**Tender No. 001/CRRAO/NSM/25-26/05-01**

CR RAO AIMSCS invites Sealed Tender for Design, Site Preparation, Supply, Installation, Testing, Commissioning, O & M and AMC services of Basic Infrastructure for the establishment of a Data Center at **C.R. Rao Advanced Institute of Mathematics, Statistics and Computer Science (AIMSCS), University of Hyderabad Campus, Central University Post Office, Prof. CR Rao Road, Hyderabad – 500 046, Telangana, India.**

## TENDER SCHEDULE AND FACT SHEET

Tender No: 001/CRRAO/NSM/25-26/05-01

| | |
|---|---|
| Name of the Institute: | **C.R. Rao Advanced Institute of Mathematics, Statistics and Computer Science (AIMSCS)** |
| **Place of Supply, Installation & Commissioning, Support etc.** | **C.R. Rao Advanced Institute of Mathematics, Statistics and Computer Science (AIMSCS), University of Hyderabad Campus, Central University Post Office, Prof. CR Rao Road, Hyderabad – 500 046, Telangana, India.** |
| Communication Mail ID - | **info_nsm@crraoaimscs.res.in** |
| Date of Release of Tender | 21 May 2025 |
| Site Visit | 30 May 2025 |
| Date & Time of Pre-bid meeting (online) | 02 June 2025 |
| Last date of submission of bids | 16 June 2025 |
| Date of opening of Technical bids | 17 June 2025 |
| Place of opening of technical bids | **C.R. Rao Advanced Institute of Mathematics, Statistics and Computer Science (AIMSCS)** |
| Tender Document Fee | **Rs. 30000/-** in the form of DD drawn in favour of **CR RAO ADVANCED INSTITUTE OF MATHEMATICS , STATISTICS AND CS** OR through on-line Transfer |
| Bank Account Details for Tender Fee | Bank Name: State Bank of India<br>Branch Name with Complete Address: University of Hyderabad Branch, Hyderabad University Campus Hyderabad, Dist. Hyderabad, Telangana 500019<br><br>Telephone: 40 23011301<br><br>IFSC Code: SBIN0005916<br>Type of Bank Account: SB Account<br>Bank Account Number: 30636141038 |

## SECTION I – INVITATION OF BIDS

# 1 Introduction

This RFP is being floated to select the most appropriate vendor to build & operate the Data Center for a period of two years. The model of the proposed Data Center (DC) should be capable of enhancing capacities by incrementally augmenting the **infrastructure. The monitoring of the proposed DC is planned through an Integrated Building Management System (IBMS)** and therefore, the equipment's to be installed in the proposed Data Centre should be BMS compliant. As a part of this project, CR RAO AIMSCS invites on-line bids from eligible bidders for supply, installation, commissioning, O & M AMC Services of Data Centre Solutions, as per the requirements stipulated in this document, at the Locations given below.

C.R. Rao Advanced Institute of Mathematics, Statistics and Computer Science (AIMSCS), University of Hyderabad Campus, Central University Post Office, Prof. CR Rao Road, Hyderabad – 500 046, Telangana, India.

# 2 Two Bid (ePacket) System:

The bids must be submitted as explained below:

## 2.1 e-Packet No. 1: TECHNICAL BID (pdf format)

### 2.1.1 Section-I

a. **Annexure G**: The contents must be organized & submitted as per the Annexure G with proper page nos containing the required information/data etc.

b. Covering Letter, as per **Annexure – A.**

c. Authorization letter (on bidder's letterhead) issued by the competent authority of bidder, authorizing the signatory to sign on behalf of the bidder, as per **Annexure – B.**

d. Scanned copy of Demand Draft/On-line receipt towards payment of tender fee. If paid by DD, the original DD must reach physically at the place of opening of the Tender on or before the Due Date & Time of the Tender.

e. The Undertaking on bidder's letterhead, towards EMD as per format given in **ANNEXURE-F**

### 2.1.2 Section-II:

a. A copy of Certificate of Incorporation, Partnership Deed / Memorandum and Articles of Association / any other equivalent document showing date and place of incorporation, in India as applicable.

b. A copy of GST registration certificate.

c. Copies of at least one purchase orders or contracts completed and successful installation and completion reports in the name of bidder from the end client / end user, during last three years for HPC Data Centre work, as per para. 3.3 of Section II. Self-declarations will not be entertained.

d. Copy of at least one purchase order from the end client/ end user for data center facility management / O & M activities completed / ongoing as per eligibility para. No 3.3.1 of Section III.

e. The self-certified copies of audited balance sheets or the certificate/s from a Chartered Accountant for last three financial years indicating the annual sales turnover.

f. A photo copy of the commercial bid actually submitted **without prices** (prices masked) and copy of commercial terms and conditions (in detail) as included in the commercial bid. CR RAO AIMSCS reserves the right to reject the bid in case of any discrepancy observed in the un-priced commercial bid and the actual commercial bid.

g. Manufacturer authorization certificate as per **Annexure-C** for, UPS and batteries, LT panels and associated component, In Row, BMS Software, etc., issued by respective OEMs.

h. The copy of registration certificate or a declaration in compliance with the provisions stipulated in office memorandum F/No/6/18/2019-PPD dated 23 July 2020 issued by public procurement Division, Dept. of Expenditure, Ministry of Finance, GoI.

i. Certificates from respective OEMs declaring the country of OEM, country of manufacture and percentage of local contents for UPS and batteries, LT panels and associated components, In Row, BMS Software, Adiabatic Dry Cooler, Pumps, etc. (Refer order No. P-45021/2/2017-PP (BE-II). Dated 4th June, 2020 issued by Public Procurement Division, Department of Investment and Internal Trade, Ministry of Commerce, GoI.)

j. All the necessary documents in support of eligibility criteria stipulated in Section–II, Para-3 (Eligibility Criteria).

2.1.3 **Section-III:**

a. The executive summary of the bid submitted.

b. Duly filled Technical Bid (covering the details of solution, detailed bill of material, bill of quantities, technical specifications, makes and models of items, diagrams, layouts, all drawings etc.)

c. The details of electrical power consumption, foot-print, ambient temp, temperature range targeted, cable schedule along with voltage drop calculations, battery sizing and back up calculations etc.

d. Design Basic Report along with annual average Power Usage Effectiveness (PUE) calculations for 25%, 50%, 75% and 100 % of IT load operating on Room Cooling only.

e. Design basis and analysis of cooling solution at full and partial load conditions including complete details, assumptions made and the specific references/standards used for the same for In row based cooling as well as Adiabatic Dry Cooler. Applicable derations while selecting the DX based In Row units and bidder to submit selection of the product considering site ambient conditions as per ASHRAE N=20. Bidder to submit the water consumption calculations for adiabatic dry cooler operating in Adiabatic mode.

f. Technical Compliance matrix against all details requested as per Para. 9 of Section IV.

g. The printed catalogue / leaflet/brochures published by the principal manufacturer of the items quoted to be submitted along with the Technical Bid.

h. Legal / statutory permissions required, if any.

2.2 **e-Packet 2: FINANCIAL BID : (in BOQ.xls format – online)**

The Financial Bid complete in all respects with all details filled in the `Name of the Bidder' column with name, designation and contact no. as per BOQ.xls format given in SECTION-VI.

**Note:**
All the documents listed in e-packet-1 (Section-I, II & III) and e-packet-2 must be arranged in the flow / in sequence as mentioned as per **Annexure-G** strictly.
CR RAO AIMSCS reserves the right to reject the bid, if any of the above listed documents are not submitted.

## 3 Pre-Bid Meeting – Date/ Time/ Venue / Online:

The pre-bid meeting will be held Online as given in schedule to sort out/resolve queries raised by the prospective bidders regarding the tender scope, conditions, terms & conditions etc. The prospective bidders requiring any clarification of the bidding document may send their queries in writing through e-mail in the format given below. CR RAO AIMSCS will respond to these queries during the pre-bid meeting. The queries/doubt/clarifications etc. must be sent at least two days prior to the date of pre-bid meeting.

| **Name of the bidder:** | | | |
|---|---|---|---|
| **Sr.** | **Section / Page and Clause Reference** | **Query from bidder** | **CR RAO AIMSCS Response** |
| 1 | | | |
| 2 | | | |

## 4 Last Date of submission of bids:

Last date for submission of bids through 16 June 2025 shall be as per given in Tender Schedule. All the technical document needs to be submitted on given mail id and commercials needs to be in sealed envelop and must reach at given address as per schedule.

## 5 Opening of bids

The technical bids will be opened as per through 17 June 2025 as per the schedule given.

*Opening of commercial bids:*

Commercial bids of the qualified bidders only will be opened. The decision of CR RAO AIMSCS bid evaluation committee in this regard will be final and binding on bidders. CR RAO AIMSCS bid evaluation committee will be authorised to take appropriate decision on minor deviations, if any.

The date, time and venue of opening of commercial bids will be informed later to the qualified bidder. The financial bids will be opened on or before 14 July 2025 (Tentative).

The bidder's name, bid prices and other appropriate details will be displayed after the opening of the commercial bids.

***(END OF SECTION I)***

## SECTION II – INSTRUCTIONS TO BIDDERS (ITB)

### 1 Locations for Supply, Installation, Commissioning, Warranty Services O & M & AMC Services

The entire data centre solutions as described in Schedule of Requirements must be supplied, installed, commissioned & supported at

**C.R. Rao Advanced Institute of Mathematics, Statistics and Computer Science (AIMSCS), University of Hyderabad Campus, Central University Post Office, Prof. CR Rao Road, Hyderabad – 500 046, Telangana, India.**

### 2 Order Placements & Payment by

The orders will be placed and payments shall be released by

**C.R. Rao Advanced Institute of Mathematics, Statistics and Computer Science (AIMSCS), University of Hyderabad Campus, Central University Post Office, Prof. CR Rao Road, Hyderabad – 500 046, Telangana, India.**

### 3 Eligibility Criteria

Only the bidders complying with following eligibility criteria will qualify for opening of commercial bids and for further processing.

3.1 The bidder must submit all the documents listed at para 3 Section – I above, along with the technical bid.

3.2 The bidder should be an entity registered in India under appropriate Indian Laws. Certificate for the same should be submitted along with the bid.

3.3 The bidder must have successfully executed at end client sites at least 1 numbers of HPC data centres in India in last Three years. Each of the data centres should be with minimum of UPS feeding power of 150 KVA(excluding redundancy) means supplied, installed, tested and commissioned and minimum feeding cooling load of 30 Tons (excluding redundancy) means supplied, installed, tested and commissioned.UPS and cooling to be considered only for server area and along with Fire- fighting and suppression systems with high end integration of building management system and all the allied works required for successful installation & completion of the Data Centre. This order should be on the name of bidder issued by the end client.

3.3.1 The bidder should have undertaken/ completed the activities of providing on-site support and facility management / O & M services to at least one data centre. The scope of the activity should cover operation and maintenance of Electrical Systems, Cooling systems (In ROW,PAC,PAHU etc.) UPS and Battery, IBMS etc. Bidder to provide the documentary evidence that minimum three technical manpower had deployed at site and maintaining electrical system and cooling system. Such Data center must have minimum cooling load of 30 Tons.

3.3.2 A summary of the relevant project as stipulated above implemented covering all the details must be enclosed with the Technical Bid.

3.4 Bidder should have minimum turnover of Rs. 5.0 Crores for each of the last three financial years.

3.5 If the bidder is not a principal manufacturer of Data Centre components, the undertaking/s (in original) from the respective OEMs/principal manufacturers (on the letterhead), as per format given in **Annexure-C** must be submitted for the components such as UPS and battery, LT panels and associated component, In Row,PAC, BMS Software , Adiabatic Dry Cooler etc. (in e-packet – 1- Section-II).

3.6 The principal manufacturers/ original equipment manufacturer (OEM) of Data Centre components viz. UPS, In Row should have service center in the respective state of site location. Documentary evidence for the same to be provided.

3.7 Bidder should have registered office in respective state of site location

3.8 The bidder must submit all the documents as per Document Checklist – **Annexure-G**, with appropriate page nos for the same. The flow of the submitted documents must be in the same order.

3.9 The bidder must not be blacklisted by any Central / State Govt. Organizations of India as on date of submission of the bids. A certificate or undertaking to this effect must be submitted (Annexure – A).

3.10 The bidder must comply with the provisions of Office Memorandum: F/No/6/18/2019-PPD dated 23rd July, 2020, issued by Public Procurement Division, Department of Expenditure, Ministry of Finance, GoI.

3.11 The solution offered must comply with the provisions of Order No P-45021/2/2017-PP (BE-II). Dated 4th June, 2020 issued by Public Procurement Division, Department of Investment and Internal Trade, Ministry of Commerce, GoI, read with order number W-43/4/2019-IPHW- MeitY, dated 7th September, 2020 issued by IPWH division of MeitY, GoI

Note: The bidder should provide sufficient documentary evidence to support the eligibility criteria and exemptions mentioned. CR RAO AIMSCS reserves the right to reject any bid not fulfilling the eligibility criteria.

## 4 Exemptions

If in the view of bidder, any exemption / relaxation is applicable to them from any of the eligibility requirements, under any Rules / process/ Guidelines/ Directives of Government of India, bidder may submit their claim for the applicable exemption /relaxation, quoting the valid Rule/ process/ Guidelines/ Directives. In this case the bidder must submit necessary and sufficient documents along with the technical bid, in support of his claim. The decision about granting the exemption/ relaxation will be taken by the bid evaluation committee which is empowered to grant exemption/relaxation.

## 5 Local Conditions

It will be incumbent upon each bidder to fully acquaint himself with the local conditions and other relevant factors at the proposed Data Centre site which would have any effect on the performance of the contract and / or the cost. The Bidder is expected to make a site visit to the proposed Data Centre facility to apprise them self and obtain all information that may be necessary for preparing the bid and entering into contract.

Failure to obtain the information necessary for preparing the bid and/or failure to perform activities that may be necessary for the providing services before entering into contract, will in no way relieve the successful bidder from the responsibility of performing any work in accordance with the Tender documents. It will be imperative for each bidder to diligently be informed of all legal conditions and factors which may have any effect on the execution of the contract as described in the bidding documents. CR RAO AIMSCS shall not entertain any request for clarifications from the bidder regarding such conditions. It is the responsibility of the bidder that such factors have properly been investigated and considered while submitting the bid proposals and that no claim whatsoever including those for financial adjustment to the contract awarded under the bidding documents will be entertained by CR RAO AIMSCS and that neither any change in the time schedule of the contract nor any financial adjustments arising thereof shall be permitted by the CR RAO AIMSCS on account of failure of the bidder to appraise himself of local laws and site conditions or otherwise.

## 6 CR RAO AIMSCS Right to amend / cancel

6.1 At any time prior to the deadline for submission of bids, CR RAO AIMSCS may, for any reason, whether on its own initiative or in response to the clarification request by a prospective bidder, modify the bid document.

6.2 The amendments to the tender documents, if any, will be notified by release of Corrigendum Notice against this tender. The amendments/ modifications will be binding on the bidders.

6.3 CR RAO AIMSCS at its discretion may extend the deadline for the submission of bids if it thinks necessary to do so or if the bid document undergoes changes during the bidding period, in order to give prospective bidders time to take into consideration the amendments while preparing their bids.

6.4 CR RAO AIMSCS reserves the right to cancel the entire RFP without assigning any reasons thereof

## 7 Precautions while preparing the Bids

Bidder should avoid, as far as possible, corrections, overwriting, erasures or postscripts in the bid documents. In case however, any corrections, overwriting, erasures or postscripts have to be made in the bids, they should be supported by dated signatures of the same authorized person signing the bid documents. In case of discrepancies and/ or calculation errors, if any, the lower of the unit prices and/or amounts shall only be considered for comparison of bids. Only Single technical solution to be submitted.

## 8 Earnest Money Deposit (EMD)

8.1 The bidder must submit the undertaking towards Earnest Money Deposit (EMD / bid security), as per format given in **Annexure-F subject** to the conditions stipulated therein Each bidder is required to deposit an amount of Rs. 1 Lakh as EMD. The EMD will either be adjusted or returned to the successful bidder. For all other bidders, the EMD will be returned after finalization of the tender.

## 9 Period of validity of bids

9.1 Bids shall be valid for minimum 180 days from the date of submission. A bid valid for a shorter period shall stand rejected.

9.2 CR RAO AIMSCS may ask for the bidder's consent to extend the period of validity. Such request and the response shall be made in writing only. The bidder is free not to accept such request. A bidder agreeing to the request for extension will not be permitted to modify their bid.

## 10 Submission of Bids

The Bid documents shall be neatly arranged and all pages should be numbered. They should not contain any terms and conditions, printed or otherwise, which are not applicable to the Bid. The conditional bid will be summarily rejected. Insertions, postscripts, additions and alterations shall not be recognized, unless confirmed by bidder's signature. Technical bids need to be submitted to the mail ID given in the tender. Commercials need to be submitted in sealed envelope.

## 11 Late Bids

CR RAO AIMSCS shall not be responsible and liable for the delay in receiving the bid for whatsoever reason. CR RAO AIMSCS will not be responsible for any issues arising/pertaining with non-submission, failure in submission of bids on-time. Bidders are advised to submit bids well in advance of the last date and time of submission so the bids. CR RAO AIMSCS will not be responsible for failure in submission/upload of bids for non-working at last day/hours of submissions of bids.

## 12 Evaluation of Bids

The bids will be evaluated in two steps.

12.1 The bids will be examined based on eligibility criteria stipulated at para 3, Section – II of this document, to check the eligibility of the bidders. The technical bids of only the eligible bidders will be evaluated based on technical requirements stipulated in the RFP.

12.2 Only the bidders, whose technical bid is found to meet the requirements as specified above will qualify for opening of the commercial bid and will be informed about the date and time of the opening of the commercial bid.

12.3 The decision of the TEC with respect to complete technical evaluation is final and binding on all the bidders.

12.4 During evaluation of the bids CR RAO AIMSCS at its discretion may ask the Bidder for clarification of its Bid. The request for clarification and the response shall be in writing, and no change in the prices is permitted. If required CR RAO AIMSCS may invite the Bidders for technical presentation on the solution offered. During the process of evaluation of bids, if any discrepancies are observed in the bid submitted, the bidders may be given an opportunity to clarify on same. If in the view of bidder, any change in quantity, make or model is required or any additional items are required, for clearing the said discrepancy, the bidder has to arrange for said change and/or addition of material without any increase in the prices quoted.

12.5 If the information provided by the bidder is found to be incorrect/misleading at any stage/time during the Tendering Process, CR RAO AIMSCS reserves the right to reject all such incomplete bids.

12.6 Only technical bids receiving a score greater than or equal to a cut-off score of 70 marks out of maximum 100 marks will be processed further.

| **Sr. No** | **Evaluation Factor Points** | |
|---|---|---|
| 1 | Technical Ability | |
| | Evaluate this factor based on review of the technical proposals. | |
| | Qualifications based on eligibility criteria as Turn Over, experience in similar project as defined in Tender | 5 |
| | Understanding of the project based on Technical documents and drawing. Justify the Strengths that make the bidder is Technically Superior. Bidder has understood objective of the project. | 10 |
| | Proposed Project Plan Quality and methodology should be in line with Requirements. Does the bidder address the timeliness which are relevance to the tender Requirement specially to the Data Center Project. Deployment of quality and experienced technical manpower at site including Project manager and experts in the field of Electrical, Mechanical, I- BMS, Controls and Automation. Bidder to indicate number of such man power getting deployed at site and submit the resume of such expertise. | 10 |
| | Risks and Added Value Assessment | 5 |
| | Proposed Operation and Maintenance Plan in line with Tender Requirement | 5 |
| | **Subtotal -** | **35** |
| 2 | Past Performance | |
| | Evaluate this factor based on Past Experience of Work Carried out either with CR RAO AIMSCS or other similar work experience with other clients by reference check. Experience in delivering the Data centre and building construction in-line with timelines stipulated for this tender shall be given weightage. | |
| | **Subtotal – Past Performance** | **25** |
| 3 | Data Center certified man power -2 or more valid certified ATD – 10.<br>1 valid certified ATD - 8. 4 or more valid certified CDCP/CDCMP/DCDC/DCFC/AOS - 4 In all cases, the maximum score will be cut off at 10. For example, if an organization has 2 certified ATD and 4 certified CDCP, the organization will only get 10 marks instead of 12 marks.<br>No certified personnel of any of the above categories - 0 | 10 |

| Sr. No | Evaluation Factor Points | |
|---|---|---|
| | **Subtotal-** | **10** |
| 4 | Presentation | |
| | Presentation by the bidder along with the Key management team, Key Technical team Staff, holding owner/employee position in the organization. Presentation should cover bidders in depth understanding of the project for the Electrical , Mechanical, I - BMS, Civil etc. related work, execution Competency and Project execution Plan for this project with timelines(Critical Path timeline), Human Resource Demographics and Deployment for this project (Manpower Deployment Chart), Testimonials & Site ref, Approvals capability, List of Completed and Ongoing Projects, Tools & technology etc. The person responsible for the supervision of the contract performance shall be present during this presentation. The proposed Senior Executive are also expected to be the part of this presentation and must, at a minimum, answer questions directed to him/her during the question-and-answer session. In case of a Consortium, all Senior Executive of members of the Consortium Firm must be also present during the presentation | |
| | **Sub Total -** | **30** |
| | | |
| | Total | 100 |

## 13 Comparison of Bids

13.1 Only the technically qualified bids as per terms and conditions stipulated in this document shall be considered for opening and evaluation of price bid.

13.2 The total price including the GST amounts, along with the comprehensive warranty support and Operation & maintenance charges for first two years as per price bid format will be considered for the purpose of comparison of bids and for calculating the L1 bidder(@rates quoted by the bidder or tariff rates, whichever are less) . (Please refer para 1, Section- III).

13.3 The date and venue for opening of price bids will be communicated to technically qualified bidders.

## 14 Award of Contract

**CR RAO AIMSCS reserves the right to award the contract to the qualified bidder whose technical bid has been accepted and determined as the lowest evaluated price bid.**

14.1 However, CR RAO AIMSCS reserves the right and has sole discretion to reject the lowest evaluated bid.

14.2 If more than one bidder happens to quote the same lowest price, CR RAO AIMSCS reserves the right to place the order with the bidder who has installed a Data Centre with more IT Electrical load at single site. The decision of CR RAO AIMSCS shall be final for awarding the contract.

## 15 Purchaser's Right to amend / cancel

15.1 CR RAO AIMSCS reserves the right to amend the eligibility criteria, commercial terms & conditions, Scope of Supply, quantities, technical specifications etc. The same shall be published on the Portals.

15.2 CR RAO AIMSCS reserves the right to cancel the entire or partially tender without assigning any reasons thereof.

15.3 CR RAO AIMSCS reserves the right to reject the bid submitted by the lowest evaluated bidder.

***(End of Section - II)***

## SECTION III – SPECIAL CONDITIONS OF CONTRACT

### 1 Prices

a. The prices quoted shall remain firm and no price escalation will be permitted till completion of order.

b. Bidder must quote in INR only.

c. The prices quoted must be inclusive of packing & forwarding, freight, insurance, loading, unloading charges /entry tax/road permit charges and allied charges till destination at site.

d. The group-wise prices must be quoted for all the items as per format given in **Section – V**.

e. Over and above the comprehensive warranty for first two years, the successful bidder is required to quote for Operation and Maintenance for first two years.

f. Before the placement of order, the successful bidder must submit the detailed Bill of Material, giving price for each individual line item, keeping the total price quoted un-changed. The order will be placed on the basis of this BoM. The supplier must ensure that their invoice exactly matches this BoM, so as to avoid any payment complications

### 2 Taxes and Duties:

**Bidder must indicate applicable GST amounts separately. The bidder should exercise utmost care to quote the correct amounts of GST on each item. Any revision in statutory tax /duty structure as on date of supply/ invoice, shall be considered, as applicable.**

2.1 In case of any error/ oversight in GST amount quoted by the bidder, the bidder will not be permitted to rectify the error/oversight. The orders/ contract will be placed with the GST amounts quoted by the bidder or actual applicable amount (as on placement of order), whichever is **LOWER.** The difference amount payable, if any, between the quoted GST amount and applicable amount shall be borne by the bidder.

2.2 Notwithstanding the para mentioned in the tender, if the GST is not quoted separately and the bid is silent whether GST is included or excluded in price, for the purpose of evaluation of bids, the prices shall be taken as quoted with GST. In this case, the order will be placed with the quoted price. The GST applicable, if any will be borne by the bidder/contractor

2.3 The prices will be compared on the basis of GST rates quoted/calculated by the bidder. In case of errors, the bidders will not be permitted to change the GST percentage.

## 3 Project Timeline

All the items covered in the Schedule of Requirements (**Section – IV**) must be supplied, installed and commissioned within 4 months (Sixteen weeks) from the date of award of Contract / placement of order.

## 4 Payments (In INR only)

a. 70% amount of the cost of UPS and batteries, LT Panels, In Row, Adiabatic Dry Cooler, AC, Filled NOVEC Cylinder etc. will be released within 30 days of on receipt of these components at site along with tax invoice and against physical verification and acknowledgement by CR RAO AIMSCS - with 30 days credit period.

b. 20% amount of the cost of UPS and batteries, LT Panels, In Row ,AC, Filled NOVEC Cylinder, Adiabatic Dry Cooler etc. and 90% cost of the remaining supplied items and 90% charges towards installation and commissioning of the system will be released on successful installation, commissioning of the solution. This portion of payment shall be subject to acceptance and submission of Integrated System Acceptance Test (ISAT) report In case of delay in integration and commissioning of the DC with HPC system for the reasons attributed to CR RAO AIMSCS beyond 60 days, this portion of payment will be released against submission of bank guarantee of equivalent amount. This Bank Guarantee will be released on successful completion of installation, commissioning and ISAT of the solution.

c. Balance 10% payment above charges will be released on successful installation & commissioning of solution against submission of PBG. The PBG must be submitted within 30 days from the date of successful installation(s) and ISAT.

d. The proportionate payments towards Operation and Maintenance charges for first two years will be released on quarterly basis within 15 days of the beginning of each next quarter.

e. The penalties - if any, towards SLA will be deducted from the quarterly payments payable.

f. The applicable TDS will be deducted.

g. The payments shall be remitted through NEFT/RTGS only.

**Note**: All the payments are subject to submission of the valid and complete tax invoices.

## 5 Security Deposit (SD)

The successful bidder will be required to furnish the Security Deposit in INR equivalent to 5% of the Contract/Order value (excluding taxes) within 21 days of award of Contract / receipt of Order(s). The Security Deposit should be submitted in the form of Demand Draft drawn in favor of CR RAO AIMSCS payable at Hyderabad or in the form of Bank Guarantee in the name of CR RAO AIMSCS. The Bank Guarantee submitted towards Security Deposit should be issued by a Scheduled Commercial Bank and must be valid for a period of 6 months. The Security Deposit will be returned within 30 days upon completion of installation, commissioning and ISAT, and on submission of Performance Security.

## 6 Performance Security

The successful bidder will be required to furnish the Performance Security towards the Data Centre Solutions supplied, in the form of a Bank Guarantee in INR equivalent to 5% of the invoice amount (except for O & M charges and excluding taxes), as per the format attached to this document. This bank guarantee should be submitted along with the invoice after successful installation and commissioning of the Data Centre solution. The Bank Guarantee should be from a Scheduled Commercial bank and shall remain valid for the period of 25 months from the date of installation and ISAT. The PBG must be negotiable at a branch of issuing bank in Hyderabad.

CR RAO AIMSCS reserves the right to invoke the Performance Bank Guarantee(s) submitted by bidder, in case of the following:

a. The Item/Components fail to achieve the performance as stipulated in this document or
b. The bidder fails to provide the comprehensive warranty and other services in scheduled time frame, as stipulated in this document or
c. The bidder delays to provide the warranty services as stipulated in this document.

## 7 Completeness Responsibility

The bidders may please note that this is a contract on 'Turn-key' basis. Notwithstanding the scope of work, engineering, supply and services stated in bid document, any equipment or material, engineering or technical services which are not specifically mentioned under the scope of supply of the bidder and which are not expressly excluded there from but which – in view of the bidder - are necessary for the required performance of the datacenter solution in accordance with the RFP specifications are treated to be included in the bid and has to be implicitly performed by bidder. In no case, the bidder will be permitted to increase the prices quoted.

## 8 Comprehensive Warranty

The Supplier warrants that all the Goods are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, unless provided otherwise in the Contract. The supplier further warrants that all Goods supplied under this contract shall have no defect arising from design, materials or workmanship (except when the design and/or material is required by the Purchaser's specifications) or from any act or omission of the supplier. The warranty should be comprehensive on site, repair/replacement basis free of cost.

**Note: - Supplier has to do the AMC / PM of all the supplied equipment as per the standard schedule with no additional charges. Any consumables required shall be paid by CR RAO AIMSCS. The supplier has to take prior approval from CR RAO AIMSCS before using any consumables.**

All the equipment and components supplied must have **two years** onsite comprehensive warranty from date of successful installation, commissioning and signing of ISAT.

SLA and managed service scope as per **Annexure - H.**

## 9 Penalties

CR RAO AIMSCS reserves the right to levy penalties for each site, as given below.

| Sr. No | Parameters | Penalty |
|---|---|---|
| A | Penalty for Delayed Deliveries and installation | 0.5% of order value per week for delay in installation and commissioning beyond schedule. If the delay is more than 10 weeks, CR RAO AIMSCS reserves the right to cancel the Contract/ Order. In case of in ordinate delay on the part of bidder in completing the work and cancellation of Purchase order, CR RAO AIMSCS will arrange to complete unfinished work through suitable contactor and expenses incurred by CR RAO AIMSCS in doing of such work shall be recovered from the bidder. Any delay because of CR RAO AIMSCS, conditions arising out of Force Majeure will not be considered while calculating the delay period for penalties. i.e. total 5% of maximum penalty shall be levied against Delayed Deliveries and installation. The maximum penalty as stipulated in Para A will be capped to 10% of the order value. |
| B | Penalty if uptime of Data Centre components. Measured on quarterly basis is ( as per calendar year ) | Penalty for downtime shall be levied as given below in B.1, B.2, B.3 which will be over and above the penalty mention above in para A . |
| 1 | Less than 98.5% but more than 97.5% in a quarter | Penalty @0.2% of the order value per quarter. |
| 2 | Less than 97.5% | Penalty @1% of the order value per quarter. |
| 3 | Less than 95% | CR RAO AIMSCS reserves the right to terminate the contract and invoke the performance bank guarantee. |
| 4 | Capping | The maximum penalty Para B above will be capped to 10% of the O & M and AMC value. |

The detailed mechanism / method for arriving at the measurable parameters mentioned in table above is covered in the **Service Level Agreement (SLA) as per Annexure –H,** to be signed before award of contract/ release of Order.

## 10 Force Majeure

CR RAO AIMSCS may consider relaxing the penalty and delivery requirements, as specified in this document, if and to the extent that, the delay in performance or other failure to perform its obligations under the contract is the result of an Force Majeure. Force Majeure is defined as an event of effect that cannot reasonably be anticipated such as acts of God (like earthquakes, floods, storms etc.), acts of states / state agencies, the direct and indirect consequences of wars (declared or undeclared), Pandemic, hostilities, national emergencies, civil commotion and strikes at successful Bidder's premises or any other act beyond control of the bidder.

## 11 Arbitration

In case any dispute arises between the CR RAO AIMSCS and successful bidder with respect to this RFP, including its interpretation, implementation or alleged material breach of any of its provisions both the Parties hereto shall endeavor to settle such dispute amicably. If the Parties fail to bring about an amicable settlement within a period of 30 (thirty) days, dispute shall be referred to the sole arbitrator mutually appointed by both parties. If the sole arbitrator is not appointed mutually by both the parties then the District Court Hyderabad shall have exclusive jurisdiction for appointment of sole arbitrator through court. Arbitration proceedings shall be conducted in accordance with the provisions of the Arbitration and Conciliation Act, 1996 and Rules made there under, or any legislative amendment or modification made thereto. The venue of the arbitration shall be Hyderabad. The award given by the arbitrator shall be final and binding on the Parties. The language of arbitration shall be English. The common cost of the arbitration proceedings shall initially be borne equally by the Parties and finally by the Party against whom the award is passed. Any other costs or expenses incurred by a Party in relation to the arbitration proceedings shall ultimately be borne by the Party as the arbitrator may decide. Courts in Hyderabad only shall have the exclusive jurisdiction to try, entertain and decide the matters which are not covered under the Arbitration and conciliation Act.

## 12 Risk and Ownership

All risks, responsibilities and liabilities in respect of goods delivered at site shall remain with selected bidder till they are successfully installed and commissioned at site and taken over by end users. Part deliveries shall not be treated as deliveries. Only full deliveries of all items ordered will be considered as delivery. The ownership of the items delivered at site, shall be of CR RAO AIMSCS on successful installation of items.

## 13 Indemnity

The successful bidder shall indemnify, protect and save CR RAO AIMSCS from/against all claims, losses, costs, damages, expenses, action suits and other proceeding, resulting from/arising out of:

1. Infringement of any law pertaining to intellectual property, patent, trademarks, copyrights etc. by the bidder or

2. Such other statutory infringements in respect of all the equipment's supplied by successful bidder, or
3. Caused due to any act/omission/performance/under or non or part performance/failure of the bidder.

## 14 Assignment

Selected bidder/ Party shall not assign, delegate or otherwise deal with any of its rights or obligation to other parties under this Contract, without prior approval of AIMCS

## 15 Severability

If any provision of this Contract is determined to be invalid or unenforceable, it will be deemed to be modified to the minimum extent necessary to be valid and enforceable. If it cannot be so modified, it will be deleted and the deletion will not affect the validity or enforceability of any other provision.

## 16 Termination

Validity of purchase order/rate contract will remain till fulfillment of all obligations (including but not limited to providing comprehensive warranty / support till completion of two years from acceptance of the entire integrated solution as a whole) by the successful bidder.

In case of the delays in providing the stipulated services, and /or defect/delay/under or non-performance pertaining to the services / products supplied by the bidder, CR RAO AIMSCS will give written notice to the bidder directing to set the things right within 30 days of notice. If bidder fails to comply with the requirements, CR RAO AIMSCS shall have the right to terminate the contract and / or cancel the order/s. The successful bidder agrees and accepts that he shall be liable to pay damages claimed by CR RAO AIMSCS, in the event of termination of contract / cancellation of order, as detailed in this RFP. The successful bidder may terminate the contract by at least 30 days' written notice, only in the event of non-payment of undisputed invoices beyond 90 days from the due date or in the case of delay or default by the Buyer/ CR RAO AIMSCS in providing encumbrances free site fronts or right to access site or approach road to site. Except this situation, the successful bidder shall have no right of termination.

"CR RAO AIMSCS will release the due amount payable to successful bidder towards the material and / or services provided till the date of termination, those are accepted by CR RAO AIMSCS. However, the amount towards penalty, if any will be deducted from the payable amounts."

**CR RAO AIMSCS** reserves the right to terminate the contract / cancel order with or without cause/ reason, by giving 90 days' notice to the successful bidder.

## 17 Limitation of Liability

The liability of the Bidder / Contractor arising out of breach of any terms/conditions of the tender / contract/work order and addendums/amendments thereto, misconduct, willful

default will be limited to the total contract value. However, liability of the bidder in case of death/injury/damage caused to the personnel/property due to/arising out of/incidental to any act/omission/default/deficiency of bidder/contractor will be at actual. In no event shall either Party, its officers, directors, or employees be liable for any form of incidental, consequential, indirect, special or punitive damages of any kind.

## 18 Disclaimer

The purpose of this RFP is to provide the bidder(s) with information to assist the formulation of their proposals. This RFP does not claim to contain all the information each bidder may require. Each bidder should conduct his own investigations and analysis and should check the accuracy, reliability and completeness of the information in this RFP and where necessary obtain independent advice. CR RAO AIMSCS makes no representation or warranty and shall incur no liability under any law, statute, rules or regulations as to the accuracy, reliability or completeness of this RFP.

## 19 Jurisdiction

The disputes, legal matters, court matters, if any shall be subject to Hyderabad jurisdiction only.

## 20 Corrupt or Fraudulent Practices

It is expected that the bidders who wish to bid for this project have highest standards of ethics.

CR RAO AIMSCS will reject bid if it determines that the bidder recommended for award has engaged in corrupt or fraudulent practices while competing for this contract.

CR RAO AIMSCS may declare a vendor ineligible, either indefinitely or for a stated duration, to be awarded a contract if it at any time determines that the vendor has engaged in corrupt and fraudulent practices during the award / execution of contract.

## 21 Interpretation of the clauses in the Tender Document / Contract Document

In case of any ambiguity/ dispute in the interpretation of any of the clauses in this Tender Document, the interpretation of the clauses by Director General, CR RAO AIMSCS shall be final and binding on all parties.

***(End of Section- III)***

## Section IV – Schedule of Requirement

This Section covers the general and technical requirements of Data Centre components.

### 1 Data Centers on Turn-key Basis

The Data Centre is required to be built on 'Turn-key' basis. The successful bidder should build the entire data centre infrastructure which includes civil works, interiors, environmental controls like humidity, temperature etc., security (including access/CCTV/ monitoring equipment), electrical systems, power systems, In Row, Adiabatic Dry Cooler, Piping, Pump, Fire alarm and suppression, BMS etc. as specified. The responsibility towards required material/items/equipment's, work, man power etc. rests with the successful bidder. The overall requirements and available information/ data/documents are included in this Section. The bidders are advised to go through same and visit the sites before working out the details in this perspective and submit the solution document complete in all respects.

### 2 Background

New build data center of 1 PF capacity which includes server racks as well as storage rack. This data center should be energy efficient in which 58% of heat extraction from server racks is by Direct Contact Liquid Cooling (DCLC)-Cold Plate technology and 42 % by room cooling for compute node racks and storage racks will be on room cooling. Main components in DCLC systems are Cooling Distribution unit (CDU), manifold- inside each rack, cold plate on server board etc. In CDU there are primary and secondary loop. Secondary loop is connected with cold plate and coolant flow is controlled by pumps inside the CDU. In CDU indirect heat exchange from liquid to liquid takes place. Primary loop is connected to Adiabatic Dry cooler water circuit. Adiabatic Dry cooler is closed loop cooling system in which heat exchange takes place from water to air. This way use of energy consuming mechanical cooling systems like chillers are avoided and data center cooling power requirement reduced which ultimately reduces in operating power cost. Dry cooler will be adiabatic dry cooler. Adiabatic cooling systems function similarly to dry cooling systems, but with the incorporation of pre-cooling pads; running water over pre-cooling pads and drawing air through the pads depresses the ambient dry bulb of the incoming air. The depressed dry bulb allows for greater system heat rejection. Supply, installation, testing and commissioning of secondary loop components like CDU, Underfloor piping, rack manifolds, cold plates including dripless connectors and tube etc. components are not part of scope of this Bid, whereas Operation and Maintenance of these components are part of the scope including BMS monitoring. All Racks are with DC power Bus bar and are of ORV 3 44 OU size. **All compute Racks are not part of the scope of this Bid whereas storage rack and spare rack each of 45 U are scope of this tender.** Efficient, flexible and scalable 50 KW, +48 VDC integrated Power System containing a module mounting assembly/ chassis of size not more than 1 OU form factor, rectifiers, intelligent control monitoring, 44 OU rack of size 600 mm width, 1300 mm depth with both front and back hinged perforated doors, DC bus bars of 1600 Amps rating etc. The power supply should comply with ORV 3 standard.

## 3 General Requirements:

The general requirements applicable to the data centres are given below. Other than these requirements, depending on the site conditions, the bidder may propose appropriate changes in other requirements. However, the responsibility towards successful installation and commissioning and smooth running of data centres rests with bidder only.

3.1 The solution shall comprise of supply, installation, testing, commissioning training and handing over of all materials, equipment, hardware, software, appliances and necessary labour to commission said system complete with all the required components strictly as per the latest IS, IEC, IEEE, ASHRAE, ASHRAE TC9.9 2017,NBC etc. codes.

3.2 Also, the scope includes the supply, installation & commissioning of any material or equipment including civil works that are not specifically mentioned in the specifications and design details but are required for successful commissioning of the project.

3.3 The vendor shall provide detailed design, documentation, make, and model, efficiency including user, system and operation manuals along with the necessary diagrams, design drawings and details bifurcation of Bill of Quantity (BOQ) along with details description. Design drawing should include but not limited to Single Line Diagram, Lighting drawing, , equipment sizing and selection along product selection calculations etc. with clear sectional drawings for server and utility room, interior, raised flooring, false ceiling, fire rated glass partitions, complete BMS system required for data centre etc.

3.4 The vendor shall take the necessary clearance / approval of the drawings, design, quality of material, make and model of the quoted material etc. prior to the execution of the project

3.5 The Data Centre should be complete in all respects.

3.6 Electrical power and water during construction will be provided at one location. CR RAO AIMSCS shall not provide any accommodation for the contractor and his staff including labor.

3.7 The scope of installation, configuration, integration and commissioning shall mean to install and configure all components and subsystems integrating the Building Management System with the required components, integrating the entire facility and make the system operational as per scope of work.

3.8 To assess the efficiency of the data centres the power usage effectiveness (PUE) will be computed as. This will be only for room cooling load

3.8.1 $$PUE = \frac{\text{Total Power ( IT + NON IT)}}{\text{IT power}}$$

3.9 The acceptance test shall cover the following scope:

3.9.1 Factory Test Reports

Bidder shall provide factory test report for all products after testing each parameter of products as per their standard test procedure.

- Electrical panels including
- In Row unit DX based
- UPS and battery
- Adiabatic Dry Cooler
- Pumps
- DG Set

## 4 Design of Data Centre

The proposed designs and indicative drawings enclosed in the RFP document are for reference and for the purpose of bidding. The vendor so finalized would be required to make the necessary shop drawings within the layouts so as to arrive at a final scheme in line with the requirements and in accordance with the requirements of Indian standards, IEC, IS,IEEE,NBC etc. However no change whatsoever in the price schedules would be allowed after the award of the work and the price shall remain firm throughout the project and the entire works are to be executed within the quoted price schedules.

The shop drawings during execution should include the following, but is not limited to,

a) Floor plan with design layout and detailed drawings, showing necessary sections etc.

b) Layout of raised floor and false ceiling layout

c) Electrical diagrams (including UPS, SLD, Lighting, Earthing, Equipment Layout, Power Distribution etc.)

d) Cooling system layout with (Equipment Layout, Schematic etc.)

e) Fire detection and suppression plan/ layout

f) Access Control Plan

g) Surveillance camera placement plan

h) Environment monitoring system placement plan

i) Out Door Equipments layout including ODU units, Adiabatic Dry Cooler, DG set , Pumps etc.

j) Piping drawing for Adiabatic Dry Cooler inline with P & ID.

## 5 Design Inputs

Tables given below are the details of exact load parameters. These values are given to the bidders to come out with appropriate configuration and sizing. The major sub systems of the DC infrastructure are:

a) UPS along with Batteries ,Electrical Panel, Instrumentation ,Cables, Illumination and earthing system etc.

b) Raised Flooring and False Ceiling

c) DX based In row units with air cooled condenser and related work,Adiabatic Dry cooler , Pumps, Chemical Dozing unit, Expansion Tank, air separator etc.

d) I-BMS System

e) 45 U Racks

f) Etc.

The specifications and requirement of the entire solution is stipulated in the RFP with respect to the design and solution, certain indicative inputs like layout, SLD etc. are provided. Bidder may follow the indicative inputs provided in this RFP or come out with innovative design which is optimal and cost effective without violating any of the specifications given.

5.1 The envisaged IT load for data center: 140 KW max.

| Sr.No | Description Rack | No Of Nodes Per Rack | DCLC Power Per Rack | Room Cooling Power Per Rack ( + losses ) | Input Power Per Rack (including switch power and losses in DC module) |
|---|---|---|---|---|---|
| 1 | CPU -Rack-1 | 40 | 28 | 12.72 | 42.76 |
| 2 | CPU -Rack-2 | 40 | 28 | 12.72 | 42.76 |
| 3 | CPU + GPU - Rack-3 | 12+12 | 8.4 | 10.32 | 19.66 |
| 4 | Storage Rack-1 | 20 | | 20 | 20 |
| 5 | Spare Rack | 14 | | 14 | 14 |
| | **DCLC IT Requirement** | **64.40** | | | |
| | **Room Cooling IT Requirement** | **74.77** | | | |
| | **Total IT Requirement** | | | | **139.17** |

## 6 Requirements towards Civil/Interior work

6.1 Civil architecture and preparation of data center: Interiors of the data centre (including, civil works, foundation work , raised floor, false ceiling, fire rated paint, fire rated gypsum partitions, , fire rated glass doors, fire rated MS door, civil work for layout underground cable etc.

6.2 METAL GRID CEILING: The drop ceiling shall be provided with Armstrong Lay in (Hot dipped galvanized steel) metal ceiling system 600 x 600 x 5 mm with standard 2.5 mm dia (16% open space) and fleece with NRC (Non Directional Visual) of 70 & CAC 36 ( CAC is a measure for rating the performance of a ceiling system as a barrier to airborne sound transmission through a common plenum between adjacent closed spaces) to be laid on Armstrong grid system. The modular ceiling sheets with necessary fittings should be done up aesthetically to integrate with the lighting.

6.3 Raised flooring: Suitable raised false flooring as per prevailing standards should be provided as per site requirements. The entire Access floor system shall be made from high density

cementatious board and provide Class O as per BS 476 PART 6 for Fire propagation index and Class 1 as per BS 476 Part 7. Fire Ratings tested as per CIRC 91/61 or BS 476 Part 6 & 7 fire resistance up to 60 min as per NFPA. System should have antistatic property and air leakage resistance. The system shall be able to withstand a minimum UDL of 2500 kg per sq meter and a point load of minimum 600 kg. and rolling load of minimum of 300 Kg.

6.4 Panel should meet the below requirements:

6.4.1 The panel shall be coated with epoxy coating on the exposed surface. Have an infill of light weight cementitious material. Insulated against heat and noise transfer. Panels shall be finished with High Performance Anti-Static Laminate.. Panels will remain flat through and stable unaffected by humidity or fluctuation in temperature throughout its normal working life. Panels will provide for impact resistance top surfaces minimal deflection, corrosion resistance properties and shall not be combustible or aid surface spread of flame. Panels will be insulated against heat and noise transfer. Panels will be 600 x 600mm and fully interchangeable with each other within the range of a specified layout. Panels shall rest on the grid formed by the stringers which are bolted on to the pedestals. Panels shall be finished with anti-static 0.9 mm Laminate and thick plastic edge material that is self-extinguishing and will be PVC free. Panel should withstand a Concentrated Load of minimum 600 Kg applied on area 25mm x 25mm in the centre of the panel which is placed on four steel blocks without deflecting more than 2.5mm and without setting permanently more than 0.20mm

6.4.2 Pedestal installed to support the panel will be suitable to achieve a finished floor height of 400mm. Pedestal design will confirm speedy assembly and removal for relocation and maintenance. Pedestal base to be permanently secured to position on the sub-floor. Pedestal assembly will provide for easy adjustment of leveling and accurately align panels to ensure lateral restrain. Pedestals will support an axial load of minimum 1500 Kgs, without permanent deflection and an ultimate load of 2500 Kgs. Pedestal head will be designed to avoid any rattle or squeaks. Pedestal should have GI Base plate of suitable dimensions, GI Pipe, check nut for level adjustment, threaded stud with GI pedestal head, all screws etc.

6.4.3 Understructure (US) system consists of stringers to form a grid of 600 x 600mm. These stringers are locked into the pedestal head and run both ways. The US system will provide adequate solid, rigid and quiet support for access floor panels. The US system will provide a minimum clear, uninterrupted height of 400 mm between the bottom of the floor and bottom of the access floor for electrical conducting and wiring The stringer shall be hot dipped galvanized steel cold roll construction specially designed to stabilize lateral stability and to support the panels on all sides for alignment. The channels shall have counter sunk holes at both ends to accommodate bolting of the same to the pedestal head assembly. Earthing point connections are to be part of standard design. The longitudinal ribs and flaps in the lower part should be designed to increase flexion resistance. The grid formed by the pedestal and stringer assembly will receive the floor panel.

6.4.4 Bidder to consider to providing 2 nos. 2-point panel remover, lead, lift, steps for 300mm raised floor etc.

6.5 Fire Rated Steel Door-two hours- Two hours fire rated double skin steel door constructed from 1.25mm thick galvanized steel sheet formed to provide a 46mm thick fully flush door shell with lock seam joints at stile edges and the internal construction of the door should be

specially designed Honey Comb structure with reinforcements at top, bottom and stile surround. The door frames and door shutters should be primed with Zinc-Phosphate Staving Primer and finished with Polyurethane Aliphatic grade or epoxy paint as per approved manufacturer specifications. Door if used for Emergency purpose is required to be with Panic bar. The Fire Doors are to be fully insulated and shall be tested as per IS: 3809-1979, ISO: 834-1975, IS: 3614 (PART-II)- 1992 and BS 476 (PART- 20 & 22)- 1987 under live fire conditions, The wired glass is to comply with both BS 476: PART 22 and BS 6206 relating to fire resistant and impact performance. Exisiting door size is small . The wall needs to be cut and new door needs to be fitting one at entrace and other at exit . Bidder to consider the wall cutting and finishing job in the scope . Bidder to refer the drawing as provided with the document.

6.6 Fire rated Partition/ Walls: Partition walls within the data centers should have 2-hour fire rated. Suitable smoke seals should be used. Fire line boards should conform to IS:2095 – 1996-Part-I. Providing and fixing minimum 132MM thick FIRE RATED gypsum board partitions with 2 Nos. x 15mm thick fire line board on both sides of 72mm GI floor channel and 70mm Square MS Pipe stud as per specifications, including cost of chasing for electrical conduits,. This item includes all tools, tackles, material, labor, fixture adhesives sealants etc. for the complete work. Exisiting window needs to be closed from inside by 2 hours fire rated material . Outside building astetic needs to be retained as it is.

6.7 Opening for the Cables or other utility services which are coming inside the building needs to be sealed by Fire resistance board system, water soluble fire retardant solutions, fire expanding foam etc. having minimum of 2 hours' fire rating when tested in accordance with BS 476 part 20 and UL 1479 for horizontal and vertical openings in RCC slabs, Beams, walls, Brick masonry or Gypsum partitions for passing service shafts. The service lines could be of various types like electrical cables, cable trays or metal pipes etc. The foam shall have Acoustic property as per DIN 4109 and Smoke and Air Seal. The Foam should have the feature of Re penetrability for future maintenance or repair activities. Fire soluble cable coating Should be suitable for protecting against spread of flame on timber panels and tested as per IEC 332 part 3 standard for reduced spread of flame & tested as per FM Class 3971. It should have no derating effect on cables, free from fiber, asbestos, odorless and solvent free, flexible when dry after application.

6.8 Room Signage and fire evacuation map. Providing & fixing Aluminium Modular Signage using Aluminium Alloy 6063 extrusion with Anodising (The thickness of the anodization is typically 30 microns. The integrity of the anodize coating is tested to meet the international specifications ISO 2143-1981.) With lifetime Warranty in normal working condition.

6.9 INSULATION ON ROOF AND FLOOR SLAB: Supply and installation of external thermal insulation class-"O" closed cell elastomeric nitrile rubber insulation with Aluminum foil recommended as per the approved shop drawings/ specifications. Minimum 13 mm thick for floor and ceiling insulation is required.

6.10 Providing and fixing of tested 120 minutes fire rated - integrity and radiation control and partial insulation (EW120) - fully glazed non-load bearing fixed glass with symmetrical (Bi-Directional) fire protection. The glass should be Contraflam Lite or equivalent 14 mm clear 120 min fire rated and partially insulated (EW120), Non Wired Toughened Interlayered glass having a sound reduction of minimum 30 dB and compliant to class 1(B)1 category of Impact Resistance as per EN 12600.The glass shall be able to withstand fire attack from both sides. The glass should be manufactured in UL & TUV audited Facility and including UL

Certification. The profiles are manufactured from 1.6 mm galvanized steel sheet pressed and formed to a required profile of the dimension. These specifications are applicable for fire rated glass door, fire rated glass partition. In order to fix this glass refer drawing provided exisiting wall needs to be broken and same is in the scope of bidder . Bidder to refer drawing provided.

6.11 Steel structure needs to be consider for the platform of the equipment's as Panels, ODU Unit of Inrow ,PAC etc. MS frame to be considered for installation and maintenance platform for equipment's for outside part of building. The ODU unit for In row as well as for PAC needs to be installed in two tier , Bidder to consider necessary civil foundation as well as MS structure. For Adiabatic Dry cooler necessary foundation and platform needs to be considered in the scope. .. Bidder to consider chain link fencing for these equipment

6.12 HOUSE KEEPING: The vendor is responsible for keeping the site clean and deep cleaning by removing all the debris etc. everyday, using adequate covering/tarpuline sheets etc to cover the any areas required (client property etc.). All cleaning equipment's like heavy duty vacuum cleaners etc to be according to the approval.

6.13 Power Cable entry in each rack will be from Top and from above ceiling, Bidder need to consider boxing arrangement or cable manager or cable trunking system so that entire data center installation should look aesthetically good.

6.14 Bidder to consider non fire rated office glass partition along with glass door for cabin room along with furniture as shown in the drawing.

## 7 Requirements towards Electrical Work

7.1 Emergency Power off (EPO): EPO is to be factored in the design for server room.

7.2 Presently 315 KVA ONAN,11/.433 KV transformer along with 1 X 250 KVA DG set is in working condition. Existing change over panel needs to be removed and new panel as per provided SLD needs to be supplied and installed and commissioned. This new panel should be at same location of existing. Same Cables from existing DG set and transformer to be considered. Bidder to consider scope of panel removal, termination and then removal of cable and installation of new panel and re termination of same cable in the scope.

7.3 Supply, installation and commissioning of Diesel Generator Set with acoustics enclosure and the other necessary systems include power cum synchronization panel, exhaust system, earthing system, battery and battery charger along with Civil foundations for successful erection, completion of the Data centre. DG sets should be of prime rating and should be capable of operating continuously on an unbalanced system within limit described in section 6 of IEC 60034.1. Genset should be with time settable Auto start, synchronization, auto stop controller. DG set should be with Auto Mains Failure (AMF) panel. Height of the exhaust stack has to be as per Central Pollution Control Board (CPCB) norms. Genset should be supplied with day tank of standard fuel storage capacity.. Fuel tank capacity will be as per Petroleum and Explosives Safety Organization (PESO) fuel storage guideline. Alternator insulation should be of Class H and temperature raise limit to Class H. Entire Genset to be provided with necessary engine protection system, alternator protection system and reverse active power protection system etc. Selection of LT switchgear will be

as per IEC 60947 and Genset will be as per ISO 8528 part1 to 10. Alternator should be with Resistance Temperature Detectors (RTD) and Bearing temperature detector (BTD). Electrical performance of the alternator will be as per IS 4722. DG system should come automatically ON LINE in less than 40 sec. First fill of oil and diesel is part of scope of the bidders scope. All necessary statutory approvals including, but not limited to, CEIG approval, Fire authority approval, etc. as applicable to DG System. DG set should be with MCCB as isolator inside the canpy.

7.4 Design, Supply, installation, testing and commissioning of all LT panels. Panels will be as per IEC 61439. Panels feeders should have rated capacity of Load manager with RS 485 communication port. This should compactable for BMS system to know the energy consumption. Bidder to submit License certificate of LT panels as per IEC 61439. Selection of switchgear should be as per IEC 60947. All the panels should be with Transient Voltage Surge Suppressor (TVSS). For selecting the source fault level bidder to consider value of transient reactance (Xd') as per IS -1180 for transformer rating and sub transient reactance (Xd") for alternator output at common bus at synchronization panel as per ISO 8528 Part 1 to 10. Typical Electrical SLD drawing along with Panel, UPS and Battery room layout drawing is provided for minimum requirement. The switchboard shall be totally enclosed, metal clad, sheet steel fabricated, compartmentalized, dead front type, dust and vermin-proof, freestanding, floor mounting type. It shall be of unit construction suitable for splitting into sections for shipping to site and to be correctly re-erected on prepared foundations without skilled supervision. The individual shipping section length shall not preferably exceed 2 metres. End busbar fishplates shall be provided. The switchgear shall be easily extensible on either side by the addition of vertical sections. The switchboard shall be fabricated preferably from cold rolled sheet steel of minimum thickness 14/16 gauge. The height of the switchboard shall be constant throughout its length, Adequate lifting facilities such as hooks for ease of handling on site shall be provided. These hooks when removed shall not leave any openings in the switchgear. Front access shall be available to all components in each cubicle, which require adjustment, maintenance or replacement. Checking and removal of components shall be possible without disturbing adjacent equipment. All auxiliary equipment shall be easily accessible. Setting of relays shall be possible without de-energizing other equipment. Each unit of switchgear shall have necessary interior barriers to form separate compartments for buses, switching devices entering cable connection etc. All barriers shall be manufactured from non-inflammable material, preferably of sheet steel. The arrangement of the feeders shall ensure that operating handle of the switch / breaker shall be above 300 mm but below 1800 mm from ground level. Horizontal busbar chambers shall be at the top of the board. Busbars shall be completely shrouded to prevent metal pieces falling on the busbar during maintenance. The busbars shall be of aluminium with continuous rating as given in the SLD. All busbars and their main current carrying connections shall have preferably the same sectional area throughout their length. The busbars shall be colour coded. The busbar sizes shall be determined taking into consideration the continuous rating without exceeding the final temperature of 45 Deg. C over maximum ambient temperature and the fault level specified. The busbars shall be supported by insulators on non-carbonizing material resistant to acid and alkali and having non-hygroscopic characteristics and braced to withstand the fault level specified. Two earth terminals shall be provided on each switch cubicle, at the back, near the floor. An earth bar of at least 25 x 6 mm GI shall be fixed to these terminals. The earth bar shall be electrically continuous and shall run the full extent of each board. Each unit shall be constructed to ensure satisfactory electrical continuity between all metal parts not intended to be alive and earth terminals of the unit. Suitable holes with bolts and lugs shall be provided at each end of earth bar of switchgear for connection to a main earthing grid of 25 x 6 mm GI bus. The

earth bar shall be accessible in each cable entering compartment either directly or through a branch extension to ground the cable armour and shields. Any unused circuit breaker compartment shall be fully equipped and provided with compartment door, vertical bus bars and control terminals / wiring, etc., such that the same could be used for housing outgoing breakers in future without any modifications to the panel. The arrangement of feeders in the switchboard shall take into consideration the number and size of cables required for the feeders. For all electrical circuit breakers anti-pumping device shall be incorporated. The breaker shall be provided with minimum 6NO + 6NC auxiliary contacts. 20% auxiliary contacts (Min. 3 NO + 3 NC) shall be provided. All spare contacts shall be wired upto terminal blocks. Auxiliary contactor or relay shall be used to multiply contacts.

7.5 Modular UPS for IT as well as NON IT Load:-

| Sr.No. | Description | Qty | Location |
|---|---|---|---|
| 1 | UPS for IT Load with Li-ION batteries for 10 minutes back up time of rating 150 KVA (Module Size should be 25 KW to 60 KW) | 2 | UPS and Battery Room |
| 2 | 1 X 75 KVA UPS for NON-IT Load – Utiliy Load with SMF batteries for 10 minutes back up time 0n 75 KVA.<br>(Module Size should be 25KW or 30 KW– 3 numbers working and 1 standby module in same frame)<br>Note- IF Harmonics distortion are more in NON-IT load as in INROW machines (NO machine as per IEEE-519 ) - Bidder needs to consider appropriate derations in the NON IT UPS . | 1 | UPS and Battery Room |

7.5.1 The UPS and associated equipment shall operate in conjunction with a primary power supply and an output distribution system to provide quality uninterrupted power for mission critical, electronic equipment load.

7.5.2 Each UPS Frame shall be sized for kW =kVA @40 Deg C . load i.e. Unity Output power Factor with no derating at 40 Deg C. Design of UPS should be Insulated-gate bipolar transistor (IGBT) rectifier and 3 level IGBT inverter switching with double conversion as per IEC 62040-3 operating modes. Inverter Switching Frequency shall be ≥18 kHz to keep the noise minimum. Inverter shall be PWM controlled using DSP logic. Analog control shall not be acceptable. Each UPS shall be of modular architecture with Power Unit & removable sub power modules rating from 25 kW to 60 kW achieve highest system protection. Failure of any sub power module in individual UPS Frame shall not lead to entire Frame Capacity down but only the failed sub power module capacity shall go down. i.e. In case of Failure of any one Sub Power module, rest of the available power module in the frame shall continue to operate in normal double conversion mode of operation with reduced capacity. This shall also be applicable to all UPS's operating in parallel configuration. The UPS shall be housed in a freestanding cabinet with casters and shall contain Static Bypass and maintenance Bypass isolator. Each

UPS should have phase sequence detection. Steady state voltage regulations will be within 1% of nominal output voltage, linear load harmonics distortion should be less than 3% and non-liner load harmonics distortion should be less than 5%. UPS should be capable of 100% unbalanced load. Efficiency of UPS should be minimum 95% from 25% to 75% in double conversion mode. Noise generated by UPS under normal steady state condition should not be more than 70 DB as per ISO 7779. UPS should be ROHS / Energy Star complied product. Cable termination will be from bottom. All serviceable components to be from front. Rear space upto 200mm can be provided only for ventilation purpose UPS display should show the battery status monitoring, UPS mode, Alarm (Audio and visible), Events etc. The UPS communication capability should be able to integrate into any industry standard Building Management System (BMS). Adequate protections for UPS, for rectifier, bypass, battery, battery against overload, short circuit, battery over charging, battery over discharging, transients, surges (as per IEEE 587) etc. needs to be considered as per IEC 62040-1. Built in SNMP card, MODBUS TCP IP, Dry contacts card to be standard feature in UPS. UPS should be with KW=KVA. For battery sizing bidder to consider power factor of 0.9 lag.

The UPS shall be have self-regulating and self-protection against conditions as over voltage, Powerline surges, Undervoltage and overcurrent induced by the mains ,Sudden changes in the output load and short circuits at the output, Transient ,surges, voltage spikes shall be suppressed and shall be removed from the output of UPS

7.5.3 Critical Cards within UPS which are directly exposed to air should be conformally coated to protect the UPS from Moisture and Conductive dust. IP rating of Min IP 20.

7.5.4 Parallel operation: it must be possible the connection of minimum 4 units of same size to set up a distributed parallel system, in order to increase system capacity or achieve system redundancy. Parallel control logic must ensure a high load sharing accuracy (less than 5% of nominal power) and no single points of failure. That is a distributed control design must be implemented (no master/slave architecture), so that any failure in one equipment won't impact operation of the whole parallel system. Parallel control connections must provide high noise rejection /

7.5.5 UPS to Battery Inter connecting cables; Links; Racks and standard accessories Connections to the Incoming terminals will be provided and take the load from Outgoing terminals of the UPS. All other equipment necessary to operate the UPS is in the scope of the Vendor.

7.5.6 The UPS shall be housed in freestanding cabinets. The mechanical structure of the UPS shall be sufficiently strong and rigid to withstand handling and installation operations. The sheet metal elements in the structure shall be protected against corrosion by a suitable treatment, such as zinc electroplating, bi-chromating, epoxy paint, or an equivalent.

7.5.7 The UPS shall be designed for forced air cooling. Air inlets shall be provided from the front. Air exhaust shall be from the top portion of the unit or from back side with maximum space available up to 200mm.

7.5.8 The type of battery shall be Sealed Maintenance-free (SMF) type. Each UPS should have separate battery bank. Battery protection shall be provided by thermal-magnetic molded-case DC circuit breakers in each battery rack.

7.5.9 STANDARDS - Product should confirm to below minimum applicable standards

IEC 62040-3 UPS PERFORMANCE,
IEC 60950, CE, VDE,
UL 1778 for UPS,

7.5.10 UPS Input:

| | |
|---|---|
| AC input nominal voltage | 340/380/400/415/440/460 VAC, three phase 50 Hzs, 5 wire (L1+L2+L3+N+G) |
| AC input voltage window | 340V to 460V( @ 400V) |
| Input frequency range | 49-51Hz |
| Input Power Factor | > 0.99 at 100% load |
| Input Current Distortion | < 4% at 100% load |

7.5.11 UPS Output:

| | |
|---|---|
| AC Output Nominal Output | (Customer configurable)-380VAC, 400VAC or 415VAC, Three phase five wire, 50 Hz |
| AC output voltage distortion | Max. 2% @ 100% linear load ,Max. 5% @ 100% non-linear Load |
| AC output voltage regulation (Static) | +/-1% |
| Voltage Transient Response | +/- 8% maximum for 100% load step |
| Voltage Transient Recovery | within < 50ms recovery time |
| Output Voltage Harmonic Distortion | <2% THD maximum for a 100% linear load<br><5% THD maximum for a 100% non-linear load |
| Overload Rating-Online | 125% - 1 minute; 150% - 60 Sec |
| System AC-AC Efficiency | Greater than 95% from 25% load to 75% load in Double Conversion Mode |
| Output Power Factor Rating | unity power factor KVA=kW @ 40 Deg C without any de rating from 0.8 lagging to 0.9 leading |
| Output frequency | 50 +/- 1Hz tracking |
| Output connectors | Three phase: Hardwire 5-wire (3 Phase + N + G) |

7.5.12 ENVIRONMENTAL

| | |
|---|---|
| Operating Ambient Temperature | + 20 to +30°C |
| Relative Humidity | 0 to 95% non-condensing |

| | |
|---|---|
| Operating altitude | |
| Audible noise | <70 dbA |
| Conformal coating PCBs | Required |
| Phase sequence correction | Required.` |

7.5.13 Bidder to submit GTP for UPS in below format for IT as well as NON IT UPS

| Sr. No | Description | Requirement | Vendor to Specify for IT and NOT IT UPS |
|---|---|---|---|
| | | | |
| 1 | MODEL | please specify | |
| 1.1 | TECHNOLOGY | IGBT Rectifier & IGBT Inverter, Microprocessor based, true online double conversion, Online Transformer free Technology ,Modular Technology | |
| 1.2 | Inverter | IGBT | |
| 1.3 | Rectifier | IGBT | |
| 1.4 | Max. Permissible Non-linear loads | 100% | |
| 1.5 | Max. unbalanced load | 100% | |
| 2 | PHYSICAL Dimension & Weight | | |
| 2.1 | Construction | Compact. Modular design | |
| 2.2 | UPS Floor Space | | |
| 2.2 | Ventilation | Specify | |
| 2.3 | UPS Dimension & weight | | |
| | Length in MM | Specify | |
| | Width in MM | Specify | |
| | Height in MM | Specify | |
| | Weight in kgs | Specify | |
| 2.4 | LI ION Battery Bank for IT UPS and SMF for NON IT (Dimension and weight) | | |
| | Length in MM | Specify | |
| | Width in MM | Specify | |
| | Height in MM | Specify | |
| | Weight in kgs | Specify | |

| | | | |
|---|---|---|---|
| | Accessibility ( front & back with clear Dimension to be specfied ) | Specify | |
| | Cable connection Bottom for Input & Output. | Specify | |
| | Parallel Configuration upto no of Module . | Specify | |
| | Minmum Input circuit breaker required to be specified | Specify | |
| 3 | INPUT | | |
| 3.1 | Voltage | 380V -400V- 415V -433V | |
| 3.2 | Voltage range | 340 to 460V | |
| 3.3 | Frequency | 50 Hz | |
| 3.4 | Frequency range | +/- 5 Hz | |
| 3.5 | Ripple content | <1% with battery connected | |
| 3.7 | Input Power Factor | | |
| | 100% | 0.99 | |
| | 75% | 0.99 | |
| | 50% | 0.99 | |
| | 25% | 0.98 | |
| 3.8 | Current Harmonic on source | | |
| | 100% | <3% | |
| | 75% | <5% | |
| | 50% | <5% | |
| | 25% | <10% | |
| 3.9 | Maximum current with out Battery Charging | Amps | |
| 4 | OUTPUT | | |
| 4.1 | Voltage | 380/ 400/ 415 V | |
| 4.2 | KW=KVA | | |
| 4.3 | Voltage regulation | | |
| | Balanced | +/- 1%, 3 Ph. + N | |
| | Un Balanced | +/- 3%, 3 Ph. + N | |
| 4.4 | Power Factor | 0.8lag - unity- 0.98 lead (Derating of UPS not acceptable in this range) | |
| 4.5 | Frequency | 50Hz | |
| 4.6 | Frequency range | +/- 0.5 Hz | |

| | | | |
|---|---|---|---|
| 4.7 | Frequency synch. range | 0.25 to 3 Hz | |
| 4.8 | Transient output voltage variation for 100% block loading | +/-5% | |
| 4.9 | Recovery time for 100% block load | < 50 mill second (ms) | |
| 4.11 | Wave form | Sinusoidal | |
| 4.12 | Total Voltage Distortion out put side | | |
| | Linear load | < 2 % | |
| | Non-Linear load | < 5 % | |
| 4.13 | Crest Factor | 3:1 | |
| 4.14 | Phase Displacement | | |
| | a) Balanced load | 120 +/- 1° | |
| | b) 100 % Unbalanced load | 120 +/- 3° | |
| 4.15 | Inverter Efficiency | | |
| | c) 100 % | Specify | |
| 4.16 | Overall Efficiency for UPS | | |
| | b) 50 % | 95% | |
| | c) 75 % | 95% | |
| | d) 100 % | 95% | |
| 4.17 | Efficiency of UPS in Battery Operations | | |
| | b) 50 % | | |
| | c) 75 % | | |
| | d) 100 % | | |
| 4.18 | Overload | | |
| | a) 125 % | 10 minutes | |
| | b) 150 % | 10 Sec | |
| 4.19 | Short circuit Capability | Vendor to Specify | |
| 5 | BUILT IN STATIC BYPASS | Required but not used for IT load in operation | |
| 5.1 | Inverter and Static Bypass change over time | Specify | |
| 5.2 | Fuse @ static bypass | No as per IEEE standards. | |
| 5.3 | Short circuit Capability | Vendor to Specify | |

| | | | |
|---|---|---|---|
| 5.4 | Overload | Specify | |
| 5.5 | Transfer time | Less than 5 milli secs. | |
| 5.6 | Manual Bypass inside ups only( input/output) | Required | |
| 6 | DC CHARACTERISTIC | | |
| | Battery backup to be calculated at unity pf. | | |
| 6.1 | VAH | Specify | |
| 6.1 | DC bus voltage | Specify | |
| 6.2 | DC Current | Specify | |
| 6.3 | No. of cells with AH | Specify | |
| 6.4 | battery voltage | Specify | |
| 6.5 | End. Cell voltage | Specify | |
| 6.6 | Float voltage | specify | |
| 6.7 | DC current at 100% load | specify | |
| 6.8 | Charging current | specify | |
| 6.9 | Charging time | | |
| 6.1 | True autonomy / measurement | Software on SNMP & UPS monitor panel | |
| 6.11 | Temp. compensated charger | Required/ Mandatory | |
| 6.12 | Automatic battery load test | Required/ Mandatory | |
| 6.13 | Batt. Breaker with protection | Required/ Mandatory | |
| | Required Battery Back Up | 10 Minutes | |
| 7 | PROTECTION | | |
| 7.1 | Overload (O/L) | Required | |
| 7.2 | Short circuit (SC) | Required | |
| 7.3 | Input low voltage | Required | |
| 7.4 | Output over voltage | Required | |
| 7.5 | Battery over charging | Required | |
| 7.6 | Battery over discharging | Required | |
| 7.7 | IP Protection | | |
| 7.8 | DC over current Protection | | |

| | | | |
|---|---|---|---|
| 8 | ENVIRONMENTAL | | |
| 8.1 | Ambient temperature range | 0 to 40° C | |
| 8.1 | Relative humidity | 95 % RH | |
| 8.2 | Max. operating altitude | 0 M above MSL | |
| | without derating | | |
| 8.3 | Acoustic Noise | 65db (Specify) | |
| 9 | AUDIO / VISUAL DISPLAY | | |
| 9.1 | Over load | Required | |
| 9.2 | Short circuit | Required | |
| 9.3 | Input low voltage | Required | |
| 9.4 | Input over voltage | Required | |
| 9.5 | Battery over discharging | Required | |
| 9.6 | Battery on load | Required | |
| 9.7 | Battery low | Required | |
| 9.8 | Fuse failure | Required | |
| 9.9 | Fan failure | Required | |
| 9.1 | Inverter failure | Required | |
| 9.11 | DC over voltage | Required | |
| 10 | VISUAL DISPLAY | | |
| 10.1 | Input/Output voltage | Required | |
| 10.2 | Output current . | Required | |
| 10.3 | Input/ Output frequency | Required | |
| 10.4 | Output power in KVA and KW | Required | |
| 10.5 | Output load power factor | Required | |
| 10.6 | Output load crest factor | Required | |
| 10.7 | battery DC voltage | Required | |
| 10.8 | Charging current | Required | |
| 10.9 | Dis-Charging Current | Required | |
| 10.1 | Autonomy Time | Required | |
| 10.11 | Event logs | 1500 events mandatory | |
| 11 | OTHERS | | |
| 11.2 | Software with LAN connect | Required | |

| | | | |
|---|---|---|---|
| 11.3 | Auto paging | Required | |
| 11.4 | SNMP compatibility | Required | |
| 11.5 | Diagnostic system | Required | |
| 11.6 | Single line mimic diagram | Required | |
| 11.7 | Telemonitoring with software | Required- Mandatory | |
| 11.8 | Capablity to parallel 6 similar ups systems | required | |
| 11.9 | ventilation | forced air cooling with integral fans | |
| 11.1 | Opertating temperature | 0-40deg.C | |
| 11.11 | Battery management | required | |
| 11.12 | Power Transfer Mode | auto systems ( during fault condition) | |
| 12 | Colour | | |
| 13 | Online Thermal Dissipation in Btu/Hr | | |
| | at 100 % | | |
| | at 75 % | | |
| | at 50 % | | |
| | at 25 % | | |

7.6 Choices of lithium chemistries and cell designs : Based on long calendar life, high safety and high power density Bidder to choose either any one maintained below chemistry of Lithium.

NMC (LiNiMnCoO2 - Lithium Nickel Manganese Cobalt Oxide)
LFP (LiFePO4 -Lithium Iron Phosphate))

7.6.1 Selection of a particular chemistry should be made with safety in mind as well as the other system requirements, namely float service life, footprint or volume of the solution, power capability, temperature of operation and discharge time etc.. Bidder need to consider above aspects while selection chemistry of Lithium.

7.6.2 A Battery system shall be furnished for the UPS with backup time of 10 Mins at Unity PF with END of life 10 years ( Warranty should be of 10 years), capacity to maintain UPS output at the specified load for the duration . Battery protection shall be provided by thermal-magnetic molded-case circuit breakers in each battery rack. UPS battery should be Lithium Ion based( LFP or LMO or NMC) battery as per recommended makes with back up time of 10 Mins at Unity PF with Built in DC Breaker , Battery Cabinet and Battery Monitoring system. These Batteries are to be in the RACK. The battery system shall be designed with highest level of protection built into the battery system against potential safety risk – over voltage and short circuit. Vendor to submit the compatibility certificate with Offered Model of Battery and UPS. Vendor to submit Battery Sizing calculation for back up.

7.6.3 The Complete battery system should be comprised of multiple such module in series / parallel combination to arrive at the required backup and DC voltage requirement of UPS.

7.6.4 Batteries should be compliant to

| | |
|---|---|
| Safety Cell | UL1642 |
| Module | UL 1973 |
| Transportation | UN38.3 |
| Seismic | GR63 |
| EMC | IEC61000-6-2, and 61000-6-4 |
| Rack Level | UL 1998,991 |
| Battery Module & Switchgear | UL 1973 with each component level |
| battery Aging factor | IEEE 495 |
| Battery manufacturer should have Quality Certificate | (i) ISO 14001:2004 (Environment) & OHSAS 18001:2007 (Health & Safety) and (ii) ISO 9001-2008 |

7.6.5 The Battery System should be equipped with Battery Management system to indicate the availability and health of entire battery system and cell balancing activity. Battery cabinet should be free standing housing Battery modules with Battery breaker, Battery management system, and Communication protocol for BMS etc.

7.6.6 The lithium ion battery solution shall communicate with the UPS via dry contact.

7.6.7 Battery monitoring shall be provided at the module, rack, and system level. A switched-mode power supply shall be included and shall provide power for the battery monitoring system from UPS Input and Output

7.6.8 The battery system shall consist of a 3 level of protection namely, cell, module and rack level.

1st Level Protection – Battery Management System (BMS) & Switch Gear: Each battery rack shall be installed with main switch gear to isolate the affected battery rack in the event of a fault. BMS shall also be included in each rack to provide continuous monitoring of the voltage and temperature of each cell within the rack. BMS gathers and

analyses the rack current. In the event of over voltage or short circuit, the BMS will trip the MCCB at rack level.

2nd Level Protection – Fuse: Fuses are built into the main switch gear at rack level. In the event of a fault current (caused by short circuit) which the MCCB cannot be activated in the shortest time, fuses will be activated to clear the fault current without damaging the cells.

3rd Level Protection – Cell: Several protection features shall be incorporated into the cell namely, safety function layer (SFL), Multi-layers Separator, Safety Vent, Safety Fuse and Overcharged Safety Device. These safety features are to protect the cell from overcharging and thermal runaway.

7.7 AC wiring circuit: Main circuit Point wiring should be surface or concealed conduit system. Conduit wiring shall be as per IS-732. Conduits and conduit accessories shall be galvanized and shall conform to IS-2667, 1988. Conduit ends shall be free from sharp edges or burrs. The ends of all conduits shall be reamed and neatly bushed with Bakelite bushings. In order to minimize condensation or sweating inside the conduit system, all outlets shall be properly drained and ventilated in such manner so as to prevent entry of insects. Conduit pipes shall be fixed by 22 gauge ribbed G.I. saddles on 25 x 3 mm G.I. (Galvanized Iron) saddle bars in an approved manner at intervals of not more than 50 cms. Saddle shall be fixed on either side of couplers, bends or similar fittings, at a distance of 30 mm from the centre of such fittings. Existing point wiring before using needs to be checked and if technically found ok can be considered for use.

7.8 Lighting fixtures: -Lighting wiring between JB(Junction Box ) and lighting fixtures shall be done by PVC insulated 3-core (phase neutral and earth) unarmored cable. All joints of conductors in Switch boards / JB's / Fittings shall be made only by means of approved Mechanical connectors (nylon / PVC connectors). Bare or twist joints are not permitted anywhere in the wiring system. Fixtures shall be firmly supported from the structures, support clamps etc. They may be bolted or welded to the steel work or metal inserts. In case of concrete structures, where metal inserts are not available, fixtures will be fixed to or supported from concrete surfaces with the help of anchor fastener, in such cases special care shall be taken to see that anchoring is firm. All LED fixtures shall be with high power factor, low harmonic (THD< 10%) (THD= Total Harmonics Distortion) and minimum 100 lumens/watt. All exisiting light fixture needs to be replaced.

7.9 Earthing and Earthing Pits: All Electrical Equipment must be efficiently double earthed in accordance with the requirement of IS-3043/IEEE 80 and relevant regulations of Electrical. The earth pits shall be as per IS with proper arrangement for testing. Maintenance free earth pits to be used. All Earthing conductors shall be hot dip galvanized / electrolytic grade base copper conductor. The main earthing rings shall be done as per practice laid in Indian Standard. All electrical equipment shall be connected to the earth bus at two points except the lighting fittings and junction boxes. All hardware for bolted joints shall be galvanized and the size of the bolt shall not be more than quarter of the size of earth conductor. Tinned copper lugs shall be provided where round earthing conductors are used. The 415V neutral shall be solidly earthed by means of two separate and distinct connections to earth. The earth pits shall be interconnected between themselves and the main earthing grid to form an earthing ring. All joints in the main earthing conductors shall be welded. Terminal joints on the equipment shall be bolted. Removable test links shall be provided near the earth

pits to facilitate testing of earth pits. Where the earthing terminal diameter provided on equipment is larger than quarter of the size of the earth conductor, connection shall be made using a wider flag welded to the conductor. The equipment to be earthed shall be connected to a common earth grid of power system. The number of earth pits will depend upon soil resistivity and the voltage of the system. The earth pit together with the electrode shall be constructed as per IS-3043-1987. The potential difference between neutral and earth should be less than 3 V. A bolted assembly link shall be provided in the connection between earth electrode and the main earth conductor. Existing Earth pits can not be used all should be new one. Equipotential earthing inside the data center needs to be considered with grid below raised flooring of 2 X 2 meter of 25 X 3 mm Cu strip and all end corners after covering complete room needs to be grounded. Pedstal /stringers, Rack body to be grounded to this grid sothat flooring and equipment's are at equal potential.

7.10 Stainless steel (SS) cable tray to be considered above each row of the Rack along with required Cable tray Grid above the rack and below false ceiling to be considered and provided. Refer Layout Drawing. SS Cable tray are used to run fiber and interconnecting cables.Rack Interconnecting cables mostly will be fiber, Bidder to take care utmost care as 90 Deg C bend will not be accepted.

All cable Trays up to 300mm shall be perforated type & above 300mm ladder type trays shall be used for power cables . The Trays shall be pre-fabricated hot-dipped galvanized. Cold galvanizing at site is acceptable only for touch-ups. The Trays shall have suitable provision for clamping at an interval of 500 mm. The Earthing Strip for the earthing ring shall be run along the side of the Tray. The connection between individual equipment to the ring shall be by bracing or with lugs. The bending of trays shall be smooth and the curvature sufficient for each bending of cables in it. Pre-fabricated accessories such as Tees, bends, risers, couplers, reducers, etc. shall be used at all junction & branches. Cutting & welding of trays at site is not permissible. Similarly, the trays shall not be welded on the supports but bolted only. Electrical Cable Tray routing shall be co-ordinated by Vendor at site to check fouling with pipes, equipment, light fittings, HVAC, etc. before fixing the trays.

7.11 All Low tension cables should be of 1.1 KV grade, All power cables from 25 Sq.mm to 400 Sq.mm should be with stranded, compact aluminium conductor, with XLPE insulated, PVC inner sheathed, galvanized steel strip armored and overall PVC sheathed conforming to IS:7098 /88. As stated in Electrical single line diagram for Cu flexible cables should be of Solid/Stranded Copper conductor, XLPE Insulated, cores laid up, PVC tape/PVC Extruded Inner sheathed for Multicore Cables, Unarmoured, extruded PVC Type ST2 Sheathed as per IS 7098 (Part 1) 1988. Cables shall comply with the latest editions of following standard, as applicable-BIS : 1554 Part 1 PVC insulated electric cables (Heavy duty),BIS: 7098 Part 2 Cross- Linked Polyethylene Insulated PVC sheathed cables, BIS : 8130 Conductors for insulated electric cables and flexible cables.1.1 KV grade cables: All LT power cables shall be 660/1100V grade, with aluminium conductor for size 10 Sq.MM and above. Power cables of sizes up to 6 Sq.mm. shall be with copper conductors, All Cables shall be externally marked at either end with the respective identification numbers by means of non-deteriorating material. Cable Markers shall be approved by Client. IS: 1554 - PVC insulated (heavy duty) electric (Part I) Cables - Part I for working voltages up to and including 1100V.IS: 1753 - Aluminium conductors for insulated cables.IS: 3961 - Recommended current ratings for (Part II) cables: Part-II PVC insulated and PVC sheathed heavy-duty cables.IS: 3975 - Mild steel wires, formed wires and tapes for armouring of cables.IS: 5831 -PVC insulation and sheath of electrical cables.IS: 7098 -Cross-linked Polyethylene insulated (Part-II) PVC sheathed cables: Part-II for working voltages from 3.3

KV upto & including 33 KV.IS: 8130 -Conductors for insulated electric cables and flexible cords.IS: 9968 - Elastomer - insulated cables, for (Part I) working voltage upto and including 1100V. Bidder to consider new cable from substation to DC area as per layout and SLD drawing provided.

## 8 Requirements towards Heating, ventilation, and air conditioning work

8.1 All cooling equipment selection to be done based on American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE n=20 ) standard. The cooling systems should perform efficiently at variable load conditions. The overall cooling solution should be designed to achieve better cooling and low operating cost. The room air temperature should be maintained at 23 +/- 2 Deg. C and humidity as per ASHRAE TC 9.9 2017 guidelines. The cooling system in the server rack area should be designed as per layout design provided in Layout Drawings. Heating and humidifier to maintain correct operating environment throughout the data centre needs to be considered. Relative humidity to be maintained in the data center will be from 45% to 55%.

8.2 Logic of operation of adiabatic dry cooling system will be-

8.3 The dedicated temperature sensor will sense the ambient air temperature continuously. As long as the ambient temperature is less than or equal to the “set point temperature”, the control system will facilitate the dry cooler to run in “dry mode”. ( Set point temperature is water leaving temperature from dry cooler and set point should not be more than 32 Deg. C +1 Deg.C, But equipment should have capacity to set to maximum 33 Deg C and to maintain the same also ). Only at times (if any) the ambient temperature increases beyond the “set point” temperature, the control system enables the unit to transition to “wet mode” operation. During “wet mode”, the adiabatic water system will be instigated to facilitate pre-cooling of the incoming hot ambient air before entering the heat exchanger coil section. In addition, the control system must also be able to optimize the fan power consumption continuously depending on the ambient temperature and heat load variations. Make provision on HMI to change set points as required. The process water side RTD (PT100) with temperature output signal will have to be fitted at the main water outlet header of the Adiabatic cooler. This temperature sensor will sense the outlet water temperature and accordingly give a signal to EC fans to increase / reduce the speed. At the set temperature the fans will be running at full speed and as soon as it drops then the fan speed will be reduced resulting in saving of power. If the adiabatic dry cooler leaving temperature increases beyond the “set point” temperature in “Wet Mode”, the control system /BMS will facilitate the unit to operate in “Wet mode”.

8.4 .**Adiabatic Dry Cooler**: Supply, installation, testing and commissioning of a adiabatic dry cooler with adiabatic cooling pads. The finned coil heat exchangers shall consist of copper phosphorus deoxidised (Cu-DHP) tubes, having copper content 99.9%, made to EN 12735 parts 1 & 2, ASTM B280/b68/b743 specifications. Aluminium fins shall be with advanced rippled-corrugated fin design to create a state of continuous turbulence, with full drawn collars to maintain fin spacing and provide a continuous surface cover over the entire tube. The tubes shall be mechanically expanded into the fin collars to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates. Headers shall be made of copper tubes having steel-flanged connections as standard. The adiabatic cooling system shall consist of instrumentation and controls,

Spray pump, adiabatic cooling pads, SS basin, screen, electrical interface, VFD pumps, EC fans. Increased energy savings shall be achieved by using EC (electronically commutated) motors with permanent-magnet rotors. The fans selected shall be labelled as 'soft commutation'. This must involve a combination of commutation strategy and motor design. It should result in low-noise operation, without structure-borne noise. The noise level shall be limited to 75 dBA at a distance of 1.8 m. With the fans selected, there must be no motor noise variation across the entire speed range. When demand for cooling is low, very low operating speeds must be selected; resulting to extremely reduced absorbed power. Fan shall be Axial type aero foil design with Direct Drive. Fan motors should be total enclosed fan controlled (TEFC) with degree of protection IP – 54 or more. The Adiabatic dry cooler shall have a control system that senses the outdoor ambient dry and the leaving water temperature; selects between dry and adiabatic cooling and varies the speed of the fans to meet the heat rejection needs of the system. The controls shall cause the adiabatic water distribution system to operate when the ambient outdoor dry-bulb temperature does not provide sufficient cooling to maintain the desired leaving water temperature. Due to adiabatic pre-cooling, Inlet air temperature (ambient) enables return temperatures below the ambient temperature or a significantly higher device output with the same space requirement. Once the defined set point of the outlet temperature of water or condensing temperature can't be achieved anymore in dry operation, due to an increasing ambient temperature, the pre-cooling system is activated. The upstream Adiabatic Pads are humidified and air cooled by exchanging the latent heat of evaporation. The water is distributed evenly and without pressure via drainage channels, which are quickly and easily accessible for maintenance and cleaning purposes. The water only wets the stable framed, easy-to-replace and chemically resistant Adiabatic Pads and not the heat exchanger, which protects it from corrosion and in most cases eliminates the need for water treatment.. The Adiabatic Pads are impregnated to prevent microbiological growth. The excess water is drained from the stainless steel sump. The adiabatic pre-cooling system should meets the highest hygienic requirements. Stagnation and dead zones in the water-bearing components needs to be avoided, . The cooling pad section on each air-inlet side shall serve as an adiabatic saturator to cool the incoming air. It shall consist of specially integrated cellulose paper sheets with flute angles that have been bonded together. The impregnation procedure shall also ensure a strong self-supporting product, with high absorbance, protected against decomposition and rotting. An inlet-air edge coating shall be provided to prevent the pad surface from extreme environment such as dirt, sand storm, and risk of bacterial and algae growth. The water flow through the pads shall be initially regulated by a special metering device, which throttles the correct flow rate. The unit shall have a water tray to collect the not-evaporated water. The unit shall be equipped with two copper tubes /Al tubes that spray water at a low pressure (2 to 3 bar) over the adiabatic pads to keep them wet. A water distributor shall be placed above wet pads to provide a homogeneous distribution of the water on all the pads length. Two fixed speed pumps shall be onboard the unit and they shall be used to circulate the water from the tank to the distribution pipes over the adiabatic pads. The Water used in the adiabatic mode needs to be reused by use of inbuilt filters. Casing is a self-supporting construction. Maximum casing dimensions are adapted to the local conditions Casing material made of Galvanized steel, powder-coated RAL 7035 Casing surface receives a high quality powder coating (RAL 7035) For easy cleaning, all surfaces are smooth. Controller should regulate the humidification and the amount of wetting water. Control ball valve including motorized valve, continuous control and emergency control function. Capacity of the adiabatic dry cooler shall be computed from the measurements of water flow, incoming/outgoing water temperatures and ambient dry bulb temperature and mean coincidental wet bulb temperature using accurately calibrated mercury-in-glass thermometers. Computed

ratings shall conform to the specified capacities. Bidder needs to consider appropriate deration due to ambient temperature , altitude etc. factors. Bourdon type pressure gauges with aluminium casing with a minimum 100 mm dial and appropriate range complete with needle valves shall be provided at the inlet and outlets of heat exchangers, and pump sets. Thermometers shall be of dial type weather & water proof type. Thermometer shall be provided at the inlet and outlet of dry cooler

8.4.1 Bidder to submit technical information as per below table.

**BTS- Bidder to Submit**

| **Adiabatic Dry Cooler - GTP** | | | | | |
|---|---|---|---|---|---|
| Air inlet temperature | Deg | Bidder to | Capacity | KW | **150** |
| Relative humidity | % | As per Site | Airflow | m3/h | **BTS** |
| Wet bulb air inlet temperature | Deg C | **BTS** | Adiabatic System water flow | m3/h | **BTS** |
| Guaranteed capacity in dry conditions % | [%] | **BTS** | Evaporation Efficiency | % | **BTS** |
| Switching temperature wet/dry | Deg C | **BTS** | Fan speed | RPM | **BTS** |
| Inlet fluid temperature | Deg C | **BTS** | Power consumption | W | **BTS** |
| Outlet liquid temperature | Deg C | **BTS** | Motor consumption | W | **BTS** |
| Fluid flow | m3/h | **BTS** | Sound level (at | dB(A | **BTS** |
| Fluid pressure drop | kPa | **BTS** | Sound Power Level | dB A | **BTS** |
| Fluid | | Water | | | |
| Altitude | m | 0 | | | |
| Fans: | mm | BTS number of fans and dimensions | Surface | m2 | **BTS** |
| Poles | [n] | EC FANS | Weight | kg | **BTS** |
| Volume | [dm3] | **BTS** | Weight with wet adiabatic panels | kg | **BTS** |
| | | | Inlet Pipe Connection | NB | **BTS** |
| Coil operating maximal pressure | [bar] | **BTS** | Outlet Pipe connections | NB | **BTS** |

| | | | | | |
|---|---|---|---|---|---|
| Dry Weight | Kg | **BTS** | Overall dimensions | | **BTS** |
| Wet Weight | Kg | **BTS** | Length | m | **BTS** |
| | | | Width | m | **BTS** |
| | | | Height | m | **BTS** |

8.5 DX Based In Row Unit- Supply, installation, testing and commissioning of self-contained direct expansion type In Row units suitable for operation on R410a/R407C refrigerant & should have advanced microprocessor based. In row units should consists of cabinet,inlet filter, EC fans, Inverter Scroll Compressor, Direct Expansion Cooling Coil, Heater banks to maintain humidity inside the space, condensate drain pan of stainless steel construction, Condensate pump, humidifier, Microprocessor panel, programmable control complete with LCD display. The unit shall be suitable for operation on 415 V, 50 Hz, AC supply. The controller unit should also be capable of starting the standby unit in case the temperature is not able to achieve with the working units. For Basis of Design Bidder to consider site ambient data along with below maintained parameters. The Row based cooling unit should get coupled with IT racks and supply cold air very close to IT load and remove hot air closely from IT load. Unit's airflow should be horizontal and should provide uniform air distribution over the entire face of the coil. The In row-based solution improves energy efficiency and cooling ability. Direct Expansion (DX) InRow unit draws air directly from the hot aisle, allowing the unit to take advantage of higher heat transfer efficiency due to higher temperature differences. It can then discharge room-temperature air directly in front of the servers it is cooling. Placing the unit in the row enables the unit to operate at higher return and supply air temperatures, yielding 100% sensible capacity. This significantly need to reduce higher humidification. The modular design of the InRow unit allows it to be easily added in the row as the demand for cooling increases. Containing the hot aisle further reduces any chance of hot and cold air streams mixing. Each Cooling unit should have net sensible cooling capacity of minimum 25 kW based on the returning air condition of 36°C +/- 2 Deg C dry bulb, defined Relative Humidity and 21°C +/- 2 Deg. C. dry bulb supply air temperature and each in row unit should deliver minimum CMH of 5500 . Total CFM (cubic feet per minute) of each unit should be adequate to maintain the rack temperature The unit shall be configured to provide air flow/pattern to provide uniform airflow over the entire height of the rack. A variable capacity compressor with inverter which permits staples adaptation of the output in partial-load operation. EC fan /variable speed should be used for maximum efficiency and minimum power cost. The system should remain in operation in case fan replacement is required. Cooling system should come with monitoring and control panel. Supply cooling temperature to be maintained at 21°C or lower with an accuracy of ±2°C. at site ambient conditions. Equipment Parameters

| | |
|---|---|
| Equipment air inlet | 21 Deg C + /- 2 Deg & 50% RH |
| Machine configuration | Front discharge |

| | |
|---|---|
| Actual Capacity | As provided |
| Flow Direction | Front discharge |
| Machine Capacity control | Return Air |
| Compressor type | Inverter Scroll Compressor |
| Evaporator Fan | Backward curve blades with Electronically commutated (EC) motor |
| Humidification & De-humidification : In built feature of humidification & dehumidification | In built feature of humidification & dehumidification |
| Filters | Filter to be provided on the Package unit, having 95% efficiency down to 5 Microns |
| Outdoor unit | 1 per dedicated circuit / In Row, with copper tubes & aluminum fins with fan speed controller & anti-corrosive coating. |

8.5.1 The frame of the units is constructed of 16-gauge formed steel for maximum strength. The cabinet is serviceable from the front and rear. All exterior panels and corner posts on the frame are powder coated for durability and an attractive finish. The front and rear exterior panels are constructed of 18 gauge perforated steel with 80% open free area. All panels, which include a key latch for safety and security, allow easy access and removal. The footprint of 300 mm is required. Units shall include casters and leveling feet to allow ease of installation in the row and provide a means to level the equipment with adjacent IT racks.

8.5.2 Inverter Scroll Compressor The compressor shall be of the high efficiency scroll design operating with R410A / R407C refrigerant and 415V/3~/50 Hz supply. The compressors should be “scroll type” operating with R410A /R407C and power supply of 400-460V/3ph/50 Hz. The compressors are provided with integrated thermal overload protection. The compressor motor control driver is provided with integral electronic protection against over temperature, over current, over or under-voltage with absence of one or more phases. Compressors, the humidifier shall be isolated from the air flow in the version with downward flow machines. The compressor shall be charged with mineral oil and designed for operation on environment friendly refrigerantR410a /R407C.The machine should be inbuilt with the liquid receiver & pressure relief valve, Liquid line solenoid Valve, NRV for better performance of the machine.- The refrigeration system shall be of the Single/ Multiple circuit direct expansion type and incorporate hermetic scroll compressors, complete with crankcase heaters. The refrigerant circuit comprises of Liquid receiver inbuilt in the indoor unit ,Electronically- controlled expansion valve (EEV),Solenoid valve for shutting off the refrigerant liquid, Refrigerant liquid flow indicator, Solid cartridge Freon filter, Safety valve, High pressure safety pressure switch with manual reset, Low pressure switch with automatic reset, Copper refrigerant pipes with anti-condensation insulation on the suction line, Pipe taps on suction and delivery side and charging valve on liquid side, Each Compressor / refrigerant circuit to have its own independent Evaporator coil and Condenser coil.

8.5.3 Condensate Pump - : A condensate pump is factory wired and piped internally to the condensate drain pan. Within the condensate pump, there should be dual position float. The first position is used for condensate pump control and the other float generates a condensate pump failure alarm to prevent condensate pan overflow.

8.5.4 Cooling Coil- Cooling coil needs to be ddesigned for high-sensible heat ratios, the coil is constructed with copper tubes, raised-lance-type aluminium fins, and 18-gauge galvanized steel end plates. Coil headers are equipped with anti-drip shields in the event of condensation. The condensate pan is thermal formed non-ferrous material, and is sloped for positive drainage to provide higher indoor air quality.

8.5.5 Electric heaters-Each packaged In Row unit shall be provided with multi stage heating elements constructed from aluminium. Electric heaters shall be of the low temperature totally enclosed strip type fitted with radiation fins . If overheating occurs, a safety thermostat should cuts off the voltage supply to the heaters and triggers an alarm. These elements are low watt density, wired for single-phase and loaded equally on all three phases, and electrically and thermally protected by both automatic and manual reset thermal cut outs.

8.5.6 Filters-Filtration of conditioned air is very important to maintaining the clean, particle-free environment required inside Data Center. Filters should be easily replaceable from the unit. Filter efficiency should be greater-than 20% as ASHRAE 52.1.Filters are washable type and needs to meet HF-1 standards (as per ASHRAE 52.2).

8.5.7 In row unit should have both bottom as well as top entry of refringent pipes.

8.5.8 The unit should be equipped with variable speed, electrically commutated (EC), to allow for varying heat load. Variable Speed Fans shall be variable speed capable of modulating from minimum 20% to 100%. Each fan assembly shall consist of integral fan finger guards.. Fans need to be easily replaceable while the unit is in operation.

8.5.9 Condenser shall be air-cooled type, suitable for outdoor installation and shall be suitable for operating at high ambient and at low ambient as per site ambient temperatures. Condenser shall be in copper tube & aluminium fins construction. The condenser fan/s shall be of axial type with variable voltage electric motor complete with IP-54 or greater protection. Motor shall be speed controlled to ensure a stable operation for varying ambient.. The condenser shall be complete with provisions for refrigerant piping connections, shut off valves and any other standard accessories necessary with the equipment supplied. Each In Row Circuit to have its independent set of condenser coil. The condenser should be equipped with fan speed controller for the speed variation based on the condensing temperature & the speed variation should be steeples. Condenser unit should be with small foot print unit and top discharge condenser will be recommended. Condenser with compressor inside is also recommended requirement as keeping compressor in the ODU unit (i.e. away from data center) will ease during routine maintenance as well as shut down maintenance activity and it lowers the sound level in Data Center. Copper piping with insulation tube of elastomeric, nitrile foam between each sets of outdoor & indoor unit. Piping to be properly supported by MS clamp. All transmission wiring between indoor to outdoor units should be kept in PVC conduit. Maximum distance between indoor and outdoor unit to be considered as per site conditions.

8.5.10 Electronic Expansion Valve (EEV) The unit should have Electronic Expansion Valve and should be capable of responding to the varying load conditions.. It should be able to provide advantages as Fast, high precision adjustment of refrigerant flow,Fast arrival of the unit at steady-state conditions, Superheating value remains constant in variable thermal load conditions, Efficient operating conditions of the compressor, especially in the presence of low room temperatures etc.

8.5.11 Humidifier-. The humidifier shall be capable of providing continuous auto modulation in steam generation as per the steam requirement per hour. The humidifier shall be fully serviceable with replaceable electrodes. This needs to be factory piped and wired, with cylinder and an automatic solid state control circuit. The humidification system shall automatically condition the passing air to a user-specified humidity setpoint. The reheat system, shall automatically work in conjunction with the condensate management system to temper the air to match the user-specified temperature and humidity setpoint.

8.5.12 De-humidification cycle shall operate by keeping the airflow constant but with the help of EEV to reduce the ADP of the coil.

8.5.13 The system shall be provided with relevant water detection kit which shall have sensors with wire of minimum 1.5mtrs and each of the sensor must be capable to detect individually any water below the false floor near the unit, the sensor must be connected to the unit microprocessor thus enabling the controller to give an alarm incase of wet floor.

8.5.14 A microprocessor shall continuously monitor operation of In ROW unit continuously digitally display temperature and room relative humidity, alarm on system malfunction and simultaneously display problem. When more than one malfunction occurs, flash fault in sequence with room temperature, remember alarm even when malfunction cleared, and continue to flash fault until reset. Microprocessor to control and display the functions as Room Temp temperature, Humidity ,Speed of the delivery fans, Timing of compressors with automatic rotation, Alarm signals , Cool fail, Air filter clogged, Return air sensor fault, Supply air sensor fault, Rack temperature sensor fault, High discharge pressure, Low suction pressure, Fan fault etc.

8.5.15 All In Row Unit should monitor on BMS system to collect critical information of connected devices, temperature, humidity etc.

8.5.16 Bidder to submit the GTP for In row

| In Row GTP | | | | |
|---|---|---|---|---|
| **S.No.** | **DESCRIPTION** | **UNIT** | **Technical requirements** | **Supplier Details** |
| **DESIGN CONDITIONS** | | | | |
| 1 | Required Capacity | KW (TR) | 25 KW | |
| 2 | Airflow | CFM (Minimum) | 5500 CMH | |
| 3 | Return air temperature | Deg C | 35 Deg C +/- 2 Deg C | |
| 4 | Return air RH | % | 30 to 40 | |
| 5 | ESP | Pa | 50 | |
| 6 | Supply air temperature | Deg C | 22+/-2 | |
| 7 | Supply air RH | % | 50 +/-5 % | |

| | | | | |
|---|---|---|---|---|
| 8 | Type of In ROW | (DIRECT EXPANSION - DX) | DX | |
| 9 | Discharge Type of In ROW | (FRONT /TOP/BOTTOM) | Front | |
| 10 | False Flooring height if any - NOT Required | mm | 300- 400 mm | |
| 11 | Site Ambient Temperature | Deg C | As per ASHRAE n=20 | |
| **UNIT DETAILS** | | | | |
| 1 | Make of Proposed unit | - | Required | |
| 2 | Model of Unit Proposed | - | Required | |
| 3 | Total Cooling Capacity | TR | Required | |
| 4 | Sensible Cooling Capacity | TR | Required | |
| 5 | Unit Size (L x D x H) | mm | Required | |
| 6 | Unit weight | kg | Required | |
| 7 | Unit Power Consumption | kW | Required | |
| 8 | Dual refrigeratin circuits | Yes/No | Required | |
| 9 | Noise levels at 1.5m distance from unit | dbA | Required | |
| **UNIT CASING DETAILS** | | | | |
| 1 | Single / Double skin | mm | Required | |
| 2 | Outer Casing material | - | Required | |
| 3 | Outer Casing thickness | mm | Required | |
| 4 | Inner Casing material | - | Required | |
| 5 | Inner Casing thickness | mm | Required | |
| 6 | Insulation material - thickness / Density | mm | Required | |
| 7 | Drain Pan Material & Thickness. | | Required | |
| 8 | Drain Connection Dia | mm | Required | |
| 9 | Access Door Location | Front / Back /Side | Required | |
| **EXPANSION VALVE** | | | | |
| 1 | Make | - | Required | |
| 3 | Dual Power supply. (RAW + UPS) | Yes/No | Required | |
| **COOLING COIL** | | | | |
| 1 | Type | - | Required | |
| 2 | Face Area | Sqft | Required | |
| 3 | Face Velocity | FPM | Required | |
| 4 | No of evaporator per unit | Nos. | Required | |
| 5 | Tube Material | - | Required | |
| 6 | Tube OD and Thickness | mm | Required | |
| 7 | Fin Material & Thickness | mm | Required | |
| 8 | Fin Spacing | FPI | Required | |
| 9 | Type of treatment for Fins | - | Required | |

| | | | | |
|---|---|---|---|---|
| 10 | Coil air inlet temperature (DB &RH) | Deg C | Required | |
| 11 | Coil air outlet temperature (DB &RH) | Deg C | Required | |
| 12 | Total Cooling capacity | kW | Required | |
| 13 | Sensible Cooling capacity | kW | Required | |
| **EVAPORATOR FAN** | | | | |
| 1 | Type of Fan | - | Required | |
| 2 | Fan make | - | Required | |
| 3 | Discharge type | - | Required | |
| 4 | No of evaporator per unit | Nos. | Required | |
| 5 | No. of fans per evaporator | Nos. | Required | |
| 6 | Total No of fans per unit | Nos. | Required | |
| 7 | Fan Dia | mm | Required | |
| 8 | Fan Operating Speed | Rpm | Required | |
| 10 | Airflow per unit | CFM | Required | |
| 11 | Internal pressure drop | Pa | Required | |
| 12 | Blower ESP | Pa | Required | |
| 13 | Total Static Pressure | Pa | Required | |
| 14 | Fan static efficiency | % | Required | |
| 15 | Fan Total efficiency | % | Required | |
| 16 | Power Consumption each fan | kW | Required | |
| 17 | Power Consumption of Unit | kW | Required | |
| 18 | Type of Drive | Direct / Belt | Required | |
| 19 | Type and make of Bearing | - | Required | |
| 20 | Material of casing | - | Required | |
| 23 | Fan placement | In cabinet | Required | |
| 24 | Fan Statically & Dynamically Balanced | Yes/No | Required | |
| 25 | Fan performance curve to be submitted for approval | Yes/No | Required | |
| **FAN MOTOR** | | | | |
| 1 | Manufacturer / Make | - | Required | |
| 2 | Type of Motor | - | Required | |
| 3 | Motor Rating | kW | Required | |
| 5 | Operating Speed | Rpm | Required | |
| 6 | IP Protection | - | Required | |
| 7 | Motor winding Insulation class | - | Required | |
| 9 | Connected load | kW | Required | |
| 10 | Electrical Supply | V/ph/Hz | Required | |
| **COMPRESSOR** | | | | |
| 1 | Manufacturer / Make | - | Required | |
| 2 | Model | - | Required | |
| 3 | Qty. | Nos. | Required | |
| 4 | Type of compressor | Inverter Scroll | Fixed Scroll | |

| | | | | |
|---|---|---|---|---|
| 5 | Refrigerant | - | Required | |
| 6 | Phase/V/Hz | - | Required | |
| 8 | Crankcase Heater | Yes/No | Required | |
| 9 | Modulation Range | % | Required | |
| **CONDENSER** | | | | |
| 1 | Make | - | Required | |
| 2 | Model | - | Required | |
| 3 | Casing Material & thickness | mm | Required | |
| 5 | Outdoor Unit Dimensions W x D x H | mm | Required | |
| 6 | Operating weight- ODU | Kg | Required | |
| 7 | No. of fans/condenser | Nos. | Required | |
| 8 | Operating voltage | Volts | Required | |
| 9 | Noise level at 1m – dBA. | Dba. | Required | |
| 10 | No. of condensers per machine (Indoor Unit) | Nos. | Required | |
| 11 | Phase/V/Hz | - | Required | |
| **FILTER SECTION** | | | | |
| 1 | Manufacturer | - | Required | |
| 2 | Filter media | - | Required | |
| 3 | Type of filter | - | Required | |
| 4 | Airflow per filter | CFM | Required | |
| 5 | Air Face Velocity across filter | m/sec. | Required | |
| 6 | Size of filter | mm | Required | |
| 7 | Quantity of filter | Nos. | Required | |
| 8 | Pressure drop-Clean | Pa | Required | |
| 9 | Pressure drop-Clogged | Pa | Required | |
| 10 | Performance as per ASHRAE Test Std.52, 76 | - | Required | |
| 11 | a) Efficiency | % | Required | |
| 12 | b) Dust holding capacity | - | Required | |
| 13 | Material of construction | - | Required | |
| 14 | a) Filter frame | - | Required | |
| **HUMIDIFIER** | | | | |
| 1 | Manufacturer | - | Required | |
| 2 | Type of Humidifier | - | Required | |
| 3 | Capacity | kg/hr | Required | |
| 4 | Input Power | kW | Required | |
| 5 | Settings | Amps | Required | |
| 6 | Electrical Characteristics | | Required | |
| 7 | Humidifier Inlet pipe Connection - Dia | mm. | Required | |
| **HEATER** | | | | |
| 1 | Manufacturer | - | Required | |
| 2 | Type of Heater | - | Required | |
| 3 | Capacity | kW | Required | |

| | | | | |
|---|---|---|---|---|
| **SUMMARY OF POWER CONSUMPTION** | | | | |
| 1 | Compressor | KW | Required | |
| 2 | Evaporator Fan | KW | Required | |
| 3 | Condenser | KW | Required | |
| 4 | Max. of Heater/Humidifier | KW | Required | |
| 5 | Total (Including Heater/Humidifier) | KW | Required | |
| 6 | Total (Excluding Heater/Humidifier) | KW | Required | |
| 7 | Specific Power Consumption (At Design Conditions) | Ikw/TR | Required | |
| 8 | Specific Power Consumption shall be submitted for the following operating conditions:<br>1) 100% load on cooling coil<br>2) 80% load on cooling coil<br>3) 60% load on cooling coil<br>4) 30% load on cooling coil | Yes/No | Required | |
| **ELECTRICAL** | | | | |
| 1 | Unit Total connected power | KW | Required | |
| 2 | Full Load current FLA | Amps | Required | |
| 3 | Starting current | Amps | Required | |
| 4 | Locked rotor current on full load | Amps | Required | |
| 5 | Required MCB / MCCB Rating | | Required | |
| 6 | Isolation for Incoming | Yes/No | Required | |
| 7 | MCB/ MPCB for critical components like Compressor, Fan,Heater, Humidifier | Yes/No | Required | |
| 8 | Terminal strip for all connection with cable marking | Yes/No | Required | |
| 9 | Single phase converter | Yes/No | Required | |
| 10 | Low voltage / high voltage cut off | Yes/No | Required | |
| 11 | Inbuilt ATS for Dual power supply | Yes/No | Not required | |
| 12 | High speed harmonic distortion | % | Required | |
| 13 | Low speed harmonic distortion | % | Required | |
| **MICROPROCESSOR CONTROLLER** | | | | |
| 1 | Microprocessor Based | Yes/No | Required | |
| 2 | P/PI/PID Logic | Yes/No | Required | |

| | | | | |
|---|---|---|---|---|
| 4 | Return air humidity sensor | Yes/No | Required | |
| 5 | Auto restart after a power failure | Yes/No | Required | |
| 6 | Sequencing of Multiple units | Yes/No | Required | |
| 7 | Interlock with Damper | Yes/No | Required | |
| 8 | List of Trip signal | Yes/No | Required | |
| 9 | List of alarm | Yes/No | Required | |
| 10 | Display of Various modes of operation (cooling, heating, humidifying and de-humidifying), | Yes/No | Required | |
| 11 | Date, time and unit identification display | Yes/No | Required | |
| 12 | Visual system alarm indication (along with mutable audio alarm as well) | Yes/No | Required | |
| 16 | Records total run hours for all main components | Yes/No | Required | |
| 17 | Monitoring card should be able to support any one of the protocol (Modbus) | Yes/No | Required | |
| 18 | Each unit Controller should be capable of control, monitoring, sharing set points and alarms | Yes/No | Required | |
| 19 | Control logic to be submitted for approval | Yes/No | Required | |

## 9.7 CONTAINMENT

Thermal Containment should be provided for best in class. Thermal containment should be with manual openable door and spring return automatic close doors. The containment should be with series of panels, door frames, doors and air blocks to enclose the zone which contains IT equipment. The cool air is supplied to the IT equipment while the IT equipment exhaust air is pushed outside the Containment and returned to the cooling unit. By preventing mixing of cool supply air and hot exhaust air, this self-contained configuration is capable of supporting heat density loads.

9.7.1 HORIZONTAL CEILING PANELS- Ceiling panels are with 4.0 mm thick Lexan clear panels which has removable option with the help of wing nuts. Minimum Light Transmission per ASTM D1003 varying between 84% - 87% Ceiling panels are designed to be supported by the frames of the IT Equipment racks. Ceiling Panel frames sizes should be suitable to match up with rack, row width, and cold aisle widths. The ceiling system should be designed to permit removal of the ceiling panel from within the contained zone without the use of tools for service access to the space above the containment. Lexan sheet should be used for the same. Toggle down top panels should be provided with magnetic latches at the place of fire suppression nozzle.

9.7.2 DOOR FRAMES AND DOORS- Aluminum extruded profile-based door frames and doors shall be provided to establish air containment at the end of two rows of racks with clear opening at aisle entry/exit. The door frame system should match the height of the rack-based equipment and match the design width of the contained aisle. Extruded aluminum frame is with "IS 1060 H2" standard Doors are with sliding mechanism, to permit access into the contained aisle for maintenance or servicing. Standard door operation shall not interfere with access or service on any rack or rack-based equipment. Doors should be with Lexan panels for clear visibility of aisle with proper handles for door operation with automatic door closure .system. Doors will have door stopper in order to avoid door closing during material movement or service

9.7.3 FRAMES AND COMPONENTS SEALS-Foam Rubber gaskets are installed at containment joints to minimize open gaps between containment system components, such as door frames, ceiling and filler panels, and IT Equipment racks and rack-based equipment. Metallic filler panels are provided for uneven height of rack with proper sealing with gasket. Polyamide brushes are provided at bottom of door to avoid air leakage

9.7.4 Powder Coating and Finish - Powder coat should be with Nano ceramic pre-treatment process using a zirconium coat. The Powder coating process is ROHS compliant. Powder coating thickness will be 80 to 120 microns

8.6 Split Air Conditioning Unit is UPS and Battery Room -The environmental control system should be a High performance factory assembled split air-conditioning unit. It should be wall mounted, optimized for maximum cooling capacity and high Airflow rate to match sensible load in technology room . This unit should be designed for service from the front of the unit.

8.6.1 The Air-cooled High Performance Split AC unit shall be designed as per following conditions:

- Inside Design condition :24 Deg C ±2 Deg C and Max 50% RH
- Ambient air design temperature :As per Site
- Net Cooling Capacity : 11 KW
    - Net Sensiable Cooling Capacity : 9.9 KW
    - Number of Units required ; 3 Nos ( 2 Working and 1 Stand By )
- Air Quantity :2800 CMH or more
- Filters Efficiency :90% efficiency down to 10 Microns.
- Type of load :High sensible heat load (Sensible heat factor above 0.90)

8.6.2 The refrigeration system should consist of a R407C based Scroll compressor, hydrophilic coated evaporator coil, condenser coil, thermostatic expansion valve(Capillary Tube type expansion device is not acceptable) and filter drier. The compressor should have a suction gas cooled motor, vibration isolators, internal thermal overloads, manual reset high pressure switch, low pressure and high pressure transducer. The unit should be equipped with a direct drive

electronically commutated radical fan with high efficiency and high reliability. The unit are designed with draw-thru airflow having fans in downstream of the coil.

8.6.3 The exterior steel panels should be custom powder coated to protect against corrosion. The wall constructed side, bottom and rear panels separated with insulation from the airstream. The unit should be provided with perforated inlet and outlet panels and same should have more than 65% open area.

8.6.4 The unit should be equipped with one set of HDPE air-filter having filtration efficiency of 90% down to 10 micron and same to be located within the cabinet and accessible from the front of the unit. The filter can be washed repeatedly.

8.6.5 The condenser should be with fan modulation kit. Condenser should be able to work -10 deg C to 45 deg C ambient temperature without triping. The condenser frame should be made up of a sturdy G.I. structure. The protection level of the outdoor unit should be IP54. The air-cooled condenser coil is constructed of mechanically expanded copper tubes in enhanced surface aluminium fin with Hydrophilic coating.

8.6.6 Unit should be controlled by intelligent control board. The control board should be microprocessor based. The controller should allow setting and monitoring of the room parameters. The controller allows setting and monitoring of the following space parameters:

- Return Temperature set-point
- Actual Room temperature
- Indoor Fan speed Range
- Mode of Operation
- Unit Number
- Active Alarm

8.6.7 The controller should give warnings / alarms.

8.6.8 The controller should capable of sequencing and auto rotation of units , automatic restart after power restores etc.

8.6.9 The control board should provide an RS485 port, and the standard protocol should be MODBUS. This should be standard feature of the product

8.7 Bidder to consider in Cabin room 1 X 1.5 Tr capacity room AC unit with

8.7.1 Split AC with inverter compressor: Variable speed compressor which adjusts cooling capacity depending on heat load. The convertible feature with 7 different cooling modes to adjusts cooling performances from 45% to rated capacity. There by enhances energy efficiency and provides personalized comfort with minimal effort.

8.7.2 Capacity (1.5 Ton): Airflow of 650 CFM to 703 CFM; Cooling Capacity of 5100 W & Ambient operating Temperature: upto 55 degree Celsius with 4 way Swing.

8.7.3 Energy Rating: 5 Star with Indian Seasonal Energy Efficiency Ratio (ISEER) Value: 5.20

8.7.4 Manufacturer Warranty: 2 year on product, 5 years on PCB and Motor, and 10 years on compressor.

8.7.5 Copper Condenser Coil: Better cooling and requires low maintenance. Healthy Cooling: Equipped with the PM 0.1 Filter to provide clean air by filtering PM 0.1 particles in the air. Longer Heat Exchanger Life: Special Shield Blu+ protection coating to prevent leakages.

8.7.6 Key Features- Stabilizer free operation with 100-290 V operating voltage range; Hidden Temperature Display; Noise Level: IDU - 34/47 (db) & ODU: 53 (db).

8.7.7 Special Feature: Premium Wi-Fi Inverter Smart Split AC,True AI mode should helps to maintain comfort conditioning & saves energy using "Adaptive Thermal Comfort Model".

8.8 PRESSURE GUAGES & THERMOMETERS

Bourdon type pressure gauges with aluminium casing with a minimum 100 mm dial and appropriate range complete with needle valves shall be provided at the inlet and outlets of heat exchangers, and pump sets. Thermometers shall be of dial type weather & water proof type. Thermometer shall be provided at the inlet and outlet of dry cooler.

8.9 Water Piping and accessories: Water pipe should be heavy duty Mild steel (MS) (Black steel) with all necessary fittings like bends, elbows, tees, flanges, reducers, vibration isolators, hanger, supports, PUF Gatti and fitting like flanges, bellows, union, etc. MS 'C' class water piping, cut to required length and installed with welded joints, including all necessary fittings such as elbows, tees etc. The above piping shall be provided with thermal insulation of 'O class' Nitrile insulation with protective coating on water piping with min 26G of Aluminium cladding. Minimum Insulation thickness of 25mm for pipe having diameter 0-80 mm. All pipe joints shall be welded or provided with necessary fittings. Pipe flanges shall conform to IS:1536 whereas the threads shall conform to IS:554. All piping shall be tested to hydrostatic test pressure of at least 1 ½ times the maximum operating pressure but not less than 7 Kg/Sqm for a period of not less than 24 hours. Entire system shall then be retested. After completion of the installation, the pipe lines are to be flushed thoroughly to blow out the entire dirt and muck. The system then shall be balanced to deliver the water quantities. Direction of flow shall be marked on aluminum cladding above pipelines in bold markings.

8.10 Piping from Adiabatic Dry cooler to CDU and piping inside server room should be grooved with grooved joints as per below specification.

8.10.1 Couplings and Fittings for Joining Pipe

8.10.2 Standard Mechanical Couplings, DN50 through DN300: Needs to manufactured in two segments of cast ductile iron, conforming to ASTM A-536, Grade 65-45-12. Gaskets shall be pressure-responsive synthetic rubber, grade to suit the intended service, conforming to ASTM D-2000. Mechanical Coupling bolts shall be zinc plated (ASTM B-633) heat treated carbon steel track head conforming to ASTM A-449 and ASTM A-183. . Coupling housings rigid type with offsetting, angle-pattern bolt pads shall be used to provide system rigidity and support and hanging in accordance with

ANSI B31.1, B31.9, and NFPA 13. Installation ready rigid coupling for direct stab installation without field disassembly for DN50 to DN 300. Center-leg gasket with pipe stop to ensure proper groove engagement, alignment, and pipe insertion depth. Gasket shall be EPDM compound designed for operating temperatures from -30 deg F (-34 deg C) to +250 deg F (+120 deg C.For DN250 ttoDN300: Standard rigid coupling and gasket shall be Grade "E" EPDM compound designed for operating temperatures from -30 deg F (-34 deg C) to +230 deg F (+110 deg C). Flexible type coupling to be used at location where vibration attenuation, misalignment to be covered, stress relief are required. Flexible adaptors to be used with grooved end pipe and fittings, flat faced, for mating to ANSI Class 125 / 150 flanges or PN rated flange outlet connections. Rigid coupling key shall be designed to fill the wedge shaped AGS groove to provide a rigid joint that corresponds with support spacing's as defined by ASME B31.1 and B31.9. Systems incorporating rigid couplings require the calculated thermal growth/contraction of the piping system to be fully compensated for in the design of the piping system through use of adequate flexible components.

8.10.3 Grooved End Fittings:

Standard fittings shall be cast of ductile iron conforming to ASTM A-536, forged steel conforming to ASTM A-234, Grade WPB 0.375" wall (9,53 mm wall), or fabricated from Std. Carbon Steel pipe conforming to ASTM A-53, Type E or S, Grade B. Fittings provided with an alkyd enamel finish or hot dip galvanized to ASTM A-153. Zinc electroplated fittings and couplings conform to ASTM B633.AGS Fittings shall be supplied with factory AGS grooved ends, for use with AGS couplings and AGS flange adapter. Fittings shall be manufactured of ductile iron conforming to ASTM A-536, forged carbon steel conforming to ASTM A-234, or factory fabricated from carbon steel pipe conforming to ASTM A-53. Fittings shall be manufactured to the dimensional standards ASME B16.9. Orange enamel coated or galvanized.

8.10.4 Bolted Branch Outlet: Branch reductions on DN50 through DN200 header piping. Bolted branch outlets shall be manufactured from ductile iron conforming to ASTM A-536, Grade 65-45-12, with synthetic rubber gasket, and heat-treated carbon steel zinc plated bolts and nuts conforming to physical properties of ASTM A-183.

8.11 Supply, installation, testing & commissioning of Centrifugal Pumps of Mono block type. The pumps shall be vertical in-line design which enables installation in a horizontal one pipe system where the suction and discharge ports are in the same horizontal level and have the same pipe dimensions. The pump, electric motor, coupling and coupling guard shall be factory assembled at the pump manufacturer's facility. Pump shall be fitted with a 3-phase, fan-cooled induction motor. Motor shall Include a frequency converter VFD ( PI or PID controller )i either in the motor terminal box or in separate Pump panel. The combined motor and frequency converter efficiency shall be to higher than the IE5 level defined for fixed-speed motors in IEC 60034-30-2. Pump and motor shall be of integrated and user-friendly compact design. Sound pressure level of pumps shall be according to EN ISO 3743.The design total head capacity curve shall preferably be continuously rising towards the shut off. In case of unstable (drooping) characteristic the duty point shall be well away from the unstable region. The shut off head shall be at least 110% of the total head. Pumps shall run smooth without undue noise and vibration. The noise level shall be limited to 70 dBA at a distance of 1M. Vibration shall limited to class II C of BS 4675 Part – I. Pumps of a particular category shall be identical and shall be suitable for parallel operation with equal load division. Components of identical pumps shall be interchangeable. . Flexible bellows at pump inlet and pump outlet as per suction and

delivery sizes to be considered. Pump Base shall be a robust construction with integrally-cast support in order to transmit pipe load to the foundation. Liquid passages in the casing shall be smooth finish to ensure high Efficiency. Pump base shall have tapped hole provision for draining. The impeller shall be bronge enclosed type with smooth surface finishes for minimum frictional loss. This ensures high Efficiency. Impeller shall be fixed to the shaft by means of a split cone and a split cone nut/union nut. Shaft shall be with splined design, and shall be adequately sized to with stand all stresses, hydraulic loads, vibrations and torques coming in during operation. Shaft shall be provided with Mechanical seal as default fitment to provide leak free operation. The liquid cavity shall be sealed off at the pump shaft by an internally flushed mechanical seal with Silicon carbide seat and Silicon carbide seal ring, suitable for continuous operation at 50 Deg C. The mechanical shaft seal shall be cartridge type for maintenance free operation and balanced. Pump base shall be EN-GJL-200 or EN-GJS-500-7 grade Cast Iron according to ASTM 25B or ASTM A536-84 70-50-05 or equivalent standard. Motor shall be suitable for operation on a 3 X 380-500V (± 10% variation), 50-60Hz ± 5%, 3phase AC supply. Motor with thermal protection against steady overload and stalled condition (IEC 34-11). Bidder may consider an integrated frequency convertor and a PI controller incorporated within the motor terminal box and also inbuild DP sensor and flow mater. Bidder to consider shed above the pump with good astestic look or pump with canopy.

8.12 Gate and globe valves: Gate and globe valves up to 50 mm size shall be gun metal construction. Valves above 50 mm diameter shall have cast iron body and bronze/gun metal spindle valve seat. The valves shall have non rising spindle.

8.13 Butterfly valves: The butterfly valve shall be supplied along with flow control lever. The valves shall be compact in size and shall conform to BS 5155, MSS SP 67 and API 609. The valves shall be light in weight and easy to install. The body shall of close grain cast iron conforming to IS:210 and the seating shall be of Resilient black, Nitrile rubber / EPDM moulded on to the body. The disk shall be of SG iron nylon coated, whereas the shaft shall be of stainless steel A ISI 431 treated permanently for lubrication. The shaft seals shall be of Nitrile 'O' rings and rubber seals. Valves shall be suitable for a working pressure of 16.5 KSC. Care should be taken during installation to see that the disk is not damaged during installation due to the flanges being incorrectly spaced. Provide gear operated valves for sizes having 300 mm and above. For smaller sizes such as 40 mm and below diaphragm type valves are acceptable. The butterfly valve shall be supplied along with flow control lever.

8.14 Ball valves: Ball Valves shall have body of carbon steel. The ball and the shaft shall be of stainless steel. The seat shall be of PTFE. The valve shall be complete with socket weld ends.

8.15 Check Valves: Check valves for smaller sizes shall be of swing type of gun metal construction. Lift type check valves shall be used for horizontal lines. Wafer type plate check valves shall be used for bigger sizes. The check valves shall be suitable for 10.5 KSC test pressure

8.16 Auto Balancing Valve: Balancing valve shall be installed in branch pipe. These valves shall be factory calibrated. Each valve shall limit flow rates within ±5% accuracy, regardless of system pressure fluctuations. Sufficient number of flanges and unions shall be provided as required to facilities maintenance work once the piping is installed. Piping shall be properly supported on or suspended from stands, clamps, roller hangers, etc. as required.

The contractor shall adequately design all brackets, saddles, clamps and hangers and shall be responsible for their structural integrity. Each support shall be isolated from the support by means of anti-vibration springs or durable liner of neoprene rubber. Pipe supports shall be of steel and shall be painted with rust preventive paint and finish coated with synthetic enamel paint of approved colour. Only factory made supports with Galvanized fully threaded rods with bands are acceptable. The chilled water pipes shall be isolated from the bands by a rubber sheet.

8.17 Expansion Tank: Closed Expansion Tank with Expansion Vessel and pressurizing Pumps with one working and one standby. Expansion tank to be of MS with Armaflex / K- Flex Insulation minimum 32 mm thick & minimum 26 Gage Aluminum Cladding with diamond finish with related piping, isolating valves, safety valves, drains, overflow. Tank Shall have Anticorrosive Coating. Close expansion tank should be provided with water capacity to suffice the capacity of volume of water contraction & expansion during operation & rest state of the system while maintaining proper system pressurization under varying operating conditions. Tank should be a closed vessel with rubber bladder/diaphragm to maintain the operating pressure inside the pipelines. System should include PRV and Air Vent also.Standby and working booster pump should be provided with selector switch for pump starting, pressure differential transmitter, pressure gauge & non return valve at discharge outlet of the pump, suction and discharge manifold.

8.18 Water Storage Tank for Adiabatic Purpose- SMC Panel tank for Water storage purpose on rooftop of size 2 meter x 2 meter x 2 meter ( LXWXH) , volume / capacity of 8000 litre construction with hot press moulded UV stabilized panel made from sheet moulding compounds (SMC) compositing of glass fibre and formulation of selected resin, of panel size of 1 meter x 2 meter with corner angles of same material as used for panels, including manhole cover provision , galvanized steel bolts,nuts and washers, roof supports made of plastic, external ladder of GRP, Connections for inlet, outlet with standard GI pipe ,air vent provision and Water level indicator made up of FRP, complete as required with top cover.

8.19 Pressurization unit consisting of inline vertical multistage, centrifugal water pump with SS 304 casing, SS304 impeller and SS316 shaft, CI base TEFC motor, with mechanical seal, control panel and with duty cycling and dry run protection.

8.20 STRAINERS -Strainers shall be preferably of approved ‘Y’ type or pot type as specified in the GeM Bid schedule with GI or fabricated steel bodies. Strainers up to 50 mm shall be of gun metal type. Strainers shall have a removable bronze screen with 3 mm perforations and permanent magnet. Strainers shall be provided with flanges. They shall be designed so as to enable blowing out accumulated dirt and facilitate removal and replacement of all screen without disconnection from the main pipe. Strainers shall be provided with isolating valves so that they may be cleaned without draining the entire system.

8.21 Chemical dosing plant with dosing pumps suitable for the requirement for flushing and treating the water. This should include make up water storage tank, first charge of Dosing chemicals for the commissioning of the system, chemicals for the operation during warranty period. Treated water tank should be of adequate capacity. Entire system should include interconnecting piping, accessories, float and valves complete in all respect. Chemical Dosing System shall be provided for cooling loop. This system is used to remove mill scale, dirt etc. and provide a protective corrosion resistant layer on the inside surface of piping. Chemical dosing system shall be provided to minimize corrosion,

biofilm prevention, preventing scale deposition and to control the water quality. Chemical dosing system shall maintain the water PH value 8.0 to 9.5, total dissolved solid less than 1500 ppm and sulphite concentration between 50 to 100 ppm.

8.22 Air Separators: Air separator working on basic centrifugal force and low velocity flow, complete with required inlet and outlet connections, high capacity float type air vent, pressure reducing valve, water fill connection, drain valve, flanged connections etc. The air separator shall be suitable for required water flow.

The bidder is required to do NSM Branding on the front door and side panel of the solution as per the specification (Specifications / drawings will be provided).

## 9 Requirements towards IBMS work

9.1 Supply and implement physical security (access controls including biometric), Motion sensors etc.

Motion sensor is required for lighting control.

The basic function of access door control is as below.

a) Access control system (ACS) is to be deployed to allow entry for the authorized personnel only and restrict unauthorized people from entering nominated areas of premises. Access privileges to be configured as per the access data stored in Access Door Controllers (ADC). These privileges define the right of access card holder to enter the predefined area upon presenting the card at readers.

b) It shall support distributed architecture with central monitoring and control. If communication to the central control fails, the ACS shall continue providing access based on the predefined security configuration. Until communication is restored, all event logs and alarms shall be stored locally for minimum six months (based on ADC capacity). These events shall be sent to the central control when the communication is regained.

c) It shall have multiple supervised inputs. The dynamic status of each input shall be continuously monitored and each change should be reported immediately.

d) It shall provide programmable inputs, i.e. the ability to apply a variety of conditions to the way in which these inputs are monitored. These conditions shall be expressed in definite terms. It shall be able to produce and communicate various types of outputs (Audible sirens, relay switching etc.) based on the above definition. These outputs shall be standard in terms and shall be interfaced as inputs to other Building Management System. ACS communications should support RS232/ RS485/ TCP/IP. All data over the network between the ADC and the Server end shall be encrypted. All ACS software/firmware upgrades shall be downloadable through the network to the ADC. Access control system is required for all the Doors in Server area , UPS area.

9.2 BMS System: - The proposed software shall be independent software platform for monitoring the parameters of Mechanical systems, Electrical systems, Dry Cooler , In Row Units, DG Sets, various sensors etc. system as applicable. The BMS shall monitor the parameters of the data centre mechanical equipment to maintain environmental conditions, such as temperature, pressure, and humidity, within acceptable limits and at

optimal energy efficiency. The operation of the system is governed by the Sequence of Operation (SOO), which is based on the mechanical system design. A graphical user interface (GUI) or Human Machine Interface (HMI) needs to provided as a visual representation of local conditions, equipment overrides, set point adjustments, historical trends, and alarms conditions at the equipment level. The BMS also functions to notify the proper recipients, onsite or offsite, in the event of abnormal operation, and archive historical data for use in troubleshooting and analysing system operation.BMS software must have web client and should be able to access from any standard Web browser (Chrome, Firefox, Edge, Internet Explorer etc.) without any plugins and shall be supplied with minimum inbuilt 5 licences. BMS Software patches update and Version updates to be considered as part of scope during Warranty and AMC Period. BMS should have minimum 3-year historical data storage capacity. BMS software should have activity/auditing functionality so that each user action can be tracked based on login.

9.2.1 The Integrated Control Platform shall support encrypted password authentication for all web services whether serving or consuming.

9.2.2 Supply, Installation, Testing and Commissioning of BMS System which includes Main Building Automation Graphic Software, BMS Machine, DDC Controllers with necessary Panels, Field Sensors, Third Party Integrations as PAC , Load Manager, Integration with fire alarm panel, Monitoring and control of cooling units , monitoring and controlling of pump and valve operations etc,

9.2.3 The BMS IO summary bidder to prepare and submit with the BID.. This summary shall define the actual Digital/Analogue Input/output points and soft points to be considered for the functioning of the BMS. The Actual soft points shall be considered during the detail design stage based on the actual parameters selected and the mapping points. Bidder shall work out the Servers configuration and storage calculation based on the requirements as stipulated in this document considering inputs and the exact count of IO, Soft points .

9.2.4 Bidder to consider soft IOs for Rack DC rectifier system minimum 50 nos. per rack..

9.2.5 BMS should control the operation of oxygen pumping equipment's i.e. In ROw under fire situation.

9.2.6 Architecture of BMS system shall be of:

- Management Level (BMS Servers/Software)
- Control Level (DDC Controllers)
- Field Level (Field Sensors)
- BMS should have capability to show real time PUE, trends and record historical data of PUE.
- BMS should generate event notifications over emails, data for events based on which uptime and downtime will be calculated.
- BMS should generate alarm signal and tripping signal at abnormal situations. This should be software generated and any one can be utilized for giving tripping command for shutting down the some servers or all.

9.2.7 There should be real-time reporting of

- Component wise and aggregate power consumption

- Temperature and relative humidity in the data centre and UPS room.
- Instantaneous PUE, hourly PUE, daily PUE, monthly PUE and annual PUE.
- Alarm indicators for component failures.
- GUI with SLD ,P *ID, Equipment's visuals etc.

9.2.8 There should be real-time monitoring and logging of all parameters of the data centre as per ASHRAE/TGG 2009 Real time energy consumption measurements in data centres guidelines (best practical). There should be facilities for periodic reports (including uptime reports) of all aspects of the data Centre. All the required hardware and software eco-system including storage (High end PC, 2 X 32" LCD HD Monitor, Key Board, Mouse etc.) has to be supplied by the bidder.

9.2.9 The BMS system should allows for the monitoring, control, interrogation, alarm handling and routing for the following equipment's but not limited to:

- HVAC equipment –
- Generators.
- UPS and Battery system
- LV metering and equipment.
- Fire Alarm Systems.
- Water Leak detection System.
- Rodent Repellent System
- Etc.

9.3 Supply and Implement fire alarm system –

The system and its components shall be Underwriters Laboratories, Inc. listed, and FM APPROVED under the appropriate testing standard, for fire alarm systems and the installation shall be in compliance with the UL 10th Edition listing. The fire alarm system shall comply with requirements of NFPA 72 (National Fire Alarm and Signaling Code). The system shall be electrically supervised and monitor the integrity of all conductors.

When a fire alarm condition is detected and reported by one of the system indicating the affected devices, the following functions shall immediately occur:

- The System Alarm LED to be flashed.
- Built in Agent release circuit with release / Abort module of same make.
- System output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm should be executed, and the associated system outputs (notification appliances and/or relays) to be activated.
- The audio portion of the system should sound the proper audio signal (consisting of tone, voice, or tone and voice) to the appropriate zones.
- Zone identification should be available on BMS system.

The publications listed below are part of this specification.

National Fire Protection Association (NFPA) - USA:

| | |
|---|---|
| No. 70 | National Electric Code (NEC) |
| No. 72-1996 | National Fire Alarm Code |

| | |
|---|---|
| No. 90A | Air Conditioning Systems |
| No. 92A | Smoke Control Systems |
| No. 92B | Smoke Management Systems in Large Areas |
| No. 101 | Life Safety Code |

9.4 Supply and Implement Video Surveillance systems:

The surveillance system shall be designed and developed to the following standards: NFPA-70 (National Electric Code), National Electrical Safety Code (NESC), CE Compliant, UL ISO/IEC 27001 etc.- Supply, Installation, Testing and Commissioning of CCTV system along with indoor, outdoor cameras to cover entire DC area as well as outside equipment's area. The complete security system shall provide "smart monitoring" where the reliance on human monitoring is minimized. All security alarm activations shall be brought to the attention of the BMS room and, where specified, live, and recorded images of the event are to be presented to the BMS control room automatically. The objective will be to provide High degree of Electronic surveillance system to the DC area and outside utility. The purpose is to monitor & servile the entire area for unwanted incidents. The objective is also to restrict unauthorized personnel entry & exit through critical areas and facilitate effective people management. Strategically placed video surveillance cameras help to enhance security by providing motion based/continuous monitoring of all parts of premises. The CCTV system shall comprise of various types of Indoor and Outdoor cameras with 90 days storage capacity with high end recording resolution. Camera should be with true day and night IR lens and suitable IP rated for indoor and outdoor applications.

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9.5 Supply and implement Rodent Repellent System:

The objective is to protect the entire premises viz. server area, utility area etc., all the voids against rodents. The purpose is to keep the rodents away from the floor by generating very variable high frequency sound waves which are not audible to human ear but irritate rodents. The objective is to protect all the cables below floor, above ceiling & room void from damage caused by rodents. The system proposed is to protect all the equipment's, areas with relevant type of high frequency sound producing device called satellites or transducers. Once powered up these transducers produce very high frequency variable sound waves continuously which irritate the rodents and are forced to evacuate the place. The devices can be tested periodically by means of a test switch provided on Main console.

9.6 Supply and implementing Water Leak Detection system:

It should include electronic alarm modules, water sensing cable, graphic display map, and auxiliary equipment. The system has to be capable of automatically detecting the presence of water at any point across the length of sensing cable. The system should alarm and locate the point of liquid contact on the digital display. This system should capable of communicating to BMS.

9.7 Supply and implementing NOVEC 1230:

Supply, install, test and commission NOVEC 1230 (Fluro Ketone FK-5-1-12) based fire suppression system. The fire suppression system shall include and not be limited to gas release control panel, CCOE approved seamless cylinders, discharge valve (with solenoid or pneumatic actuator) as the case may be, discharge pipe, check valve and all other accessories required to make a complete operation system meeting applicable requirements of NFPA 2011 standards and installed in compliance with all applicable requirements of the local codes and standards. Suppression system needs to be inside the server rack as system is with close containment and in UPS and battery room needs to be for full room.

## 10 Indicative Design Schematic

**Minimum rating** of components at site ambient conditions (considering deration factors, taking in to account utilization of 90% under peak load) along with rating is as shown in below table.

| Sr. No. | Name of Components | Rating for each unit | Qty. | Redundancy |
|---|---|---|---|---|
| 1 | DX based Inrow with Air cooler condenser unit for Data Center Area | 25KW | 4 | N+1 |
| 2 | 2 X 150 KVA UPS with 10 minutes Li ION battery back for IT load | 150 KVA | 2 | N+N |
| 3 | 1 X 75 KVA UPS with 10 minutes SMF battery back for NON IT load . UPS should be with module of size 25KW or 30 KW– 3 numbers working and 1 standby in same frame. Battery back up on 70 KVA for 10 minutes . | 75 KVA | 1 | |
| 4 | IBMS System | | | |
| 5 | Electrical LT Panels, IEC Socket, Cables, internal and external illumination system etc. | | | |
| 6 | 1X 150 KW Adiabatic Dry Cooler system along with pump, chemical dozing system, air separator, piping, grooved fitting, expansion tank etc. | 150 Kw | 1 | |
| 7 | 3 X 3 T DX Based AC in UPS and battery room | 3T | 3 | N+1 |
| 8 | Civil work | | | |
| 9 | 1X1.5 Tr Split AC in Cabin | | | |

## 11 Refer annexure for all drawings

- Annexure A- Site Plan
- Annexure B-DC layout and Sections
- Annexure C-P & ID
- Annexure D-Electrical SLD

## 12 Applicable Standards but Not Limited to

Installation and materials shall also confirm to latest amendments of

a. Indian Electricity Rules
b. Indian Factories Act
c. National Electric Code
d. Petroleum rules
e. Quality and Safety Standards

| Sr. No. | Code Number | Description |
|---|---|---|
| 1 | IS 2309 | Protection of buildings and allied structures against lightning. |
| 2 | IS 3043 /IEEE 80 | Code of practice for earthing. |
| 3 | IS 5216 | Safety procedure and practices in Electrical work. |
| 4 | IS 3106 | Code of practice for selection, installation and maintenance of fuses ( Voltage not |
| 5 | IS 1646 | Code of practice for fire safety of buildings (general) Electrical installation. |
| 6 | IS 9921 | Alternating Current Dis connectors above 1000 V. |
| 7 | IS 2551 | Danger notice plates. |
| 8 | IS 1248 | Electrical indicating instruments. |
| 9 | IS 722 | AC Electric meters. |
| 10 | IS 3156 | Voltage transformers. |
| 11 | IS 10118 | Installation and maintenance of switchgear. |
| 12 | IS 398 /IEC 1089-1991 | ACSR conductors |
| 13 | IS 7098 | Cross linked polyethylene insulated PVC sheathed cables up to 33 KV |
| 14 | IS 12943 | Brass glands for PVC cables |

| Sr. No. | Code Number | Description |
|---|---|---|
| 15 | IEC 99-4 | Gapless Surge Arrestors |
| 16 | IS-900 | Code of practice for Installation and Maintenance of Induction Motors |
| 17 | IS-1255 -1983 | Codes of practice for Installation and Maintenance of Power Cables up to and including 33 KV Rating. |
| 18 | IS-732 1989 | Code of practice for Electrical Wiring Installation. (System Voltage not exceeding660 Volt). |
| 19 | IS-1913 | General and Safety Requirements for Luminaries. |
| 20 | IS-1646 | Code of Practice for Fire Safety of Building (General) Electrical Installation. |
| 21 | IS 8130 | Conductors for insulated electrical cables and flexible cords. |
| 22 | IS 3975 | Specification for mild steel wires, strips and tapes for armouring of cables |
| 23 | IS-2667 | Specification for Fittings for Rigid Steel Conduits for Electrical Wiring. |
| 24 | IS 3615 | Glossary of terms used in Refrigeration and Air-conditioning. |
| 25 | IS 325 | Three phase induction motor. |
| 26 | IS 1239 | Mild steel tubes, tubular and other wrought steel fittings. |
| 27 | IS 639 | Steel pipe flanges. |
| 28 | IS 277 | Galvanized sheet steel. |
| 29 | IS 5831 | Specification for PVC insulation sheath for electric cables. |
| 30 | IS 655 | Metal air ducts. |
| 31 | IS 732 | Code of practice for electrical wiring and fittings for buildings. |
| 32 | IS 900 | Code of practice for installation and maintenance of induction motors. |
| 33 | IS 1248 | Direct acting electrical indicating instruments. |
| 34 | IS 6392 | Steel pipe flanges. |
| 35 | IS 1367 | Technical supply conditions for threaded steel fasteners. |
| 36 | IS:10462 | Thickness of the PVC outer sheath |
| 37 | IS 4894 | Centrifugal fan. |

| Sr. No. | Code Number | Description |
|---|---|---|
| 38 | IS 1554 | PVC insulated (heavy duty) electrical cables for working voltages up to and including 1100 V. |
| 39 | IS 659 | Air-conditioning safety code. |
| 40 | IS 616 | Mechanical refrigeration safety code. |
| 41 | IS: 1554 - | PVC insulated (heavy duty) electric (Part I) Cables - Part I for working voltages up to and including 1100V. |
| 42 | IS: 1753 - | Aluminum conductors for insulated cables. |
| 43 | IS: 3961 - | Recommended current ratings for (Part II) cables: Part-II PVC insulated and PVC sheathed heavy-duty cables. |
| 44 | IS: 3975 - | Mild steel wires, formed wires and tapes for armouring of cables |
| 45 | IS: 5831 - | PVC insulation and sheath of electrical cables. |
| 46 | IEEE 519:1992 | Harmonics |
| 47 | IS 277 | Galvanized Steel Sheet (Plain and corrugated). |
| 48 | IS 655 | Metal Air Ducts. |
| 49 | IS 737 | Wrought Aluminum and Aluminum Alloy sheet and strip for general engineering purposes. |
| 50 | UL 181 | Factory – Made Air ducts and connectors. |
| 51 | UL 555 | Fire Dampers. |
| 52 | ASHRAE 70 | Method of testing for rating the performance of Air Outlets and inlets. |
| 53 | BS 649 | Diesel Engines for general purpose. |
| 54 | BS 2613 | Rotating Electrical Machinery. |
| 55 | IS 4722 | Electrical performance of rotating electrical machinery. |
| 56 | IS 4728 | Terminal markings for rotating electrical machines. |
| 57 | IS 4729 | Measurement of vibrations of rotating electrical machines. |
| 58 | IEC60034 | Rotating Electrical Machines |
| 59 | IEC60034.1 | Rotating Electrical Machines Part1: Rating and Performance |
| 60 | IEC60947 | Low Voltage Switchgear and Control Gear |
| 61 | ISO 8528 Part 1 to 10: | Reciprocating Internal Combustion engine Driven Alternating current Generating Sets |

| Sr. No. | Code Number | Description |
|---|---|---|
| 62 | IS-375 | Marking and arrangement for switchgear bus bars, main connection and auxiliary wiring. |
| 63 | IS-722 Part – I | AC Electricity Meters |
| 64 | | Part - I General requirements and tests |
| 65 | IS-1248 | Direct acting indicating analogue electrical measuring instruments and their accessories. |
| 66 | IS-1822 | AC Motor starters, of voltage not exceeding 1000 volts. |
| 67 | IS-2147<br>IS-2208 | Degrees of protection provided by enclosures for low voltage switchgear and control gear. |
| 68 | | HRC cartridge fuse links for voltage above 650V. |
| 69 | IS-2419<br>IS-2516 | Dimensions for panel mounting indicating and recording electrical instruments. |
| 70 | | Circuit Breakers - Requirements and Test voltages not exceeding 1000V AC or 1200V DC. |
| 71 | IS-2607 | Air break isolators for voltages not exceeding 1000 volts. |
| 72 | IS-2959 | Contactors for voltages not exceeding 1000V AC or 1200V DC |
| 73 | IS-3072 | Code of practice for installation and maintenance of switchgear. |
| 74 | IS-3106 | Code of practice for selection, installation, maintenance of fuses (voltage not exceeding 650V). |
| 75 | IS-3156, Part - I | Voltage Transformer - General Requirements. |
| 76 | Part – II | Voltage Transformer - Measuring Voltage Transformers. |
| 77 | Part – III | Voltage Transformer - Protective Voltage Transformers. |
| 78 | IS-3231 | Electrical Relays for Power System Protection. |
| 79 | IS-3914 | Code of practice for selection of AC Induction Motor Starters (Voltage not exceeding 1000V) |
| 80 | IS-4047 | Heavy-duty air-break switches and composite units of air-break switches and fuses for voltages not exceeding 1000 Volts. |
| 81 | IS-4064 | Air break switches, air break disconnections, air break switch disconnections and fuse combination units for voltages not exceeding 1000V AC or 1200V DC. |
| 82 | Part – I | Part I - General Requirements. |

| Sr. No. | Code Number | Description |
|---|---|---|
| 83 | IS-4146 | Application guide for Voltage Transformers. |
| 84 | IS-4201 | Application guide for Current Transformers. |
| 85 | IS-4237 | General Requirements for Switchgear and Control Gear for Voltages not exceeding 1000V AC or 1200V DC. |
| 86 | IS-4483 | Preferred panel cut-out dimensions for electrical relays - flush mounting IDMTL relays. |
| 87 | IS-4794, Part- I | Push Button Switches - General Requirement and Tests. |
| 88 | IS-5082 | Wrought aluminum & aluminum alloy bars, rode, tubes and sections for electrical purposes. |
| 89 | IS-5987 | Code of practice for selection of switches (Voltage not exceeding 1000V). |
| 90 | IS-6236 | Direct recording electrical measuring instruments. |
| 91 | IS-6875 | Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages up to and including 1000V AC and 1200V DC. |
| 92 | IS-8623 | Factory built assemblies of switchgear and control gear for voltages up to and including 1000V AC and 1200V DC. |
| 93 | IEC 62040-3 | (International Electro technical Commission) – Uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements. |
| 94 | IEEE 587 (ANSI C62.41) | Category A & B (International Electrical and Electronics Engineers) – Recommended practices on surge voltages in low voltage power circuits. |
| 95 | ANSI B 31.5 | Code for Refrigeration Piping |
| 96 | ASHRAE 30 | Methods of Testing Liquid Chilling Packages |
| 97 | ASHRAE 15 | Safety Code for Mechanical Refrigeration |

Bidder is required to submit compliance sheet in the tabular format for the selected products against above applicable code provision.

## 13 DC Acceptance Criteria:

Based on demonstration of following technical parameters, the DC implemented solution will be accepted.

13.1 Equipment's supplied and installed as per tender specifications defined in respective sections.

13.2 PUE

PUE should not be more than 1.4 during linpack testing.

13.3 Validating UPS redundancy operation by switching on and OFF some breakers.

13.4 Room Temperature – Measurement at various points inside data center to work out the hot pockets.

13.5 FAT report of equipment.

13.6 Demonstration of UPS operation under EB failure condition and EB restoration condition.

13.7 Demonstration of Battery backup under full load condition.

13.8 Demonstration of In Row Operation on actual heat load for air flow and temperature.

13.9 As build Drawing

13.10 Demonstration of creating false fire signal ( Cross Zoning Input )and checking operation of magnetic coil on NOVEC cylinder manifold.

13.11 Demonstration of Water Leak Detector system

13.12 Safety during Project Execution

13.13 Submission of Warranty Certificate from manufacturer of UPS , Battery , In Row , Battery etc. as per RFP

13.14 Demonstration of DG operation

13.15 Demonstration of Adiabatic Dry Cooler Operation

13.16 Effective GUI in BMS screen, Effective implementation and utilization of BMS system. Monitoring of all field devices including Humidity ,temperature sensors etc. on BMS screen , Control thro BMS in Automatic mode as well as Manual mode ( Manual mode should be on BMS screen as well as Hard Wiring) of all actuators equipment's etc as per operating, failure and fale safe logic..

13.17 Data Center aesthetics and interiors

## 14 Safety Regulations

The contractor shall at his own expense, arrange for the safety provisions as per the codes of Indian Standard Institution, Indian Electricity Act / Rule and such other Rules, Regulations and Laws as may be applicable in respect of all labour, directly or indirectly employed in the work for performance of the Contractor's part of this agreement. While the Indian Electricity

Rules 1956, as amended up to date, are to be followed in entirety, any installation or portion of the installation that does not comply with these Rules, should be rectified immediately.

The contractor shall be responsible for and indemnify the buyer against all injury to persons – both his own workmen and others and for all damage to structural and / or decorative part of the buyer's property during erection and commissioning of the equipment. The contractor shall repair / reinstate all such damage at his own cost.

It shall be ensured that the control switches and distribution boards are duly marked, the distribution diagrams of substations are prominently displayed, and the substation premises, main switch rooms and D.B. enclosures are kept clean. Particular care should be taken to prevent the substation being used as store for inflammable materials, broken furniture, waste materials etc.

No inflammable materials shall be stored in places other than the rooms specially constructed for this purpose in accordance with the provisions of the Indian Explosives Act. If such storage is unavoidable, it should be allowed only for short period and in addition, special precautions such as cutting off supply such places at normal times, storing materials away from wiring and switch boards, giving electric supply for a temporary period with due permission of engineer- in charge shall be taken.

Protective and safety equipment such as rubber gloves, earthing rods, line men's belt, portable respiration apparatus, necessary number of caution boards such as " Man on Line", "Don't switch on" etc. should be provided in easily identifiable locations. Where electric welding or such other nature of work is undertaken, goggles shall be provided.

Rubber or insulating mats should be available in front of the main switchboards or any other control equipment of medium voltage or above.

Standard first Aid boxes containing materials as prescribed by Indian red cross should be provided in easily identifiable locations and should be easily available.

Periodical examination of the first aid facilities and protective and safety equipment provided should be undertaken and proper records shall be maintained for their adequacy and effectiveness.

Charts (one in English and one in regional language) displaying methods of giving artificial respiration to a recipient of electrical shock shall be prominently displayed at appropriate places.

A chart containing the names, addresses and telephone numbers of nearest authorized medical practitioners, hospitals, fire brigade and also officers in charge shall be displayed prominently along with the first Aid box.

Steps to train supervisory staff and authorized persons of the engineering staff in the first Aid practices, including various methods of artificial respiration with the help of local authorities such as fire brigade, St. John's Ambulance Brigade, Indian Red Cross or other recognized institutions equipped to impart such training shall be taken, as prompt rendering of artificial respiration can save life at the time of electric shock.

Electrical wiring and control switches should be periodically inspected and any defective wiring switches which will expose live parts should be replaced immediately to make installation safe.

No work on live L.T. bus bars or pedestal switch boards should handle by a person below the rank of a wire man and such a work should preferably be done in the presence of the Engineer in charge of the work.

- When working on or near live installation, suitable insulated tools should be used, and special care should be taken to see that these tools accidentally do not drop on live terminals causing shock or dead short.
- The electrical switchgear and distribution boards should be clearly marked to indicate the area being controlled by them.
- Before starting any work the existing installation, it should be ensured that the electric supply to that portion in which the work is undertaken is preferably cut off. Precautions like displaying “Men at Work” caution boards on the controlling switches, removing fuse carrier from these switches and these fuse carriers being kept with the person working on the installation, etc., should be taken against accidental energization. “Permit to Work” should be obtained from the Engineer-in-charge. No work on H.T. main should be undertaken unless it is made dead and discharged to earth with an earthing lead of appropriate size. The discharge operation shall be repeated several times and the installation connected to earth positively before any work is taken up.
- Before energizing any installation after the work is completed, it should be ensured that all the tools have been removed and accounted and no person is present inside any enclosure of the switchboard. Any earthing connection made for carrying out the work should be removed. "Permit to work” should be received back duly signed by the person to whom it was issued in token of having completed the work and the installation being ready for energisation and “Men at Work” caution Boards removed.
- In case of electrical accidents and shock, the electrical installation on which the accident occurred should be switched off immediately and the affected person should be immediately removed from live installation by pulling him with the help of coat, shirt, and wooden material or with any other dry cloth. He should be removed from the place of accident to a nearby safe place and artificial respiration continuously given as contained in BIS code and standard prescribed by St John Ambulance Brigade or Fire Brigade.
- While artificial respiration on the affected person is started immediately, help of Fire Brigade and Medical Practitioner should be called for an artificial respiration should be continued uninterrupted until such help arrived.
- These instructions should be explained in Hindi / local language to those staff who does not understand English.

The contractor shall ensure that all portable power tools used by the workman are rated 230 volts, double insulated and have to taken through 100 mA Earth Leakage Circuit Breaker (ELCB). Also all temporary lighting shall be supplied through 30 mA ELCB. Inserting wire into the sockets without the plug tops is not allowed. The length of the extension cord for portable tools should not be more than 5 feet. Temporary cables and flexible wires of short length should be bunched up and supported at inaccessible height. Temporary lamps should be mounted at inaccessible height. If lamps are incandescent, they should be protected by wire-mesh.

All power supply / Distribution Boards shall have canopy for protection against weather if located outdoors.

While carrying out work in Vessels / AC ducts or any other confined place, hand lamps with metallic guard suitable for 24 Volts AC supply shall be used All non-current carrying metallic parts of electrical system and equipment shall be earthed with two separate earthing wires of adequate capacity.

a. GENERAL RESPONSIBILITY

The contractor shall obtain a "Work Permit" from the Site Engineer / Client before starting any work at site. The work permits are issued to prevent any one working in unauthorized areas and they are valid for specific period.

The contractor shall produce test certificates from Government approved certifying authorities for all the lifting gear & hoists (slings, chains, hooks, chain pulley blocks, winches, cranes etc.) before starting the work. The contractor's supervisor for subsequent spot checks shall retain the certificates.

The gas cylinders should be used in safe manner. They should not be dropped from heights. Acetylene cylinder should be kept upright position. Oxygen cylinders should not be kept near inflammable materials like oil etc.

The contractor is to remove all waste materials from and around the work site and leave the work spot spick and span.

**Works like Gas cutting, welding etc.**

Before carrying out any work like gas cutting, welding etc. the contractor shall contact the site-in -charge to ascertain about the safety of the area for welding work.

The contractor shall produce certificates for his welding sets checked by the site in charge before starting the work. The certificates shall have to be renewed every two months. A copy of the current certificate shall be displayed on the welding sets.

Only cables in good condition and insulated holders are to be used. The length of the supply cable shall not exceed 25 feet and the welding set body shall be properly earthed. Under no circumstance building structure pipeline should be used as a return path of the current.

**A charged fire extinguisher of CO2 type is to be carried with each welding set.**

**The welder is to wear good quality insulated welding gloves, shoes & goggles while at work.**

**Tarpaulins are not be used in the vicinity of welding / gas cutting jobs.**

b. EXCAVATION

In the event of an excavation being made, it is the responsibility of the contractor to see that any opening, sump or pit caused by them is securely fenced as required by the Factory Act.

c. WORKING AT HEIGHT

For carrying out work at heights exceeding 6 feet or over and near the opening in floors, roofs, etc the following precaution to be taken.

The written permission of the Departmental Manager is to be taken before carrying out any work. Adequate safety precautions like use of safety belts, crawling ladders etc are to be taken.

All personnel engaged on overhead work shall be men experienced in such work.

Whenever possible timber staging or platform shall be erected with planks of minimum thickness 2 inches and minimum width 12 inches when the nature of work demands staging of a greater width than plank provided then additional planks shall be added and lashed securely.

Staging shall be provided with simple safety rails or ropes throughout its length, at waist height and on each open side.

Staging supports shall be of standard steel scaffolding safely secured and supported on firm level footings or slung from overhead beams. The supports shall be situated at a maximum distance of 8 feet apart and staging shall be secured to each support.

In case the site or nature of work is unsuitable for erection of proper staging all workers shall wear safety belts around their waists and secure their lifelines to strong scaffolding or structural members.

Wherever it is not possible to put up staging and / or use safety belts, safety nets or sheets shall be slung beneath the place of work.

When working in open process vessels or tanks, safety belts or safety nets shall always be used whether or not staging and scaffolding is provided.

Safe access to all points of work should be provided in the form of suitable ladders, stairways etc.

Contractor's employee of at least status of a foreman shall examine all arrangements before starting such work is commenced and shall satisfy himself that all reasonable safety precautions have been taken.

d. FIRE INSTRUCTIONS

Before carrying out any gas cutting, welding etc, the contractor shall contact the site-in - charge to ascertain about the safety of the area for welding work.

Smoking is strictly prohibited in premises. Severe action will be taken if any of the contractor's workmen is found smoking at the work site area.

In case fire is discovered, dispatch additional force & site Engineer. Wherever possible switch off any electrical and gas apparatus near the fire.

Check the nature of fire, pick up appropriate fire extinguisher and try to put out fire. For Electrical fire use carbon dioxide fire extinguisher.

e. PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment should be worn wherever necessary.

f. REVIEW MEETINGS

Periodic safety review meeting shall be conducted to review safety and for better coordination with other agencies.

Periodically safety review will be held with Site Engineer and issues will be discussed and action points shall be monitored and recorded in a separate safety Register / File.

g. WORK AFTER NORMAL WORKING HOURS

Extra care need to be taken for jobs being carried out after normal working hours with due revalidated work permit.

h. ACCIDENTS

In case of injury or serious illness, the department should be informed immediately. All injuries are to be reported by filling in the “injury report” form, which will be available with the respective department / site engineer.

These safety conditions should not be regarded as exhaustive. These have been issued for the guidance of the contractor and will not in any way absolve the contractor from any obligations or liabilities that might incur or transfer such obligations on liabilities to the company.

***(End of Section- IV)***

## SECTION V - PRICE SCHEDULE

**Summary Format- Supply, Installation, Testing and Commissioning along with Loading, Unloading, Transport, Transit Insurance etc.**

| Sr. No. | Particulars | Unit | Quantity | Supply Price Rs. | GST Rs. | Installation Price Rs | GST Rs. | Total Price Rs. |
|---|---|---|---|---|---|---|---|---|
| | Bidders to calculate the quantity as per Drawing Layout, SLD and Site visit | | | | | | | |
| 1 | Civil and allied works – Raised floor, False ceiling, fire door, gypsum partition, fire rated vision window, equipment foundation work, soil excavation work and refilling for laying of cable, MS work etc . Cabin Civil Work including glass partition, glass door, furniture etc. | Lot | 1 | | | | | |
| 2 | UPS 2 X 150 KVA along with Li ION battery bank for 10 minutes back up time , with Battery Rack, Isolator, DC cabling etc. | Set | 1 | | | | | |
| 3 | UPS 1 X 75 KVA along with SMF battery bank for 10 minutes back up time, with Battery Stand, Isolator, DC cabling etc. | Set | 1 | | | | | |
| 4 | LV Electrical Components, All LT Panels, DBs, IEC sockets, Isolator Panels, In Row Panels etc. | Lot | 1 | | | | | |
| 5 | All LT Cabling –Power and Control, Earthing, Cable Trays, SS Cable Tray, perforated mesh cable trays Supports, Cable terminations, Glands and other accessories etc. Modification work in existing substation room. | Lot | 1 | | | | | |
| 6 | Internal and External Illumination System along with DBs | Lot | 1 | | | | | |
| 7 | In Row Unit along with Air cooled Condenser, Cu piping and other accessories including close aisle containment, doors etc. Cu piping needs to be laid thro perforated cable trays. | Lot | 1 | | | | | |
| 8 | AC unit 3 T and 3 Nos in UPS and battery room along with Air cooled Condenser, Cu piping and other accessories etc. Cu | Lot | 1 | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | piping needs to be laid thro perforated cable trays. Cabin AC work including 1 X 1.5 TR split AC unit. | | | | | | | |
| 9 | Adiabatic Dry Cooler along with Pump, Grooved Fitting, Piping, Chemical Dozing unit, Expansion tank, air separator, water tank for adiabatic water storage etc . | Lot | 1 | | | | | |
| 10 | Fire Alarm system including Detectors, panels, cabling and associated accessories in Server Rack and UPS and Battery room | Lot | 1 | | | | | |
| 11 | Fire Suppression system including Gas release panel, cylinder, Manifold, piping and associated accessories inside server racks, UPS and Battery area. | Lot | 1 | | | | | |
| 12 | NOVEC Gas with NOVEC cylinder for Server rack | Lot | 1 | | | | | |
| 13 | NOVEC Gas with NOVEC cylinder for UPS and battery room. | Lot | 1 | | | | | |
| 14 | CCTV system including camera, switch, NVR, Cables, monitors etc. | Lot | 1 | | | | | |
| 15 | IBMS software including system (Computer, Monitor) integration of third-party devices, I/O modules, all control and communication cabling etc. | Lot | 1 | | | | | |
| 16 | Other IBMS including Water leak detectors, Rodent Repellent, Water quality sensor system | Lot | 1 | | | | | |
| 17 | Any other item, material required to complete the solution | Lot | 1 | | | | | |
| 18 | Operation and Maintenance –Year-1 | Set | 1 | | | | | |
| 19 | Operation and Maintenance –Year-2 | Set | 1 | | | | | |
| | | | | | | | | |
| | **Sub - Total Rs.** | | | | | | | |
| | | | | | | | | |
| | **Grand Total Rs.** | | | | | | | |

**Detailed Commercial Bid is to be submitted in the format as appearing above.**

**Notes:**

1. **Prices for individual line items of the BoQ should be mandatorily submitted. CR RAO AIMSCS reserves the right to reject the bid in case bidder fails to quote all the required items**.
2. Bidder must fill the supply and installation prices separately as per the above table.

3. The prices quoted should include the charges towards testing of equipments, installations and approvals from local electricity board/PWD, electrical/ civil engineering authority, pollution control board - as applicable. The official charges required for the required testing, certification, NOC etc. are to be paid by the bidder. The certifications, NOC etc. shall be in the name of CR RAO AIMSCS.
4. The invoice can be raised in compliance with GST requirements, giving full bill of material.

## ANNEXURE A – COVERING LETTER

Date:
To:
Director,
**C.R. Rao Advanced Institute of Mathematics, Statistics and Computer Science (AIMSCS), University of Hyderabad Campus, Central University Post Office, Prof. CR Rao Road, Hyderabad – 500 046, Telangana, India.**

**Subject:** Submission of the Technical bid for Supply of Data Centre Solutions

Dear Sir,

We, the undersigned, offer to supply Data Centre Solutions and allied services in response to your Tender No. 001/CRRAO/NSM/25-26/05-01. We are hereby submitting our proposal for same, which includes this Technical bid and the Financial Bid

We hereby declare that all the information and statements made in this Technical bid are true and we accept that any misinterpretation contained in it, may lead to our disqualification.

We undertake, if our proposal is accepted, to submit a Security Deposit of 5 % of the contract / order value, as per terms stipulated in the tender.

We confirm that the deliveries, installation will be done within 4 months (16 weeks), if the order is placed.

We hereby certify that my/ our firm has not been disqualified and / or blacklisted by any Office/ Department/ Undertaking of the State Government / Central Govt. of India, PSU/ Autonomous Body of Government of India, as on the date/time of submission of this bid.

We undertake, if our proposal is accepted, to initiate the Implementation activities towards supply of material and services, as stipulated in the referred RFP.

We hereby accept the applicable protocols while delivery, installation, implementation, commissioning of the entire `Turn-key' job with regards to `COVID-19' conditions at the Institution/site. (The same will be informed in the supply/work order(s) placed, if any).

We agree to abide by all the terms and conditions of the RFP document, including corrigenda. We would hold the terms of our bid valid for 180 days as stipulated in the RFP document.

We understand you are not bound to accept any Proposal you receive.

The undersigned is authorized to sign this bid document. The authority letter to this effect is enclosed.

Yours sincerely,
Authorized Signatory:
Name and Title of Signatory:
e-mail:
Mobile No:

## ANNEXURE B – AUTHORITY LETTER

Date:

Director,
**C.R. Rao Advanced Institute of Mathematics, Statistics and Computer Science (AIMSCS), University of Hyderabad Campus, Central University Post Office, Prof. CR Rao Road, Hyderabad – 500 046, Telangana, India.**
**Subject: Authority Letter**

Reference: Tender No. 001/CRRAO/NSM/25-26/05-01

Dear Sir,

We, M/s _____ (Name of the bidder) having registered office at _____ (address of the bidder) herewith submit our bid against the said RFP document.

Mr./Ms. _____ (Name and designation of the signatory), whose signature is appended below, is authorized to sign and submit the bid documents on our behalf against said RFP

Specimen Signature:

The undersigned is authorised to issue such authorisation on behalf of us.

For M/s _____ (Name of the bidder)

Signature and company seal

Name

Designation

Email

Mobile No.

## ANNEXURE C – UNDERTAKING BY PRINCIPAL MANUFACTURER

**(To be submitted in Original on Letterhead- for all major equipments/devises/products – separately.)**

Date:

Director,
**C.R. Rao Advanced Institute of Mathematics, Statistics and Computer Science (AIMSCS), University of Hyderabad Campus, Central University Post Office, Prof. CR Rao Road, Hyderabad – 500 046, Telangana, India.**

Subject: **Undertaking by Principal Manufacturer against tender no. 001/CRRAO/NSM/25-26/05-01 for Supply, Installation & Commissioning of Data Centre Solutions.**

Dear Sir,

We, M/s _____ (Name of the manufacturer) having registered office at _____ (address of the manufacturer) by virtue of being manufacturer for _____ (Name of the product/s), hereby authorise M/s _____ (Name of the bidder) having their office at _____ (Address of bidder) to submit quote, supply, install and provide after sales support for our range of products quoted by them to meet the above mentioned tender requirements.

M/s _____ (Name of the manufacturer) within the scope of requirement as per the tender mentioned above undertake to provide technical & other support towards fulfilling the requirements of installation, commissioning, acceptance criteria and product warranty services of the Data Centre Solutions to be supplied and installed at site(s) by our authorised representative M/s (Name of bidder) against said tender.

The undersigned is authorised to issue such authorisation on behalf of M/s _____ (Name of the manufacturer).

For M/s _____ (Name of the manufacturer)

Signature & company seal

Name

Designation

Email

Mobile No.

## *ANNEXURE E – PERFORMANCE BANK GUARANTEE*

**(on non-judicial paper of appropriate value)**

To,

Director,
**C.R. Rao Advanced Institute of Mathematics, Statistics and Computer Science (AIMSCS), University of Hyderabad Campus, Central University Post Office, Prof. CR Rao Road, Hyderabad – 500 046, Telangana, India.**

BANK GUARANTEE NO:

DATE:

Dear Sir(S)

This has reference to the Purchase Order No. _____ Dated _____ been placed by CR RAO AIMSCS on M/s_____ (Name & Address of vendor) for supply, installation, commissioning warranty of _____ (description of items) at CR RAO AIMSCS.

The conditions of this order provide that the vendor shall,

1. Arrange to deliver the items listed in the said order to the consignee, as per details given in said order, and
2. Arrange to install and commission the items listed in said order at client's site, to the entire satisfaction of CR RAO AIMSCS and
3. Arrange for the comprehensive warranty service support towards the items specified in purchase order.

M/s (Name of Vendor) has accepted the said purchase order with the terms and conditions stipulated therein and have agreed to issue the performance bank guarantee on their part, towards promises and assurance of their contractual obligations vide the Supply Order No. _____ M/s. _____ (name of vendor) holds an account with us and has approached us and at their request and in consideration of the promises, we hereby furnish such guarantees as mentioned hereinafter.

CR RAO AIMSCS shall be at liberty without reference to the Bank and without affecting the full liability of the Bank hereunder to take any other undertaking of security in respect of the suppliers obligations and / or liabilities under or in connection with the said contract or to vary the terms vis-a – vis the supplier or the said contract or to grant time and or indulgence to the supplier or to reduce or to increase or otherwise vary the prices or the total contract value or to forebear from enforcement of all or any of the obligations of the supplier under the said contract and/or the remedies of CR RAO AIMSCS under any security (ies) now, or hereafter held by CR RAO AIMSCS and no such dealing(s) with the supplier or release or forbearance whatsoever shall have the effect of releasing the bank from its full liability of CR RAO AIMSCS hereunder or of prejudicing right of CR RAO AIMSCS against the bank.

This undertaking guarantee shall be a continuing undertaking guarantee and shall remain valid and irrevocable for all claims of CR RAO AIMSCS and liabilities of the supplier arising up to and until _____ (date)

This undertaking guarantee shall be in addition to any other undertaking or guarantee or security whatsoever the that CR RAO AIMSCS may now or at any time have in relation to its claims or the supplier's obligations/liabilities under and / or in connection with the said contract and CR RAO AIMSCS shall have the full authority to take recourse to or enforce this undertaking guarantee in preference to the other undertaking or security (ies) at its sole discretion and no failure on the part of CR RAO AIMSCS in enforcing or requiring enforcement of any other undertaking or security shall have the effect of releasing the bank from its full liability hereunder.

We _____ (Name of Bank) hereby agree and irrevocably undertake and promise that if in your (CR RAO AIMSCS) opinion any default is made by M/s _____ (Name of Vendor) in performing any of the terms and /or conditions of the agreement or if in your opinion they commit any breach of the contract or there is any demand by you against M/s _____ (Name of Vendor), then on notice to us by you, we shall on demand and without demur and without reference to M/s _____ (Name of Vendor), pay you, in any manner in which you may direct, the amount of Rs. _____/- (Rupees _____ Only) or such portion thereof as may be demanded by you not exceeding the said sum and as you may from time to time require. Our liability to pay is not dependent or conditional on your proceeding against M/s _____ (Name of Vendor) and we shall be liable & obligated to pay the aforesaid amount as and when demanded by you merely on an intimation being given by you and even before any legal proceedings, if any, are taken against M/s _____ (Name of Vendor)

The Bank hereby waives all rights at any time inconsistent with the terms of this undertaking guarantee and the obligations of the bank in terms hereof shall not be anywise affected or suspended by reason of any dispute or disputes having been raised by the supplier (whether or not pending before any arbitrator, Tribunal or Court) or any denial of liability by the supplier or any order or any order or communication whatsoever by the supplier stopping or preventing or purporting to stop or prevent payment by the Bank to CR RAO AIMSCS hereunder.

The amount stated in any notice of demand addressed by CR RAO AIMSCS to the Bank as claimed by CR RAO AIMSCS from the supplier or as suffered or incurred by CR RAO AIMSCS on the account of any losses or damages or costs, charges and/or expenses shall as between the Bank and CR RAO AIMSCS be conclusive of the amount so claimed or liable to be paid to CR RAO AIMSCS or suffered or incurred by CR RAO AIMSCS, as the case may be and payable by the Bank to CR RAO AIMSCS in terms hereof.

You (CR RAO AIMSCS) shall full liberty without reference to us and without affecting this guarantee, postpone for any time or from time to time the exercise of any of the powers and rights conferred on you under the contact with the said M/s _____ (Name of Vendor) and to enforce or to forbear from endorsing any power or rights or by reason of time being given to the said M/s _____ (name of Vendor) which under law relating to the sureties would but for the provisions have the effect of releasing us.

You will have full liberty without reference to us and without affecting this guarantee, postpone for any time or from time to time the exercise of any of the powers and rights conferred on you under the contract with the said M/s _____ (Name of Vendor) and to enforce or to forbear from endorsing any power or rights or by reason of time being given to the said M/s _____ (Name of Vendor) which under law relating to the sureties would but for the provisions have the effect of releasing us.
Your right to recover the said sum of Rs. _____/- (Rupees _____ only) from us in manner aforesaid will not be affected/ or suspended by reason of the fact that

any dispute or disputes have been raised the said M/s _____ (Name of Vendor) and/ or that any dispute or disputes are pending before any officer, tribunal or court or Arbitrator.

The guarantee herein contained shall not be determined or affected by the liquidation or winding up, dissolution or change of constitution or insolvency of the said M/s _____ (Name of Vendor) but shall in all respects and for all purposes be binding and operative until payment of all dues to CR RAO AIMSCS in respect of such liability or liabilities.

Our liability under this guarantee is restricted to Rs._____/- (Rupees _____Only). Our guarantee shall remain in force until unless a suit action to enforce a claim under guarantee is filed against us within one month from the date of expiry of guarantee, all your rights under the said guarantee shall be forfeited and we shall be relieved and discharged from all liabilities there under.

We have power to issue this guarantee in your favour under Memorandum and Articles of Association of our Bank and the undersigned has full power to do under the power of Attorney dated.

Notwithstanding anything contained herein:

A. Our liability under this guarantee shall not exceed Rs_____ (in words)
B. This bank guarantee shall be valid up to (36 months from date of installation) & unless a suit for action to enforce a claim under guarantee is filed against us within one month from the date of expiry of guarantee, all your rights under the said guarantee shall be forfeited and we shall be relieved and discharged from all liabilities there after i.e. after one month from the date of expiry of this Bank guarantee
C. We are liable to pay the guaranteed amount or any parts thereof under this bank guarantee only and only if you serve upon us a written claim or demand or before _____
D. The Bank guarantee will expire on _____

Granted by the Bank

Yours faithfully,

For (Name of Bank)

SEAL OF THE BANK

Authorised

Signatory

## *ANNEXURE F – UNDERTAKING*

Date:

Director,
**C.R. Rao Advanced Institute of Mathematics, Statistics and Computer Science (AIMSCS), University of Hyderabad Campus, Central University Post Office, Prof. CR Rao Road, Hyderabad – 500 046, Telangana, India.**

**Subject: Undertaking as per GFR – 2017, Rule 170(iii)**

Dear Sir,

We, the undersigned, offer to carry out the `Turn-key' project including **Products/items, components etc.** as per tender at CR Rao AIMSCS, in response to your Tender 001/CRRAO/NSM/25-26/05-01. We are hereby submitting our proposal for same, which includes Technical bid and the Financial Bid. As a part of eligibility requirement stipulated in said tender document, we hereby submit a declaration in lieu of Earnest Money Deposit (EMD), as given below:

1. **Our bid shall remain valid for 180 days from the date of submission and that we will not withdraw or modify our bid during the validity period,**
2. **In case, we are declared as successful bidder and an order is placed on us, we will submit the acceptance in writing within 7 days of placement of order on us.**
3. In case, we are declared as successful bidder and an order is placed on us, we undertake, to submit a Security Deposit of 5 % of the order value, as per terms stipulated in the tender.
4. In case of failure on our part to comply with any of the above said requirements, we are aware that we shall be declared as un-eligible for said tender and /or debarred from any **future bidding process of CR RAO AIMSCS or any Government entity for a period of minimum one year.**
5. The undersigned is authorized to sign this undertaking.

Yours sincerely,

Authorized Signatory:

Name and Title of Signatory:
e-mail:
Mobile No:

## *ANNEXURE –G: DOCUMENTS CHECK –LIST*

| Sr. No. | Documents to be Submitted (IN THE FOLLOWING SEQUENCE ONLY). | Submitted (Yes / No) with page nos. |
|---|---|---|
| | e-Packet-1 (Section-I) | |
| 1 | Annexure-G duly filled and neatly arranged in the following sequence only. The bidder must submit all the documents as per Document Checklist – Annexure G, with appropriate page nos for the same. The flow of the submitted documents must be in the same order/sequence. | |
| 2 | Covering Letter as per Annexure - A. | |
| 3 | Authority Letter as per Annexure – B | |
| 4 | Demand Draft no /UTR no – (direct deposit) for Rs. 30000/- towards Tender fees (Non-exempted/non-refundable) | |
| 5 | Demand Draft / BG / Exemption documents or Annexure F towards EMD | |
| | e-Packet-1 (Section-II) | |
| 6 | A copy of Certificate of Incorporation, Partnership Deed / Memorandum and Articles of Association / any other equivalent document showing date and place of incorporation, as applicable. | |
| 7 | A copy of GST registration certificate. | |
| 8 | Copies of at purchase orders or contracts and installation reports in the name of bidder from the end client / end user, as per eligibility criteria. | |
| 9 | A photo copy of the commercial bid without prices (prices blocked) and copy of commercial terms & conditions (in detail) as included in the commercial bid. CR RAO AIMSCS reserves the right to reject the bid in case of any discrepancy observed in the un-priced commercial bid and the actual commercial bid. | |
| 10 | The undertaking(s) from the Principal Manufacturer(s) (OEMs) of products/ items offered as per Annexure – C. | |

| Sr. No. | Documents to be Submitted (IN THE FOLLOWING SEQUENCE ONLY). | Submitted (Yes / No) with page nos. |
|---|---|---|
| 11 | Undertaking to the effect that a Security Deposit of 5% of the order value will be submitted in case CR RAO AIMSCS decides to place the Purchase Order. | |
| 12 | Undertaking to the effect that the bidder is not black-listed or barred from participation in bidding process by any Central/ State Government, Government Department, Government Undertaking, Public Sector Unit (PSU) or autonomous institution, as on date of submission of bids. | |
| 13 | All the necessary documents in support of eligibility criteria stipulated in Eligibility Criteria. | |
| | e – Packet 1 (Section-III) | |
| 14 | The executive summary of the bid submitted (As per Section-V) | |
| 15 | Duly filled Technical Bid (covering the details of solution, detailed bill of material, technical specifications, makes and models of items, diagrams, layouts, all drawings etc.) | |
| 16 | The details of electrical power consumption, foot-print, ambient temp, temperature range targeted, short circuit calculations, cable schedule along with voltage drop calculations, battery sizing and back up calculations etc. | |
| 17 | Design basis and analysis of cooling solution at full and partial load conditions including complete details, assumptions made and the specific references/standards used for the same | |
| 18 | Legal / statutory permissions required, if any. | |
| | e –packet 2 (FINANCIAL BID- B.O.Q.xls format) | |
| 1 | Price Bid as per format given in Section - V | |

## ANNEXURE H – SERVICE LEVEL AGREEMENT (SLA)

The successful bidder will be required to sign a SLA, at the time of issuing the works order for supply, installation and commissioning of Data Centres. The basic service requirements /conditions that would be covered in the SLA are as given below.

### 1. Scope of Work for Operation and Maintenance

Scope of this SLA covers the satisfactory Operations of DC, Maintenance, warranty and support, as stipulated in the Tender, Works Order, for a period of two years from the date of successful installation and commissioning of the Data Centre. One minimum four years experienced ITI technician with experience in the field of O & M for Electrical and cooling equipment's per shift (Shift means 8 working hours so three peoples in three shift ) and one Diploma Engineer with minimum six years of technical + administration experience needs to be deployed. Data center operation will be 24 hr and 365 Days. Accordingly, man power needs to be deployed for 365 Dyas 24 Hours. 44 OU CPU ,44 OU CPU+GPU Racks -ORV 3 complied, DC power modules for this component along with DCLC systems bidder needs to do the operation activity. During any kind of maintenance (Routing or Breakdown) bidders O & M team needs to communicate with the respective vendors service representative by phone / e mail keeping CR RAO AIMSCS. CR RAO AIMSCS will communicate in due time the list of service persons and escalation matrix.

### 2. Definitions

"**Uptime**" shall mean the time period for which the specified services / components with specified technical and service standards are available to the state and user departments. Uptime, in percentage, of any component (Non-IT) can be calculated as:

Uptime = {1- [(Downtime) / (Total Time – Scheduled Maintenance Time)]} * 100

"**Downtime**" shall mean the time period for which the specified services / components with specified technical and service standards are not available to the state and user departments and excludes the scheduled outages planned in advance, the link failures and reasons beyond Vendor Control.

"**Incident**" refers to any event / abnormalities in the functioning of the Data Centre Equipment / specified services that may lead to disruption in normal operations of the Data Centre services.

"**Resolution Time**" shall mean the time taken (after the incident has been reported at the helpdesk), in resolving (diagnosing, troubleshooting and fixing)

**The following shall be the responsibilities of the successful bidder.**

### 3. Uptime Requirements:

The bidder shall ensure the uptime requirements for various systems, equipment's, components as per details given in the following Table.

| Sr No | List of Utilities | Criticality | Redundancy | Uptime | Resolution time |
|---|---|---|---|---|---|
| 1 | HVAC and Cooling (Including In Row, PAC etc.) | High | N+1 | 98.5% | 6-8 hours for minor complaints and 24-48 hours for major complaints. |
| 2 | UPS | High | N+1 | 98.5% | 6-8 hours for minor complaints and 24-48 hours for major complaints. |
| 3 | Electrical Infrastructure | High | N+1 | 98.5% | 6-8 hours for minor complaints and 24-48 hours for major complaints. |
| 4 | Fire detection and alarm systems, VESDA system, Fire suppression system, | High | | | Within 24 Hours |
| 5 | BMS and real-time measurements, CCTV system, Rodent control, Water leak detection system, Access control system | Medium | | | Within 48 Hours |

**4. Reporting Methodology**

Understand & analyzing the products covered in the Supply, installation and commissioning scope and performance on periodic basis.

Submission of daily, weekly and monthly service performance reports in the agreed format specified as per the requirement of the infrastructure facilities.

Measurement and Monitoring with recording of readings and checking parameters of different facility equipment's.

Analyzing the readings and escalating suitably for abnormalities observed, if any. Supervise installation and maintenance work, whenever new equipment or systems are to be / being installed.

Adequate stock of onsite and offsite spare parts and spare component must be maintained by the successful bidder.

Successful bidder to ensure the commitment towards uptime requirement of the DC.

To provide this service it is important for the M/S ..... selected bidder to have back to back arrangement with the OEMs. The selected bidder would be required to provide a copy of the service level agreement signed with the respective OEMs.

Component that is reported to be down on a given date should be either fully repaired within the stipulated time frame. If breakdown is major, bidder to arrange for standby component/equipment on temporary basis (of equivalent configuration) within the time frame. In case the selected bidder fails to meet the above standards of maintenance, there will be a penalty as per clause 9 of section III.

**5. DAILY CHECKS:**

**Access Control System:**

- 24x 7 checking of Access System for alert and alarms.
- Monitoring of Status.
- Abnormality of System / errors
- Access Card Activity
- Report of Access to Data Center
- Report of Forceful Access (Invalid Access)
- Generation of Logs / reports and submission to Host Institute for review and necessary action.
- Testing & checking of all Doors, Magnetic locks and Sensors.

**CCTV:**

- Daily Checking of DVR System & Cameras
- Suspicious Action Report
- Abnormality of System
- Generation of Logs / reports and submission to Host Institute for review and necessary action/s Maintenance of reports

**Fire Alarm System, Novec 1230 Gas, VESDA, Water Leak Detection (WLD), Rodent Repelled:**

- Daily Checking of FAS Panel
- Immediate Action to Alarm Generated
- Monitoring of MCP
- Generation of Logs / reports and submission to Client for review and necessary action/s Maintenance of reports, Report Generation through IBMS.

**In Row unit:**

- Monitoring of In ROw's Temperature and Humidity every half an hour physically.
- Monitoring of Alarms & Immediate Action to it Comparison of Software readings with Actual Reading.

**6. Fire Drill Test**

Maintenance Activities will be carried for the System/Devices in Coordination with Host Institute Engineer & Technician

**7. Daily Reports**

1. Hourly basis monitoring of UPS & In Row & concern System
2. Reports of Energy meter reading of all meters.
3. Readings of main LT panel.
4. Fuel in DG fuel tank.
5. Immediate response to electrical complaints by any Working staff.
6. Following of effective power consumption chart provided by Customer.
7. Maintaining Critical Electrical parts.
8. Generation of Logs / reports and submission to Host Institute for review and necessary action's Maintenance of reports

**8. Weekly Reports**

1. All Electrical Systems Health Check Report
2. Vendor call tracking until closure
3. UPS & DG: On load Report.
4. Fire Alarm System: Reports of False Alarm.
5. Access System: Data Backup.
6. CCTV: Backup of DVR Status.
7. WLD: Test of Water Leak Detection Sensor Cable.
8. All System Health Report.
9. In Row, Adiabatic Dry Cooler and comfort AC

**9. Monthly Reports**

1. Follow up of schedule regarding preventive maintenance.
2. Presentation of consumption of meter units by Pie diagram.
3. Vendor Performance Reports.
4. Report of pending calls/problems.
5. MIS Report Presentation for Each Month

**10. Call Logging Process with OEM/Vendors**

The onsite team will get alerts on any issue in the data center. The onsite team will identify the area of problem and define problem severity into minor or major call. Call severity will be decided on basis of unit under suspect and impact on functions inside data center like - electrical power in DB, racks, cooling efficiency. Based upon this on site team will either manage to close the problem in case of minor alerts/alarms or In case of major alarms the team will raise an alarm over phone and email to OEM/Vendor with information to CR RAO AIMSCS /Host Institute designated team and O&M in-charge. O&M team will follow the

Escalation matrix. The site team / OEM will identify problem area and will work towards resolution of problem.

**11. Scheduled Maintenance**

Bidder to submit the scheduled maintenance time along with frequency for the components.

**12. Bidder has to submit and present the detailed plan of execution for Operation and maintenance activities including manpower deployment along with qualification details of manpower deployed at site.**

**MANDATORY ANNEXURE (Declaration/Undertaking- As per below Notification)**

F.No.6/18/20
19-PPD

Ministry of Finance
Department of
Expenditure Public
Procurement
Division

(Dt. 23 July 2020)

**Restrictions under Rule 144(xi) of the General Financial Rules (GFRs) 2017**

**Annex I: Competent Authority and Procedure for Registration**

A. The Competent Authority for the purpose of registration under this Order shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT)*.
B. The Registration Committee shall have the following members*:
   i. An officer, not below the rank of Joint Secretary, designated for this purpose by DPIIT, who shall be the Chairman;
   ii. Officers (ordinarily not below the rank of Joint Secretary) representing the Ministry of Home Affairs, Ministry of External Affairs, and of those Departments whose sectors are covered by applications under consideration;
   iii. Any other officer whose presence is deemed necessary by the Chairman of the Committee.
C. DPIIT shall lay down the method of application, format etc. for such bidders as stated in para 1 of this Order.
D. On receipt of an application seeking registration from a bidder from a country covered by para 1 of this Order, the Competent Authority shall first seek political and security clearances from the Ministry of External Affairs and Ministry of Home Affairs, as per guidelines issued from time to time. Registration shall not be given unless political and security clearance have both been received.
E. The Ministry of External Affairs and Ministry of Home Affairs may issue guidelines for internal use regarding the procedure for scrutiny of such applications by them.
F. The decision of the Competent Authority, to register such bidder may be for all kinds of tenders or for a specified type(s) of goods or services, and may be for a specified or unspecified duration of time, as deemed fit. The decision of the Competent Authority shall be final.
G. Registration shall not be granted unless the representatives of the Ministries of Home Affairs and External Affairs on the Committee concur*.
H. Registration granted by the Competent Authority of the Government of India shall be valid not only for procurement by Central Government and its agencies/ public enterprises etc. but **also for procurement by State Governments and their agencies/ public enterprises etc. No fresh registration at the State level shall be required.**

I. The Competent Authority is empowered to cancel the registration already granted if it determines that there is sufficient cause. Such cancellation by itself, however,

will not affect the execution of contracts already awarded. Pending cancellation, it may also suspend the registration of a bidder, and the bidder shall not be eligible to bid in any further tenders during the period of suspension.

J. For national security reasons, the Competent Authority shall not be required to give reasons for rejection / cancellation of registration of a bidder.

K. In transitional cases falling under para 3 of this Order, where it is felt that it will not be practicable to exclude bidders from a country which shares a land border with India, a reference seeking permission to consider such bidders shall be made by the procuring entity to the Competent Authority, giving full information and detailed reasons. The Competent Authority shall decide whether such bidders may be considered, and if so shall follow the procedure laid down in the above paras.

L. Periodic reports on the acceptance/ refusal of registration during the preceding period may be required to be sent to the Cabinet Secretariat. Details will be issued separately in due course by DPIIT.

* Note:

i. In respect of application of this Order to procurement by/ under State Governments, all functions assigned to DPIIT shall be carried out by the State Government concerned through a specific department or authority designated by it. The composition of the Registration Committee shall be as decided by the State Government and paragraph G above shall not apply. However, the requirement of **political and security clearance as per para D shall remain and no registration shall be granted without such clearance.**

ii. Registration granted by State Governments shall be valid only for procurement by the State Government and its agencies/ public enterprises etc. and shall not be valid for procurement in other states or by the Government of India and their agencies/ public enterprises etc.]

**Annex** Ill

**Clause / Certificate to be inserted in tenders**

Clauses for Tenders

I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority.

II. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

III. "Bidder from a country which shares a land border with India" for the purpose of this Order means: -

a. An entity incorporated, established or registered in such a country; or

b. A subsidiary of an entity incorporated, established or registered in such a country; or

c. An entity substantially controlled through entities incorporated, established or registered in such a country; or

d. An entity whose *beneficial owner* is situated in such a country; or

e. An Indian (or other) agent of such an entity; or

f. A natural person who is a citizen of such a country; or

g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above

IV. The beneficial owner for the purpose of (iii) above will be as under:

1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.

   Explanation-

   a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent. of shares or capital or profits of the Company;

   b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;

2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;

3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;

4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;.

5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

1.

VI. [To be inserted in tenders for Works contracts, including Turnkey contracts] The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

Certificate for Tenders (for transitional cases as stated in the Order)

*"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I hereby certify that this bidder is not from such a country and is eligible to be considered."*

Certificate for Tenders

*"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by the Competent Authority shall be attached.]"*

Certificate for Tenders for Works involving possibility of sub-contracting

*"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries; I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by the Competent Authority shall be attached.]"*

***(End of Document)***