'O' (A1 EU) fireproof insulation.

The frontal panel(s) are assembled on hinges to make the access easier; this can be opened by the fast closing lock.

The rear and side panels are screwed to the supports. The rear panel(s) are screwed directly to the frame.

3.4 Cooling circuits

One (Two) refrigeration circuit(s), (each) incorporating one (two) high efficiency, fully hermetic Inverter Scroll compressor/s with crankcase heater, air-cooled condenser, liquid receiver with outlet service valve, safety valve, filter drier, moisture indicating sight glass, liquid line solenoid valve and an electronic expansion valve directly controlled by the unit microprocessor to allow the highest energy saving.

Each circuit is equipped with pre-set high-pressure switch and low-pressure transducer for protection against high condensing and low evaporating temperatures. The low-pressure transducer is managed by microprocessor controller, whilst to avoid compressor cycling at high discharge pressures, the high-pressure switch is equipped with a manual reset.

The inclined evaporator coil is manufactured from copper tubes, mechanically bonded to hydrophilic painted aluminium fins, with a stainless-steel condensate drain pan. The large face area/low velocity coil allows precise control of temperature and humidity during cooling and dehumidification, and is designed to optimize fluid velocity and minimize pressure drop.

The evaporator shall be **staged / single** coil to allow a maximum efficiency on partial loads. The moisture indicating sight glass and liquid line solenoid valve for each circuit are mounted visible from a service window, immediately accessible once open the frontal door/s, to allow checking and adjustment while the unit is in operation.

3.5 Fan section

The unit is fitted with one (two, three) direct-driven, high efficiency, single inlet, backward curved, centrifugal 'plug' type innovating EC fan(s). The fan(s) have an impeller with curved blades corrosion resistant made of fiberglass plastic. This new technology allows keeping the current high strength of aluminium alloy adding the benefits of light weight and full flexibility on blade design of the new material. The good dampening behavior of the plastic also helps to reduce noise emissions.

The fan motors are Electronically Commutated, IP54, with internal protections, continuous speed regulation via controller signal. The motor is three-phase with IP54 protection; provided with internal thermal protection.

The fan wheel is statically and dynamically balanced; the bearings are self-lubricating. Single / double fan may be provided. It shall be also designed to increase efficiency. Fan(s) removal(s) shall be made faster using buttonhole specifically designed and tested to allow 10 cm increasing height during the operation.

3.6 Humidifier

The humidification system is provided by an electronic control humidifier. The dehumidification function, which is supplied as standard when the humidifier option is installed, acts by reducing the fan speed with consequent reduction of the air flow and at the same time operating the variable capacity compressors at full capacity

Humidification control may be of the proportional or of the on-off type, according to the requirements of the installation. Any amongst the following two may be used for Humidification:

3.6.1 Infrared Humidifier:

The unit is fitted with an infrared humidifier suitable for use with water of varying degrees of hardness. The humidifier is complete with a water inlet valve, and a maximum water level sensor; the humidifier includes 3 high-intensity quartz lamps shine on water creating instantaneous moisture using almost any water quality. The cleanable stainless-steel humidifier pan is removable from front of the unit.

Or

Steam electrode humidifier may be provided.

3.6.2 Heating / reheating.

The heating resistors are of a rigid design for extended operational life and are normally utilized to maintain room dry-bulb conditions during a system call for dehumidification. Each stage of heaters is made of finned armoured stainless steel AISI 304 to maintain a low surfaces power density. Ionization effects are eliminated owing to the low heater surface temperature.

Heating control is of the ON-OFF type. The heaters are phase balanced and are provided with a manual reset safety thermostat to disable them in the event of a high temperature.

The heating system also incorporates Miniature Circuit Breaker(s) which protect the heater(s) from short circuits, should the harness be damaged accidentally.

3.7 Air filtration

The standard filtration grade is G4 (95% down to 5 microns). The filter pleated structure gives high filtration efficiency, low pressure drops and permit to use the **Aluminium / SS frame filter**. They are easily accessed/replaced by opening the front panels.

The unit should be fitted with a filter differential pressure switch, connected to the microprocessor controller to provide 'Filter Clogged' warning indication.

3.8 Monitoring

The unit shall be supplied with suitable card for SNMP or RS 485 Modbus connectivity.

3.9 Electrical panel

The electrical panel, located at the front of the unit in a compartment isolated from the airflow, contains the MCB's, contactors, transformers, controller PCB, overload relays etc. Each high voltage system component is provided with an MCB over-current protective device. All high voltage components are touch protected by means of a plastic cover. The electrical panel complies with the IEC norm EN60204-1.

Electrical power supply is 415V ($\pm 10\%$) / 3Ph / 50Hz ($\pm 2\text{Hz}$) +N +E and are fitted with a mains isolator, mechanically interlocked with the electrical panel cover.

3.10 **Microprocessor controller**

The Control System is microprocessor based, 32-bit RISC. It can be programmed to control the function of every device within the unit via I/O.

The controller allows setting and monitoring of the following room parameters via a 3-button keypad:

- Air Temperature
- Temperature set-point
- Temperature band
- Humidity
- Humidity set-point
- Humidity band

The parameters are indicated using symbols and text on a back-lit, 3 digits Liquid Crystal Display. Cooling and heating modes are also indicated on the LCD screen. Alarm conditions activate a visual indicator. Three LED's indicate the unit status – 'Power on' (Yellow), 'Unit on' (Green) and 'Warning/Alarm activated' (Red)

The controller shall provide Unit to Unit Ethernet connection to operate with multiple units, run/stand-by rotation, automatic changeover and parameter sharing functions, external communications through BMS, sequential auto restart timer, with adjustable time delays to be applied to unit restart after a power loss.

The following warnings / alarms are included:

- High temperature
- Low temperature
- High relative humidity
- Low relative humidity
- Humidifier failure
- Fan failure
- Electrical heater high temperature (When applicable)
- Sensor failure
- Controller errors

Terminals are provided for remote start/stop control plus Volt-free 'Common Alarm' and 'Unit Run' indication.

The display shall provide with track recorded of temperature and humidity with graphically display on the screen.

A buzzer provides audible indication of a 'Warning' or 'Alarm' condition

Unit memory shall hold the 200 most recent alarms with time and date stamp for each alarm

Unit memory shall hold the 400 most recent events with id number, time and date stamp for each event

Menu shall display accumulative component operating hours for major components including compressors, fan motor, humidifier and reheat.

3.11 **Safety interlocks:**

Operation of heaters & humidifiers shall be possible only when blower fan is in operation. Fire detection signal from fire detector system shall be able to switch off the package unit operation in event of fire in conditioned space.

3.12 **Refrigerant piping:**

Each refrigerant circuit shall be suitable for operation on R410a and shall include the following items:

- i. Expansion valve with pressure equalization;
- ii. Removable liquid line drier / filter.
- iii. Liquid line sight glass with moisture indicator.
- iv. Hand shut off valves.

Scope not considered in this work:

- Any type of painting if required.
- Air tight partition if required.
- Shifting of any fan/light/ DB/switch board if required.
- Power supply for Indoor & outdoor units shall be provided at one point only by IIT Roorkee.

3.13 Providing of Earth pit and earth network for equipment if required. Equipment earthing will be terminated in the earthing network by HVAC vendor.

SECTION –2

Comprehensive Annual Operation and Maintenance Contract:

A. Scope of Work:

1. CAMC will start after completion of warranty period (i.e. 01 year from the handing over of the system).
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 as per OEM norms has to be carried out during the tenure of the contract. Also, major overhauling of the system shall be in the scope of bidder and shall be carried out as per OEM norms and EIC instruction as and when required.
4. All parts including compressor, PWB, Sensor, electricity distribution boards, MCCB/ MCB/ ELCB, ancillary work such as ducting which requires repair / replacement due to normal wear and tear during the contract shall be replaced free of cost.
5. This contract does not cover the repair / replacement of, / masonry work, cabinet sheet metal panels, shifting of units in part or as a whole.
6. In case need any anti-corrosive coating same shall be provided/arranged by customer.
7. Bidder shall be deputed only authorized service team of PAC equipments from OEM.
8. Bidder will be fully responsible for trouble free and smooth operation of PACAC as per norms of manufacture during the period.
9. 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.
10. Faulty compressor will be replaced within 7 days failing which Rs. 1000/- will be deducted from the bill for each defaulted day.
11. In case it is felt by the department that undue delay is being caused by the bidder in doing the rectification work, 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.
12. In case of continued non-performance and inability to meet service requirements, this office shall reserve the right to terminate the contract after giving 15 days' notice in writing. Also, the agency is liable to be blacklisted in such cases.

B. Payment terms for CAMC: -

1. Payment will be made on quarterly basis after successful completion of the quarter.
2. Payment shall be made upon submission of following documents:
 - i) Two copy of Invoice (Original & duplicate).
 - ii) Copy of the "Maintenance Cards" signed by the user & countersigned by the person in charge of the section/subsection of the institute.
 - iii) Copy of purchase order.
 - iv) Revenue stamp on the invoice.

Signature of Contractor

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 / L&T / ABB / Siemens
2	MCBDB & Loose Wire Box	Legrand/ L&T/ Schneider / ABB / Siemens
3	Change Over Switches	Asco/ Russel/ Socomac/ ABB/ L&T/ Schneider / Havells
4	Automatic Transfer Switch (ATS)	Asco/ Russel/ Socomac/ ABB/ L&T/ Schneider / Havells
5	FRLS PVC insulated copper conductor single core cable for wiring . (ISI marked)	Finolex/ RR Kabel/ KEI/ Havells/ Polycab
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 heavy duty PVC conduit pipe accessories	AKG/ BEC/ Precision/ MK(Honeywell)
8	Modular Switch, Socket/ Telephone Socket/ Cable TV Socket/ Data Outlet Socket/ Fan Regulator/ G.I. Boxes Etc. (Wiring accessories)/ Regulator etc.	Havells (Murano)/ Legrand (Arteor)/ Schindler Electric (Zencelo)/ Honeywell-MK (Blenzeplus)/ ABB (Tvisha)
9	Selector Switch & Toggle Switch	Salzer (Larsen & Toubro)/ Siemens/ Kaycee
10	PVC Trunking	Legrand/ schneider/ MK(Honeywell)/ AKG/ Precision
11	G.I. Pipe	Tata/ Jindal (Hissar)/ Prakash Surya
12	Paints	Asian/ Berger/ Dulux/ Narolac
13	Terminals Blocks and Connectors	Elmax/ Wago/ Hensel/ Connectwell
14	Phenolic Laminated Sheet/ Bakelite Sheet	Hylam/ Formica/ (P-I Grade)/ Mylam/ Greenlam
15	Piano Type Switch/ Socket	Anchor/ Kinjal/ Cona
16	Ceiling Rose/ Holder/ Call Bell/ Buzzer etc.	Anchor/ Kinjal/ Cona
B	Fans & Fitting	
1	LED Fittings	Wipro/ Phillips/ Crompton Greaves/ Havells
2	Exhaust Fan	Havells/ Crompton Greaves/ Usha/ Almonard/ Orient / Atomberg
3	Ceiling Fan	Havells/ Crompton Greaves/ Usha/ Almonard/ Orient / Atomberg
4	Geysers	Racold/ CG/ Havells/ Usha/ Jaquar
5	Sensor based LED Light Fittings	OCTIOT/Wipro/ Phillips/ Crompton Greaves/ Havells
C	Street Lighting	
1	Ornamental G.I. pole (Factory Finish)	Phillips/ Crompton Greaves/ Wipro/ Bajaj
2	Hot Dipped Galvanized Octagonal Pole (Factory Finish)	Crompton Greaves/ Phillips/ Bajaj/ Wipro
3	Polycarbonate Junction Box/ Enclosure	Hensel/ Spelsberg/ Neptune- Bals/ Cape Electric
4	XLPE insulated PVC Sheathed Alum./ Copper conductor Armoured cable of 1.1KV Grade	Finolex/ Universal/ Polycab/ RPG Cable/ KEI/ Havells/ Grandley/ Gemscap
D	Sub Station Equipments	

1	LT Panel/ Meter Panel Board/ Outdoor Feeder Pillar/ APFC Panel (less than 200 kVAR)/ Bus Ducts	Tricolite Electrical Industries/ Control & Switchgears Pvt. Ltd./ Sterling & Wilson/ Milestone/ Adlec Control System Pvt. Ltd./ Advance Panels & Switchgears Pvt. Ltd./ S.S. Enterprises/ A.R. Engineers
2	Air Insulated Rising Main	C&S/ L&T/ Schneider/ Legrand
3	Sandwich type Bus Trunking	C&S/ L&T/ Schneider/ Legrand
4	Moulded Case Circuit Breaker (MCCB) Thermal Release/ Microprocessor Based (Ics=Icu=100%)	Schneider Electric (NSx Series)/ Siemens (VL Series)/ L&T (D-Shine)/ Legrand (DPX3)/ ABB (Tmax)/ C & S (Winbreak-1/2)
5	Power/ Aux. Contactor 3/4 pole	Schneider Electric/ L&T/ Siemens/ Legrand/ ABB/ C&S
6	Potential Transformer/ Current Transformer	Automatic Electric/ Gilbert & Maxwell/ Matrix/ Precise/ L&T/ Kappa/ Rishabh / CGL
7	LED type indicating lamps/ Push Button	Schneider Electric/ L&T/ Siemens/ C&S/ GE
8	Overload relays with built in Single Phase Preventer	Schneider Electric/ L&T/ Siemens/ C&S/ ABB
9	Conventional/ Electronic Digital Meters (A/V/PF/Hz/KW/KWH)	Conzerv/ Larsen & Toubro/ Secure/ AE/ C&S/ Siemens/ Schneider/ ABB/ Rishabh
10	Timer	Siemens/ L&T/ Legrand/ ABB/ Schneider Electric/ C&S
11	Fasteners/ G.I. Clamps	Hilti/ Fischer/ Chilli/ GMGR
12	D.W Corrugated HDPE Pipe (ISI marked)	REX/ Dura plast/ Zenduct/ Triputi/ Duraline
13	Transformer (Oil/ Dry type)	Crompton/ ABB/ Schneider/ Voltamp/ Kirloskar (only oil type)
14	HT Panel/ Ring Main Unit	Siemens/ ABB/ L&T/ Schneider
15	H.T Cable (ISI marked)	CCI/ Polycab/ Universal/ KEI/ Havells/ RPG Cables
16	HT End Termination Cable Joint Kit	Reychem/ Cab Seal/ 3M
17	ACBs (with display)	Siemens/ L&T/ ABB (Emax)/ C&S / Legrand/ Schnieder
18	Rubber Mat	Jyoti/ Deep Joyti/ Premier (duly ISI marked)
19	Fire Extinguishers	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
20	Capacitors & Reactors/ APFC Relay	EPCOS/ L&T/ ABB/ Siemens/ Schneider
21	APFC Panel (200 KVAR & Above) (Accessories make will be as per manufacture's standards)	L&T/ Schneider/ ABB/ Siemens/ Legrand/ C&S
22	Cable Glands Double Compression with earthing links	Comet/ Cosmos/ Dowells/ Gripwell/ Jainson / Hax Brass (Copper Alloy India)
23	Bimetallic Cable Lugs	Comet/ Dowells (Biller India)/ Hax Brass (Copper Alloy India)/ Jainson/ Action
24	MS / GI Cable Tray	Pilco/ Slotco/ Pasco/ MEM/ BEC/ Steelways/ Legrand
25	Programmable Logic Controller (PLC)	Siemens / Woodward/ Allen Bradley / Delta / Mitsubishi
E	DG Sets	
1	Diesel operated 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	MS Pipe	Tata/ Jindal(Hisar)/ Prakash Surya
2	GI Pipe	Tata/ Jindal(Hisar)/ Prakash Surya

3	Forged Steel Fitting/ Flanges	Johnson Industries/ VS Forge/ JK Forging/ Trueforge
4	Forged Steel Fitting & Flanges (for welding joints)	VS Forge/ Rohini/ Kanwal Forge/ Johnson/ Trueforge
5	Pipe Hangers	Chilli/ Hilti/ GMGR/ Fischer
6	Gun Metal/ Brass Valve (ISI marked) (Full way Globe valve/ Non Return Valve)	Sant/ Leader/ Advance/ Zoloto/ Kirlosker
7	Butterfly/ Sluice Valve (ISI marked)	Audco/ Advance/ Kirloskar/ Sant/ Leader/ Zoloto
8	Check Valve (ISI marked)	Sant/ Leader/ Advance/ Audco/ Zoloto/ Kirlosker
9	Foot Valve (Cast Iron/ Gun Metal)	Sant/ Leader/ Advance/ Audco/ Zoloto/ Kirlosker
10	Y-type Strainer	Sant / Audco / Kirloskar / Leader / Zoloto
11	Fire/ Sprinkler Pump/ Terrace Fire Pump	Kirloskar/ KSB/ Grundfos/ Mather & Platt/ Wilo
12	Electrical Motor	ABB/ Siemens/ Kirloskar/ Grundfos/ Crompton/ NGEF
13	Diesel Engine for Fire Pump	Kirloskar/ Ashok Leyland/ Cummins
14	Coupling (Tyre-Type)	Lovejoy/ Fenner/ Dunlop
15	Anti Vibration Mountings	Kanwal Industrial Corporation/ Dunlop/ Resistoflex
16	Pressure Switch (ISI marked)	System Sensor/ Indfoss/ Danfoss/ Switzer
17	Pressure Gauge (ISI marked)	H Guru/ Fiebig/ Dwyer
18	Double/ Single Headed Landing Valve (ISI marked)	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
19	Male Female Fire House Coupling (SS 304) (ISI Marked)	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
20	First Aid House Drum/ Fire Hose Reels/ Shut off Nozzle (Gunmetal/ ABS) (ISI marked)	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
21	SS 304/ Gun metal Branch Pipe & Nozzle (ISI Marked)	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
22	Fireman Axe	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
23	Water Flow Switch (FM/ UL listed)	System Sensor/ Switzer/ Potter/ Siemens/ Honeywell
24	Rust preventive polymeric 4mm thick tape for pipes directly buried in ground Pipe Protection Wrapping (ISI marked)	Pypcoat/ Makphalt/ Rustech/ Safex
25	Level Controller & Indicator (Water)	Auto Pump/ Cirrus Engineering/ Techtrol/ L&T/ Entes
26	Fire Brigade Inlet Connection (ISI marked)	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
27	Thermoplastic pipe for First Aid Hose Reel (ISI marked)	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
28	Fire Sealant	Promat/ Birla 3 M/ Hilti
29	Overload relays with built-in Single-Phase Preventer	Schneider Electric/ L&T/ Siemens/ ABB/ C&S
30	Power/ Aux. Contactor 3 / 4 Pole	Schneider Electric/ Larsen & Toubro/ BCH/ Siemens/ Legrand/ ABB/ C&S
31	LED type indicating lamps/ Push Button	Schneider Electric/ L&T/ Siemens/ C&S
32	LT Jointing Kit/ Termination	Raychem/ Cab Seal/ 3M
33	RRL Hose Pipe (ISI marked)	Minimax/ New Age/ Safex/ Ansul/ Ceasefire/ Amerex
34	Dry Battery	Exide/ Standard/ Amar Raja/ Rocket/ HBL/ Pulse/ Amco
35	Battery Charger	Statcon/ Amarraja/ CDC/ AE/ Expofyn/ Thycon India
36	Epoxy Paint	Dulux/ Berger/ Asian/ Nerolac
37	Air Release Valve	Rb/ Tbs/ Cimbrio/ Zoloto
38	Analogue/ Digital Measuring Instruments (Voltmeter/ Ammeter/ Energy)	AE/ Rishab/ L&T/ C&S/ Conzerve/ Secure

39	Aluminium/ Copper power cable / Control Cable (Armoured/ Unarmoured)	Finolex/ Universal/ Polycab/ RPG Cables/ KEI/ Havells
40	Cable Glands & Lugs	Comet/ Dowells/ Jainson/ Cosmos/ Gripwell
41	Solenoid Valve/ Spray Nozzle	Parker/ HD Fire Protect/ Tyco/ Emersion
42	Sprinkler	HD Fire Protect/ Tyco/ Reliable/ Wormald/ Viking
43	Sprinkler Heads/ Water Curtain Nozzle	Tyco/ Viking/ Omex/ Newage
44	Steel Flexible Extension	Omex/ Newage/ Tyco
45	Vibration Eliminator	Resistoflex/ D wren/ Kanwal
46	Welding Electrodes	Advani/ ESAB/ L&T
47	Deluge Valve	Tyco/ Viking/ HD
48	Cast Iron Valve	Kirloskar/ Kartar/ Kalpana
G	Fire Alarm 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 for hooter	Notifier(Honeywell)/ Johnson Control(Simplex)/ Siemens/ Bosch/Edwards/Advanced/Apollo
5	Addressable monitor module for flow switch	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 (Addresable)	Notifier(Honeywell)/ Johnson Control(Simplex)/ Siemens/ Bosch/Edwards/Advanced/Apollo
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
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	L&T/ ABB/ Siemens
9	Water Flow Meter	ABB/ L&T/ Siemens/ Supreme Technology
I	Air Conditioner & Water Purifier	
1	Split/Window/Cassette Air Conditioner	Mitsubshi Electric/ Mitsubshi 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
J	Solar Water Heating System	
1	Solar Water Heating System	Racold/ Electrotherm/ V-Guard/ Bosch/EMVEE/Photon energy /
K	Lift	
1	Lift	OTIS/ KONE/ Mitsubishi/ Schindler/ECE
L	Uninterrupted Power Supply (UPS)	
1	Online/ Offline UPS	Numeric/ Eaton/ APC/ Vertiv/ Peagusus
M	Solar Power Generation System	
1	Solar PV Module	Waaree/ Vikram/ Adani/Tata Solar Power
2	Junction Box	As per OEM of SPV Modules
3	SPV Inverter	Delta/ SMA/ Solaredge/ Fronius
4	Module Mounting Structure	As per MNRE/ Manufactures Standards
5	Solar Cable XLPO Insulated (DC)	RR Kabel/ Polycab/ Havells/ Finolex
N	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/ Bryair/ Nichotra/ Krugger or OEM of VRF/ VRV
3	Precision AC	Emerson-Vertive /APC(Uniflair) /Stulz / Mitsubishi (Climaveneta) / Swegon Blue Box Private Limited/ flakt Group / Sidwal
	b. Ducting & Grilles	
1	Grilles/ Diffusers	Airflow/ Systemair Company/ Mapro/ Tristar/ Servex/ Dynacraft
2	Fire Dampers	Airflow/ Systemair Company/ Mapro/ Tristar/ Servex/ Dynacraft
3	Fire Dampers motors	Belimo/ Siemens/ Honeywell
4	G.I. Sheet Metal for duct	Jindal/ Tata/ SAIL
5	Factory fabricated duct (TDC)	
5.1	Rectangular	Rolastar/ Techno Aircon/ Ductofab/ RSP Air/ Zeco
5.2	Round	GP Spiro/ Atco/ Zeco
6	Self-Adhesive Sealing Gasket for Ducts	Prima Seal/ Air Flow/ Trocellen
7	Stick Pins	Prima Seal/ Air Flow/ Trocellen
8	VCD/ Gravity louvers/ Exhaust & fresh air louvers	Air Flow/ Airflow/ Ravistar
9	Electronic controller/ actuator for smoke exhaust fan	Belimo/ Siemens/ Honeywell
10	Smoke detector	Apollo/ System sensor/ Edward/ Siemens
11	Round Flexible Duct	Atco/ UP Twiga/ Carryaire
	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 / Armaflex/ 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	Pressure Gauges	H.Guru/ Dwyer/ Emerald
3	Thermometers (with brass encasing)	Emerald/ Taylor/ Japsin
4	Room Thermostat/ AHU& FCU Thermostat	Honeywell/ Siemens/ Danfoss
5	Humidistat	Honeywell/ Siemens/ Danfoss
6	VFD with sensors	ABB/ DANFOSS/ Siemens
	f. Fans	
1	Inline Fans	Systemair/ Nicotra/ Kruger/ Greenheck/ Airflow/ Caryaire
2	Propeller	Alstom/ Khaitan/ Crompton Greaves/ Nicotra/ Kruger/ Caryaire/ GE

Note - Due to compatibility of items, for replacement purpose existing brand shall be considered subject to availability.

Sl. No.	Item descriptions	Offered Capacity and configuration	Offered Brand	Offered model	BoQ Compliances Yes/ No
1	PAC Unit as per BoQ				

Note:

1. Above information is mandatory, if any additional sheets required to provide the required information, then bidder can submit.
2. Without filling essential information in Annexure-C, bid shall not be considered for evaluation.

Signature of the bidder

(To be submitted by the vendor/firm on its official letter head)
Self-Certificate for Local Content

No. IWD/DI/e-tender/ VRFAC/63

Dated: . .2023

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:

EARNEST MONEY DEPOSIT DECLARATION

Whereas, I/we(name of agency) have submitted bids for
..... (Name of work).

I/we hereby submit following declaration in lieu of submitting Earnest Money Deposit.

(1) If after the opening of tender, I/we withdraw or modify my/our bid during the period of validity of tender (including extended validity of tender) specified in the tender documents,

or

(2) If, after the award of work, I/we fail to sign the contract, or to submit performance guarantee before the deadline defined in the tender documents,

I/we shall be suspended for **one year** and shall not be eligible to bid for IIT Roorkee tenders from date of issue of suspension order.

Signature of the contractor(s)

Name -

Designation -

Seal of the Firm / Organization -

Bill of Quantity

Tender Inviting Authority: Dean Infrastructure

Name of Work: "Supply Installation Testing & Commissioning of Air conditioning System in Durability Lab Civil Department, IIT Roorkee with 05years CAMC"

PRICE SCHEDULE

Sl. No.	Item Description	Qty	Units	Estimated Rate in Rs. P	TOTAL AMOUNT With Taxes
1	<p>Supply Lifting, Shifting, Positioning, Installation, Commissioning & Handing over of Precision AC system of Floor Mounted, 8.0 TR (Net Sensible Cooling Capacity) with 8550 CMH air quantity. TOP discharge (Ducted Type), Air Cooled DX type Variable Cooling Capacity Precision AC units for Civil Durability Testing Lab application, equipped with most advanced industry technology to operate at higher return air temperatures, guaranteeing precise control of the lab. The units shall be selected on the basis of following parameters:</p> <p>i) Net Sensible Cooling Capacity - 8.0 TR and 8550CMH air Circulation quantity at 41.0 Deg. Cent. Ambient Conditions and Condensing Temp. not higher than 58.0 Deg. Cent. (Cooling Capacity Variations- 40 % to 100% in a Stepless manner to meet the requirement and Oil return mechanism for Long lasting life.</p> <p>ii)- Environmentally Friendly Green Refrigerant R-410A Only.</p>	2	Nos	11,17,312.50	2234625
1.1	<p>a) The Indoor unit shall comprise of Variable Capacity Energy Efficient Scroll Compressor, Corrosion Resistant Composite Material Aerodynamic EC Fans, Slant Type Evaporator DX Cooling Coil with Hydrophilic Coating, Microprocessor Controllers, Electronic Expansion valves (EEV), Driers, G4 Filter, Suction and Discharge piping, Internal power and Control wiring, Crankcase heaters, Electrode Humidifier to generate Sterilized steam, Heaters, HP/LP Cutouts, Power and Control contactors, water leak detectors and Other Electrical accessories.</p>				
1.2	<p>b) The system done by multiple units shall work with efficient way, trying to maximize energy efficiency always working where EC Fans are more effective. Fixed capacity compressor technology like multiple scrolls or Tandem scrolls are strictly not allowed. Systems should mandatorily be having variable capacity compressors and performance as per above specifications.</p>				
1.3	<p>c) The Outdoor Condenser unit shall comprise of Condenser fans & motor, Condenser cooling coil (Copper coil with aluminium fins), Fan speed controller, Isolator switch.</p>				

1.4	d) The unit shall be suitable for operation on 415 Volts, 50 Hz, 3 Phase, 4 Wire AC supply. Each unit should be having individual display panel, Advance Touch Screen Display with three level password protection and algorithm for default setting which shall display date, time, actual & set values, operating conditions, signal faults, collective faults, limiting values and PAC wellness alarm / service alarm to reduce the down time and unit memory shall hold the recent events with ID number, time and date stamp for each event. Unit shall have Compatible all Global Communication Protocol for BMS Integration. PAC unit's controller for synchronizing the Multiple No. of units to work as single system for all above units to save the energy and Individual operation also as per customer need.				
2	Supply Installation Testing and commissioning of copper piping between indoor & outdoor. Copper piping will be duly insulated with in the AC space. 10 Rmt per machine per circuit.				
2.1	Hot gas line	50	Mtr	1,966.47	98,323.50
2.2	Liquid line	50	Mtr	1,728.11	86,405.50
3	Supply, Installation, testing and commissioning of 10 KG Pressure PVC pipe with 6 MM Nitrile insulation, complete with fittings, supports accessories in surface/recess as per specifications & site requirements				
3.1	32 mm dia	20	m	202	4,040.00
3.2	40 mm dia	15	m	252.5	3,787.50
4	Supply and filling of Green and Enviro-friendly Refrigerant R- 410 A	60	Kg	1,489.75	89,385.00
5	Sequencing of PAC machine.	1	Lot	23,836.00	23,836.00
6	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.				
6.1	Thickness 0.63 mm sheet	60	Sq.M	1,136.22	68,173.20
6.2	Thickness 0.80 mm sheet	40	Sq.M	1,319.86	52,794.40
7	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				
7.1	Thickness 0.63 mm sheet	20	Sq.M	1,159.85	23,197.00
7.8	Thickness 0.80 mm sheet	10	Sq.M	1,356.38	13,563.80
8	Duct Insulation				

8.1	Supplying and fixing of following thickness 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.				
8.2	19 mm thick	90	Sqm	809.75	72,877.50
9	Supply and fixing of Closed Cell Cross Linked Polyethylene (XLPE) Foam with Factory Laminated Aluminium Foil				
9.1	9 MM	50	Sqm	2.42	121.00
10	Supply, Installation, Testing and Commissioning of Acoustic lining inside ducts using Non-Fibrous fire-retardant crosslinked polyethylene foam of 30-60 +/- 3 Kg/m3 density & thickness of 15mm having porous surface on one side & a flat surface on other side using Synthetic rubber-based Adhesive preferably Low VOC & high strength characteristic (Initial portion of ducting and main plenum) as per specifications				
10.1	15mm thick Eco sound (FR-Open Cell Cross Linked Polyethylene) for supply & return air ducts	15	Sq.M	10.69	160.35
11	Supplying & fixing of powder coated extruded aluminium Return Air Grills with louvers but without volume control dampers complete as required.	2	Sq.M	6,346.94	12,693.88
12	Supplying & fixing of powder coated extruded aluminium Supply Air Grills with aluminium volume control dampers as per specifications.	2	Sq.M	9,778.16	19,556.32
13	Supply Air Diffusers				
13.1	Supplying, fixing testing commissioning of supply air diffusers of powder coated aluminium with aluminium volume control dampers with anti-smudge ring & removable core.	1	Sqm	13,084.80	13,084.80
14	Return Air Diffusers				
14.1	Supplying, fixing testing commissioning of Return air diffusers of powder coated aluminium without volume control dampers with anti-smudge ring & removable core.	1	Sqm	8,721.41	8,721.41
15	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.	1	Sqm	7,566.93	7,566.93
16	Supplying & fixing of 18 G GI Volume Control Damper with th with Motorized actuator along with other control accessories to Open and Close the damper as per Logic to avoid the reverse flow and short cycling of cold air.	3	Nos	41,713.00	1,25,139.00
17	Fire Retardant and UV Coated Canvas Connections double fold type as per site requirement to connect the Ducted Unit and Duct	3	Nos	5,363.10	16,089.30
18	Fire Protection Coating on Duct.				
18.1	Supply & application of fire retarded coating on existing Supply air Ducts for 2Hrs fire rating	30	Sqmt	2,383.60	71,508.00

19	UV/Waterproof Coating on Duct Insulation for High durability and Long life.				
19.1	Supply & application of UV/waterproof compound on application on entire nitrile insulation for 2Hrs fire rating	30	Sqmt	679.33	20,379.90
20	Supply, erection, testing and commissioning of factory fabricated metal clad dust and vermin proof-floor mounted 160-250 A cap 440 V, 50 HZ,3 phase and neutral electric feeder pillar double door 400 mm depth duly powder coated spray painted with separate chamber for instruments (e.g. ampere meter, volt meter, frequency meter, KWH meter etc.) & switch gears (like I/C & O/G MCB's/MCCB's, C/o switch with extentionable/rotary handle etc.). The feeder pillar/ panel shall have 160-250 Amp, 415V TPN electrolyte aluminium bus bar as per IS 8623 insulated with heat shrink sleeve and mounted on no hygroscopic supports with detachable side with hinge and locking. The switches shall be completed with lug and cable gland of suitable size of cables with connection as required. The feeder pillar should be made with 2 mm CRCA sheet. The feeder pillar should be fixed on M.S. channel 75mm X 40mm X 6mm size and mounted on M.S. angle iron 50mm X 50mm X 5mm size frame 450mm height with cross support completed as per direction of site in charge. The panel shall be comprised of indicator and feeder nomenclature as per direction of site-in-charge.	20	Sqft	4,383.40	87,668.00
21	Providing and fixing following 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.				
21.1	150 A, 16 KA, TPMCCB	1	Nos	6,435.01	6,435.01
21.2	125 A, 16 KA, TPMCCB	1	Nos	5,177.43	5,177.43
22	Supply, laying, testing and commissioning of control cabling, as per Standard specification including end termination as required.				
22.1	Supply and laying of Power Cabling (PVC insulated and PVC sheathed, armoured, Copper Conductor of 1.1 KV grade on existing cable trays).				
22.2	3C x 2.5 Sq mm	50	RM	221.19	11,059.50
23	Supplying and laying of following sizes of 1.1 KV XLPE insulated Copper conductor armoured cables on existing cable tray / hume pipe / trench..				
23.1	4 core 10 Sq mm	50	RM	782.75	39,137.50
24	Supplying and laying of following sizes of Flexible FRLS insulated Copper conductor on existing cable tray / hume pipe / trench.				
24.1	2 core 1.5 Sq mm	200	RM	112.11	22,422.00
25	Supplying and drawing following sizes of FRLS PVC insulated copper conductor, single core cable in the existing surface/ recessed steel/ PVC conduit as required.				
25.1	2 X 6.0 Sq mm	30	RM	272.7	8,181.00

26	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.				
26.1	4 X 10 sq. mm (25mm)	10	Each	288.89	2,888.90
27	Supplying and fixing of following sizes 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.				
27.1	25 MM	30	RM	155.72	4,671.60
28	Cable Trays :				
28.1	Supplying and installing following size of perforated Hot Dipped Galvanized Iron cable tray (Galvanizations 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.				
28.2	150 mm width X 50 mm depth X 1.6 mm thickness	20	RM	768.94	15,378.80
28.3	300 mm width X 50 mm depth X 1.6 mm thickness	20	RM	1,034.20	20,684.00
29	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	8,024.43	16,048.86
30	Providing and fixing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required.	20	RM	262.04	5,240.80
31	Providing and fixing 6 SWG dia G.I. wire on surface or in recess for loop earthing as required.	10	RM	75.18	751.8
32	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.	4	Nos	2,896.68	11,586.72
33	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.				
33.1	63 Amp	1	Nos	3,084.34	3,084.34
34	Providing and fixing angle iron frames for doors, windows and ventilators of mild steel Angle sections of size 35x35x5 mm, joints mitred and welded by angle iron 35x35x5 mm or 35x 5 mm flat pieces to the existing T-iron frame or to the wall with dash fastener, including fixing of necessary butt hinges and screws and applying a priming coat of approved steel primer, all complete as per the direction of Engineer-In-charge.	300	Kg	111.37	33,411.00
Total in Figures					33,59,856.55

Wind Lab

