UNIVERSITY OF CALICUT

NOTICE INVITING TENDER

No.153855/PURCHASE-ASST-A1/2015/Admn

Calicut University (P.O.)
Dated, 28.02.2017.

The Registrar, University of Calicut invites online tender (2 cover tender) from the OEM/ System integrators/contractors who have the necessary expertise and experience in the design and execution jobs of similar nature and extent for participating in the tender of Design, Supply Installation and Commissioning of Data Center at Calicut University Premises, **on TURNKEY BASIS.**

EMD and tender cost amount should be remitted as prescribed in the e-tender portal. Rate quoted should be inclusive of taxes and all other charges. Hard copies (Technical Bid) of the documents must be submitted to the Deputy Registrar, Purchase Division, University of Calicut on or before 15.03.2017 5.P.M. Last date of receipt of documents **submitted online is 10.03.2017 6 P.M.**

Detailed technical specifications (including catalogues and other details if any) should be uploaded under the heading Other Important Documents.

A Performance Security equivalent to 5% of the total value of the contract rounded to the nearest rupee should be submitted by the successful bidder for a contract value above Rs.1,00,000/. The EMD and Performance Security are returnable.

Unpriced BOQ shall be uploaded for each item in Miscellaneous document.

Submission of proposals

Bidders are suggested to Visit the site and study the requirement before submitting the proposal. Bidders can contact Purchase Branch, for further queries and for related formalities and entry permit.

Project overview

The University of Calicut is planning to set up a Data center at their existing building at the University campus with around -300- 400 sq. ft. Including NOC and UPS room with all the infrastructure and migrate the existing Servers and network equipment with the racks with minimum down time.

It is proposed to build the new data center with maximum of 6 racks.

Average rack power density of around5kVA per rack for the Server racks 2kVA per rack for the Network rack may be considered for the overall design.

The University has already procured 2 Nos. of 20 KVA UPS with Independent battery bank for powering IT equipment's in the DATA Center. Since the UPS are having parallel option, one 20 KVA will be active and another 20 KVA will be considered as redundant UPS (N+1).

The Vendor has to calculate necessary MCB, IN /OUT UPS electrical distribution components based on the site requirement.

The vendor has to migrate the existing servers, switches to the new Data Center and all the necessary components, services to be incorporated in the proposal.

University will be providing active switches with Multimode fiber uplink and vendor has to install and commission all the active, passive components as a part of Data Center commissioning.

The bidder has to undertake Design, construction of the Data center as per standard Data center design practices. Detailed technical requirements has been specified in the concerned section of this document for the guidelines, however it is the responsibility of the bidder to provide the solution as per the standard datacenter guidelines. Bidder has to do the detailed site survey and propose the solution, understanding the complexity of the Data center build.

Since the DC needs to be built in the existing building, care must be taken that the existing superstructure of building and the operation is not Damaged/disturbed while new DC is constructed.

The selected bidder should conduct a site survey and submit the preliminary plans, and other illustrations as required for the design of DC for Calicut University approval. The structural plans, data centre diagram, cabling diagram and layout plan should be submitted to the University.

1. Pre Qualification Criteria

The bidder must possess the requisite experience, strength and capabilities in providing the services necessary to meet the requirements, as described in the bid document.

The bidder must also possess the technical know-how and the financial capability that would be required to successfully build the Data Centre.

The bids must be complete in all respects and should cover the entire scope of work as stipulated in the bid document.

The invitation to bid is open to all bidders who qualify the eligibility criteria as given below:

- Bidder should have experience of having successfully supplied, installed, commissioned and maintained at least two Data Center Infrastructure project successfully implemented for any government department, PSUs, which should be either of the following

A1) One Data Center Project implemented in PSU worth not less than one Crore or
A2) Two Data Center infrastructure Project implemented in PSU each costing not less than 50 Lakhs. Letter of completion of work from customer/s and copy of purchase order should be submitted as proof.

B) The annual turnover should be minimum 2 Crore for each year for the last 3 years. The bidders should submit Annual Financial Statement certified by Chartered Accountant as proof.

C) The bidder should have at least 5 years experience in the data center field. The copy of purchase order showing proof of date should be attached along with technical Bid.

D) The bidder should have an ISO 9001-2008 or later certifications for IT related infra structure works and ISO 20000 or ISO 27001 certifications. Attach copy of certificates as proof.

- The firms will submit the prequalification documents in the technical bid in the order prescribed in the notice and a checklist need to be submitted by the bidders on the documents submitted in the same order.

- õ Detailed Specification and make of all items quoted are to be furnished for the tender.
- õ The bidder shall submit an architectural diagram of proposed data center along with area calculation, height, and width length. The bidder also submits the clean agent gas volume engineering drawings along with quantity from OEM.
- õ Only bidders who quote for the entire items shall be considered. The total amounts quoted shall include the cost for drawings, design and there will be no claim for any excess amount.
- õ The successful bidder has to get the drawing approval from the client before any item procurement.
- õ The Contractor shall obtain Sanctions and inspectorate approval from concerned offices of KSEB, for electrical and other related power cabling works and Calicut University shall not be part of such matters.
- õ A Licensed contractor having 'B' grade or above received from the Department of Electrical Inspectorate shall execute the electrical works and shall obtain mandatory sanction and Inspectorate approvals from the concerned officers of KSEB, Department of Electrical Inspectorate etc. for electrical and other related power cabling works. Undertaking to this effect should be submitted.
- õ The Bidder should not have been blacklisted by any Government Authority.
- õ University reserves the right to amend or cancel the tender in part or in full without prior notice at any point of time.
- õ The University does not bind to accept the lowest tender and reserves the right to accept either in full or part of any tender or reject all the tenders without assigning any reason.

- The payment will be made after the completion of the project and after the receipt of the report of the Technical Committee. No part bill will be entertained.
- The successful bidder shall execute an agreement as per rules.

Bidder shall have a direct purchase and support agreement with the OEMs of data centre equipment.

The bidder should submit valid letter from all the OEMs (whose products are being quoted) confirming the following:

a) Authorization for bidder

b) Confirm that the products/technologies/components/services quoted are not end-of-life.

The Bidder can be OEM or authorized business partner. In case of Authorized business partner, an authorization letter from OEM must be submitted. In case bidder is sourcing items from other manufacturers, an authorization letter for supply and servicing the same assuring full guarantee and warranty obligations shall be obtained from the principal supplier / manufacturer.

The bidder shall have an office/service centre in Kerala with qualified support staff and full-fledged service facility.

The bidder shall furnish a brief write-up, backed with adequate data, explaining his available capacity and experience (both technical and commercial) for the supply and installation.

Bidder shall submit documentary evidence in proof of each of the above Pre Qualification criteria, in the absence of which his offer is liable to be rejected.

The university reserves the right to request for any additional information and also reserves the right to reject or accept the bid of a bidder, if in the opinion of University the qualification data is incomplete or the bidder is found not qualified to satisfactorily execute the requirements of the project and no communication shall be entertained in this regard in future.

Tender Submission

Technical BID

The bidder should necessarily have the following technical document in the technical bid:

1. Checklist duly filled in
2. Company profile and financials
3. Documents as required for the eligibility criteria.
4. Customer reference letters
5. Detailed Proposal
6. 3 Years balance sheet
7. 2 PO copy of Data Centre confirming the past experience
8. Compliance to technical specifications
9. Manufacturers authorisation letters
10. Data Sheets/ catalogues
11. Un-priced Bill of quantities with makes models of equipment
12. Project Plan
13. Architectural drawings, layouts, necessary schematics

Checklist

Sl. No.	Item	Document to be attached	Remarks
1.	Company Profile and financials	Self attested copy	
2.	Bidder should have experience of having successfully supplied, installed, commissioned and maintained at least two Data Center Infrastructure project successfully implemented for any government department, PSUs, which should be either of the following A1) One Data Center Project worth not less than one Crore. OR A2) Two Data Center infrastructure Project implemented in PSU each costing not less than 50 Lakhs	Copy of purchase order/orders	
3.	Completion of work in item 2	Letter/Letters of completion of work from customer	
4.	The annual turnover should be minimum 2 Crore for each year for the last 3 years.	The bidders should submit Annual Financial Statement certified by Chartered Accountant for last 3 years	
5.	The bidder should have at least 5 years experience in the data center field.	The copy of purchase order showing proof of date should be attached along with technical Bid.	
6.	The bidder should have an ISO 9001-2008 or later certifications for IT related infra structure works and ISO 20000 or ISO 27001 certifications.	Copy of certificates	
7.	The Bidder should not have been blacklisted by any Government Authority.	Self certificate	
8.	The bidder should submit valid letter from all quoted are not end-of-life.the OEMs (whose products are being quoted) confirming the following: a)Authorization for bidder b) Confirm that the products/ technologies/ components/services quoted are not end-of-life.	a. Authorization letter b. Confirmation letter	
9.	The bidder shall have an office/service centre in Kerala with qualified support staff and full-fledged service facility	Self certificate	
10.	Customer reference letters	Letter	

11.	Detailed Proposal	Proposal	
12.	3 Years balance sheet	Balance sheets	
13.	Compliance to technical specifications	Self certified	
14.	Data Sheets/ catalogues	Self certified	
15.	Un-priced Bill of quantities with makes models of equipment	Self certified	
16.	Project Plan	Self certified	
17.	Architectural drawings, layouts, necessary schematics	Self certified	

Commercial Bid

Price BID along with BOQ and price as per the prescribed format.

General conditions

- The documents as specified to be submitted as part of response to the bid. Bids with incomplete or false information is liable for rejection
- Construction to be undertaken based on mutually agreed upon layout
- All individual components used in the construction to conform to data centre best practices and industry standards
- The bidder will be responsible for project managing the entire project from commencement to final handling over of the facility to University.
- The selected bidder will report project progress on a periodic intervals and submit weekly reports

- The Data centre complete in all aspects to be handed over with all systems tested and accepted to University.

Acceptance testing shall be carried out before the commencement of Live Operations. The Data Centre would be tested for the following parameters:

- Electrical Requirements
- Cooling & Environmental Control
- Smoke & Fire Detection, Prevention & Suppression requirements
- Surveillance & Physical Security
- LAN Passive Components
- On completion of the project a training should be imparted to the University officials on the various installed components
- **The equipment supplied should be covered under warranty for 2 years from the date of installation and commissioning.**
- The selected bidder shall also maintain records of all maintenance of the system and shall maintain a logbook on-site that may be inspected by University at any time.

Technical Specification for Data Centre and Control Centre

1. Broad functional requirements and design Parameters

- The Data center shall be designed based on industry standards. All individual components used in the construction shall confirm to data centre best practices and industry standards.
- The bidder shall be responsible for managing the entire project from commencement to final handing over of the facility to the Calicut University
- The Bidder is required to provide detailed architectural diagrams and other illustrations like conceptual architectural plan, electrical layouts, false ceiling layouts; etc., for the envisaged DC.
- The Data centre complete in all aspects to be handed over with all systems tested and accepted to Calicut University Calicut.
- Construction to be undertaken based on mutually agreed upon layout.
- On completion of the project a training shall be imparted to the university officials on the various installed components
- The equipment/ systems supplied shall be covered under warranty for two years from the date of commissioning.

Broad scope of work of the bidder:

The Data Centre (DC) has to comply with Data centre standards designs and the

Bidder has to:

- design the DC layout plan
- Undertake Civil works for the DC, erection of partitions, false flooring, false ceiling, ramp etc.

- Demolition of the existing partitions/structure in the identified DC premises if any.
- Carry out electrical power distribution works for supplying power to the Data center.
- Supply & installation and integration of Precision cooling requirement of the DC.
- Provide Access Control security.
- Design and implement intelligent fire detection system and complement the same by a high sensitivity smoke detection system.
- Provide clean agent based fire suppression system (NOVEC).
- Surveillance system for the Data Centre area.
- Water leak detection system for the server farm area.
- VESDA
- Rodent repellent system.
- SMS alert system.
- Obtaining statutory approvals if any.
- Necessary Fiber , Copper cables from the existing server room to the new location as required

CIVIL WORKS

2.1 Dismantling:

The demolition work if any should be done with utmost care while removing the existing brick wall, false ceiling and other supports fixed onto the wall.

2.2 Partitions:

The proposed data centre shall have non-permissible airtight, thermally insulated and fire rated Partition Walls. Both the real ceiling and real flooring to be leak proof, air tight and thermally insulated. For server room, rigid floor-to-ceiling partition walls having 2-hour fireproof rating are to be considered.

The existing windows in the proposed Data Centre shall be closed from inside the room with thermally insulated, fire rated brick wall construction/ partition, without affecting the aesthetics of the building from outside. Walls shall be plastered with super plaster/ cement mortar 1:4 with 12mm thickness.

Opening in the walls/partitions at required place shall be provided for Electrical and LAN cabling entry to the server room and then sealed.

Partition with Fire , Moisture Resistant with thermal properties preferably aerocon block size of 600 x200 x 200 with cement mortar 1:4 plastering including racking joints curing scaffolding etc.

2.3 False ceiling:

The false ceiling shall be of Metal ceilings and grid type (600x600 tiles type. All the ceiling tiles with grid shall be supported on suitable powder coated galvanized steel/hot dipped galvanized steel white shade suspension as per manufacturer specification. The ceiling shall be provisioned with cut-outs for lighting, AC grills, Fire detectors, nozzles etc.

Horizontal level False Ceiling grid using hot dipped galvanized steel section, exposed surface chemically cleaned capping pre-finished in baked polyester paint, rotary stitched Main Tee of 24 x 38 x 0.33mm at every 1200 mm C/C max and supported by 2.5 mm GI wire which is fixed to the RCC slab with GI hook and Raw Plug and rotary stitched Cross Tee of size 24 x 30 x 0.254 mm at every 600 mm C/C max and rotary stitched Sub Cross Tee of size 24 mm x 25 x 0.254 mm at every 1200 mm C/C max and 15 x 15 x 0.457 mm Wall Angle all round the wall to form a grid of size 600 x 600 mm and laying of Tiles Prima Fine Fissured regular Edge Tiles with life time warranty 600 x 600 x 15mm thick tiles having RH 99 %, NRC of 0.55 and CAC of 34 dB in the above grid.

The ceiling shall be accessed frequently for cabling, maintenance work and emergency needs.

2.4 Flooring:

The Server rooms should have access flooring with antistatic properties.

Access floor systems shall confirm to EN 12825 standard. The entire access floor system shall be made from Calcium sulphate / Cement and steel / or solid fire resistant material to provide adequate fire properties, acoustic barrier and air leakage resistance. The system shall be able to withstand a UDL of 1631kg/Sq.m without deflecting more than 1 mm and without setting permanently more than 0.25mm and a point load of 305 kg .The pedestal shall withstand Axial load of 2200kg size. The Ratio of UDL concentrated load should be minimum 5 times.

For server room the under-structure system shall be rigid-grid with 12” Clearance between bottom of tile and top of treated real floor. Assembly shall provide a means of levelling and locking at a selected height. Assembly shall provide 30mm adjustment.

For non-full tiles (cut out tiles): treat / insulate edge with PVC

AC Grills/Tiles (600mm X 600mm): With Manual dampers.

Suction Equipment for lifting tiles (Access Floor Systems Panel Lifting Tools: 1 Number).

Finish of the Panel:

The access floor panel shall be laminated with finishes as required and same shall be factory laminated on semiautomatic lamination lines leaving no chance for human error.

The finish shall be either High Pressure Laminate/ Antistatic Vinyl flooring of required shade and colour and the Laminate shall be either:

- õ Protected on its edges with PVC beading with mitred corners which shall factory fit.
- õ Or integral trim design.

Jack Assembly

Panels: -Panels shall be made up of 38 mm thick high density chipboard strengthened by high performance resins with the top of High Pressure laminate. The bottom of the panel shall be of aluminium foil to create a fire and humidity barrier and this should provide floor’s electrical continuity properties . Panels shall remain flat through and stable unaffected by humidity or fluctuation in temperature throughout its normal working life. The panels should have dimensional & thickness tolerances not exceeding -0.1/+0.2 mm and diagonal tolerance of less than 0.4 mm. Panel shall have density of 650 kg/m3. Panels shall be insulated against heat and noise transfer. Panels shall be 600 x 600mm fully interchangeable with each other within the range of a specified layout. Panels shall rest on the grid formed by the stringers which are based on snap on system with bolted on to the pedestals. The Panels shall confirm to class O and Class

1 Fire Ratings tested as per BS 476 and fire resistance up to 30 min and shall be finished with 0.45 mm thick plastic edge material that is self extinguishing and PVC free.

Pedestal:- Pedestals installed to support the panel shall be suitable to achieve a specified floor height from the existing floor level and shall be placed 600mm distance in both directions to form a grid of 600x600mm. Pedestal design shall confirm speedy assembly and removal for relocation and maintenance. Pedestal base shall be permanently secured to position on the sub floor mostly by effective glue of mechanical fastening. Pedestal assembly shall provide for easy adjustment of levelling and accurately align panels to ensure lateral restrain. Pedestal shall be built entirely of Galvanized steel consisting of hexagonal shaped and fixed with stringers of size 525 x 30x 25 x 0.8 mm thick to form a grid of 600 x 600mm. These stringers are locked into the pedestal head and run both ways and has gasket made up of extruded plastic , with a U section and acts as a sound deaden and makes it air tight . Pedestals shall support an axial load of 2200 Kg and an ultimate load of 3800 Kg. Pedestal head shall be designed to avoid any rattle or squeaks and carrying gasket which is conductive in nature.

Head: The jack head consists 90 x 90 x 4mm thick. Die cut steel plate having tapped holes either to receive screws for locking stringer or bare tiles. To the bottom of the head a flared pipe of 40mm is MIG welded. The reduced end (25mm) has internal threads enabling it to be engaged to the pedestal. The adjusted height of the jack assembly is locked by specially designed check nut, which allows locking without use of spanners. The pedestal is either powder coated or electro galvanized for prevention of corrosion and the head is electro galvanized for prevention of corrosion.

Stringers: The stringer is hot dipped galvanized steel construction, rectangular C channel with inverted flanges 0f 6mm width each. The size of the C channel is 20 x 25 mm, 1.2 mm thick having special notching arrangement for panel alignment.

Earthing to be done in consultation with the electrical consultant. A pedestal can be connected to the main earth pit by providing necessary copper earthing and end termination.

2.5 Access/Fire door:

Appropriate door sizes, negotiable corners, and smooth floor surfaces inside the facility are required. Proper access has to be provided to allow for service or replacement of UPS, Precision AC and other large items

The server room shall be provided with a main access door manufactured from high quality galvanized steel and having fire rating up to 2 hours (conforming to BS 476 part 22 and IS 3614 part 2 standards). The doors shall be 1100 x 2100 mm size singe leaf with SS ball bearing butt hinges, mortise lock, heavy duty door closer and all other accessories. The door shall have fire rated vision panel of suitable sizes. The door shall be painted with etch primer and finish painting of approved color to match the color scheme of the area.

The doors shall be as per the standards set by CBRI [Central Building Research Institute –

Required Features of Doors:

- Galvanized Painted
- Fire rating 60 to 120 minutes (Stability and integrity)
- Clear Fire Glass- (size300x 200) 120 minutes fire rating tested at Central Building Research Institute
- Shutter Thickness- 46 mm

- õ Fully Flush Construction

2.6 Thermal Insulation:

The real Flooring to be thermally insulated using 19mm nitrate rubber/ equivalent insulation with one side aluminium foil and fire retardant properties for the reason that the cold air is blown from below the false floor to the room void through AC grills.. The junctions between the insulator and fixtures shall be watertight and airtight.

2.7 Painting:

Wall finishing shall be with two coats paint inside and outside walls including two coats putty + 2 coats primer, inside and outside wall of data centre and server room of C&C Centre. Finishing with light colour shall be provided to enhance the illumination.

All material required for the works shall be of specified and approved manufacturer, delivered to the site in the manufacture's containers with the seals, etc., unbroken and clearly marked with the manufacture's name or trade mark with a description of the contents and colour.

2.8 Debris Cleaning:

Removal of Debris: The material shall be packed in gunny sacks/plastic bags and dumped in the area instructed by customer after taking prior permission from the project in charge on a daily/weekly basis

2.9 Permission for beam cutting not allowed.

3.0Electrical Power Distribution

This specification shall be applicable to all equipments to be supplied and erected under this package in accordance with detailed scope of work and accompanying electrical sections. Contractor shall provide fully compatible electrical system, equipments, accessories and services for entire area under his scope as well as those specially required by University if any.

Ambient air temperature shall be taken as 50 deg. C, altitude less than 1000m from MSL and relative humidity 95% for the purpose of designing of electrical equipment. This specification shall be read and constructed in conjunction with the drawings and annexure to determine the scope of work. All equipment shall be capable of continuous operation satisfactorily under the following conditions:

Voltage variation: +/- 10%

Frequency variation: +/- 5%

Combined voltage & frequency variation: +/- 10%

Nominal system supply available shall be as follows:

Codes and Standards

All electrical installation work shall comply with the Central Electrical Authority standards.

All equipments, materials and system shall in general confirm to the latest edition of relevant national and international codes & standards, specially the Indian statutory regulations. The accompanying specification shall indicate the applicable codes and standards. The equipment/material/systems confirming to other equivalent national and international standards shall also be considered provided the same ensures equal or better features compared to standards listed in accompanying section.

All equipment and materials specified herein or not, shall be designed, manufactured and tested with the latest applicable standards & Bureau of Indian standards.

Design Criteria

a) The equipment shall be used in medium voltage system having characteristics as listed in this specification.

b) The equipment shall be installed in a hot, dusty, humid and tropical atmosphere.

c) There shall be no radio interference when the equipments are operated at maximum service voltage.

d) The maximum temperature in any part of the equipment at specified rating shall not exceed the permissible limits as stipulated in the relevant standards.

e) The equipment shall be capable of withstanding the dynamic and thermal stresses of listed short circuit current without any damage or deterioration.

f) All equipment, accessories and wiring shall have tropical protection, involving special treatment of metal and insulation against fungus, insects and corrosion.

h) The safety clearances of all live parts of the equipment shall be as per relevant standards.

i) All equipment/components of identical rating shall be physically and electrically interchangeable.

j) All outdoor equipment shall be suitable to mount on steel structure connectors shall be bimetallic conductor.

k) Wherever single core cables are terminated in any equipment, gland plate shall be of aluminium (3-4 mm thick).

l) There shall be no straight through joints in power & control cables.

m) All cable terminations shall be with double compression cable gland with armour holding system.

n) The lighting fixture shall have loop in & loop out facility.

Installation, Testing and Commissioning of Electrical Equipments, Cabling, Grounding & Illumination System

UPS Cum PAC incomer Panel Board -1 and UPS Outgoing Panel Board- 2

a. Scope

This scope shall cover supply, installation, testing and commissioning of medium voltage Panel Board as described in this specification, as per drawings and Bill of quantities. Medium voltage Panel Board will be installed indoor and is connected through the bus duct / cables.

b. Documentation

i. Vendor shall furnish

• Drawings, data and manuals in three sets along with equipment supplied.

• General arrangement drawing indicating accessories and dimensions.

• Foundation plan and loading.

• Termination arrangement with dimensions.

ii. Documents to be submitted after placement of order

• Schematic.

iii. Final documents

• As built drawings

• Instruction and maintenance manual

• Test certificates

c.General Specifications

All the Panels shall be metal clad, totally enclosed, rigid, floor / wall mounting, air insulated, cubicle type suitable for operation on three phase / single phase, 415 V / 230 V, 50 Hz., neutral effectively / non-effectively grounded at transformer and short circuit level as mentioned in the drawings.

d.Standards and Codes

The Panels shall comply with the latest edition of relevant Indian Standards and Indian Electricity Rules and Regulations. The following Indian standards shall be complied with:

IS: 4237 General requirements for switchgear and control gear for voltages not exceeding 1000 V.

IS: 375 Switchgear busbars, main connection and auxiliary wiring, marking and arrangement.

IS: 2147 Degree of protection provided by enclosures for low voltage switchgear and control gear.

IS: 8197 Terminal marking for electrical measuring instrument and their accessories.

IS: 2551 Danger notice plates

IS: 10118 Code of Practice for installation and maintenance of switchgear.

IS : 8623 Specification for factory built assemblies of switchgear and control gear for voltage up to and including 1000 V A.C. and 1200 V D.C. IS : 8828 Miniature circuit breakers.

IS: 9224 HRC fuse links IS: 2705 Current transformer

IS: 1248 Indicating instrument IS: 722 Integrating instrument '

e.Construction

Cubical Type Panels

i) Structure: The Panels shall be of compartmentalized design so that circuit arc / flash products do not create secondary faults and be fabricated out of high quality CRCA sheet, suitable for indoor installation having dead front operated and floor mounting type.

All CRCA sheet steel used in the construction of Panels shall be 1.6 mm. thick and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet steel shall be seam welded, all welding slag grounded off and welding pits wiped smooth with plumber metal.

The Panels shall be designed to withstand a heaviest condition at site, with maximum expected ambient temperature of 50° c., 95% humidity.

Gaskets between all adjacent units and beneath all covers shall be provided to render the joints dust proof.

All doors and covers shall be with foam rubber gasket and /or rubber strips and shall be lockable.

All panels and covers shall be properly fitted and secured with the frame and holds in the panel correctly positioned. Fixing screws shall enter into holes, taped into an adequate thickness of metal or provided with bolts and nuts.

Self-threading screws shall not be used in the construction of Panels. A base channel of 75 mm. x 40 mm. x 6 mm. thick shall be provided at the bottom.

Panels shall be preferably arranged in multi-tier formation. The size of the Panels shall be designed in such a way that the internal space is sufficient for hot air movement and the electrical component does not attain temperature more than 50°C. If necessary, openings shall be provided for natural ventilation, but the said openings shall be screened with fine weld mesh.

All electrical components shall be de-rated for 50°C. Knock out holes of appropriate size and number shall be provided in the Panels in conformity with the number, and the size of incoming and outgoing conduits / cables. Alternately, the Panels shall be provided with removable sheet steel plates at top and bottom to drill holes for cable / conduit entry at site.

The Panels shall be designed to facilitate easy inspection, maintenance and repair. The Panels shall be sufficiently rigid to support the equipment without distortion under normal and under short circuit condition. They shall be suitably braced for short circuit duty.

ii) Protection Class: All the indoor Panels shall have protection class of IP: 54 and shall be dust/damp and vermin proof.

iii) Painting: The painting shall be seven-tank process with epoxy paint.

iv) Circuit Compartments: Each MCCB shall be housed in separate compartments and shall be enclosed on all sides. All instruments and indicating lamp shall be mounted on the compartment door. Sheet steel barriers shall be provided between the tiers in a vertical section.

v)**Instrument Compartments:** Separate adequate compartment shall be provided for accommodating instruments control contactors / relays etc. These components shall be accessible for testing and maintenance without any danger of accidental contact with live parts, busbar and connections.

vi) Busbars: The Busbar shall be air insulated and made of high quality, high conductivity, high strength Aluminium.

The busbar shall be of 3 phases and neutral system with separate neutral and earth bar.The size of neutral busbar in all main panels or lighting panelsand feeders for panel shall be equal to phase busbar where as the busbars for the UPS distribution panel, the size of the neutral busbar should be double the Phase busbars.The busbar and interconnection between busbars and various components shall be of high conductivity Aluminium.

The busbar shall be of rectangular cross-section designed to withstand full load current for phase busbars and half rated current for neutral busbars in case of MCC panels only and shall be extensible on either side.

The busbar shall have uniform cross-section throughout the length. The busbars and interconnections shall be insulated with Heat Shrinkable Insulation*Sleeve*. The busbar shall be supported on bus insulators of non flammable type with high creep age and high anti tracking property and non-hydroscopic SMC / DMC insulated supports at sufficiently close intervals to prevent busbars sag and shall effectively withstand electromagnetic stresses in the event of short circuit.

The busbar shall be housed in a separate compartment. The busbar shall be isolated with 2-mm. thick Bakelite sheet to avoid any accidental contact.

The busbar shall be arranged such that minimum clearances between the busbar are maintained as below:

Between phases : 25 mm, minimum

Between phases and neutral : 25 mm.

Between phases and earth : 25 mm.

Between neutral and earth : 20 mm. minimum

All busbar connections shall be done by drilling holes in busbars and connecting by chromium plated or tinned plated brass bolts and nuts. Additional cross-section of busbar shall be provided in all Panels to cover up the holes drilled in the busbar. Spring and flat washers shall be used for tightening the bolts.

All connections between busbars and circuit breakers / switches and cable terminals shall be through aluminium strips of proper size to carry full rated current. These strips shall be insulated with insulating tapes or Heat Shrinkable Insulation*Sleeve*.

Panel to panel entry of busbar shall be effectively sealed by electrical and thermal insulation barriers so that products of flashover do not travel from one panel to another panel creating multiple faults.

Busbar calculated on 50 deg. C. ambient temp. and 85 deg. C. for continuous and short time rating. Busbar surrounded air temp. shall be considered 70 deg. C. for busbar calculation.

All busbar joints shall have non-flammable insulation shrouds for secondary insulation purpose

vii) Electrical Power and Control Wiring Connection: Terminal for both incoming and outgoing cable connections shall be suitable for 1100 V grade, aluminium / copper conductor XLPE insulated and PVC sheathed, armoured cable and shall be suitable for connections of solder less sockets for the cable size as indicated in the Bill of Material.

Power connections for incoming feeders of the main Panels shall be suitable for 1100 V grade aluminium conductor (AYFY) cables.

Both control and power wiring shall be brought out in cable alley for ease of external connections, operation and maintenance. Both control and power terminals shall be properly shrouded.

10% spare terminals shall be provided on each terminal block. Sufficient terminals shall be provided on each terminal block, so that not more than one outgoing wire is connected per terminal.

Terminal strips for power and control shall preferably be separated from each other by suitable barriers of enclosures.

Wiring inside the modules for power, control, protection and instruments etc. shall be done with use of 660 / 1100 V grade, FRLS PVC insulated copper Conductor cables conforming to IS. For current transformer circuits, 2.5 sq.mm. Copper conductor wire shall be used. Other control wiring shall be done with 1.5 sq.mm. PVC insulated copper conductors. Wires for connections to the door shall be flexible. All conductors shall be crimped with solder less sockets at the ends before connections are made to the terminals.

Control power wiring shall have control fuses, (HRC fuse type) for circuit protection. All indicating lamps shall be protected by HRC fuses.

Particular care shall be taken to ensure that the layout of wiring is neat and orderly. Identification ferrules shall be filled to all the wire termination for ease of identification and to facilitate checking and testing.

Final wiring diagram of the Panels power and control circuit with ferrules numbers shall be submitted along with the Panels as one of the documents against the contracts.

viii) Terminals: The outgoing terminals and neutral link shall be brought out to a cable alley suitably located and accessible from the panel front. The current transformers for instruments metering shall be mounted on the disconnecting type terminal blocks. No direct connection of incoming or outgoing cables to internal components of the distribution board is permitted; only one conductor may be connected in one terminal.

ix) Wireways:A horizontal / vertical either metal or Aluminium wire way with screwed covers shall be provided at the top to take interconnecting control wiring between different vertical sections.

x)**Cable Compartments:**Cable compartments of minimum**300 mm**size shall be provided in the Panels for easy termination of all incoming and outgoing cables entering from bottom or top. Adequate supports shall be provided in the cable compartments to support cables. All outgoing and incoming feeder terminals shall be brought out to terminals blocks in the cable compartment

xi) Earthing: Copper earth bars of 25 mm x 3 mm shall be provided in the Panels for the entire length of the panel. The framework of the Panels shall be connected to this earthbar. Provisions shall be made for connection from this earth bar to the main earthing bar coming from the earth pit on both sides of the Panels. The earth continuity conductor of each incoming and outgoing feeder shall be connected to this earth bar. The armour shall be properly connected with earthing clamp, and the clamp shall be made for connection from this earth pit on both sides of the Panels. The earth continuity conductor of each incoming and outgoing feeder shall be connected to this earth bar. The armour shall be properly connected with earthing clamp, and the clamp shall be ultimately bonded with the earth bar.

xii) Labels: Engraved PVC labels shall be provided on all incoming and outgoing feeders. Single line circuit diagram showing the arrangements of circuit inside the distribution board shall be pasted on inside of the panel door and covered with transparent laminated plastic sheet.

xiii) Name Plate:A nameplate with the Panels designation in bold letters shall be fixed at top of the central panel. A separate nameplate giving feeder details shall be provided for each feeder module door. Inside the feeder compartments, the electrical components, equipments, accessories like switchgear, control gear, lamps, relays etc. shall suitably be identified by providing stickers. Engraved nameplates shall preferably be of 3 ply, (Red-White-Red or Black-White-Black) lamicoid sheet. However, black engraved perplex sheet name plates shall also be acceptable. Engraving shall be done with square groove cutters. Nameplate shall be fastened by countersunk screws and not by adhesives.

xiv) Danger Notice Plates: The danger notice plate shall be affixed in a permanent manner on operating side of the Panels. The danger notice plate shall indicate danger notice both in Hindi, English and Malayalam and with a sign of skull and bones. The danger notice plate, in general, meets the requirements of local inspecting authorities. Overall dimensions of the danger notice plate shall be 200 mm. wide x 150 mm. high.

The danger notice plate shall be made from minimum 1.6 mm. thick mild steel sheet and after due pre-treatment to the plate, the same shall be painted white with vitreous enamel paint on both front and rear surface of the plate. The letters, the figures, the conventional skull and bones etc. shall be positioned on plate as per recommendation of IS: 2551-1982. The said letters, the figures

and the sign of skull and bones shall be painted in signal red colour as per IS: 5-1978. The danger plate shall have rounded corners. Location of fixing holes for the plate shall be decided to suit design of the Panels. The danger notice plate, if possible, be of ISI certification mark.

xv)**Internal Components**:The Panels shall be equipped complete with all types of required number of Air circuit breakers, soft starters, switch fuse units, contactors, relays, fuses, meters, instruments, indicating lamps, push buttons, equipment, fittings, busbars, cable boxes, cable glands etc. and all the necessary internal connections / wiring as required and as indicated on relevant drawings and Bill of Material. Components necessary for proper complete functioning of the Panels but not indicated on the drawings shall be supplied and installed on the Panels. All part of the Panels carrying current including the components, connections, joints and instruments shall be capable of carrying their specified rated current continuously, without temperature rise exceeding the acceptable values of the relevant specifications at the part of the Panels. All units of the same rating and specifications shall be fully interchangeable.

Components

The type, size and rating of the components shall be as indicated on the relevant drawings. While selection of the capacity of the components resulting from the prevailing conditions like ambient temperature shall be allowed for. The thermal and magnetic trip rating shall be compensated for the ambient temperature. The rating indicated on the drawing are, ratings anticipated at prevailing site conditions.

i. Moulded Case Circuit Breaker: The moulded case circuit breaker (MCCB) shall be air break type and having quick make - quick break with trip free operating mechanism. Housing of the MCCB shall be of heat resistant and flame retardant insulating material. Operating handle of the MCCB shall be in front and clearly indicate ON/OFF/TRIP positions. The electrical contact of the circuit breaker shall be of high conducting non-deteriorating silver alloy contacts. The MCCB shall be provided with overload and short circuit protection device. The electrical parameters of the MCCB shall be as per the description given in the Bill of Material.

ii. Current Transformer: Where ammeters are called for C.T.s shall be provided for current measuring. Each phase shall be provided with separate current transformer of accuracy Class I and suitable VA burden for operation of associated metering and controls. Current transformer shall be in accordance with IS: 2705 - 1964 as amended up to date.

iii.**Indicating Lamps**: Indicating lamps assembly shall be screw type with built in resistor having non-fading colour lens. LED type lamps are required.

As per CEA regulation 12:

a. All the panels shall be named prominently.

b. Incoming and outgoing shall be named on the panel.

c. All the panels shall be doubly earthed.

d. Flexible Earth wire between panel and panel door shall be ensured

e. Warning notice "Disconnect power supply before opening the panel" on back of the panels shall be displayed. `

f. Extra wires shall be removed.

g. Entries shall be sealed.

h. Names of CBs on rear side shall be unique without any ambiguity.

i) ON/OFF indications shall be marked

g.Shop Drawings

Prior to fabrication of the Panels the supplier / contractor shall submit for Engineer In charge's approval the shop / vendor drawing consisting of G.A. drawing, sectional elevation, single line diagram, bill of material etc. and design calculations indicating type, size, short circuiting rating of all the electrical components used, busbar size, internal wiring size, Panels dimension, colour, mounting details etc. in 6 sets. The contractor shall also submit manufacturer's catalogues of the electrical components installed in the Panels along with the drawing.

h.Inspection

At all reasonable times during production and prior to transport of the Panels to site, the supplier / contractor shall arrange and provide all the facilities at their plant for inspection.

i.Test Certificates

Testing of Panels shall be carried out at factory and at site as specified in Indian standards by the contractor at his own cost. Representative of University may present at the time of Testing. The test results shall be recorded on a prescribed form. The test certificate for the test carried out at factory and at site shall be submitted in duplicate to the Engineer In-charge for approval.

The detailed panel diagram is attached separately (Annexure I)

Wiring

The wires shall be FRLS armoured PVC copper cable. Cable shall generally be installed in ladder type FRP / cable trays except for some short run in rigid/flexible conduit for protection or crossings.

Wiring shall be generally carried out by FRLS wires in conduits. All wires in a conduit shall be drawn simultaneously. No subsequent drawing is permissible.

Wire shall not be pulled through more than two equivalent 90° bends in a single conduit run.

Wiring shall be spliced only at junction boxes of with preferred make terminal blocks having anti-vibration terminals. Maximum two wires can be connected to each way of the terminal block. ELCBs shall be used for lighting and power sockets.

For lighting fixtures, connection shall be teed off through suitable round conduit or junction box, so that the connection can be attended without taking down the fixture.

For vertical run of wires in conduit, wires shall be suitably supported by means of wooden/hard rubber plugs at each pull/junction box.

Normal and Emergency circuits shall not be run in the same conduit.

Receptacle sub-circuits shall be kept separate and distinct from lighting and fan sub-circuits.

Separate neutral wire shall be provided for each circuit. Wiring throughout the installation shall be such that there is no break in the neutral wire in form of switch or fuse.

Cable Laying

Cables laid on trays and risers shall be neatly dressed and clamped at an interval of 1000 mm and 600 mm for horizontal and vertical cable runs. Clamps for multi-core cables shall be fabricated out of 25 x 3 mm Aluminium flats.

In order to prevent fire through cable penetrations of wall/floor/ceiling as well as through cable shaft openings, after laying, dressing & clamping of cables, all the openings shall be properly sealed by using pieces of mineral wool butted to one another

After completion of installation and prior to connection, all power cables shall be subjected to a high potential test.

Conduit and Accessories

Conduit/pipes shall be used only in short lengths in certain areas where required and/or as directed by the Engineer In-charge.

The contractor shall furnish all conduits complete with accessories as required.

Conduits shall be rigid type. However, rigid type steel conduit, if required, shall also be supplied by the contractor.

Except for inside, an enclosure wherever the cable enters or leaves the conduit, the conduit end shall be sealed by suitable sealing compound having fire withstand capability.

Cable Termination and Connection

The cable end termination shall be carried out using brass compression type cable glands, copper crimping lugs, gland earthing of adequate size etc.

The end termination and connection of cables shall be done strictly in accordance with manufacturer's instruction, drawings and/or as directed by the Engineer In-charge.

The work shall include all clamping, fitting, fixing, cable jointing, crimping, shorting and grounding etc. as required for the complete job.

All equipment required for all such operations shall be of contractor's procurement under this specification. Furnishing of all consumable materials, such as soldering material, electrical tape, sealing material as well as cable jointing kits shall be included in the offer.

The equipment will be generally provided with blank bottom plates for cable/conduit entry and cable end box for power cables.

The contractor shall perform all drilling, cutting on the blank plate and any minor modification work required to complete the job. If the cable end box or terminal enclosure provided on the equipment is found unsuitable and requires major modification, the same shall be carried out by the contractor at the discretion of Engineer In-charge.

Control cable cores entering Control Panel/Switchgear/PMCC etc. shall be neatly bunched and served with PVC perforated tape to keep it in position at the terminal block. The contractor shall put ferrules on all control cable cores in all junction boxes and at all terminations. The ferrules shall carry terminal numbers with cross reference as per drawings. All ferrules shall be colored, plastic and interlocked type. Spare cores shall be similarly ferruled, crimped with lug and taped on the ends.

Spare cores shall be ferruled with individual cable number. Termination and connection shall be carried out in such a manner as to avoid strain on the terminals. All cable entry points shall be properly sealed and made vermin and dust-proof. Unusual opening, if any, shall be effectively closed. Sealing work shall be carried out with approved sealing compound having fire withstand capability for at least three hours.

Cable Joints

Cable shall be installed without joints as far as practicable.

Cable Tags & Markers

Each cable and conduit run shall be tagged with numbers that appear in the cable and conduit schedules.

Cables and conduits shall be tagged at their entrance, every 30.0M and exit from any equipment, junction box.

The tags shall be of Aluminium with the number punched on it and securely attached to the cable by not less than two turns of nylon 6 cable ties.

The location of cable joints, if any, shall be clearly indicated with cable marker with an additional inscription 'cable-joint'. The contractor shall furnish and install all tags and markers stated above.

Cable Trays

Pre-fabricated cable trays and accessories shall be assembled & erected at site as per instructions of manufacturer. Alternatively, the contractor shall install all cable trays, racks, risers, shafts & supports.

Cable trays either inside concrete trenches or inside buildings and racks inside cable shafts shall be aligned and levelled properly. All tray runs shall be installed parallel to the trench/building walls and floors except otherwise noted in the drawings.

The contractor shall have to secure rack/tray supports by welding to inserts or other available building steel surfaces. Outdoor trays shall be installed by welding on the steel/concrete structures with inserts by the contractor.

In case of non-availability of embedded steel inserts in certain tray routes, the contractor shall have to secure the supports on wall/floor/ceiling surfaces by suitable anchoring system having adequate load bearing capability.

Grounding

The Contractor shall carry out the grounding of all electrical equipment, steel structures, etc. Excavation and backfilling, if required, shall be performed by the Contractor at no extra cost.

The grounding shall be done by copper conductors / strips of sizes as laid down in BOM and the same shall be connected to the risers of main ground mat.

In case of site fabricated cable tray/ladder, the runner angles shall be used as ground conductors and shall be made electrically continuous.

All ground conductor connections shall be made by electric arc welding/brazing unless otherwise specified. Ground connections shall be made from nearest available station ground grid risers.

All ground conductors WELDED/BRAZED connection shall be painted black for prevention of corrosion.

Equipment will generally be furnished with two separate ground pads with tapped holes, bolts and spring washers. If, however, the same are not furnished, Contractor shall drill and tap holes and provide bolts, spring washer for connection.

Equipment ground connections, after being checked and tested by the Engineer In-charge, shall be coated with anti-corrosive paint. Whether specifically shown or not, all conduits, trays, cable armour and cable end box, electrical equipment, switch boards, panels, cabinets, junction boxes, lock-out switches, fittings, fixtures, etc. shall be effectively grounded.

All equipment, supporting steel structures, panels, boards, switchgears, junction boxes, conduits, etc. shall be grounded in compliance with the provision of I.E. Rules and as per enclosed grounding notes and details.

All ground connections shall be made from nearest available station ground grid.

Illumination System

a.Lighting Fixtures

The lighting shall be 2 x PL - L 36 watts decorative pearl white direct-indirect luminaire for modular ceiling.

Fixtures shall be mounted on false ceiling grid with suitable metal rod and clamps. No cutting or drilling of false ceiling structures is permitted.

The fixtures after erection shall be marked up indelibly with corresponding circuit number for easy identification of lamp circuit.

b.Conduit System

In case of un-armoured cable, all conduits shall originate from the respective lighting panel and terminate in lighting fixtures, receptacles, etc.

Exposed conduits shall be run in straight lines parallel to building columns, beams and walls as far as practicable. Unnecessary bends and crossings shall be avoided to present a neat appearance.

Conduit supports shall be provided at an interval of 750 mm for horizontal runs and 1000 mm for vertical runs.

Conduits shall be clamped on to approved type spacer plates or brackets by saddles or U-bolts. The spacer plates or brackets, in turn, shall be fixed to the building steel by welding and to concrete or brick work by grouting

Wooden plug inserted in the masonry or concrete for conduit support is not acceptable.

Embedded conduits shall be securely fixed in position to preclude any movement. In fixing embedded conduit, if welding or brazing is used, extreme care should be taken to avoid any injury to the inner surface of the conduit.

Spacing of embedded conduits shall be such as to permit flow of concrete between them and in no case shall be less than 38 mm.

Where conduits are run on cable trays provided by Owner, they shall be clamped to supporting steel at an interval of 600 mm.

For directly embedding in soil, the conduits shall be coated with an asphalt - base compound. Concrete pier or anchor shall be provided where necessary to support the conduit rigidly and to hold it in place.

Conduits shall be installed in such a way as to ensure against trouble from trapped condensation.

Running threads shall be avoided as far as practicable. Where it is unavoidable, check nuts shall be used.

Conduits shall be kept, wherever possible, at least 300 mm away from hot pipes, heating device, etc. when it is evident that such proximity may impair the service life of cables.

Slip joints shall be provided when conduits cross structural expansion joints or where long run of exposed conduits are installed, so that temperature change will cause no distortion due to expansion or contraction of conduit run.

For long run, junction/pull boxes shall be provided at suitable intervals to facilitate wiring.

Field bends shall have a minimum radius of four (4) times the conduit diameter. All bends shall be free of kinks, indentations or flattened surfaces. Heat shall not be applied in making any conduit bend.

The entire metallic conduit system, whether embedded or exposed shall beelectrically continuous and thoroughly grounded.

Lighting fixture shall not be suspended directly from junction box in themain conduit run.

Conduits and fittings shall be properly protected during construction period against mechanical injury. Conduit ends shall be plugged or capped to prevent entry of foreign material.

After installation, the conduits shall be thoroughly cleaned by compressedair before pulling in the wire.

Drawings

Drawings and schedules enclosed with this specification are for general guidance of the Bidder to assess the type and volume of work involved.

These drawings & schedules will be revised to suit the actual requirement in related systems. Additional drawings & schedules will also be furnished to contractor if/when necessary.

Final drawings & schedules will be furnished to the contractor from time to time as detailed designs are developed.

Such revisions, corrections, additions to drawings & schedules shall not be considered to change the scope of work.

The contractor shall mark in red on one (1) set of drawings all deviations/alterations, not shown on drawings but carried out at field. After completion of work, the contractor shall furnish a set of marked-up prints of "As Built" drawings to the University.

Testing Equipment

The testing equipment that is required for testing is to be provided by the contractor, during the testing of the installed equipments at Data Center.

Few are listed below:

a. Hand operated megger of 1,000V grade for insulation testing.

b. Hand driven earth resistance megger of range 0-1/3/30 ohms.

c.Tong testers of suitable ranges.

As far as practicable, cable trays shall be supported from one side only in order to facilitate installation and maintenance of cables from the other side.

The cable trays shall be supported in general at a span of 1.5 meters horizontally and at a distance of 1.0 meter vertically.

Sufficient spacing not less than 250 mm shall be provided between trays and maintained to permit adequate access for installing and maintaining the cables.

Cleaning up of Work Site

The Contractor shall, from time to time, remove all rubbish resulting from execution of his work. No materials shall be stored or placed on passage or drive ways. Upon completion of work, the Contractor shall remove all rubbish, tools, scaffoldings, temporary structures and surplus materials, etc. to leave the premises clean and fit for use.

Inspection & Testing

On completion of erection works, the Contractor shall request the Engineer In-charge for inspection and tests. The Engineer In-charge shall arrange for joint inspection of the installation for completeness and correctness of the work. Any defect pointed out during such inspection shall be promptly rectified by the Contractor.

The installation shall be then tested and commissioned in presence of the Engineer In-charge and put on trial run for stipulated contract period. All rectification, repair or adjustment work found necessary during inspection, testing, commissioning and trial run shall be carried out by the Contractor without any extra cost.

h.Commissioning and Trial Run

Following successful inspection and testing, the equipment shall be commissioned and put on trial run in a manner mutually agreed upon based on the commissioning schedule. The Contractor should perform commissioning and trial run with men and material as required and/or as directed Engineer In-charge.

Earthing and Earth pit

All the non current carrying metal parts of the electrical installation and mechanical equipments shall be earthed properly. The cables armour and sheath, electric panel boards, lighting fixtures, ceiling and exhaust fan and all other parts made of metal shall be bonded together and connected by means of specified earthing system. An earth continuity conductor shall be installed with all the feeders and circuits and shall be connected from the earth bar of the panel boards to the conduit system, earth stud of the switch box, lighting fixture, earth pin of the socket outlets and to any metallic wall plates used. All the enclosures of motors shall be also connected to the earthing system.

Earth Resistance

The resistance from any part of the lightning protection system to earth shall not exceed 1 ohm before any bonding has been affected to metal in or on a structure or to services below ground. If the value obtained exceeds the specified one then shall be reduced by adding to the number of earth electrode.

a.Scope of Work

The scope of work shall cover supply, laying, installation, connecting, testing and commissioning of:

i. Earthing station with Copper plate of size as given in BOQ.

ii. Earthing G.I / Copper strips from earthing station to equipotential bar.

iii. Earthing G.I / Copper strips / wires from equipotential bar to power panels, DBs, Rack etc.

iv. Bonding of Non current carrying parts, and metallic parts of the electrical installation.

b.Standards

The following standards and rules shall be applicable:

• IS: 3043 - 1987 Code of practice for Earthing.

• Indian Electricity Act and Rules

All codes and standards mean the latest. Where not specified otherwise the installation shall generally follow the Indian Standard Code of Practice or the British Standard Codes of Practice in absence of Indian standard.

c.Type of Earthing Station Plate Earthing Stations

The Equipment neutral earthing shall be with copper plate earthing station and equipment body earthing shall be with hot dip galvanized iron earthing station.

The plate electrode shall be 600 x 600 x 3 mm copper plate for neutral earthing and shall be of copper plate having dimensions 600 x 600 x 6 mm thick for body earthing. The earth resistance shall be maintained with suitable soil treatment. The resistance of each earth station should not exceed 1 ohm. The earth lead shall be connected to the earth plate through Hot Dip G.I. bolts. The earthing conductors shall be of copper strip in case of copper earthing and hot dip galvanized iron strip in case of G.I. earthing. G.I. pipe with funnel of approved quality shall be used for watering the earthing electrodes / stations. The block masonry chamber with chequered plate shall be provided for housing the funnel and the pipe for watering the earthing electrodes / stations. The hardware and other consumables for earthing installation shall be of copper/brass in case of copper earthing and shall be hot dip galvanized iron material in case of G.I. earthing. Test link

Precision Air Conditioning

Technical requirement of Precision Air Conditioning are:

- Precision air conditioners complete with all controls, indoor and outside units, with direct driven Motors and Backward curved blowers, multiple scroll compressors preferably in tandem circuit, electronic expansion valve, and hydrophilic fins for IDU Coil complete installation and commissioning for server room.
- The vendor is expected to include all auxiliary works like ducting, inlet and drain piping, piping between indoor and outdoor, cabling, acoustic and thermal insulation (Duct and floor for server room), volume control dampers, supply and returns air grills, stands for indoor and outdoor units with related civil works etc. as per the site requirements.
- Automatic monitoring and control of cooling, heating, humidification, dehumidification, air-filtration, etc. should be installed
- The PAC solution shall support N+1 configuration
- These equipment should be compliant to the following :
- Cabinet conforming to Class 1 BS 476 Part 6&7 standards
- Air filtration conforming to EU4 standards for Data centre and EU2 for Command and Control Center.
- Humidifier should have an adjustable capacity control ranging from 40%-100%. Immersible electrode and Bottle type humidifier.
- Visual and audible alarm indication
- Real time logging of the last 100 events/alarms.

Humidity, Ventilation, Air Conditioning (HVAC)

- Air conditioning for direct expansion air conditioning is used then condensers should be located outside the building

- Criteria in determination of the air conditioner placement should be its effectiveness in addressing the current planned load, and their adaptability to change in configuration.
- Consider the air flow patterns of the hardware being installed. Take care units are not laid out in a fashion that exhausts air from one unit into the intake of the next.
- Optimal temperature range for system reliability and operator comfort levels should be between 21 deg C + or – 1
- For safe data processing operations ambient relative humidity should be between 50+/- 5% RH.
- Server room requires precision air conditioning with a sensitivity of +/- 1.5 C and +/- 5% RH or closer.
- Ideally a Server Hall cooling system should have sensible ratio of 1: 1, most precision systems have between 85% to 100% sensible cooling.
- To deliver the air to the areas in need of air conditioning, the sub floor pressure differential should be maintained at an optimal level of 2 mm wg.
- Server Hall should be isolated from contaminants. Inside server Hall airborne dusts, gasesand vapours should be maintained in the defined limits to minimize their potential impact on the hardware
- Server Hall should be free from water ingress

Microprocessor controller Panel

- The display panel should be located on the front of the unit with LCD display for monitoring and alarm indication. The panel should be used for:
- Status detection (whether on or off)

1.Temperature controller

2.Humidity controller

- The panel should make an audio visual alarm in case of:

1.Power failure

2.Fan overload

3.Humidifier power fault

4.Humidifier control fault

5.Heater fault

6.Airflow failure

7.Change filter

8.Control circuit trip

9.Return air temperature / RH out of range

10.Supply air temperature out of range

11.Return air humidity sensor alarm

12.Return air temp. Sensor alarm

13.Data Error

14.Service alarm

15.Electric heater alarm

16.Microprocessor fault

17.Humidifier flood

18.Water leakage alarm

19.Smoke alarm

- Other functions of the control panel:

1.Self-diagnostic functionality

2.An automatic changeover for duty / standby unit based on time interval setting and any failure of duty unit.

3.An automatic restart function with sequence start program to prevent power surge during start-up on multi-system installation.

4.Comprehensive event storage system by date and time of occurrence.

5.Simply user-friendly operating guidance.

6.Remote monitoring of the Precision AC unit using desktop PC with SNMP interface.

5. Fire Detection System

Fire Alarm Control Panel

UL / EU Listed

AC Power: MS-9050UD 230 VAC, 50 Hz, 3.0 A. MS-9050UDE: 240 VAC, 50 Hz, 1.5 A. Wire size: minimum 14 AWG (2.00 mm2) with 600 V insulation. Non-power-limited, supervised.

Battery: Two 12 V 18 AH lead-acid batteries. Battery Charger Capacity: 7-18 AH (MS-9050UD cabinet holds maximum of two 18 AH batteries.)

Communication Loop: Supervised and power-limited.

Notification Appliance Circuits: Terminal Block provides connections for two NACs, Style Y (Class B) or. Style Z (Class A). Special Application power. Power- limited, supervised circuitry. Maximum signalling current per circuit: 2.5 A. End-of-Line Resistor: 4.7 kilo-ohm, 1⁄2 watt for Style Y (Class B) NAC.

Two Programmable Relays and One Fixed Trouble Relay:

Contact rating: 2.0 A @ 30 VDC (resistive), 0.5 A @ 30 VAC (resistive). Form-C relays, non-power-limited, non-supervised.

Should comply with the NFPA 72 Fire Alarm Systems requirements:

– LOCAL (Automatic, Manual, Waterflow and Sprinkler Supervisory).

– AUXILIARY (Automatic, Manual and Waterflow) (requires 4XTMF).

–REMOTE STATION (Automatic, Manual and Waterflow) (Where a DACT is not accepted, the alarm, trouble and supervisory relays may be connected to UL 864 listed transmitters. For reverse polarity signalling of alarm and trouble, 4XTMF is required.)

–PROPRIETARY (Automatic, Manual and Waterflow).–CENTRAL STATION (Automatic, Manual and Waterflow

and Sprinkler Supervised).

– OT, PSDN (Other Technologies, Packet-switched Data Net- work)

Addressable Monitor Modules

Normal operating voltage range: 15 to 32 VDC. Maximum current draw: 6.4 mA (LED on). Average operating current: 750 µA (LED flashing). Maximum IDC wiring resistance: 1,500 ohms. Maximum IDC Voltage: 11 Volts.

Maximum IDC Current: 240 µA

EOL resistance: 47K ohms.

Maximum SLC Wiring resistance: 40 Ohms.

Temperature range: 32° to 120°F (0° to 49°C).

Humidity range: 10% to 93% (non-condensing).

Dimensions: 4.5" (11.43 cm) high x 4" (10.16 cm) wide x 2.125" (5.398 cm) deep.

Manual Fire Alarm Pull Stations

UL/ EU FM Approved.

Switch contact ratings: gold-plated; rating 0.25 A @ 30 VAC or VDC.

Manual Fire Alarm Stations shall be non-code, with a key- or hex-operated reset lock in order that they may be tested, and so designed that after actual Emergency Operation, they cannot be restored to normal except by use of a key or hex. An operated station shall automatically condition itself so as to be visually detected as activated. Manual stations shall be constructed of red colored LEXAN (or polycarbonate equivalent) with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in white letters, 1.00 inches (2.54 cm) or larger. Stations shall be suitable for surface mounting on matching backbox SB-10 or SB-I/O; or semi-flush mounting on a standard single-gang, double-gang, or 4" (10.16 cm) square electrical box, and shall be installed within the limits defined by the Americans with Disabilities Act (ADA) or per national/local requirements. Manual Stations shall be Under- writers Laboratories listed.

Multi-Sensor Intelligent Detector

Sensitivity: auto-adjusting levels: 1 to 2%/ft. and 2 to 4%/ft. with classic CLIP systems; 1 to 2, 2 to 3, and 3 to 4%/ft. with Lite Speed TM systems; fixed-sensitivity levels: 1, 2, and 4%/ft.

classic CLIP systems; 0.5, 1, 2, 3, and 4%/ft. with FlashS- can systems.

Size: 2.0" (5.3 cm) high x 4.1" (10.4 cm) diameter installed in B501 base, 6.1" (15.5 cm) diameter installed in B350LP base.

Operating temperature: 0°C to 38°C (32°F to 100°F).

Operating altitude: up to 10,000 feet.

UL-Listed velocity range: 0 – 4000 ft./min. (1219.2 m/min.),

Relative humidity: 10% – 93% no condensing. Thermal sensing rating: fixed-temperature set-point 135°F

(57°C).

ELECTRICAL SPECIFICATIONS:

Voltage range: 15 – 32 volts DC peak. Standby current (max. avg.): 300 µA.

Loop resistance: 50 ohms maximum;

LED current (max.): 6.5 MA @ 24 VDC (“ON”).

Addressable Photoelectric Smoke Detectors

UL /EU/ ULC Listed CSFM , MEA and FM Approved

Voltage range: 15 – 32 VDC (peak).

Standby current: 300 µA @ 24 VDC.

LED current: 6.5 mA @ 24 VDC (latched “ON”).

Air velocity: 4,000 ft./min. (20 m/sec.) maximum.

Diameter: 6.1" (15.5 cm) installed in B350LP base.

Height: 2.1" (5.33 cm) installed in B350LP base.

Weight: 3.6 oz. (102 g).

Operating temperature range:***for SD355(A):***0°C to 49°C (32°F to 120°F);***for SD355T(A):***0°C to 38°C (32°F to 100°F).

Temperature: 0°C – 49°C (32°F – 120°F). Relative humidity: 10% – 93%, non-condensing.

HOOTER /Mini-Horns

UL /EU/ ULC Listed CSFM , MEA and FM Approved

HYSICAL SPECIALIZATIONS

Dimensions: 4.6”L x 2.9”W x .45”D.

Operating Temperature Range: 0°C to 49°C (32°F to 120°F).

Mounting: Surface: Deep single-gang backbox (2-3/4” deep); Flush: Standard 4” x 4” back box.

ELECTRICAL SPECIFICATIONS

Input Terminals: 12 to 18 AWG Nominal Voltage: Regulated 12DC/FWR or 24DC/FWR Operating Voltage: 8-33 Operating Voltage with MDL3R/W: 9-33

Control Module

UL/EU Listed FM Approved

Normal operating voltage: 15 to 32 VDC. Maximum SLC current draw: 6.5 mA (LED on).

Average operating current: 350 µA direct poll (CLIP mode), 375 µA group poll (LiteSpeed mode) with LED flashing.

External supply voltage: maximum 80 volts (RMS or DC). Drain on external supply: 2 mA maximum (using internal

EOL relay). EOL resistance: 47K ohms. Temperature range: 32°F to 120°F (0°C to 49°C). Humidity range: 10% to 93% non-condensing.

Dimensions: 4.5" (11.43 cm) high x 4" (10.16 cm) wide x 1.25" (3.175 cm) deep. Mounts to a 4" (10.16 cm) square x 2.125" (5.398 cm) deep box.

GAS Release Panel

Powder coated finish. Operates on 220V, A.C supply Battery backup with built in charging. 16 X 2 LCD Dot Matrix Display.

Evacuate and Key pad Enable, Disable Facility. Low battery visual warning with audible tone. Relay output for actuators. Remote fire indication with Audible Tone. Compatible to all types of conventional detectors. Zone Disable (Isolation) facility with loop voltage cut off. Resettable 24v DC output for 4 wire detectors . Three 24V Hooter Output (Fire, after Cross zone, after gas release). Two mode operation facility (Auto / Manual).

Programmable FAP input selection Facility. Programmable Solenoid Output with On and OFF Timer. Main / Standby Cylinder output Facility (Optional). Gas Inhibition and Instant release facility. Manual Gas Release with or without timer. Actuator pressure low sensing facility. Pressure switch facility.

AC Power

220-240 VAC, 50 Hz. Wire size: 1.5 Sq. mm with 600V insulation

Battery (Lead Acid only)

Charging Capacity: 7 Amp Hour Battery Max. System Quiescent Current: 50mA

Solenoid Loop Circuits

Operating Nominal Voltage: 24 VDC Solenoid output: 0.75A @ 24 VDC (Max). End-Of-Line Resistor: 4.7K, 1/4watt

Gas Release Outputs

Programmable NAC Output (2No’s)

(Fire, Timer On, Solenoid On, Gas Released)

Remote Outputs

Programmable Relay Contact (C,NO,NC) (Fire, Timer On, Solenoid On, Gas Released)

: 0.3A @ 24VDC

: 220v AC/30v DC@ 1A

Fire Suppression System

1. Fire Suppression System

Fire Detection is not the complete Fire Protection Solution.

In case of a fire threat sensed, immediate action has to be initiated so as to avoid the impetus of a potential Fire Hazard and most important to maintain Business Continuity.

Fire Protection follows the empirical formula:

DETECTION + SUPPRESSION = PROTECTION

In the event of a Fire alarm, signal is given to the Control panel, which sounds an audiovisual alarm, and a preset timer circuit is initialized. (Time delay set – 0 to 256 seconds, as per site requirement). Trained Fire fighting Personnel can extinguish the fire in this time delay made available, else, the time delay, signal is given to the gas release module. The gas release module actuates the Electrical Solenoid on the release valve fitted on the NOVEC® Gas cylinder, and gas is released in to the manifold through the high-pressure hose. The gas is further let into the protected area through a properly designed Piping distribution network and nozzles.

The entire sequence of operation from the signal to Gas release module to the actual completion of Gas discharge takes less than 10 seconds, and the fire is not allowed to propagate, thus saving the critical assets housed in the protected area.

Purpose

This specification is for procurement of NOVEC Clean Agent Based Fire suppression system. It shall be used as a standard for the System Equipment, System Installation and acceptance testing.

Mandatory Bidding Requirements:

Original Equipment Manufacturers (OEMs) for NOVEC equipment authorized and certified to market NOVEC Fire protection only can be quoted. Any other product without system approvals shall not be qualified for this Tender.

The OEM shall arrange for the storage container, CCOE approval required for their respective systems and certify that they possess a computer aided software design program suitable for the particular Seamless Cylinder being offered for this project.

Specific Technical Requirements:

- The Storage Container offered shall be of seamless type. Welded cylinders are not permitted.
- The Seamless storage cylinder & valve shall be approved by Chief Controller of Explosive.
- The NOVEC valve, operating actuators shall be an Electric (Solenoid) type, and should be capable of resetting manually. Provision should be provided on the Electric Control Head for a Manual Lever for over-ride in case of failure of the Electrical components. The Electric Control Head (Actuator) shall operate at 24 VDC. Bidders are required to submit confirmation for the same and provide the technical data sheet for the same. The Electric Control Head should be capable of being functionally tested for periodic servicing requirements, and without any need to replace consumable parts.
- The system flow calculations shall be carried out on<u>certified software, suitable for the particular container being offered for this project.</u>Such System flow calculations carried out for this project, shall be further vetted by the OEM for it's accuracy, and the only such vetted calculations shall be admissible for approval.

General Technical Requirements

The designer shall consider and address possible Fire hazards within the protected volume at the design stage. The delivery of the NOVEC system shall provide for the highest degree of protection and minimum extinguishing time. The design shall be as per NFPA standard NFPA 2001.

Sub floor and the ceiling void to be included in the protected volume.

The NOVEC Fire Suppression System shall include a detection and control switch provision for both pre-alarm and automatic agent release.

The NOVEC System to be supplied by the bidder must satisfy the requirement of the Authority having Jurisdiction over the location of the protected area and must be in accordance with OEM's product design criteria.

The detection and control system that shall be used to trigger the NOVEC suppression shall employ photoelectric and ionization smoke detectors, and heat detectors. A single detector in one zone activated, shall cause an alarm signal to be generated.

Another detector in the second zone activated, shall generate a pre-discharge signal and start the pre-discharge condition.

The discharge nozzles shall be located in the protected volume in compliance to the limitation with regard to the spacing, floor and ceiling coverage etc. The nozzle locations shall be such that the design concentration will be established in all parts of the protected volumes. The final number of the discharge nozzles shall be according to the OEM approved software, OEM Product manual and the OEM vetted programmable pressure loss & flow calculation for this particular project, and the same shall be approved by the

The Cylinders shall be equipped with differential pressure valves & No replacement parts shall be necessary to recharge the NOVEC containers.

NOVEC shall be discharge through the operation of an Electric (Solenoid) operated device which releases the agent through a differential pressure valve. Systems that employ explosive or pyrotechnic device shall not be permitted.

All system components shall be New and of Current manufacture and shall be installed in accordance with local codes. The Buyer, or the End user of this system reserves the Exclusive Rights to unconditionally reject any and all such components which may not be, or are suspected not to be of current manufacture; and / or on the grounds of authenticity of the system components and designs.

The bidder shall provide IN ORIGINAL all documentation such as Cylinder Manufacturing Certificates, Test and Inspection Certificates & Fill Density Certificates.

The extinguishing system shall include the following components:

Agent storage container with cylinder valve.

NOVEC agent.

Discharge nozzle (s).

Electronic control head for master cylinder (s) and pressure operated control head for slave cylinder(s) as releasing devices.

Mounting brackets.

Discharge hoses.

EL Check valves on manifold.

Actuation hoses for slave cylinder(s)

Master cylinder adapter kit for slave cylinder system

Any other required for the completeness of the system

The NOVEC discharge shall be activated by an output directly from the NOVEC Gas Release control panel, which will activate the Electric control head based releasing device. NOVEC agent is stored in the container as a liquid, having a natural vapour pressure of 66.4 psia at 77 degree F . To aid release and distribution, the container shall be super pressurized to 360 psi(g) at 70 degree F with dry nitrogen.

Cylinder valve bodies shall be brass. Any other material of construction shall not be acceptable.

The releasing device shall be easily removable from the cylinder without emptying the cylinder. While removed from cylinder, the releasing device shall be capable of being operated, with no replacement of parts required after this operation. The use of explosive devices to actuate agent

discharge shall not be permitted. Upon discharge of the system, no parts shall require replacement other than gaskets, lubricants, and the NOVEC agent. Systems requiring replacement of disks, squibs, or any other parts that add to the recharge cost will not be acceptable.

Systems containing component that have a dated life span and must be periodically replaced shall not be acceptable.

The releasing device shall also be capable of direct mechanical actuation, providing a means of discharge in the event of total electrical malfunction.

Provided with a manual lever and a faceplate with clear instruction of how to mechanically activate the system. In all cases, NOVEC cylinders shall be fitted with a manual mechanical operating facility that requires two-action actuation to prevent accidental actuation.

NOVEC storage cylinders shall be provided with a safety rupture disc. An increase in internal pressure due to high temperature shall rupture the safety disc and allow the contents to vent before the rupture pressure of the container is reached. The contents shall not be vented through the discharge piping and nozzles. NOVEC containers shall be equipped with a pressure gauge to display internal pressure. The gauge shall be an integral part of the container and shall be color-coded for fast referencing of pressure reading.

Release of NOVEC agent shall be accomplished by an electrical output from the NOVEC Gas Release Panel to the Electric control head release device and shall be in accordance with the requirements set forth in the current edition of the National Fire Protection Association Standard 2001.

7. Rodent Repellant System

Introduction

Ultrasonic Pest Repellent shall be electronic transmitters of high frequency sound waves (well above the 20 KHz frequency which is the upper limit of the hearing range of the human ear.) They should emit intensive sound at high decibel levels (sound pressure) that is audible and painful to pests, but inaudible and harmless to humans.

System

System shall consist of Master Console with corresponding twelve Satellites/ Transducers. The Master Console shall be installed in the main control room/ server room, and the satellites in the problematic areas i.e. above and below false ceiling and below false flooring.

1.Master Console

The Master console shall be powered through a 230 VAC, 5 A quality supply.

2.Satellites

- Each Satellite shall cover an open area of 300 sq ft given the average height of the ceiling is 10 ft. Installed in the false ceilings or false floorings, it shall be capable of covering an minimum area of 150 sq ft.
- The whole system (12 nos.) will accordingly be capable of covering an open area of approximately 3,600 sq ft.(If installed in false ceilings and false floorings, the area covered will be less).

Technical information

1.<u>Satellites</u>

Crystal : Shall be similar to DM 44T 24V of MAS Germany. Visible Hexagonal, Triangle excitor – Centre damp horizontal line excitors.

- **Frequency :**Peak frequency responses of the satellites are,
  - 21.6 KHz +/- 3 KHz
  - 31.6 KHz +/- 3 KHz
  - 50.4 KHz +/- 3 KHz
  - 60 KHz +/- 3 KHz
- **Nature Of Sound Waves :**The sound waves propagated by the satellites shall be linear sine waves with constantly varying frequencies.
- **Operating Environment :**The satellites shall be capable of operation in a temperature range of - 4^0C to 60^0C, and should propagate sound waves in 100% humid conditions, and even when they are submerged under water.

Specifications

1) Configuration : One master console with 12 satellites/ transducers

2) Operating frequency : Above 20 KHz (variable)

3) Sound output : 80 dB to 110 dB (at 1 metre)

4) Power output : 800 mW per satellite

5) Power consumption : 15 W approximately

6) Power supply : 230 V AC 50 Hz

7) Dimensions : 16” x 8” x 4”

8) Weight : 5.5 kgs approximately

9) Mounting : Wall/ table mounting

Rodent Repellent are electronic transmitters of high frequency sound waves above 20 KHz frequency in the upper limit of the hearing range of the human ear. They emit intensive sound at high decibel levels (sound pressure) that is audible and painful to pests, but is inaudible and harmless to humans. The pests usually leave the area being protected by ultrasound. They do not get killed.

The system is designed for server room and Transducers which emit UHF sound waves are placed in the desired location to cover the entire room including the false ceiling and false flooring area. These transducers are connected to the main controller which controls the entire operation of the system

8. Door Access control System

500 fingerprints

30,000Event buffers

1:1 Authentication & 1:N Identification

Stand-alone/Network communication via RS232/RS485 and TCP/IP

FX50u Standalone Access

control system 1:1 Authentication & 1:N Identification

Standalone/Network communication via RS232/RS485 and TCP/IP

Up to 3fingerprint templates per registration

Up to 3 fingerprint templates per registration

FAR (False Acceptance Rate) with less than 0.0001%

FRR (False Rejection Rate) with less than 0.1%

Language Support: English,

Dimensions: 180 x 82 x 55 mm

Voltage:3A/12V DC Standard

Current:50mA Operating

Current:400mA **Surveillance**

system - CCTV

The Critical area of the Data Centre along with the Non Critical area needs to be under constant video surveillance. The primary objective of implementing a CCTV system is to ensure effective surveillance of the area and also create a record for post event analysis. Monitoring cameras should be installed in proper areas to cover all the critical areas of the data centre. The scope of work involves supply, installation, commissioning, testing and maintenance of the Closed Circuit Television system for the Data Centre.

A set of fixed dome cameras with remote control operation of focus and zoom.

• A complete CCTV control facility that performs all the functions with provision to increase the total number of inputs for each monitor site.

• CCTV Cabinets as required complete with all cable termination facilities, cable distribution system for video and power system along with any additional video amplifiers and other video equipment as may be required.

• End point amplifiers as may be required to achieve satisfactory system operation.

• Complete range of accessories as required.

• All necessary relay boxes connectors, extension cables and adapter boxes as required at each of the ends of the CCTV System as required.

General

• All systems and components shall have been thoroughly tested and proven in actual use.

• Specifications included in this section are indicative and considered as a minimum; component and software that shall be acquired at the time of implementing the project shall be the latest versions available in the market.

System Capabilities

• The system shall provide visual images from the cameras located through out the facility. The cameras located shall be fed into the Digital Video Recorder (DVR) located in the DC room.

• The Digital Video Recorder shall consist of 16 channels Digital Multiplexer with built-in recording system into Hard Disk.

• The CCTV should be equipped with Digital recording facility for later scrutiny, with at least 30 days of recording facility.

Technical Requirements

a.Dome Camera :

The Dome camera unit should be 1/3" CCD type Digital Signal Processor Colour Camera. The camera must have Auto Gain Control and Back Light Compensation. The complete unit shall be housed in a dome and base unit, both made from the material suitable for required fire grade. The camera should be tamperproof. It shall be possible to adjust the camera head inside the dome in both the planes so that it can be wall or ceiling mounted. Other important features of the camera should be as follows:-

Product Parameters:

Horizontal Resolution : 700 TV Lines Resolution

Focal Length : f = 3.6 mm

Sensitivity : 2.0 lux / F=1.2

Gamma Correction : >0.45

Back light Compensation : Yes

Auto Gain Control : On

Auto White Balance : Yes

IRIS Level : Adjustable

S/N Ratio : >48dB

b. Digital Video Recorder (DVR) :

i. The Digital Video Recorder (DVR) shall be offering Triplex Operations for Simultaneous Viewing Live, Playback and Recording.

ii. The DVR must be Non-PC based standalone equipment with its own proprietary Non Windows based Software.

iii. The DVR must have a LAN / ISDN / Modem network connectivity built in with unlimited simultaneous user access for both Live and Play Back Viewing and System configuration settings.

iv. No additional software should be required in order to watch the DVR from a remote location.

v. The DVR must be compatible with the hard disk array such that additional hard disks may be connected for months of uninterrupted recording.

vi. The DVR must directly connect to Zip drives, CDR-W's, DVDR-W's.

vii. Compression format must be selectable between MPEF-1 and JPEG for picture quality and Time Selection.

viii. Full Screen, 4,7,9,10,13,16 multi-screen display for Monitoring and Playback.

ix. The Cameras should have a selectable Recording Frame Rate for Live Recording, Motion Based recording or Time lapse Recording.

(xi) The DVR shall provide a Menu based operation for Alarm Events such as Video Loss, Motion, Alarm Inputs, Power ON-Off etc.

(xii) The DVR should provide an optional mode for Watermark Recording such that the Video cannot be altered or tampered with.

(xiii) The DVR must provide a motion detection of 16 W x 12 H Matrix for selectable area with a sensitivity graph for selection of sensitivity of motion detection.

(xvi) The DVR must have Time and Day modes for recording time options.

(xxii) Each Video input to the DVR will have time, date and title for easy identification.

d. **Cables :**

There are 2 types of cables used for this work :

RG 6 copper Video Cable and 2 Core Power flexible Cable

VESDA

The air sampling type very early smoke detection system shall detect the invisible byproducts of materials, before getting degraded during the pre-combustion stages of an incipient fire and shall actively and continuously sample the air and shall operate, independent of air movements.

Sampling Pipe Network:

The main sampling pipes shall be U-PVC/C-PVC with internal diameter of at least 20mm and shall be identified as a Fire detection sampling pipe at intervals not exceeding the NFPA/FIA guidelines for labelling pipe. The far end of each trunk or branch pipe shall be fitted with an end cap and drilled with a hole appropriately sized to achieve the performance as specified and as calculated by the system design. All joints shall be air tight and made by using solvent cement, except at entry to detector mounting box.

Sampling Point Network:

Sampling holes of at least 2 mm diameter shall be separated by intervals of not more than 9 mtr along the length of the pipe. These intervals may vary according to calculations. Each sampling point shall be identified in accordance with NFPA. Consideration shall be given to local regulations and Manufacturer's recommendations in relation to the number of sampling points and the distance of the sampling points from the ceiling or roof structure and forced ventilation systems.

Capillary Sampling Network:

Where false ceilings/LT panels are installed, if required, the sampling pipe shall be installed above the ceiling, and capillary sampling points shall be installed on the ceiling/LT Panels and connected by means of a capillary tube. The minimum internal diameter of the capillary tube shall be 5 mm and the maximum length of the capillary tube shall be 2.0 m. The capillary tube shall terminate at a ceiling sampling point. The performance characteristics of the sampling points shall be taken into account during the system design. A conventional tee fitting with a 15 mm female port may be provided in the main sampling pipe for each capillary sampling point.

Specifications

Input Power

Voltage: 24V DC Nominal (18-30 V DC)

Current @ 24 VDC: 410 mA nominal, 490 mA in alarm

Dimensions (W x H x D) 255 mm x 185 mm x 90 mm (97/8 in x 71/8 in x 31/2 in)

Weight Approx. 2 kg (4.4 lbs)

IP Rating IP30

Mounting Upright, inverted or horizontal

Operating Conditions†

Detector Ambient: 0 °C to 40 °C (32 °F to 104 °F)

Sampled Air: 0 °C to 40 °C (32 °F to 104 °F)

Humidity: 5% to 95% (non-condensing)

Sampling Network

Maximum pipe lengths: 1 x 50 m (150 ft) (Max. 24 holes)

2 x 30 m (90 ft) per branch (Max. 12 holes per branch)

Sampling Hole Options: Pre-Engineered Option or Maximum Pipe length in

accordance with Pipe Modelling Design Tool (ASPIRE2™)

Air Inlet Pipe

Accepts both metric and American standard pipe sizes.

Metric: 25 mm American Pipe: IPS ¾ in.

Area Coverage

Up to 500 m2 (5000 sq. ft.) depending on local codes and standards

Relay Outputs

3 changeover relays (Fire 1, Action, Fault), Contacts rated 2A @ 30 VDC (max). NO/NC Contacts

RS232 Programming Port.

General Purpose Input (GPI) interface offers: Reset, Disable, Standby, Alarm set 1, Alarm set 2 and External Input functions.

Alarm Threshold Setting Range

Alert, Action, 0.025 - 2.00% obs/m (0.008 - 0.625% obs/ft)

Fire 1, Fire 2 0.025 - 20.00% obs/m (0.008 - 6.25% obs/ft)

Individual Alarm Delays 0 – 60 seconds

Two Alarm Threshold Settings Either time or GPI based

Display

- õ 4 Alarm State Indicators
- õ Fault and Disabled Indicators
- õ Smoke Level Indicator
- õ Instant Fault Finder
- õ Reset, Disable and Test Controls

- Smoke and Flow Auto-Learn Controls

Event Log

Up to 18000 events, time and date stamped in separate, non-volatile, logs for:

Smoke Level, Flow Level, Detector Status and Faults

Auto-Learn Smoke & Flow

• Automatically set acceptable alarm thresholds for both smoke and flow levels

Minimum 15 minutes, maximum 15 days (default 14 days)

Water Leakage Detection System.

A. Water Leak detection Module.

Water Leak detection module with Webpage interface for viewing conditions and modifying configurations, Optimal scalability sensing cable Easy integration with existing systems via Modbus, BACnet, SMTP, SNMP and/or dry contact outputs ,Reduces false alarms due to adjustable alarm thresholds, Highly precise pinpointing and displaying in feet or meters , Logging capabilities of event and trend data ,Simple installation with NO calibration required ,Compact and light-weight, Optional DIN rail mount ,Supervised system with facility to map with Graphic Display on PC. RoHS compliant .

B. WLD sensor cables.

Digital Addressable Water leak detection cable sensor with Non-conductive polymers used in the leak detection cable's construction,. This helps eliminate irritating nuisance alarms that could result from contact with metal, such as spiral wrap conduit or raised floor pedestals. An abrasion resistant polymer core increases the strength of the cable. Pressure on the sensing cable will not create a false alarm, with Pre Connected Connectors, Dries quickly without external drying devices, Complete - Plenum rated, & RoHS compliant .

C. Pre laminated Leak detection reference plan / Map

Pre laminated Leak detection reference plan / Map to indentify the actual location of any water leak detection in the protected area.

The leak detection plan / map shall identify protected room layout, cable routing and distance marked in feet or meters.

Mini Environment Monitoring System

Mini Environment Monitoring System with Advanced Sensor Support monitors on critical environmental conditions (such a temperature, humidity).The System console to have SMS provision. There should be temperature and humidity sensors so that system can generate SMS if the temperature/ Humidity varies from the preset parameters.

To be supplied with all necessary cables, sensors and accessories.

Fiber optic cable

6 Core Multi Mode Indoor Fiber cable

1 Armored Optical Fiber Cable

2. With a loose tube construction.

3. Cable contains up to6 fibers.

4. LSZH Sheath.

Sl. No.	Specification	Requirement
1	TYPE OF CABLE	Indoor OM3 Fiber optic
2	STANDARDS	EN 50173; ISO/IEC 11801; EN 187105
		ANSI/TIA-568-C.3
		Telcordia GR-20
		RoHS 2002/95/EC
		ANSI/ICEA S-87-640
		TIA 598-A
3	FIBER SIZE	50/125 OM3

Fiber Optic LIU with Pigtails, Splice Trays& Splice Protectors (Loaded)		
Sl. No.	Specification	Specification
1	Connector Type	LC-Style, Simplex
2	Operating temperature	-40 Degree C to +85 Degree C
3	Durability & color	
4	MM connectors	220 cycles, Blue
5	Ferrules	Pre-radiused Ceramic Ferrules
6	Attenuation	Not more than 0.75 dB per mated pair
7	Fiber Optic Patch panels	

8	FMS- Front Patching / Splicing Shelf	1U • 19” / ETSI versions available The FMS fiber management shelf series is ideal for high density front patching applications. Its compact design and high density capacity allows it to deliver carrier class fiber management to central offices, Pops, FTTx, mobile systems and LANs. High Density: 1U: 12/24 Fiber terminations • Should be supplied loaded with secondary coated SC pigtails Mounting brackets can be placed in different positions

9	Drawer concept allows for	Easy access to splicing tray Easy access to back side of Trays with hinges(book type) which allows connector facilitates easy fiber management and greater access during installation and rework Fiber guides, radius controls & secure tie downs provided
10	Dimensions	Width- 450 mm & Depth - 280 mm , Height –44 mm
11	Color	RAL 7035 / Black

SC to LC Patch Cord MM- OM3		
Sl.No	**Specification**	**Specification**
1	Make and Type	SC to LC Duplex Fiber Optic Patch Cords 3m, 9/125 micron
2	Cable Sheath	LSZH
3	Cable Diameter	1.8 mm mini twin zip
4	Ferrule	Ceramic
5	Buffer	.6 mm
6	Return Loss	> 45 db
7	Insertion Loss	.1 db Typical Max .3 db
8	ROHS	ROHS/ELV Compliant

Pigtails Multi mode – OM3		
Sl.No	**Specification**	**Specification**

1	SC Style Pigtails	50/125,0.9,SC,LSZH, Semi Tight Pre terminated compatible with SC snap in adapter plates
2	Features	Splice able Pigtail assembly
3		250 µm coated fiber in protective 900 µm
		tubing
4		Compatible with fusion or mechanical splices.

UTP Cables

Sl. No.	**Details**	**Specification**
1	Type	Unshielded Twisted Pair, Category 6, TIA / EIA 568-C.2 & ISO/IEC 11801
2	Conductor	24 AWG 7 / 32, stranded copper conductors 100 Ohm
3	Plug Protection	Transparent Slim boot
4	Warranty	2 -year component
6	Insulation	Flame Retardant Polyethylene
7	ROHS Compliant	ROHS/ELV Compliant

UTP JACK PANELS 24 PORTS

Sl. No.	Details	Specification
1	Type	24-port, Modular, PCB based, Unshielded Twisted Pair, Category 6, TIA / EIA 568-C.2 and ISO/IEC 11801
2	Ports	24
3	Port arrangement	Configured as 6 Port Module with individually replaceable CAT-6 Jacks
4	Circuit Identification	Front of each module shall be capable of accepting 9 mm to 12 mm labels
5	Port Identification	9mm or 12mm Labels on each of 24-ports (to be included in supply
6	Modular Jack	750 mating cycles
7	Wire terminal	200 termination cycles
8	Accessories	Integrated bend-limiting strain-relief unit for cable entry
9	Materials	
	Housing	Polyphenylene oxide, 94V-0 rated
	Wiring blocks	Polycarbonate, 94V-0 rated
	Jack contacts	Beryllium copper, plated with 1.27 mm [.000050] thick gold in localized area and 3.81 mm [.000150] minimum thick tin-lead in solder area over 1.27 mm [.000050] minimum thick nickel under plate
	Panel	Black, powder coated steel
10	Approvals	UL listed / ETL Verified
11	Termination Pattern	TIA / EIA 568 A and B;
12	ROHS Compliant	ROHS/ELV Compliant

Cat6 UTP JACKS (I/O)

Sl. No.	Details	Specification

1	Type	PCB based, Unshielded Twisted Pair, Category 6, TIA /EIA 568-C.2 and ISO/IEC 11801
2	Modular Jack	750 mating cycles
3	Wire terminal	200 termination cycles
4	Accessories	Integrated bend-limiting strain-relief unit for cable entry
		Support cable pair termination process on the jacks at 90 degree angle.
		Bidder should have a mechanism to maintain the quality of the termination ir-respective of the skill level of the termination staff.
5	Housing	Polyphenylene oxide, 94V-0 rated.
6	110 Blocks	polycarbonate, 94V-0 rated
7	Jack contacts	Beryllium copper, plated with 1.27 mm [.000050] thick gold in localized area and 3.81 mm [.000150] minimum thick tin-lead in solder area over 1.27 mm [.000050] minimum thick nickel under plate

Cat6 U/UTP CABLES

Sl No.	**Details**	**Specification**
1	Type	Unshielded Twisted Pair, Category 6, TIA / EIA 568-C.2 & ISO/IEC 11801
2	Conductors	23 AWG solid bare copper
3	Insulation	Polyethylene
4	Jacket	FRLSZH
	Pair Separator	Cross-member (+) fluted Spline.
5	Approvals	(a) UL Listed / UL Verified
		(b) ETL verified to TIA / EIA Cat 6
6	Operating temperature	-20 Deg. C to +60 Deg. C
	Storage Temperature	-20 Deg. C to +80 Deg. C

7	Frequency tested up to	Minimum 250 MHz
8	Packing	Box of 305 meters
9	Cable Outer Diameter	.23 inches
10	Delay Skew	45ns MAX.
11	Bend Radius	4 * Cable Diameter
12	Impedance	100 Ohms + / - 15 ohms, 1 to 250 MHz.
13	UL/NEC Ratings Fire Rating:	CMR Rated IEC 60332-1
14	Mutual Capacitance	5.6 NF MAX /100 Mtr.
15	Conductor Resistance	66.58 Ohms Max / KM
16	Propagation Delay	536 ns/100 Mtrs. MAX @ 250 Mhz
17	Performance characteristics to be provided along with bid	Attenuation, Pair-to-pair and PS NEXT, ELFEXT and PSELFEXT, Return Loss, ACR and PS ACR
18	ROHS Compliant	ROHS/ELV Compliant

DG Set

82.5 KVA DG Set with alternator , CPCB Approved acoustic enclosure mounted on common base frame with standard accessories of Battery and leads.

Engine: Water cooled four storke 4 cylinder turbo charged Inline type arrangement developing 110 BHP @1500 RPM Diesel Engine with 12V Electric start arrange, tn with silencer .

Alternator : Alternator rated 66KW/82.5 KVA , Three phase 0.8 PF , 415 V: Brish less 50 Cycles per second 1500 rpm , Under normal conditions the voltage regulations will be +/- 1.)% The alternator shall be of Clss “H” Insulation for designed and built to withstand tropical conditions.

Base frame: Sturdy , Fabricated welded construction channel iron base frame for mounting the above engine and alternator. DG tank capacity is 400 liters.

It should include :

AC , KVA , KW, Hz (Multifunction meter – 1 Nos=

Indicating Lamp set Load on - 1 No each

MCCB - 1 No

Hour Meter - 1 No

Recommended Makes

Sl No	Equipment/ System	Recommended make

1	**Civil**	
1.1	False Flooring – Panels and Pedestals	Unitile, Uniflair, Kebao
1.2	Modular Ceiling Tile	Armstrong, USG, Celotex
1.3	Partition Wall/ Structure	Aerocon Blocks, Promat or equivalent
1.4	Fire Rated Door	Godrej, Promat, Shaktimet
2	**Electrical**	
2.1	Isolator	Legrand, L&T, Siemens
2.2	MCCB	L&T, Siemens, Legrand, Schneider
2.3	MCB	Legrand, L&T, Siemens,
2.4	DB	Legrand, L&T, Siemens,
2.5	Armoured PVC Cable	Finolex, CCI, Gloster, Havells, Polycab
2.6	Multistrand PVC Cu Cable	Finolex, CCI, Gloster, Polycab
2.7	Power Sockets, plugs and switches	M K Electric, Crab Tree, MDS Legrand
2.8	Indication Lamps	L&T, Siemens, Binay, Vaishno
2.9	PVC Conduits	ISI Make
2.10	Meters	L&T, Siemens, HPL Socomec
2.11	Lighting Fixtures	Philips, GE, Wipro
2.12	End Termination Materials	Dowels, SMI, Jainsons
3	**Fire Detection and Suppression**	
3.1	Fire Alarm System	Honeywell, Siemens, GE, Notifore
3.2	Gas Releasing Panel and Accessories	IAS Morley, Ravel
3.3	Fire Suppression System	Chemetron, Kidde, Minimax
4	**Air Conditioning**	
4.1	Precision Air Conditioning	Emerson, Uniflair, Bluestar
5	Rodent Repellent	Maser India / Honeywell

6	LAN Components	Systimax, Panduit , Norden ,
7	Door Access Control	Honeywell/ Siemens/HID/ Samrteye
8	VESDA	FAAST, HONEYWELL, SIEMENS, XTRALIS
9	DG Set	POWERICA / Cummins/ Caterpillar
10	CCTV	Bosch / Honeywell / Norden / Pelco/ Axis

Warranty

Two year comprehensive On- Site warranty has to be provided for the data centre and installed systems. Any additional cost component should be clearly mentioned separately, if not included in the offered cost.

Comprehensive warranty will start from the day of completion of installation and acceptance by University and AMC will start after the expiry of the warranty period.

The 5 years Compressive AMC cost should be shown separately.

The detailed system specification, as built drawings/documents and preventive maintenance schedules along with a Do's and Don'ts list have to be complied and passed on to University for effective and safe use of the installed High Density Precision Cooling of the Data Centre.

During warranty period one engineer must visit site once in a quarter for preventive maintenance. Log record of preventive maintenance carried out should be properly maintained.

Any fault reported by University, must be attended and rectified on the same working day. Necessary stock of spares should be maintained at site to attend to any exigencies, thus ensuring 24 X 7 X 365 days operation.

The supplier should have technical support centre in Kerala to provide round the clock on-call service to attend to system failure. Complete contact details must be included in the offer.

The Warranty should be comprehensive and free replacement of all the spares , and inclusive of Transportation, Services, taxes etc.

The warranty should also ensure the following quarterly periodically maintenance

The Vacuum cleaner should have HEPA filter for the Dust removal.

Item	**No. of minimum PMs(Yearly)**	**Check list for PM**
PAC	4	Cleaning the Unit, Check the refrigerant piping for signs of leak Check machine's Compressor and other drives for undue vibration, Clean Air filter, Ensure Condensate drain is not clogged, Ensure blower wheel fins are free from dirt, Record the Voltage – RY –YB –RB, Record Amps indoor motor- R-Y-B Record condenser motor Amp, Record Suction pressure and discharge pressure, Check all Starters, Check operation of HP, LP Switches, Check electrical connection and fuses, Check operation of heater and humidifier, Record amps of the compressor – R-Y-B

Fire Detectors & Suppression system	4	Check each detector manually and run for the smoke sensing test Ensure the Alarm sounds well as installed, check the voltage a the NOVEC Gas release module by pressing manual call points (Disconnect the cable from the cylinder before testing),Record Gas pressure status at the cylinder side, Clean each Nozzles of each Zone, Verify each detector response indicator status, clean each detector and ensure dust free
Rodent Repellent	4	Run the System in test mode and see each transducers condition Clean each transducers and see the cables, See if there is any new passage / Hole/ Duct made close to the DC and deploy additiona transducers accordingly.
Electrical	4	Check at MCB and outlets of each rack and vacuum dust, Check the Incoming and outgoing panel board condition and vacuum dust, Record current and voltage of each phase Min 230 +/-5% Record the neutral value between each phase Min – 415 +/- 5% Record Neutral to earth voltage Below 3 Volts. Record earth resistance at Pit side Below 2 Ohms
UPS	4	Battery leads clean and water filling opening UPS and cleaning cards battery self test ,input & out put voltage calculation and checking
Networking	4	Ensure all unwanted cables are removed from the DC, Ensure all the new installed cables are labelled properly ,Re route the patch cords according to the standards, Clean the spare Fiber connectors and ensure the installation of protection Cap, Make sure that no electrical cables are running close to the UTP Cables, No cables piece and cutting pieces are left inside the DC, Ensure the cables are not blocking the cold Aisle reaching the server front, Ensure any new cable trays installed is not blocking the Air throw
Civil	4	Ensure tile alignment is in proper condition, check the air throw and return duct, clean the floor using antistatic floor cleaner.
VESDA	4	Check the pipe and chamber remove the dust.
WLDS	4	Check the sensor cable and run the test.

FORM I

Particulars of major Data Centre Projects

Sl. No.	Name & address of The Client	Project Duration		Value of Project in Rs.	Brief Description of the Project	Contact person with Tel no & Email ID
		Start Date	Completion Date			

(To be filled and submitted along with the Technical Bid)

Note: details of minimum 3 projects should be provided. Provide sufficient evidence such as agreements, work completion certificates to support information provided in the above table. Additional sheets can be attached if required.

Signature of the Bidder

Seal of the Bidder

14 FORM – II

Particulars of Make, model and configuration of equipments/ system Compliance

(To be filled and submitted along with the Technical Bid)

Sl . No	Equipment/ System	Manufacturer, make & model no	Details/Configuration Compliance
1	**Civil**		
1.1	False Flooring – Panels and Pedestals		
1.2	Modular Ceiling Tile		
1.3	Partition Wall/ Structure		
1.4	Paints		
1.5	Fire Rated Door		
1.6	Door closures		
2	**Electrical**		
2.1	Isolator		
2.2	MCCB		
2.3	MCB		
2.4	DB		
2.5	Armoured PVC Cable		
2.6	Multi-strand PVC Cu Cable		
2.7	Power Sockets and plugs		
2.8	6A Switches		

2.9	Indication Lamps		
2.10	PVC Conduits		
2.11	Meters		
2.12	Lighting Fixtures		
2.13	End Termination Materials		
3	**Fire Detection and Suppression**		
3.1	Fire Alarm System		
3.2	Fire Suppression System		
4	**Air Conditioning**		
4.1	Precision Air Conditioning		
5	Rodent Repellent		
6	LCD Panel		
7	UPS System		
8	LAN Components		

Signature and Seal of the Bidder

FORM III

Certificate of undertaking from Original Equipment manufacturer (OEM) for Precision Air-conditioning

(This certificate has to be submitted along with the technical bid by all bidders signed by manufactures of basic equipment)

We M/s ……., the manufacturer of ……. Precision Air-conditioning systems here by authorize M/s ……. to participate in the tender for Design, Construction and Commissioning of Data Centre for Calicut university. We guarantee that the Precision Air-conditioning systems supplied are manufactured by us and would be brand new and these items have not been used anywhere else before. Also, we hereby authorize M/s …….. for providing support and service for the supplied equipments during warranty of 1 year and AMC period for 5 years (after the warranty period of 1 year) as per the terms and conditions specified in the tender document. In case M/s…….. is not able to perform their duties including service support during installation, warranty and AMC period, we are ready to extend our direct support to

University under the same terms and conditions of this tender document, without any additional expenditure to Calicut university. Also we hereby agree to comply with all technical specification for the Precision Air-conditioning system in the above said tender.

Name Name

Designation Designation

Signature of the Manufacturer Signature of the bidder

Seal of the manufacturer. Seal of the bidder.

16. FORM IV

Certificate of undertaking from Original Equipment manufacturer (OEM) for Fire Detection System

(This certificate has to be submitted along with the technical bid by all bidders signed by manufactures of basic equipment)

We M/s ……., the manufacturer of …….

here by authorize M/s ……. to participate in the tender for Design, Construction and Commissioning of Data Centre for University. We guarantee that the items supplied are manufactured by us and would be brand new and these items have not been used anywhere else before. Also, we hereby authorize M/s …….. for providing support and service for the supplied equipments during warranty of 1 year and AMC period for 5 years. (after the warranty period of 1 year) as per the terms and conditions specified in the tender document. We also conform that M/s is our Trained Certified Partner for us and can commission the systems as per the manufacture standards.

Name Name

Designation Designation

Signature of the Manufacturer Signature of the bidder

Seal of the manufacturer. Seal of the bidder.

17. FORM V

Certificate of undertaking from Original Equipment manufacturer (OEM) for Fire Suppression System

(This certificate has to be submitted along with the technical bid by all bidders signed by manufactures of basic equipment)

We M/s ……., the manufacturer of …….

here by authorize M/s ……. to participate in the tender for Design, Construction and Commissioning of Data Centre for University. We guarantee that the items supplied are manufactured by us and would be brand new and these items have not been used anywhere else before. Also, we hereby authorize M/s …….. for providing support and service for the supplied equipments during warranty of 1 year and AMC period for 5 years (after the warranty period of 1 year) as per the terms and conditions specified in the tender document. We also conform that the complete system is designed by us and the filling agent calculation will be provided along with the designed drawing made by us.

Name Name

Designation Designation

Signature of the Manufacturer Signature of the bidder

Seal of the manufacturer. Seal of the bidder.

1	**UPS Cum PAC incomer PANEL BOARD -1**		
	Supply, fabrication, erection, testing and commissioning of cubicle type dust/damp and vermin proof, free standing floor mounting panel boards maid out of 14/16SWG CRCA sheet provided with powder coated paint of approved shade. The Panel Board Complete with all inter connection,earthing provisions, painting and control wiring etc.. as per Electrical Inspectorate Standards.I/C- 125Amp 4P MCCB - 1noO/G- 32 Amp 4P MCB - 4 No 40Amp 4P MCB- 2 Nos32 Amp 2P MCB- 1 No 16Amp 2P MCB- 4 Nos with RYB indicator, MFM meter , OV,UV,OC,& EL relays	Nos	1
2	**UPS Outgoing Panel Board- 1**		
	Supply, fabrication, erection, testing and commissioning of cubicle type dust/damp and vermin proof, free standing floor mounting panel boards maid out of 14/16SWG CRCA sheet provided with powder coated paint of approved shade. The Panel Board Complete with all inter connection,earthing provisions, painting and control wiring etc.. as per Electrical Inspectorate Standards. I/C- 125Amp 2P MCCB- 1 No O/G- 16 Amp 2P MCB - 18 Nos with line indiactor, Ammeter,Voltmeter	No	1
3	**CABLES**		
3.1	Supply, Laying and commissioning of armoured PVC Power Cables of the following sizes, laying in built up trench, racks, risers, truss, walls, pulling through pipes, excluding all civil works such as fixing of rackers excavation of earth laying of brick, sand, chipping of floors, chasing of		

	walls etc.		
a	31/2x35 Sq.mm Ar. Cu.Cable	Mtr	30
b	4 X10 Sq mm Ar. Cu.Cable	Mtr	35
c	3 x 6 sq mm Ar. Cu.Cable	Mtr	120
d	3 x 4 Sqmm Ar. Cu.Cable	Mtr	50
4	**CABLE Termination**		
	Supply of all materials and Carrying out cable end termination using brass compression type cable glands, copper crimping lugs, gland earthing of adequate size etc. complete		
a	31/2x35 Sq.mm	Nos	6
b	4 x 10 Sq mm	Nos	12
c	3 x 6 sq mm	Nos	42
d	3 x 4sqmm	Nos	4
5	**EARTHING**		
	Supply of materials and providing 600 X 600 X 3mm Cu Plate earth station As per IS:3043/87 including excavation of earth in all classes of soil, with G.I. pipe with funnel, salt, charcoal.		
5.1	Supply, Laying and fixing of earthing conductor of copper flat/ copper wires	Mtr	140
5.2	Copper wire No.10 or 2.5sq mm wire	Mtr	30
5.3	600x600 MM copper plate	Mtr	3
6	Supply an Fixing of LT danger board	No	2
7	Supply an Fixing of shock treatment chart	No	1
8	20 A single phase metal clad socket with 16 A MCB	No	12
9	**POINT WIRING**		
	Supply of all materials and carrying out point wiring for 230Volts A.C circuits through PVC conduits, 1.0 sq.mm single core PVC insulated copper wire for distribution with continuous earthing**modular**type 6A control switch, 6A sockets, mounting boxes etc, as necessary for the following items.		

	1 No 6A socket outlets controlled by, 1 No 6A SP Switch in Independent position.	No	9
10	**Power Points**		
	Supply of all materials carrying out power point wiring as per following configuration excluding the cost of circuit wiring	No	3
11	**Wiring- COPPER WIRES**		
	Supply, laying and termination of PVC insulated copper wires through 20mm PVC conduits for the following types of wires.	Mtr	30
12	**PVC CONDUIT**		
	Supply and laying of Electrical rigid PVC conduits of ISI grade. Medium duty laying through roof/surface and light duty laying through brick wall.		
a.	20mm dia. rigid PVC conduits.	Mtr	80
13	**MCB DISTRIBUTION BOARD**	No	1
a	**lighting DB**		
	Supply and Erection, Testing and commissioning of MCB Distribution Boards double door type with MCB combination on the incomer side and MCB on the outgoing. I/C- 16 Amp- 2P MCB O/G- 10 Amp SP MCB- 2Nos		
	MCB DISTRIBUTION BOARD	No	1
	Power DB		
	Supply and Erection, Testing and commissioning of MCB Distribution Boards double door type with MCB combination on the incomer side and MCB on the outgoing. I/C- 32 Amp- 2P MCB O/G- 16 Amp SP MCB- 2Nos		
14	LIGHTING FIXTURES / OTHER FIXTURES		
	Installation of the following outdoor/indoor type light fittings, including all wiring, termination, and interconnections and earthing from the termina block/ceiling rose to the light fitting/luminaries**. (LED)**	Nos	10
15	Charges for the preparation of necessary drawings and completion report with the CEA for getting scheme approval and Energisation sanction	Lum	1
16	Supply of single phase heavy duty exhaust fan of Dia 380mm for battery room.	Nos	2

* Shifting of existing DBs at the proposed DC location will be done by the University.

Sl. No.	Item	Compliance Report
1	Civil (Points 1-11)	Yes/No
2	Electrical (Points 1-16)	Yes/No
3	PAC (Point 1)	Yes/No
4	Fire detection (Points 1-7)	Yes/No
5	Fire Suppression (Points 1-12)	Yes/No
6	Networking (Points 1-12)	Yes/No
7	Rodent Repellent (Points 1-3)	Yes/No
8	Water leak detection (Points 1-3)	Yes/No
9	SMS alert (Point 1)	Yes/No
10	AMC (Point 1-5)	Yes/No
11	Terms & Conditions (Points 1-10)	Yes/No
12	Prequalification Criteria (Points 1-10)	Yes/No
13	General Conditions	

The statement of compliance (from the Manufacturer) with tender specification should be submitted in a tabulated and point wise manner giving a reference to the above documents.

Tender documents and tender schedule may be downloaded free of cost from the Website www.etenders.kerala.gov.in

All bid/tender documents are to be submitted online only and in the designated cover(s)/envelope(s) on the website. Tenders/Bids shall be accepted only through online mode on the website and no manual submission of the same shall be entertained. Late tenders will not be accepted.

Further details can be had from the **Deputy Registrar, Purchase Division, University of Calicut, Malappuram,**during working hours. (0494 – 2407130, 2407160).

Online Payment modes: The tender document fees can be paid in the following manner through**e**-Payment:

i. **State Bank of Travancore (SBT) Internet Banking**: If a bidder has a SBT internet banking account, then, during the online bid submission process, bidder shall select SBT option and then select Internet banking option. The e-Procurement system will re-direct the bidder to SBT's internet banking page where he can enter his internet banking credentials and transfer the tender document amount.

ii. **National Electronic Fund Transfer (NEFT)**: If a bidder holds bank account in a different bank, then, during the online bid submission process, bidder shall select NEFT option. An online remittance form would be generated, which the bidder can use for transferring amount through NEFT either by using internet banking of his bank or visiting nearest branch of his bank. After obtaining the successful transaction receipt no., the bidder has to update the same in e Procurement system for completing the process of bid submission. Bidder should only use the details given in the Remittance form for making a NEFT payment otherwise payment would result in failure in e- Procurement system.

As NEFT payment status confirmation is not received by e-Procurement system on a real time basis, bidders are advised to exercise NEFT mode of payment option at least 48 hours prior to the last date and time of bid submission to avoid any payment issues. NEFT payment should be done according to following guidelines:

i. **Single transaction for remitting Tender document fee and EMD:**Bidder should ensure that tender document fees and EMD are remitted as one single transaction.

ii. **Account number as per Remittance Form only:**Account no. entered during NEFT remittance at any bank counter or during adding beneficiary account in Internet banking site should be the same as it appears in the remittance form generated for that particular bid by the e-Procurement system. Bidder should ensure that tender document fees and EMD are remitted only to the account number given in the Remittance form provided by e- Procurement system for that particular tender. Bidders must ensure that the banker inputs the Account Number (which is case sensitive) as displayed in the Remittance form. No additional information like bidder name, company name, etc. should be entered in the account no. column along with account no. for NEFT remittance.

iii. **Only NEFT Remittance Allowed:**RTGS payments, Account to Account transfers, State Bank Group Transfers (GRPT) or Cash payments are not allowed and are treated as invalid mode of payments. Bidder must ensure that the banker does NEFT transaction only irrespective of the amount and specially instruct the banks not to convert the payment type to RTGS or GRPT.

iv. **Amount as per Remittance form:**Bidder should ensure that the amount being remitted is neither less nor higher than the amount shown in remittance form.

v. **UTR Number:**Bidders should ensure that the remittance confirmation (UTR number) received after NEFT transfer should be updated as it is, in the e-Procurement system for tracking the payment.

vi. One Remittance Form per Bidder and per Bid: The remittance form provided by e-Procurement system shall be valid for that particular bidder and bid and should not be re-used for any other tender or bid or by any other bidder.

Any transaction charges levied while using any of the above modes of online payment has be borne by the bidder. The supplier/contractor's bid will be evaluated only if payment status against bidder is showing “Success” during bid opening.

REGISTRAR

UNIVERSITY OF CALICUT

MALAPPURAM, KERALA STATE