



**INDIAN INSTITUTE OF TECHNOLOGY, KANPUR
GT ROAD, KALYANPUR, KANPUR – 208016
UTTAR PRADESH, INDIA**

TENDER REFERENCE NUMBER: IITK/EE/MJA/2020/01

BID SUBMISSION END DATE- 15.09.2020

TENDER DOCUMENTS

FOR

**ESTABLISHMENT OF EMI/ EMC TEST FACILITY INCLUDING
SEMI-ANECHOIC CHAMBER (SAC), RELATED EQUIPMENT AND
ACCESSORIES**

FOR

**TESTING OF MEDICAL, ELECTRICAL, AND ELECTRONIC
DEVICES**

INDEX

Sl. No.	Section	Contents	Page Number
1	Section I	Notice	3
2	Section II	Bid Document	4
3	Section III	Instruction for Online Bid Submission	6
4	Section IV	Instruction for eProcurement	10
5	Section V	Technical Bid	14
6	Section V: Part A	Technical Specifications of RF Shielded Semi-anechoic Chamber, RF Shielded Amplifier Room, RF Shielded Control Room and Non Shielded Room for other Test	15
7	Section V: Part B	Technical Specifications of Equipment for Susceptibility and Emission (Radiated and Conducted) Testing.	43
8	Section VI	Terms and Condition	69
9	Annexure – I	Tender Acceptance Letter	73
10	Annexure – II	Details of Earnest Money Deposit (EMD)	74
11	Annexure – III	Bidder's Eligibility Criteria	75
12	Annexure – IV	Schematic of the Building for the Proposed Facility	77

SECTION I

NOTICE

Online Financial and Technical Bids are invited from reputed firms for “**Establishment of EMI/EMC Test Facility including Semi-Anechoic Chamber (SAC), Related Equipment and Accessories for Testing of Medical, Electrical, and Electronic Devices**” for IIT Kanpur.

The Bidder should fulfil the following eligibility criteria: -

1. Should be registered as a Company under Companies Act 1956/ 2013 and should be in existence as such entity for not less than seven years as on 31.08.2020.
2. PAN Card (in the name of bidder/agency or proprietor)
3. GST Registration
4. The bidder should have at least 7 years of experience in the installation of similar types of EMI/EMC test facility in various organizations in India and abroad.
5. OEMs of all the products including test equipment, ferrite based absorbers, accessories etc. quoted by the bidder to establish this facility should also have at least 7 years of experience in the supply of such products to various organizations in India and abroad.
6. The bidder should have completed a similar work with a value of at least Rs. 5 crores.
7. Annual turnover for the last three years i.e. 2016-17, 2017-18 and 2018-19 should not be less than Rs. 30 crores each year.
8. The bidder should not have been black listed/debarred by any of the government agencies.

Applicants may apply for the E-tender through e-procurement (URL: <http://eprocure.gov.in/eprocure/app>) duly supported by the prescribed Annexure. Tender documents can be downloaded from e-procurement website as well as from Institute website <https://iitk.ac.in/new/tenders-notice>. Technical bid shall be opened on the date as per the system generated. Eligible bidders may be asked for a presentation. The financial bids shall be opened later on, only for those bidders who qualify the technical evaluation. Institute reserves the right to reject any or all the tenders/bids/ without assigning any reason thereof.

Sd/-
Assistant Registrar

SECTION II

BID DOCUMENT

Online bids (Technical and Financial) from eligible bidders which are valid for a period of 90 days from the date of Technical Bid opening (i.e. 16.09.2020) are invited for and on behalf of the Assistant Registrar, IIT Kanpur for "Establishment of EMI/EMC Test Facility including Semi-Anechoic Chamber (SAC), Related Equipment and Accessories for Testing of Medical, Electrical, and Electronic Devices"

Name of Work	Establishment of EMI/EMC Test Facility including Semi-Anechoic Chamber (SAC), Related Equipment and Accessories for Testing of Medical, Electrical, and Electronic Devices
Date of Publishing	14.08.2020 (16:00 hrs)
Clarification Start Date and Time	14.08.2020 (16:30 hrs)
Clarification End Date and Time	24.08.2020 (16:00 hrs)
Queries (if any)	Contact information, for any queries: email: contact@emcmedtest.org email: rakeshr@iitk.ac.in Phone: +91 8840637563 Phone: +91 512 679 6153 Phone: +91 512 259 6153 No queries will be entertained after clarification end date and time
Bid Submission Start Date	14.08.2020 (16:00 hrs)
Last Date and time of uploading of Bids	15.09.2020 (16:00 hrs)
Last Date and time of submitting, EMD and other documents at IIT Kanpur (if any)	15.09.2020 (16:00 hrs) EMD Amount: Rs.12,00,000/- (Rupees twelve lakhs only) EMD Amount can be in the form of DD in favour of Registrar IIT Kanpur or online submission to the following account: Account Name: Registrar IIT Kanpur Account Number.: 10426002137 IFS Code: SBIN0001161 If the amount is being paid through DD, a scanned copy of the draft should be uploaded

	<p>along with the technical bid. The original draft should reach the Purchase Section, IIT Kanpur on or before the date of opening of the technical bid.</p> <p>In case the amount is being paid online to the above mentioned account, a scanned copy of the transaction slip should be uploaded along with the technical bid.</p>
Estimated cost	Rs. 6,00,00,000/- (Rupees six crores only)
Pre- bid meeting date	25.08.2020 (16:00 hrs)
Pre-bid meeting Place	Due to Covid 19, the meeting will be conducted online. The link for the online meeting will be sent on request. The request may be sent to contact@emcmedtest.org
Date and time of opening of Technical Bids	16.09.2020 (16:00 hrs)
Date and time of opening of Financial Bids	Will be separately notified to Technically shortlisted/qualified bidders
Duration to complete the work	Bidder has to complete work within 01 year from date of tender allotment or within 6 months of building handover, whichever is later.

Interested parties may view and download the tender document containing the detailed terms and conditions from the website <http://eprocure.gov.in/eprocure/app>

(The bids have to be submitted online in electronic form on www.eprocure.gov.in only. No physical bids will be accepted.)

SECTION III

INSTRUCTION FOR ONLINE BID SUBMISSION

The bidders are required to submit soft copies of their bids electronically on the Central Public Procurement (CPP) Portal ie <http://eprocure.gov.in/eprocure/app> , using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP Portal.

1. REGISTRATION

- (i) Bidders are required to enrol on the e-Procurement module of the Central Public Procurement Portal (URL:<https://eprocure.gov.in/eprocure/app>)by clicking on the link “Online Bidder Enrolment” option available on the home page. **Enrolment on the CPP Portal is free of charge.**
- (ii) During enrolment/ registration, the bidders should provide the correct/ true information including valid email-id and mobile number. All the correspondence shall be made directly with the contractors/ bidders through email-id provided.
- (iii) As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.
- (iv) For e-tendering possession of valid Digital Signature Certificate (Class II or Class III Certificates with signing key usage) is mandatory which can be obtained from SIFY /nCode/eMudra or any Certifying Authority recognized by CCA India on eToken/ SmartCard.
- (v) Upon enrolment on CPP Portal for e-tendering, the bidders shall register their valid Digital Signature Certificate with their profile.
- (vi) Only one valid DSC should be registered by a bidder. Bidders are responsible to ensure that they do not lend their DSCs to others which may lead to misuse and should ensure safety of the same.
- (vii) Bidders can then log into the site through the secured login by entering their user ID/ password and the password of the DSC/ eToken.

2. SEARCHING FOR TENDER DOCUMENTS

- (i) There are various search options built in the CPP Portal to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, organization name, location, date, value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as organization name, form of contract, location, date, other keywords, etc., to search for a tender published on the CPP Portal.
- (ii) Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective ‘My Tenders’ folder. This would enable the CPP Portal to intimate the

bidders through SMS / e-mail in case there is any corrigendum issued to the tender document.

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

3. PREPARATION OF BIDS:

- (i) For preparation of bid Bidders shall search the tender from published tender list available on site and download the complete tender document and should take into account corrigendum if any published before submitting their bids.
After selecting the tender document the same shall be moved to the 'My favourite' folder of bidders account from where bidder can view all the details of the tender document.
- (ii) Bidder shall go through the tender document carefully to understand the documents required to be submitted as part of the bid. Bidders shall note the number of covers in which the bid documents have to be submitted, the number of documents – including the names and content of each of the documents that need to be submitted. Any deviations from these may lead to rejection of the bid.
- (iii) Any pre-bid clarifications if required, then the same may be obtained online through the tender site, or through the contact details given in the tender document.
- (iv) Bidders should get ready in advance the bid documents in the required format (PDF/xls/rar/dwf/jpg formats) to be submitted as indicated in the tender document/schedule. **Bid documents may be scanned with 100 dpi with black and white option which helps in reducing the size of the scanned document.**
- (v) Bidders can update well in advance, the documents such as experience certificates, annual report, PAN, EPF and other details etc., under "My Space/ Other Important Document" option, which can be submitted as per tender requirements. This will facilitate the bid submission process faster by reducing upload time of bids.

4. SUBMISSION OF BIDS:

- (i) Bidders should log into the site well in advance for bid submission so that he/ she uploads the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay.
- (ii) Bidder should prepare the EMD as per the instructions specified in the NIT/ tender document. The details of the DD physically sent or details of electronic transfer should tally with the details available in the scanned copy and the data entered during bid submission time. Otherwise the uploaded bid will be rejected.
- (iii) While submitting the bids online, the bidder shall read the terms and conditions (of CPP portal) and accept the same in order to proceed further to submit their bid.
- (iv) Bidder shall digitally sign and upload the required bid documents one by one as indicated in the tender document.
- (v) Bidders shall note that the very act of using DSC for downloading the tender

document and uploading their offers is deemed to be a confirmation that they have read all sections and pages of the tender document without any exception and have understood the complete tender document and are clear about the requirements of the tender document.

- (vi) Bid documents may be scanned with 100 dpi with black and white option which helps in reducing the size of the scanned document. For the file size of less than 1 MB, the transaction uploading time will be very fast.
- (vii) **If price quotes are required in XLS format, utmost care shall be taken for uploading Schedule of quantities and Prices and any change/ modification of the price schedule shall render it unfit for bidding.**

Bidders shall download the Schedule of Quantities and Prices i.e. Schedule-A, in XLS format and save it without changing the name of the file. Bidders shall quote their rate in figures in the appropriate cells, thereafter save and upload the file in financial bid cover (Price bid) only.

If the template of Schedule of Quantities and Prices file is found to be modified/corrupted in the eventuality by the bidder, the bid will be rejected and further dealt as per provision of clause number 23.0 of ITB including forfeiture of EMD.

The bidders are cautioned that uploading of financial bids elsewhere i.e. other than in cover 2 will result in rejection of the tender.

- (viii) Bidders shall submit their bids through an online e-tendering system to the Tender Inviting Authority (TIA) well before the bid submission end date and time (as per Server System Clock). **The TIA will not be held responsible for any sort of delay or the difficulties faced during the submission of bids online by the bidders at the eleventh hour.**
- (ix) After the bid submission (i.e. after Clicking “Freeze Bid Submission” in the portal), the bidders shall **take print out of system generated acknowledgement** number and keep it as a record of evidence for online submission of bid, which will also act as an entry pass to participate in the bid opening.
- (x) Bidders should follow the server time being displayed on bidder’s dashboard at the top of the tender site, which shall be considered valid for all actions of requesting, bid submission, bid opening etc., in the e-tender system.
- (xi) All the documents being submitted by the bidders would be encrypted using PKI (Public Key Infrastructure) encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128 bit encryption technology.

5. ASSISTANCE TO BIDDERS:

- (i) Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contact person indicated in the tender. The contact number of the end user is 0512-259-6153, Please call between 10:30 hrs to 17:00 hrs, contact@emcmedtest.org.

- (ii) Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24X7 CPP Portal Helpdesk. The 24 x 7 Help Desk Number 0120-4200462, 0120-4001002 and 0120-4001005. The helpdesk email id is support-eproc@nic.in .

SECTION IV

INSTRUCTION FOR e-PROCUREMENT

1. PREPARATION AND SUBMISSION OF BIDS:

- a. The detailed tender documents may be downloaded from <http://eprocure.gov.in/eprocure/app> till the last date of submission of tender. The Tender may be submitted online through CPP Portal <http://eprocure.gov.in/eprocure/app>.
- b. The bidder should submit the bid online in two parts viz. Technical Bid and Financial Bid. Technical Bid should be uploaded online in Cover-1 and Financial Bid in “.Xls” should be uploaded online in Cover-2.

2. SUBMISSION OF THE BID:

All interested eligible bidders are requested to submit their bids online on CPP Portal:

<http://eprocure.gov.in/eprocure/app> as per the criteria given in this document:

Technical Bid should be uploaded online in Cover-1.

Financial Bid should be uploaded online in Cover-2.

Both Technical and Financial Bid covers should be placed online on the CPP Portal :

(<http://eprocure.gov.in/eprocure/app>).

3. TECHNICAL BID:

Signed and Scanned copies of the Technical bid documents as under Cover-1 must be submitted online on CPP Portal: <http://eprocure.gov.in/eprocure/app> .

List of Documents to be scanned and uploaded (Cover-1) within the period of bid submission:

- a. Bank details.
- b. Certificate of GST. (GSTIN of Indian Agent in case of Import Shipments).
- c. Tender acceptance letter (Annexure I).
- d. Receipt of EMD payment and details of EMD (Annexure II).
- e. Bidder's eligibility criteria (Annexure III)
- f. (i) List of organizations (with contact information) within India and abroad, where a similar type of large EMI/ EMC test facility has been established by the bidder in the last 7 years.
(ii) Work completion Certificate provided by the respective organizations.
- g. Specifications or brochures of each item and complete list of equipment/ item that will be used in establishing this EMI/EMC test facility.
- h. Compliance sheet against the specification mentioned in technical bid
- i. Annual report, audited balance sheet, and profit and loss account for preceding

three years from the date of tender opening.

- j. Scanned copy of other documents as specified in Technical Bid.

NOTE - no indication of the rates/amounts be made in any of the documents submitted with the Technical Bid.

4. FINANCIAL BID

- a. The currency of all quoted rates shall be Indian Rupees or an equivalent amount in other currency (US Dollar, Euro etc).
- b. In case the bidder quotes the prices in different currencies, all such quoted prices will be converted to a single currency viz., Indian Rupees for the purpose of equitable comparison and evaluation, as per the exchange rates established by the Reserve Bank of India for similar transactions, as on the date of 'Price Bid' opening.
- c. For items in Section V: Part A, the bidder shall provide the overall price against item A: 1 in the BOQ excel file.
- d. For items in Section V: Part B, the bidder shall provide price for each of the items (starting with B:) mentioned in the BOQ excel file.
- e. The final tender will however be awarded to the bidder quoting the lowest total price, which is the sum of prices of all the items listed in the BOQ excel file. The item wise price will be used for audit and bookkeeping purposes.
- f. The price quoted shall include the warranty and calibration charges as specified in the technical bid.
- g. All the prices should be FOR IIT Kanpur.
- h. In preparing the financial bids, bidders are expected to take into account the requirements and conditions laid down in this Tender document. The financial bids should be uploaded online as per the specified ".Xls" format i.e. Price Bid Excel sheet attached as '.Xls' with the tender and based on the scope of work, service conditions and other terms of the Tender document. It should include all costs associated with the Terms of Reference/Scope of Work of the assignment.
- i. The Financial Proposal should be inclusive of all applicable taxes, duties, fees, levies, and other charges imposed under the applicable laws. The rates quoted in the Tender are inclusive of all applicable taxes, duties etc. Items that are imported on behalf of us, under the High Fee Sale Agreement, the institute will provide the required documents. For imported items, relaxed custom duty @ 5.5% is applicable to IIT Kanpur.

5. LAST DATE FOR SUBMISSION OF TENDER:

- a. Online bids complete in all respects, must be submitted on or before the last date and time specified in the schedule of events.
- b. The IIT Kanpur may, at its own discretion, alter/extend the last date for submission of tenders.

6. BID VALIDITY:

- a. All the Bids must be valid for a period of 90 days from the last date of submission of the tender for execution of Contract. However, the quoted rates SHOULD be valid for the initial/ extended period of the Contract from the

effective date of the Contract. No request will be considered for price revision during the original Contract period.

- b. A bid valid for a shorter period shall be declared as non-responsive.
- c. In exceptional circumstances, prior to expiry of the original time limit, the IIT may request the bidders to extend the period of validity for a specified additional period beyond the original validity of 90 days. The request and the bidders' responses shall be made in writing. The bidders, not agreeing for such extensions will be allowed to withdraw their bids without forfeiture of their Bid Security.

7. MODIFICATION / SUBSTITUTION/ WITHDRAWAL OF BIDS:

- a. No Bid shall be modified, substituted or withdrawn by the Bidder after the Bid's due Date.
- b. Any alteration/ modification in the Bid or additional information supplied subsequent to the Bid's due Date, unless the same has been expressly sought for by the Authority, shall be disregarded.

8. REJECTION OF THE BID:

The bid submitted shall become invalid if:

- a. The bidder is found ineligible.
- b. The bid does not meet the selection criteria mentioned in clause 9 of this section.
- c. The bidder does not upload all the documents as stipulated in the bid document.

9. SELECTION CRITERIA:

Phase-I: Technical evaluation:

Technical evaluation will be done on the basis of information given by technical bids submitted by the bidders and demonstration of previously installed similar facility.

Bid containing partial, incomplete, uncleared and superfluous and unwanted information will be summarily rejected. Technical declaration must be supported with relevant documents. Discrepancy in relevant supporting document and technical compliance sheets shall lead to rejection of technical bids.

Bidders should be willing to demonstrate the previous EMI/ EMC facility of similar type installed by them at major institutions in India and abroad, before the opening date of the financial bid. Non-demonstration of the previously installed facility by the bidder may result in disqualification.

Phase-II: Financial evaluation

- (i) Financial bids of technically qualified bidders only, shall be opened.

(ii) Financial evaluation is purely done on the total financial implication.

(iii) Any superfluous, unreasonable assets rate quotes will be summarily rejected.

10. LATE DELIVERY:

Delivery must be completed within the period mentioned in the tender document from the date of receipt of the order. Penalty @ 1% per week or part thereof subject to a maximum of 10% of the delivery price will be deducted from the balance payment if supply is not completed within stipulated period.

SECTION V

TECHNICAL BID

Department of Electrical Engineering
Indian Institute of Technology Kanpur
Kanpur (UP) 208016 India

Enquiry date: August 14, 2020

Enquiry No: IITK/EE/MJA/2020/01

Online quotations are invited to Establishment of EMI/EMC Test Facility including Semi-Anechoic Chamber (SAC), Related Equipment and Accessories for Testing of Medical, Electrical, and Electronic Devices. The detailed specifications are given in Sections V Part A through V- Part B.

The EMI/EMC test facility shall be a fully compliant fully automated radiated susceptibility and radiated emission test system for testing of electrical/electronics and medical equipment as per IEC/ EN/ CISPR standards. The scope is to design, supply, integrate, install and commission the complete system that conforms to the standards which can then get accredited by appropriate agencies.

The facility including the test equipment should provide the capability to test products as per the following standards (latest versions): IEC 60601-1-2, IEC 61000-4-3, IEC 61000-4-6, CISPR 11, 13, 14, 15, 22, 32, CISPR 16-1-1, CISPR 16-1-4, CISPR 16-1-2 and FCC standards, as applicable.

Bidder shall be responsible for complete design, construction, supply, testing and commissioning of RF Shielded semi-anechoic chamber, RF Shielded amplifier room, RF Shielded control room and Non shielded room for other tests, as specified, along with necessary testing equipment and required automation software, on turnkey basis.

The bidder shall write the specifications in each row in the following table. Mere writing “COMPLY” or “YES/NO” is not sufficient and such offers are liable for rejection.

Part A

A: TECHNICAL SPECIFICATION OF RF SHIELDED SEMI-ANECHOIC CHAMBER, RF SHIELDED AMPLIFIER ROOM, RF SHIELDED CONTROL ROOM AND NON-SHIELDED ROOM FOR OTHER TEST

S. No	Parameter	Required Specification	Bidder's specification	Compliance (Yes or No)
A: 1	RF SHIELDED SEMI-ANECHOIC CHAMBER (SAC)			
A: 1.1	Performance			
A: 1.1.1	Type of Chamber	3-Meter EMC Semi Anechoic Shielded Chamber (Modular Pan Type)		
A: 1.1.2	Standards	Standards: IEC 60601-1-2 Edition 4, 2014-02, CISPR 11, CISPR 13, CISPR 14, CISPR 15, CISPR 22, CISPR 32, CISPR 16-1-1, CISPR 16-1-4, CISPR 16-1-2, ANSI C63.4, FCC Part-18, EN 50147-1 Immunity: IEC 61000-4-3, IEC 61000-4-6		
A: 1.1.3	Equipment to be tested	Medical devices, IT equipment, and other electronic devices, as per standards.		
A: 1.1.4	Measurement distance	3m; For both immunity and emission tests		
A: 1.1.5	Quiet zone	2m X 2m X 2m (L X W X H)		
A: 1.1.6	Frequency range	Radiated immunity: 80 MHz – 6 GHz Radiated emission: 9 KHz – 40 GHz		
A: 1.1.7	Power	Maximum power supply rating EUT:		

	and utilities for the Equipment Under Test (EUT)	<p>AC: 230 V, 20 A, 50 Hz, 1 Ø and 440 V, 50 A, 50 Hz, 3 Ø.</p> <p>Gas supply should provide the provision for medical gas (e.g. O2, N2, N2O, and Air) inside the chamber. Four pipes of 12 mm diameter.</p> <p>Provision for taking in and bringing out liquid</p>		
A: 1.1.8	Chamber Performance Criteria	<p>Shielding Effectiveness (SE):</p> <p>Magnetic Field : 1 MHz: ≥ 80 dB</p> <p>Electric Field: 200 KHz - 50 MHz: ≥ 100 dB</p> <p>Plane wave field: 50 MHz – 1 GHz: ≥ 100 dB</p> <p>Microwave Field: 1 GHz – 40 GHz: ≥ 100</p> <p>As per EN 50147-1</p>		
		<p>Normalized Site Attenuation (NSA):</p> <p>± 4.3 dB from 30 MHz – 1 GHz at 3 m distance in the above defined Quiet zone(QZ), as per ANSI C63.4, CISPR 16-1-4</p>		
		<p>Site Voltage Standing Wave Ratio (SVSWR) :</p> <p>< 6 dB</p> <p>for 1 GHz – 18 GHz, As per CISPR 16-1-4, ANSI C 63.4</p>		
		<p>Field Uniformity (FU):</p> <p>0 to +6 dB at 80 MHz – 6 GHz (75% points in 16 points) as per IEC 61000-4-3</p>		

		<p>As per IEC 61000-4-3, the analytical result should be provided confirming to given standards EN 50147-1, 2, IEEE 299, ANSI 63.4, CISPR 16-1-4, IEC 61000-4-3.</p> <p>The chamber shall be validated by third party or independent laboratory which is accredited as per ISO 17025: 2005.</p> <p>The bidder shall attach the sample certificate along with technical bid.</p>		
A: 1.2		Materials, Dimensions and Rating:		
A: 1.2.1	Dimensions	<p>Minimum External Dimension: 9 m x 6 m x 6 m approx.</p> <p>Building site is an existing laboratory. Floor plan is given in Annexure IV.</p> <p>Suggested modifications to the building for optimum placement of the chamber should be mentioned by the bidder. The suggested modifications to the building will be carried out by IIT Kanpur.</p>		
A: 1.2.2	Shielding Material for side walls and ceiling	<ul style="list-style-type: none"> ● Pan type Shielding panels with ferrite tiles on all side walls and ceiling. ● Fully dismantlable and transferable. ● Supporting steel structure for the chamber ● Panels to be made of single sheet of steel (at least 2 mm thick) with environmental coating (e.g. zinc) ● Proper RF shielding gasket to be used between panels 		

A: 1.2.3	Hybrid pyramidal absorbers	<p>Full coverage non-drooping with polyurethane foam or latest thin film technology absorbers</p> <ul style="list-style-type: none"> ● High Field withstand capacity (at least 200 V/m) ● Fire retardant as per UL/DIN/IEC as per DIN 4102 ● Removable and replaceable ● Clean room compatible absorbers according to ISO 14644-1 class 5 / class 100000 <p>- RF testing as per EEE1128</p>		
A: 1.2.4	Floor absorbers	<p>Movable type partially covering absorbers</p> <p>Immunity testing – hybrid absorber with ferrite 16 pieces of 2 ft x 2 ft absorbers on sixteen floor carts</p> <p>Emission testing – 28 pieces of 2 ft x 2 ft removable pyramidal absorber placed in front of the quiet zone and three rolling non conductive platforms with integrated casters.</p>		
A: 1.2.5	Floor and ground plane	<p>Raised floor of required height with load bearing capacity of at least 1500 kg/m² with floor entry panels included.</p> <ul style="list-style-type: none"> ● Anti-moisture mat should also be included under the shielded floor. ● Multi sheeted mat located inside the main door and it has the same width as that of the shielded door. 		

		<ul style="list-style-type: none"> ● Suitable below floor clearance for turntable installation 		
A: 1.2.6	Cable ducting	Provide a suitable ducting to run RF and Power cables separately below the floor		
A: 1.2.7	RF Shielded Door (Main)	<p>2.0m x 2.1m Double leaf knife edge swing door, electrically and pneumatically operated (1500 kg load capacity).</p> <ul style="list-style-type: none"> ● Test in progress” Display with Interlock Switch. ● Easy to operate, light weight with standard sealing. ● Should be able to shut off the RF in the event of door being opened during Immunity Testing ● Should provide door maintenance kit ● Provide compressor in case of pneumatic door ● Provide the separate price for all types of doors. 		
A: 1.2.8	RF shielded Door between SAC and CR	<p>Semi-automatic Single leaf swing door of size 1.2m x 2.1m</p> <ul style="list-style-type: none"> ● RF shielded swing door and limit switch to accommodate immunity interlock ● Test in progress” Display with Interlock Switch. 		
A: 1.2.9	Ventilation	Honeycomb Waveguide air vents with cut off Freq of 40 GHz (100 dB shielding Effectiveness @ 40 GHz)		

		Size and quantity are to be recommended by the bidder for proper AC tonnage and heat load to maintain the required environmental conditions inside the chamber.		
A: 1.2.10	Lighting	<p>EMI-Free LED lights (minimum 5 in number) of (60W-100W) and (with electrical distribution and filtering.</p> <p>Capable of withstanding the produced field strength.</p> <p>Test in Progress Lights over SAC door and CR door;</p> <p>EMI Free Emergency lighting system with rechargeable battery backup to be provided above the exit door.</p> <p>Signal lights over SAC, CR and AR doors.</p> <p>Ladder provided for lighting maintenance.</p>		
A: 1.2.11	EUT Monitoring system	<p>Three EMI-shielded full HD digital cameras one for chamber wall and other two on tripod having 30x optical zoom and 10x digital zoom with minimum 330° pan tilt, built-in Audio system and battery backup.</p> <p>One rack control should be provided to select cameras for various types of controls: -joystick control, Pan/tilt control and audio Monitoring (built-in speaker);</p>		

		<p>Video Recording capability with 1TB hard disk and one LED monitor of 42" min.</p> <p>Audio monitoring / Intercom system between SAC and Control Room and NSR and AR.</p>		
A: 1.2.12	Reference radiator	To evaluate chamber and test instrument performance		
A: 1.2.13	RF Filters	<p>Power line Filters with more than 100 dB insertion loss from 9 kHz to 40 GHz as per CISPR17</p> <p>For EUT</p> <ul style="list-style-type: none"> - 1 Ø, 230V AC, 50 Hz, 20 A, 2 lines (1 Ø + neutral) - 2 number - 3 Ø, 4 Line, 440 V, 50 Hz, 50 A – 2 number - DC, 2 line, 300 V, 25A – 2 number <p>Filters are to be provided as per requirement of Lighting, Antenna mast, Turntable, Fire detection system, CCTV, Intercom, VOIP phone and Ethernet.</p>		
A: 1.2.14	Device controller	<p>The device controller, being operated using software from the control room, shall control various devices such as RF source, external receivers, amplifiers, power meters, antenna mast, turntable, and other equipment in the test loop etc.</p> <p>Provision should be there to control the devices manually.</p>		

		This should facilitate all the testing being carried out in the chamber, including radiated emission and immunity.		
A: 1.2.15	Ground stud	Threaded ground stud along with earth cable. Dedicated earth pit is the responsibility of the bidder.		
A: 1.2.16	Antenna mast	Scanning range from 1m to 4m with accuracy of ± 2 cm or better <ul style="list-style-type: none"> ● Remotely controllable with fiber optic control lines ● Centerline Polarization for better accuracy ● Variable Speed Drive ● Electrically operated All the fittings, wiring is to be carried out by the bidder.		
A: 1.2.17	Turntable	One optimum size duty turntable with standard diameter 2m, payload 1500 kg and variable drive speed. Fiber optic controllable and terminal box with access cover plate More information is required on specification, drive, hold, positioning accuracy, etc.		
A: 1.2.18	Connector panels and penetration between SAC and amplifier room	Appropriate size panels containing the following connectors with RF shielded connector caps. N type(F) , SMA, 7/16 DIN connectors Quantity: 4 each		
A: 1.2.19	Connector panels and penetration on SAC between	Appropriate size panels containing the following connectors with RF shielded connector caps.		

	SAC and control room	<ul style="list-style-type: none"> ● BNC (F), SMA (F), 7/16 DIN (F) (Quantity- 4 each) ● N type(F)- Quantity 6 ● Fiber optic (FO) cables, connectors, adaptors: as per requirement ● 1 ½ pipe penetration with cap ● 6-way Fiber optic feed through – 1 number. <p>RS232, RS485, USB, LAN 1Gbps shielded optical converter - 1 set each</p>		
A: 1.2.20	Access hatches	Essential number of access hatches on raised ground floor and near turntable and antenna mast with Power outlets and RF Connectors		
A: 1.2.21	Electrical Distribution panel	<p>Power distribution box with ELCB, MCB/MCCB and RCCB – 1 Number</p> <ul style="list-style-type: none"> ● Light ON/OFF switches as per requirement. ● ON/OFF control switches for turntable and antenna mast ● EUT outlets 32 A - 3 phase with neutral and single phase 		
A: 1.2.22	Chamber design	Chamber design will be suggested by the bidder and work may be started after approval from Indian Institute of Technology Kanpur (IITK).		

		If IITK suggests any changes in the chamber design such as, location of the chamber, control room, amplifier room, doors, etc., they will be carried out by the bidder at no extra cost.		
A: 2	RF SHIELDED CONTROL ROOM (CR)			
A: 2.1	Type of Chamber and Dimension	<p>Modular Pan Type Shielded Control Room.</p> <ul style="list-style-type: none"> ● Hot galvanised sheet steel / conductive material ● Zinc galvanisation on every side of the shielding to resist corrosion. ● Corners of the shielded room should be secured properly ● Aesthetically pleasing floor tiles applied with adhesive over the exposed steel surface <p>Suitable size 4.0m (L) x 7.0m (W) x 3.0 m (H)</p>		
A: 2.2	RF shielded Door between Outside and CR	<p>Semi-automatic RF shielded swing door.</p> <p>Should have “Test in progress” Display</p>		
A: 2.3	Connector panels and Penetration panels between Control Room and outside	<p>Appropriate size panels containing the following connectors with RF shielded connector caps.</p> <ul style="list-style-type: none"> ● BNC(F), SMA(F), N type(F) ● Quantity: 4 each ● Fiber optic (FO) cables, connectors, adaptors: as per requirement ● 1½” diameter pipe penetration with cap 		
A: 2.4	Connector panels and Penetration	Appropriate size panels containing the following		

	panels between Control Room and Amplifier Room	connectors with RF shielded connector caps. <ul style="list-style-type: none"> ● 7/16 DIN (F) Quantity: 2 ● N type (F) Quantity: 6 ● Fiber optic (FO) cables, connectors, adaptors: as per requirement ● 1½” diameter pipe penetration with cap 		
A: 2.5	Lighting	LED light as per requirement <ul style="list-style-type: none"> ● Emergency lighting system with rechargeable battery backup to be provided above the CR door. ● Test in progress and signal lights over CR door 		
A: 2.6	Ventilation	Size and quantity are to be recommended by the bidder		
A: 2.7	Power line filters	RF Power line Filters with 100dB insertion loss from 9 kHz to 40 GHz <ul style="list-style-type: none"> ● For Instrumentation, Lighting and other accessories: 3 Ø, 4Line, 440 V, 50 Hz, 25 A – 1 Number. ● Shielded optical converter for Ethernet - 1 each. 		
A: 2.8	Electrical Distribution panel for CR	Power distribution box with ELCB, MCB/MCCB or RCCB – 1 Number <ul style="list-style-type: none"> ● Light ON/OFF switches as per requirement. ● Power points (1 Ø, 230V - 5/15A) with switch along the wall of the CR. ● 3 Ø outlets at specific locations. 		
A: 2.9	Test environment	Must provide a user-friendly system with a required number of tables, racks, trolleys and furniture.		

A: 3	EMI RECEIVER-1 Quantity: 1 Number			
A: 3.1	Frequency range	9 kHz – 26 GHz		
A: 3.2	Mode of operation	EMI Receiver/ Spectrum analyser		
A: 3.3	Measurement time	<100 ms (maximum measurement time periods 2 min)		
A: 3.4	Minimum measurable Probability	1×10^{-7}		
A: 3.5	Limitation of receiver noise and internally generated spurious signal	(i) Random noise: Back-ground noise shall not introduce an error more than 1 dB. (ii) Continuous wave: For any input signal to the measuring receiver existence of spurious signal shall not introduce measurement error more than 1 dB.		
A: 3.6	Video bandwidth	1 Hz to 3 MHz		
A: 3.7	Resolution bandwidth	10 Hz-10 MHz Table below shows the Bandwidth requirement for measuring the receiver.		
Table - Bandwidth requirements for measuring receivers				
Bandwidth requirements for measuring receivers (As per Table 3 of CISPR 16 -1 -1)				
Characteristics		Frequency band		
Bandwidth requirements	Band A 9 kHz to 150 kHz	Band B 0.15 MHz to 30 MHz	Bands C and D 30 MHz to 1 GHz	Band E 1 GHz - 18 GHz

	Bandwidth requirements (B6)	100 Hz to 300 Hz	8 kHz to 10 kHz	100 kHz to 500 kHz	300 kHz to 2 MHz
	Reference Bandwidth	200 Hz	9 kHz	120 kHz	1 MHz
A: 3.8	Input attenuator range	0 to 60 dB in 10 dB steps			
A: 3.9	IF detectors	In-built with Peak, Average, Quasi-Peak, R.M.S- Average (as per CISPR standard)			
A: 3.10	Pre-selector	In-built as per CISPR 16-1-1			
A: 3.11	Pre-amplifier	In-built with ON/OFF provision; 20 dB gain (typical).			
A: 3.12	Frequency Tuning Tolerance	$\pm 2 \%$			
A: 3.13	Intermediate frequency rejection ratio	≥ 40 dB			
A: 3.14	Image frequency rejection ratio	≥ 40 dB			
A: 3.15	Marker read out resolution	≤ 0.1 dB			
A: 3.16	Total measurement uncertainty	≤ 1 dB			
A: 3.17	Tracking generator	Needed			
A: 3.18	Pulse Limiter	Required for conducted emission testing.			
A: 3.19	Measurement Accuracy	$\leq \pm 1$ dB			
A: 3.20	Average Noise level	Average Detector On , RF Atten- 0dB Pre-amp OFF, ≤ 19 dB μ V Pre-amp ON, ≤ 8 dB μ V			

A: 3.21	Maximum safe RF CW input level at RBW \geq 30 kHz	+ 30 dBm		
A: 3.22	Units of measurement	Logarithmic: dBm, dB μ V, dBmV, dB μ A, dBpW, Linear: μ V, μ A, nW		
A: 3.23	Characteristic of EMI Receiver	Table below shows the characteristics of the receiver		
Characteristic of EMI Receiver described in Table below				
(i) Bandwidth characteristics for inter-modulation test of quasi-peak measuring receivers . As per Table 4 of CISPR 16 -1 -1				
Characteristics		Frequency Band		
Bandwidth characteristics	Band A 9 kHz to 150 kHz	Band B 0.15 MHz to 30 MHz	Bands C 30 MHz to 300 MHz	Band D 300 MHz- 1000 MHz
KHz	0.4	20	500	500
KHz	4	200	2000	6000
MHz	0.15	30	300	1000
MHz	0.3	60	600	2000
(ii) Overload Factor (Hz)				
Characteristics		Frequency Band		
	Band A 9 kHz to 150 kHz	Band B 0.15 MHz to 30 MHz	Bands C and D 30 MHz to 1 000 MHz	Band E 1GHz- 18 GHz
Overload Factor (Hz)	< 25	< 500	< 5000	NA
(iii) Test pulse characteristics for quasi-peak measuring receivers				

(As per Table 5 of CISPR 16 -1 -1)					
Characteristics	Frequency Band				
	Band A 9 kHz to 150 kHz	Band B 0.15 MHz to 30 MHz	Bands C 30 MHz to 300 MHz	Band D 300 MHz - 1 GHz	
μ Vs	13.5	0.316	0.044	0.044	
MHz	0.15	30	300	1000	
Hz	25	100	100	100	
(iv) VSWR requirements for receiver input impedance					
Characteristics	Frequency Band				
	9 kHz to 1 GHz	9 kHz to 1 GHz	1 GHz - 18 GHz	1 GHz - 18 GHz	
Attenuation (dB)	0	≥ 10	0	≥ 10	
VSWR	2.0 to 1	1.2 to 1	3.0 to 1	2.0 to 1	
(v) Combined Selectivity of CISPR measuring receiver and high pass filter					
Frequency kHz	150	146	145	140	130
Relative attenuation (dB)	≤ 1	≤ 6	≥ 6	≥ 34	≥ 81
(vi) Characteristics of Quasi-peak measuring receivers As per Table H.1 of CISPR 16 -1 -1					
Characteristics	Frequency band				
	Band A 9 kHz to 150 kHz	Band B 0.15 MHz	Bands C and D		

			to 30 MHz	30 MHz to 1 000 MHz
Bandwidth at the -6 dB points ,B6 in KHz	0.20	9		120
Detector electrical charge time constant, in ms	45	1		1
Detector electrical discharge time constant, in ms	500	160		550
Mechanical time constant of critically damped indicating instrument , in ms	160	160		100
Overload factor of circuits preceding the detector, in dB	24	30		43.5
Overload factor of the DC amplifier between detector and indicating instrument, in dB	6	12		6
(vii) Minimum pulse repetition rate without overload (As per Table 10 of CISPR 16 -1 -1)				
Characteristics	Frequency band			
	Band A 9 kHz to 150 kHz	Band B 0.15 MHz to 30 MHz	Bands C and D 30 MHz to 1 000 MHz	Band E 1 GHz - 18 GHz
Corner frequency f_c (kHz)	0.01	0.01	0.1	1
Minimum pulse repetition rate (Hz)	5	5	100	316
Ratio peak / RMS-average indication (dB)	19	35.5	30.6	40
A: 3.24	Other features	<ul style="list-style-type: none"> Scan results should be presented in tabular format 		

		<ul style="list-style-type: none"> • Option of measuring multiple traces at the same time • Limit lines should be selected as per standard and option for saving it in customised mode. • Various marker functions and Peak search analysis • Interface-GPIB/IEEE488/RS232/USB/ETHERNET. 		
A: 3.25	Accessories	The necessary accessories required for tests, such as interconnection cables, connectors, and probes etc. must be supplied along with the test system.		

A: 4	RF SHIELDED AMPLIFIER ROOM (AR)			
A: 4.1	Type of Chamber and Dimension	Modular Pan Type Shielded Amplifier Room. <ul style="list-style-type: none"> • Hot galvanised sheet steel / conductive material • Zinc galvanisation on every side of the shielding to resist corrosion. • Corners of the shielded room should be secured properly • Aesthetically pleasing floor tiles applied with adhesive over the exposed steel surface 		
A: 4.2	RF shielded Door between Outside and AR	Single leaf swing door of size - 1.2m(W) x 2.1m(H) Should have “Test in		

		progress” Display and automatic lock facility		
A: 4.3	Ventilation	Size and quantity are to be recommended by the bidder		
A: 4.4	Lighting	Proper EMI free LED lighting to be provided.		
A: 4.5	Power line filters	RF Power line Filters with 100dB insertion loss from 9 kHz to 40 GHz For Instrumentation / Lighting and Others: 3 Ø - 4 Line, 440 V, 50 Hz, 50 A – 1 number		
A: 4.6	Electrical Distribution panel for AR	Power distribution box with ELCB, MCCB, and RCCB – 1 Number. <ul style="list-style-type: none"> ● Light ON/OFF switches as per requirement. ● ON/OFF switches for instruments with at least 3 extra for future 		
A: 4.7	Connector panels and penetration on amplifier room	Appropriate size panels containing the following connectors with RF shielded connector caps. <ul style="list-style-type: none"> ● BNC (F), SMA (F), 7/16 DIN (F) (Quantity- 4 each) ● N type(F)- Quantity 6 ● Fiber optic (FO) cables, connectors, adaptors: as per requirement ● 1½” diameter pipe penetration with cap ● 6-way Fiber optic feed through – 1 Number ● RS232, RS485 		

A: 5	NON - SHIELDED ROOM (NSR) FOR OTHER TESTS			
A: 5.1	Available Space Dimension	Approximate size: 15m x 10m x 3 m		
A: 5.2	Internal Layout	Best possible arrangement recommended by the bidder for Conducted emission, Conducted Immunity and other tests as per standard.		
A: 5.3	Civil Works	<p>Epoxy flooring (Electrostatic) as per standard has to be carried out by the bidder.</p> <p>False ceiling – Bidder to provide false ceiling along with all necessary supporting structures.</p> <p>Painting – Epoxy Wall Painting as per standard has to be carried out by the bidder.</p>		
A: 5.4	Lighting	<p>LED light as per requirement</p> <p>Emergency lighting system with rechargeable battery backup to be provided.</p>		
A: 5.5	Electrical Distribution panel	<p>Power distribution box with ELCB, MCB and RCB – 1 Number.</p> <ul style="list-style-type: none"> ● Light ON/OFF switches as per requirement. ● Power points (1 Ø, 230V - 5/15A) with switch as per requirements. ● 3 Ø outlets at specific locations. 		

A: 5.6	Test environment	Must provide a user friendly system with required number of tables, racks, trolleys and furniture as per standard for conducted emission and conducted immunity testing.		
A: 6	OTHER SPECIFICATIONS FOR PART A			
A: 6.1	Chamber Design	Bidder should provide best possible design along with the 3-D drawing and layout of the chamber for approval		
A: 6.2	Interior Finishing for CR, AR and NSR	Should provide proper interior finishing for CR, AR and NSR		
A: 6.3	Installation and Commissioning	Installation and Commissioning of the chamber should be facilitated by the bidder.		
A: 6.4	Civil work	<p>For SAC, CR and AR: IITK will provide the building space required for the chamber with a rough concrete platform.</p> <p>All necessary chasing, drilling and allied works for trench, turntable, etc., and finishing the same has to be carried out by the bidder.</p> <p>The appropriate flooring works around the chamber should also be carried out by the bidder</p>		
A: 6.5	Fire detection and fire extinguishing system for SAC, CR, AR and NSR	<p>Complete Fire detection system for SAC, CR, AR and NSR</p> <ul style="list-style-type: none"> ● Fire extinguishers outside CR AR and NSR doors ● Provision for hooter and Manual/Automatic power shut off. 		

		<ul style="list-style-type: none"> ● CO₂ cylinders (2 numbers) 		
A: 6.6	Electrical Wiring (SAC, CR, AR and NSR)	<p>Bidder shall provide and carry out the wiring for lighting, CCTV system, air conditioning system.</p> <p>IITK will provide a required power distribution board nearer to the chamber.</p> <p>All the wiring from board to chamber, control room, amplifier room is the responsibility of the bidder.</p>		
A: 6.7	Air conditioning system (SAC, CR, AR and NSR)	<p>Air conditioning system to be installed as per the latest international environment guidelines.</p> <p>Temperature: 22 ± 2 °C Humidity: $50\% \pm 5\%$ or as per the requirement of the instrument and chamber, whichever is more stringent.</p> <p>The system shall take into account the heat load inside the various rooms considering rating of RF power amplifiers, filter rating, lighting system, typical EUT requirement and all measurement systems, etc.</p> <p>Ductable packaged A/C unit from reputed brands to be used.</p> <p>Bidders should advise the recommended tonnage for AC by considering the temperature and humidity factors.</p>		

		<p>System shall provide effective humidity control</p> <p>Duct noise should be within the required safe level. The duct should have adequate internal acoustic lining and thermal insulation. Return duct to package A/C unit should be provided.</p> <p>Adequate arrangement for treated fresh air inside the chamber to be considered in the design of air conditioning systems.</p>		
A: 6.8	Audio Intercom System	The bidder has to provide audio intercom system between SAC and CR and between NSR and CR		
A: 6.9	Accessories	<p>Any other accessory required for testing shall be included in the offer and optional accessories shall be quoted separately.</p> <p>All the essential accessories set of interconnection cables including power cables, fibre optic cables with required length, switches and switchboards shall be supplied along with the test system.</p> <p>All electrical distribution system and accessories including connectors, wiring (as per load requirement) and conduit (internal and external), accessories for air conditioning system and fire detection system shall be supplied with the system by the bidder</p>		

A: 6.10	Data sheets	<p>The bidder shall provide all the details regarding country of manufacturing, model and year of manufacturing of all the instruments/materials</p> <p>Datasheets, technical literature, operational manuals and brochures should be enclosed with the offer</p>		
A: 6.11	Experience	<p>The bidder should have at least 7 years of experience in the installation of similar types of EMI/EMC test facility for medical devices in various organizations in India and abroad.</p> <p>OEMs of all the products including test equipment, ferrite based absorbers, accessories etc. quoted by the bidder to establish this facility should also have at least 7 years of experience in the supply of such products to various organizations in India and abroad.</p> <p>The bidder should have completed a similar work with a value of at least Rs. 5 crores.</p> <p>The bidder should provide a list of organizations (with contact information) within India and abroad, where such a facility has been established by the bidder in the last 7 years. This should be supported with relevant documents.</p>		
A: 6.12	Chamber performance testing by the bidder and	The performance testing of the chamber shall be carried out by the bidder using the		

	validation by Accredited 3rd Party	<p>procedure established in accordance with the latest edition of the test standard (EN 50147-1, 2, IEEE 299, ANSI 63.4, CISPR 16-1-4, IEC 61000-4-3).</p> <p>The performance of the chamber should be validated by an external ISO/IEC 17025 accredited agency.</p> <p>The bidder/agency would be responsible to provide the required calibrated measuring instruments including antennas and other accessories etc. for the evaluation of the performance of the chamber.</p> <p>The bidder shall identify the 3rd party accredited testing agency and facilitate the validation process. The cost towards the same shall be borne by the bidder.</p>		
A: 6.13	Safety	<p>The test facility shall conform to the safety standards</p> <p>The bidder shall provide appropriate signages indicating RF hazards, shock hazards, hazardous smoke, gas etc. and also display boards showing instructions / precautions to be taken during testing and in case of emergency/accident. Fire exits in the facility should be clearly marked.</p>		
A: 6.14	Logo	Both FACILITY and IITK logos to be fixed on the wall.		

A: 6.15	Documentation	Technical, safety, operational, maintenance and service manuals should be provided in hard copy along with the electronic versions.		
A: 6.16	Installation, Commissioning, and Training	The bidder will be responsible for the installation and commissioning of the chamber including all the equipment and software. The bidder will also provide proper training to the team associated with the facility. The training will be provided at IIT Kanpur		
A: 6.17	Warranty for SAC under Section V Part A	Performance: 10 years minimum Material workmanship: 10 years minimum Shielding effectiveness: 10 years minimum Absorber reflectivity: 10 years minimum		
A: 6.18	Warranty for shielded amplifier and control rooms under Section V Part A	Material workmanship: 10 years minimum		
A: 6.19	Warranty for other accessories under Section V Part A	3 years minimum		
A: 7	INTEGRATED SYSTEM SOFTWARE			

	<p>The control software for the following EMI EMC test shall be complaint to the requirement as per the latest standards-</p> <p>(i) Radiated Immunity Test- as per IEC/EN 61000-4-3.</p> <p>(ii) Conducted Immunity Test- as per IEC/EN 61000-4-6 Ed. 4.0.</p> <p>(iii) Radiated Emission and Conducted Emission - as per CISPR 11 standard and FCC Part 18 standard.</p> <p>The software should consist of the following features according to the test:</p> <p>Radiated Immunity/ Conducted Immunity:</p> <ul style="list-style-type: none"> ● For calibration of the field, a feedback controlled loop from probes is required. ● Routine calibration should be done for 16 points as per latest standard, and corrections if any. ● It should have several levelling methods like Forward power, Net Power, level on field, Signal generator drive, calibration levels etc., ● Drivers for all the equipment like signal generators, amplifiers, power meters, and switching units etc should be provided. ● Option to select the standards or other Regulation test limits or EUT susceptibility threshold levels. <p>Radiated Emission / Conducted Emission:</p> <ul style="list-style-type: none"> ● It should Pre-Scan routine to find peaks and final scan routines. ● Option to compare 2 different scans. ● Able to make uncertainty measurements. <p>General features for all the test:</p> <ul style="list-style-type: none"> ● User friendly, windows based menu-driven, interactive operation. ● Detailed Software manual and online support for software. ● Test Data should be in tabular as well as in 		
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	<p>graphical format and able to move its data to any Microsoft office products.</p> <ul style="list-style-type: none"> ● Ability to export reports to PDF, DOC, RTF, XL or HTML etc. ● Software should be able to generate report with all test parameters ● Generating test reports in graphical, tabulated data and document format (Test Report format should be able to be customised). ● Graphical representation of the results on the computer screen. ● Marker function, USB interface for downloading results, Peak search and analysis. ● Selection of limits lines as per standard. Provision for saving customised limit lines. ● Ability to find the EUT Threshold during EUT failure where all the test parameters can be varied to find the EUT threshold and return to normal testing with original test parameters. ● Fully automatic EUT monitoring for future expansion and control of test level of the EUT. Software shall allow automated data ● acquisition from EUT to determine pass/fail status of EUT. ● It should be modular and flexible to adapt the system to new Regulations / Standards or extend or modify the hardware due to new test requirements. ● The software shall be upgradeable in future to handle the changes in the test standards. ● Program listing provided for modification and up gradation. ● Software program shall comply with any make of USB/RS232/IEEE/GPIB compatible instruments. 		
A: 8	HARDWARE		

	<p>The bidder shall provide the</p> <ul style="list-style-type: none"> ● Latest configuration branded i9 10th generation Desktop PC- 5 (Number) ● 24" LED monitor (full HD)FDW ● 16 GB RAM upgradable to 64 GB ● 1 TB HDD ● Windows 10 Professional ● UPS (Rating: as per required for entire facility) with battery backup ● MS office latest version, ● Antivirus and PDF converter. ● HP LaserJet Pro M479fdw colour printer. 		
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PART B

B: TECHNICAL SPECIFICATIONS OF EQUIPMENT FOR SUSCEPTIBILITY AND EMISSION (RADIATED AND CONDUCTED) TESTING
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B: 1 RADIATED SUSCEPTIBILITY TEST SYSTEM

Frequency Range	80 MHz – 6 GHz minimum
Test level	30 V/m (54 V/m CW) As per IEC 60601-1-2 with reference to IEC 61000-4-3.

S. No	Parameter	Required Specification	Bidder's Specification	Compliance (Yes or No)
B: 1.1	RF SIGNAL GENERATOR-1 Quantity: 1 Number			
B: 1.1.1	Frequency range	9 kHz – 20 GHz		
B: 1.1.2	Frequency error	< 1 ppm		
B: 1.1.3	Frequency Resolution	more than 0.01 Hz		
B: 1.1.4	Frequency aging	< 1 ppm/year		
B: 1.1.5	RF Power Level	-120 dBm to + 10 dBm or more		
B: 1.1.6	Amplitude Resolution	< 0.1 dB		
B: 1.1.7	Harmonics	< -25 dBc The harmonics should be measured in continuous wave (CW) at the maximum test level without modulation.		
B: 1.1.8	Phase noise	< -125 dBc/Hz		

B: 1.1.9	RF switch	Provision for switching the RF signal ON/OFF				
B: 1.1.10	Level uncertainty	0.5 dB or better				
B: 1.1.11	Modulation	<ul style="list-style-type: none"> ● AM, FM, Phase Modulation, Pulse Modulation. ● There should be provision for manual control of various parameters (e.g., frequency, amplitude, modulation index) ● Facility to control frequency-dependent step sizes and dwell times in programmable mode. ● The modulation methods should include the following schemes as ● specified in latest IEC/EN 61000-4-3. ● Sine wave amplitude modulation, 80 % AM at 1 kHz rate; ● Square wave amplitude modulation, 1:2 duty cycle, 100 % AM at 200 Hz rate; ● Pulsed RF signal approximately simulating the characteristics of each system. e.g- 1:8 duty cycle at 200 Hz for GSM (Global System for Mobile Communication), 1:24 duty cycle at 100 Hz for DECT (Digital Enhanced telecommunications), portables etc. ● The modulation methods as given below (specified in Table 9 of IEC60601-1-2) should also be possible. 				
B: 1.1.12	Table : Modulation Methods as per IEC 60601-1-2					
	Test frequency	Band (MHz)	Service	Modulation	Distance (m)	Immunity Test Level (V/m)

(MHz)					
385	380 – 390	TET RA 400	Pulse modulation b) 18 Hz	0.3	27
450	430 – 470	GMRS 460, FRS 460	FM ± 5 kHz deviation 1 kHz sine	0.3	28
710	704 – 787	LTE Band 13, 17	Pulse modulation 217 Hz	0.3	9
745					
780					
810	800 – 960	GSM 800/900, TETRA 800, iDEN 820, CDMA 850, LTE Band 5	Pulse modulation 18 Hz	0.3	28
870					
930					
1 720	1 700 – 1 990	GSM 1800; CDMA 1900; GSM 1900; DECT; LTE Band 1, 3, 4, 25; UMTS	Pulse modulation 217 Hz	0.3	28
1 845					
1970					
2 450	2 400 – 2 570	Bluetooth, WLAN, 802.11 b/g/n, RFID 2450, LTE Band 7	Pulse modulation 217 Hz	0.3	28

	5 240	5 100 – 5 800	WLAN 802.11 a/n	Pulse modulation 217 Hz	0.3	9
	5500					
	5 785					
	<p>NOTE If necessary to achieve the IMMUNITY TEST LEVEL, the distance between the transmitting antenna and the ME EQUIPMENT or ME SYSTEM may be reduced to 1 m. The 1 m test distance is permitted by IEC 61000-4-3.</p> <p>a) For some services, only the uplink frequencies are included. b) The carrier shall be modulated using a 50 % duty cycle square wave signal. c) As an alternative to FM modulation, 50 % pulse modulation at 18 Hz may be used because while it does not represent actual modulation, it would be the worst case.</p>					
B: 1.1.13	Interface	GPIO IEEE488/ USB/ Ethernet				

B: 1.2	RF POWER AMPLIFIER – 1					
	Quantity: 1 Number					
B: 1.2.1	Type	Solid state				
B: 1.2.2	Frequency Range	80 MHz – 1 GHz				
B: 1.2.3	Input impedance	50 Ω				
B: 1.2.4	Output impedance	50 Ω				
B: 1.2.5	VSWR	≤ 1.5				
B: 1.2.6	Rated output power	1000 W (typical) The amplifier should be able to generate typically 30 V/m at a distance of 3m from the transmitting antenna while working in the linear region				
B: 1.2.7	Power output at 1dB compression	1000 W (typical)				

B: 1.2.8	Flatness	± 3.5 dB or better		
B: 1.2.9	Gain (in the whole frequency span)	≥ 50 dB		
B: 1.2.10	Harmonic distortion	≤ -20 dBc at 1 dB compression point		
B: 1.2.11	Linear Characteristics of Amplifier	Amplifier linearity shall be evaluated in the full operating frequency range.		
B: 1.2.12	Modulation capability	To reproduce AM, FM, pulse or any other modulation schemes appearing in the RF input signal.		
B: 1.2.13	Connectors	Type N female		
B: 1.2.14	Interface	GPIB IEEE 488 / RS232 / USB / ETHERNET		
B: 1.2.15	Directional coupler	Directional Coupler should have – <ul style="list-style-type: none"> • Low Transmission loss (0.2 dB) • VSWR - 1.5 • Better Power Handling capacity (1000 W Typical) • Better coupling factor at least 50 dB. • Directional Coupler should be calibrated. • Frequency: 80 MHz – 1 GHz. • Power : 1000W 		
B: 1.2.16	Load/termination	Suitable load should be provided to test amplifier performance at typical output power level in the full operating frequency range.		
B: 1.3	RF POWER AMPLIFIER – 2			
	Quantity: 1 Number			
B: 1.3.1	Type	Solid state		
B: 1.3.2	Frequency Range	1 GHz – 6 GHz		

B: 1.3.3	Input impedance	50 Ω		
B: 1.3.4	Output impedance	50 Ω		
B: 1.3.5	VSWR	< 1.5		
B: 1.3.6	Rated output power	200 watts min.		
B: 1.3.7	Power output at 1dB compression	200 watts min.		
B: 1.3.8	Flatness	± 3.5 dB or better		
B: 1.3.9	Gain (at maximum setting)	48 dB minimum.		
B: 1.3.10	Harmonic distortion	≤ -20 dBc at 1 dB compression point		
B: 1.3.11	Modulation capability	To reproduce AM, FM or pulse modulation appearing on the input signal.		
B: 1.3.12	Connectors	Type N female		
B: 1.3.13	Interface	GPIB IEEE488/RS232/USB/ETHERNET		
B: 1.3.14	Directional Coupler	<p>Dual Directional Coupler should have</p> <ul style="list-style-type: none"> ● Low Transmission loss (0.2 dB) ● VSWR - 1.5 ● Better Power Handling capacity ● Better coupling factor at least 40dB. ● Directional Coupler should be calibrated. ● Coupler Directivity - 20 dB. ● Frequency: 1 GHz – 6 GHz , ● Power : 300W 		
B: 1.3.15	RF Switching unit	<ul style="list-style-type: none"> ● RF Switching scheme should provide three different amplifiers to one signal generator. It provides 3 different forward, 		

		reverse and feedback power ports to two power sensor ports. <ul style="list-style-type: none"> • One extra switch port is considered for redundancy. • It also has one switch for Antenna Switching. 		
B: 1.3.16	Load	Suitable load should be provided to test amplifier performance.		

B: 1.4	DUAL CHANNEL POWER METER Quantity: 1 Number			
B: 1.4.1	Frequency range	10 MHz –18 GHz		
B: 1.4.2	Number of channel	Minimum Two		
B: 1.4.3	Power measurement range	- 70 dBm to +20 dBm min.		
B: 1.4.4	Measurement speed	500 readings/sec		
B: 1.4.5	Sampling rate	100 M samples/s continuous		
B: 1.4.6	Display units	nW, μ W, mW, W, dBm		
B: 1.4.7	Should be compatible with Power Sensor.			
B: 1.5	PROGRAMMABLE POWER SENSOR Quantity: 1 Number			
B: 1.5.1	Frequency range	10 MHz – 18 GHz		
B: 1.5.2	Power range	-70 dBm to +20 dBm		
B: 1.5.3	sampling rate	20 M Samples/second		
B: 1.5.4	Measurement speed	\geq 50,000 readings/second		
B: 1.5.5	Interface	USB/GPIB		
B: 1.6	ANTENNA-1: BI-CONICAL ANTENNA OR ANY OTHER SUITABLE TYPE Quantity: 1 Number			
B: 1.6.1	Frequency	30 MHz – 300 MHz		
B: 1.6.2	Impedance	50 Ω		

B: 1.6.3	VSWR	$\leq 2:1$		
B: 1.6.4	Gain	2 dBi (Typical)		
B: 1.6.5	Polarisation	Vertical and horizontal		
B: 1.6.6	Connectors	Type N		
B: 1.7	ANTENNA-2: LOG PERIODIC ANTENNA			
	Quantity: 1 Number			
B: 1.7.1	Frequency	200 MHz – 1 GHz		
B: 1.7.2	Impedance	50 Ω		
B: 1.7.3	VSWR	$\leq 2:1$		
B: 1.7.4	Gain	10 dBi		
B: 1.7.5	Power handling capacity	1 kW		
B: 1.7.6	Polarisation	Horizontal and vertical		
B: 1.7.7	Connector	Type N female		
B: 1.8	ANTENNA-3: STANDARD GAIN HORN ANTENNA			
	Quantity: 1 Number			
B: 1.8.1	Frequency	1 GHz – 18 GHz		
B: 1.8.2	VSWR	$\leq 2:1$		
B: 1.8.3	Power handling capacity	≥ 200 W		
B: 1.8.4	Polarisation	Horizontal and vertical		
B: 1.8.5	Gain	10-18 dBi (Typical)		
B: 1.8.6	Impedance	50 Ω		
B: 1.8.7	Connector	Type N female		
B: 1.9	ACCESSORIES FOR RADIATED SUSCEPTIBILITY TEST			
B: 1.9.1	ISOTROPIC FIELD STRENGTH PROBE			
	Quantity: 2 Number			
B: 1.9.1.1	Type	Electric field		
B: 1.9.1.2	Frequency range	30 MHz to 18 GHz		

B: 1.9.1.3	Field strength range	$\leq 0.1 - 100$ V/m		
B: 1.9.1.4	Signal Level	Between -6 dB to + 6 dB of the field strength which is used for the validation of the chamber (typical step size of 1dB)		
B: 1.9.1.5	Linearity of probe	Within ± 0.5 dB of the ideal linear response.		
B: 1.9.1.6	Axes	X, Y, Z axes and composite		
B: 1.9.1.7	Measurement speed	≥ 50 samples/ sec.		
B: 1.9.1.8	Communication	Fiber optic from the sensor output to outside the chamber.		
B: 1.9.1.9	Supply	Laser powered		
B: 1.9.1.10	Resolution	0.01 V/m		
B: 1.9.1.11	Probe stand	Adjustable Probe stand is to be provided for calibration of field uniformity.		

B: 2	CONDUCTED SUSCEPTIBILITY TEST SYSTEM			
	Conducted disturbances induced by RF fields as per IEC/EN 6 1000-4-6 Ed. 4.0 for Testing on Input AC/DC Port, Signal Input/output Port and Patient Coupling port.			
	Set of equipment: Signal generator, Power Amplifier, Directional Coupler and Power meter, Coupling- Decoupling Network, EM Clamp -Injection Clamp, Decoupling Clamp, BCI Injection Probe, Current Monitoring Probe			
	Test Level for CDN, BCI and EM Clamp	3V CW with 80% AM Modulation (5.4V) from 150kHz – 80MHz		
		6V CW with 80% AM Modulation (10.8V) in ISM Bands between 150KHz – 80MHz		

B: 2.1	SIGNAL GENERATOR-2: PROGRAMMABLE SYNTHESIZED SOURCE Quantity: 1 Number			
B: 2.1.1	Frequency	10 kHz – 6 GHz		

B: 2.1.2	Frequency Resolution	1 Hz		
B: 2.1.3	Output Impedance	50 Ω		
B: 2.1.4	VSWR	≤ 1.5		
B: 2.1.5	Harmonics and distortion	≤ -15 dBc		
B: 2.1.6	Amplitude (Signal generator output level)	-60 dBm to 0 dBm		
B: 2.1.7	Amplitude Resolution	0.1 dB or better		
B: 2.1.8	Level uncertainty	± 1 dB		
B: 2.1.9	PC Interface	GPIB/USB		

B: 2.2	RF POWER AMPLIFIER- 3			
	Quantity: 1 Number			
B: 2.2.1	Rated Power at 1dB compression	100 Watts (Typical) As per defined in standard IEC 61000-4-6 for test level 10 V.		
B: 2.2.2	Harmonic Distortion	≤ -20 dBc at max. power		
B: 2.2.3	Input Impedance	50 ohms		
B: 2.2.4	Output Impedance	50 ohms		
B: 2.2.5	VSWR	≤ 1.5		
B: 2.2.6	Modulation	-1 kHz, 80 % AM as per IEC 61000-4-6. -2 Hz, 80 % AM as per IEC 60601-1-2.		
B: 2.2.7	Linearity of Amplifier	Linearity characteristics of Amplifier should be		

		evaluated over the range of amplifier that is used for testing. (As describe in para J.4.2 of IEC 61000-4-6)		
B: 2.2.8	PC Interface	USB/GPIB		
B: 2.2.9	Load	Suitable termination should be provided to the test amplifier.		

B: 2.3	DIGITAL POWER METER Quantity: 1 Number			
B: 2.3.1	Frequency	10 kHz – 6 GHz		
B: 2.3.2	Number of Channel	3 channels. Three channels are required to measure Forward, Reverse and feedback Power. (Injected Voltage or Current)		
B: 2.3.3	Power handling	Suitable for expected RF levels, considering 30V injection. If necessary, include attenuators.		
B: 2.3.4	PC Interface	GPIB/USB		

B: 2.4	ACCESSORIES FOR CONDUCTED SUSCEPTIBILITY TEST			
B:2.4.1	DUAL DIRECTIONAL COUPLER Quantity: 1 Number			
B:2.4.1.1	Frequency	4 KHz - 400 MHz		
B:2.4.1.2	Power handling	According to RF power amplifier		
B:2.4.1.3	Input Impedance	50 Ohms		

B:2.4.1.4	Output Impedance	50 Ohms		
B:2.4.1.5	VSWR	≤ 1.5		
B:2.4.1.6	Insertion Loss	≤ 0.7 dB		
B:2.4.1.7	Coupling factor	≥ 40 dB for forward and reverse power ports.		
B: 2.4.2	COUPLING DECOUPLING NETWORK (CDN) Quantity: 1 Number			
B:2.4.2.1	No of Lines No of Lines	CDN-M1 (single wire), CDN-M2 (two wires) , CDN-M3 (three wires)		
B:2.4.2.2	VSWR	≤ 1.2		
B:2.4.2.3	Common mode impedance of CDN (Zce) Common mode impedance of CDN (Zce)	150 Ω and it is according to Table B.1 of IEC 61000-4-6 and input port of CDN is terminated with 50 Ω load. Common mode impedance of CDN with respective frequency band is given in table below		
Table: Common Mode Impedance Of CDN (Zce)				
		Frequency band		
Parameter	0.15 MHz to 24MHz	24 MHz to 80 MHz	80 MHz 230 MHz	
Zce	150 $\Omega \pm 20 \Omega$	150 $\Omega +60 \Omega / -45\Omega$	150 $\Omega \pm 60 \Omega$	
B:2.4.2.4	EUT Power Rating	AC: 230V single phase,400 V three phase 16A , 50 Hz DC: 250 V,16 A		
B:2.4.2.5	RF Level	30V Maximum		

B:2.4.2.6	CDN Calibration Adaptors	Shorting Adaptors for EUT and AE side, for M1, M2 and M3.		
B:2.4.2.7	Attenuators	<ul style="list-style-type: none"> ● 3 dB, 100 watts –1 number ● 6 dB, 80 watts - 1 number ● 20 dB, 15 watts - 2 number Connectors should be Compatible with impedance matching units or else adaptors to be included.		
B:2.4.2.8	Impedance Matching	150 ohm-to-50-ohm impedance for CDN calibration with connector plate: 100 mm x 100 mm – 2 number		
B:2.4.2.9	Insertion Loss of Impedance matching	Not more than 9.5dB ± 0.5dB		
B:2.4.2.10	Terminator	50 ohm termination, 6 watt and Connector should be compatible with impedance matching units.		
B: 2.4.3	EM CLAMP -INJECTION CLAMP			
	Quantity: 1 Number			
B: 2.4.3.1	Frequency	150 KHz – 1 GHz		
B: 2.4.3.2	Power Handling	100 watts		
B: 2.4.3.3	Cable diameter	20mm ± 20 mm		
B: 2.4.3.4	Length	650 mm ± 50 mm		
B: 2.4.3.5	Clamp reference point (distance from outer dimension to first core)	< 30 mm		

B: 2.4.4	DECOUPLING CLAMP			
	Quantity: 1 Number			
B: 2.4.4.1	Frequency	150 kHz – 1 GHz		
B: 2.4.4.2	Inductance	At least 280 μ H at 150kHz		
B: 2.4.4.3	Reactance	$\geq 260 \Omega$ up to 24MHz $\geq 150 \Omega$ above 24MHz		
B: 2.4.4.4	Cable diameter	20mm		
B: 2.4.4.5	Impedance Matching	150 ohm to 50 ohm impedance for CDN calibration with Connector plate: 150 mm x 150 mm – 2 number		
B: 2.4.4.6	Any other calibration accessories for EM Clamp testing			
B: 2.4.5	BULK CURRENT INJECTION (BCI) PROBE			
	Quantity: 1 Number			
B: 2.4.5.1	Frequency	150 kHz - 230 MHz		
B: 2.4.5.2	Insertion Loss	≤ 8 dB		
B: 2.4.5.3	Power Handling	100 watts		
B: 2.4.5.4	Cable diameter	40 mm		
B: 2.4.5.5	Suitable calibration accessories for calibrating the injection probe.			
B: 2.4.6	CURRENT MONITORING PROBE			
	Quantity: 1 Number			
B: 2.4.6.1	Frequency	150 kHz - 230 MHz		
B: 2.4.6.2	Transfer Impedance	1 Ω from 150 kHz –230MHz		
B: 2.4.6.3	Cable diameter	32 mm		

B: 2.4.6.4	Impedance Matching	150ohm - to - 50ohm impedance for CDN calibration with connector plate: 150 mm x 150 mm – 2 number		
B: 2.4.7	Test Table	2.4m x 1.2m x 0.8m, (LWH) or bigger size.		
B: 2.4.8	Complete system solution should be provided by the bidder as per IEC 61000-4-6 Ed 4.0. Any accessory, which is not listed here and may be necessary for testing, should be included.			

B:3	RADIATED EMISSION SYSTEM			
B: 3.1	ANTENNA-4: BI-CONICAL OR ANY OTHER SUITABLE TYPE ANTENNA Quantity: 1 Number			
B: 3.1.1	Frequency	30 MHz – 300 MHz		
B: 3.1.2	Impedance	50 Ω		
B: 3.1.3	Gain	2 dBi (Typical)		
B: 3.1.4	VSWR	≤ 2:1		
B: 3.1.5	Polarisation	Vertical and horizontal		
B: 3.1.6	Connectors	Type N		
B: 3.2	ANTENNA-5: LOG PERIODIC OR ANY OTHER SUITABLE TYPE ANTENNA Quantity: 1 Number			
B: 3.2.1	Frequency	200 MHz – 1 GHz		
B: 3.2.2	Polarisation	Vertical and horizontal		
B: 3.2.3	V.S.W.R	≤ 2:1		
B: 3.2.4	Gain	10 dBi (Typical)		
B: 3.2.5	Impedance	50 Ω		
B: 3.2.6	Connectors	Type N		

B: 3.3	ANTENNA-6: STANDARD GAIN HORN ANTENNA OR ANY OTHER SUITABLE TYPE ANTENNA Quantity: 1 Number		
B: 3.3.1	Frequency	1 GHz – 18 GHz	
B: 3.3.2	Impedance	50 Ω	
B: 3.3.3	Gain	10-18 dBi (Typical)	
B: 3.3.4	V.S.W.R	≤ 2:1	
B: 3.3.5	Polarisation	Vertical and horizontal	
B: 3.3.6	Connectors	Type N	
B: 3.4	PRE-AMPLIFIER		
B:3.4.1	Frequency	10 MHz -18 GHz	
B:3.4.2	Noise Figure	< 4	
B:3.4.3	Gain	≥ 30 dB	
B:3.4.4	Package	<ul style="list-style-type: none"> • Shielded, • It should be either placed below the antenna mast or the ground plane 	
B:3.4.5	Power	AC: 230 V	
B: 3.5	ACCESSORIES FOR RADIATED EMISSION TEST		
B: 3.5.1	ANTENNA-7: ACTIVE LOOP ANTENNA (MAGNETIC FIELD MEASUREMENT) Quantity: 2 Numbers		
B: 3.5.1.1	Frequency	9 kHz – 30 MHz	
B: 3.5.1.2	Diameter	2 m	
B: 3.5.1.3	Input impedance	50 Ω	
B: 3.5.1.4	Polarization	Vertical and Horizontal	
B: 3.5.1.5	VSWR	≤ 2:1	

B: 3.5.1.6	Antenna factor	Antenna factors data in the specified frequency range to be provided.		
B: 3.5.1.7	Connector	BNC female		
B: 3.5.2	ANTENNA-8: DOUBLE RIDGED HORN ANTENNA			
	Quantity: 2 Number			
B: 3.5.2.1	Frequency	1 GHz- 18 GHz		
B: 3.5.2.2	Impedance	50 Ω		
B: 3.5.2.3	V.S.W.R	$\leq 2:1$		
B: 3.5.2.4	Gain (includes preamplifier)	40 dBi		
B: 3.5.2.5	Polarisation	Vertical and horizontal		
B: 3.5.2.6	Connectors	Type N		

B: 4	CONDUCTED EMISSION SYSTEM			
	Quantity: 1 Number			
B: 4.1	EMI RECEIVER- 2			
	Quantity: 1 Number			
B: 4.1.1	Frequency range	10 Hz – 3.5 GHz		
B: 4.1.2	Mode of operation	EMI Receiver/ Spectrum analyser		
B: 4.1.3	Measurement time	<100 ms (maximum measurement time periods 2 min)		
B: 4.1.4	Minimum measurable Probability	1×10^{-7}		
B: 4.1.5	Limitation of receiver noise and internally generated spurious signal	(i) Random noise: Back-ground noise shall not introduce an error more than 1 dB. (ii) Continuous wave: For any input signal to the measuring		

		receiver existence of spurious signal shall not introduce measurement error more than 1 dB.		
B: 4.1.6	Video bandwidth	1 Hz to 3 MHz		
B: 4.1.7	Resolution bandwidth	10 Hz-10 MHz Table below shows the Bandwidth requirement for measuring the receiver.		
Table - Bandwidth requirements for measuring receivers				
Bandwidth requirements for measuring receivers (As per Table 3 of CISPR 16 -1 -1)				
Characteristics		Frequency band		
Bandwidth requirements	Band A 9 kHz to 150 kHz	Band B 0.15 MHz to 30 MHz	Bands C and D 30 MHz to 1 GHz	Band E 1 GHz - 18 GHz
Bandwidth requirements (B6)	100 Hz to 300 Hz	8 kHz to 10 kHz	100 kHz to 500 kHz	300 kHz to 2 MHz
Reference Bandwidth	200 Hz	9 kHz	120 kHz	2MHz
B: 4.1.8	Input attenuator range	0 to 60 dB in 10 dB steps		
B: 4.1.9	IF detectors	In-built with Peak, Average, Quasi-Peak, R.M.S- Average (as per CISPR standard)		
B: 4.1.10	Pre-selector	In-built as per CISPR 16-1-1		
B: 4.1.11	Pre-amplifier	In-built with ON/OFF provision; 20 dB gain (typical).		
B: 4.1.12	Frequency Tuning Tolerance	± 2 %		

B: 4.1.13	Intermediate frequency rejection ratio	≥ 40 dB		
B: 4.1.14	Image frequency rejection ratio	≥ 40 dB		
B: 4.1.15	Marker read out resolution	≤ 0.1 dB		
B: 4.1.16	Total measurement uncertainty	≤ 1 dB		
B: 4.1.17	Tracking generator	Needed		
B: 4.1.18	Pulse Limiter	Required for conducted emission testing.		
B: 4.1.19	Measurement Accuracy	$\leq \pm 1$ dB		
B: 4.1.20	Average Noise level	Average Detector On , RF Atten- 0dB Pre-amp OFF, ≤ 19 dB μ V Pre-amp ON, ≤ 8 dB μ V		
B: 4.1.21	Maximum safe RF CW input level at RBW ≥ 30 kHz	+ 30 dBm		
B: 4.1.22	Units of measurement	Logarithmic: dBm, dB μ V, dBmV, dB μ A, dBpW, Linear: μ V, μ A, nW		
B: 4.1.23	Characteristic of EMI Receiver	Table below shows the characteristics of the receiver		
Characteristic of EMI Receiver described in Table below				
(i) Bandwidth characteristics for inter-modulation test of quasi-peak measuring receivers . As per Table 4 of CISPR 16 -1 -1				
Characteristics		Frequency Band		
Bandwidth characteristics	Band A 9 kHz to 150 kHz	Band B 0.15 MHz to 30 MHz	Bands C 30 MHz to 300 MHz	Band D 300 MHz-1000 MHz

KHz	0.4	20	500	500
KHz	4	200	2000	6000
MHz	0.15	30	300	1000
MHz	0.3	60	600	2000
(ii) Overload Factor (Hz)				
Characteristics	Frequency Band			
	Band A 9 kHz to 150 kHz	Band B 0.15 MHz to 30 MHz	Bands C and D 30 MHz to 1 000 MHz	Band E 1GHz- 18 GHz
Overload Factor (Hz)	< 25	< 500	< 5000	NA
(iii) Test pulse characteristics for quasi-peak measuring receivers (As per Table 5 of CISPR 16 -1 -1)				
Characteristics	Frequency Band			
	Band A 9 kHz to 150 kHz	Band B 0.15 MHz to 30 MHz	Bands C 30 MHz to 300 MHz	Band D 300 MHz - 1 GHz
μVs	13.5	0.316	0.044	0.044
MHz	0.15	30	300	1000
Hz	25	100	100	100
(iv) VSWR requirements for receiver input impedance				
Characteristics	Frequency Band			
	9 kHz to 1 GHz	9 kHz to 1 GHz	1 GHz - 18 GHz	1 GHz - 18 GHz
Attenuation (dB)	0	≥ 10	0	≥ 10

VSWR	2.0 to 1	1.2 to 1	3.0 to 1	2.0 to 1	
(v) Combined Selectivity of CISPR measuring receiver and high pass filter					
Frequency kHz	150	146	145	140	130
Relative attenuation (dB)	≤ 1	≤ 6	≥ 6	≥ 34	≥ 81
(vi) Characteristics of Quasi-peak measuring receivers As per Table H.1 of CISPR 16 -1 -1					
Characteristics	Frequency band				
	Band A 9 kHz to 150 kHz	Band B 0.15 MHz to 30 MHz	Bands C and D 30 MHz to 1 000 MHz		
Bandwidth at the -6 dB points ,B6 in KHz	0.20	9	120		
Detector electrical charge time constant, in ms	45	1	1		
Detector electrical discharge time constant, in ms	500	160	550		
Mechanical time constant of critically damped indicating instrument , in ms	160	160	100		
Overload factor of circuits preceding the detector, in dB	24	30	43.5		
Overload factor of the DC amplifier between detector and indicating instrument, in dB	6	12	6		
(vii) Minimum pulse repetition rate without overload (As per Table 10 of CISPR 16 -1 -1)					
Characteristics	Frequency band				

		Band A 9 kHz to 150 kHz	Band B 0.15 MHz to 30 MHz	Bands C and D 30 MHz to 1 000 MHz	Band E 1 GHz - 18 GHz
	Corner frequency f_c (kHz)	0.01	0.01	0.1	1
	Minimum pulse repetition rate (Hz)	5	5	100	316
	Ratio peak / RMS-average indication (dB)	19	35.5	30.6	40
B: 4.1.24	Other features	<ul style="list-style-type: none"> • Scan results should be presented in tabular format • Option of measuring multiple traces at the same time • Limit lines should be selected as per standard and option for saving it in customised mode. • Various marker functions and Peak search analysis • Interface-GPIB/IEEE488/RS232/USB/ETHERNET. 			
B: 4.1.25	Accessories	The necessary accessories required for tests, such as interconnection cables, connectors, and probes etc. must be supplied along with the test system.			

B.4.2	ACCESSORIES FOR CONDUCTED EMISSION TEST			
B: 4.2.1	LISN Quantity: 1 Number			
B: 4.2.1.1	Frequency	9 kHz – 30 MHz		
B: 4.2.1.2	Rating	single phase,16A and three Phase, 32A , 50/60Hz		
B: 4.2.1.3	Connector	Remote input control		
B: 4.2.1.4	Interface	GPIB/IEEE488/RS232/USB/ ETHERNET		
	As specified in CISPR 16-1-2 and CISPR 11			
B: 4.2.2	CURRENT PROBE Quantity: 1 Number		for 2 patient coupled cables	
B: 4.2.2.1	Frequency	30 Hz – 30 MHz		
B: 4.2.2.2	Insertion Impedance	<1 Ω impedance		
B: 4.2.2.3	Transfer Impedance	0.1 Ω to 5 Ω in the flat linear range; 0.001 Ω to 0.1 Ω below the flat linear range (current probe terminated into 50 Ω load)		
B: 4.2.2.4	Magnetic Saturation	The maximum d.c. or a.c. mains current in the primary lead for a measurement error less than 1 dB shall be specified.		
B: 4.2.2.5	Influence of external magnetic field	40 dB reduction indication when a current carrying conductor is removed from the current probe opening to a position adjacent to the probe.		
B: 4.2.2.6	Influence of electric field	Not susceptible to fields <10V/m.		

B: 4.2.2.7	Influence of orientation	Less than 1 dB up to 30 MHz and 2.5 dB from 30 MHz to 1 000 MHz, when used on a conductor of any size placed anywhere inside the aperture.		
B: 4.2.2.8	Current Probe Opening	At least 15 mm.		
B: 4.2.2.9	As Per	As specified in CISPR 16-1-2.		

B: 4.2.3	REFERENCE GENERATOR: COMB GENERATOR Quantity: 1 Number		For Verification of LISN and Chambers	
B: 4.2.3.1	Frequency	9 kHz – 18 GHz		
B: 4.2.3.2	Frequency Spacing	1 MHz, 5 MHz, 10 MHz		
B: 4.2.3.3	Output level, 50 Ω	90 dBμV @ 10 MHz, 60 dBμV @ 6 GHz		
B: 4.2.3.4	Frequency stability	< 1 ppm (0°C to +50°C)		
B: 4.2.3.5	RF- output connector	N, female, 50 Ω		
B: 4.2.3.6	Power supply	Battery – rechargeable, changeable		
B: 4.2.3.7	Antennas for radiation	Suitable Physically small antennas from 9 kHz – 18 GHz.		

B: 5	GENERAL /OTHER REQUIREMENT			
	Required Specification		Bidder specification	Compliance (Yes or No)
	Supply	The operating voltages of the equipments shall be -		

		3 Ø – 415 V AC ± 10%, 50 Hz 1 Ø – 240 V AC ± 10%, 50 Hz		
B: 5.1	Calibration Certificate	Accredited Calibration certificate must be provided for all applicable equipment, as per ISO/IEC 17025: 2005		
B: 5.2	Safety and EMI/EMC requirements	The test system shall comply with the safety and EMI/EMC requirements of latest directives.		
B: 5.3	Rack	To integrate the system, bidder should provide all the requirement like furniture, racks, trolleys etc.		
B: 5.4	Accessories	Any additional accessory including connectors, interconnection cables, etc., required for testing must be included in the offer.		
B: 5.5	Documentation	Technical, safety, operational, maintenance and service manuals should be provided in hard copy along with the electronic versions.		
B: 5.6	Installation, Commissioning and Training	The bidder will be responsible for the installation and commissioning of all the instruments and software. The bidder will also provide proper training to the team associated with		

		the facility. The training will be provided at IIT Kanpur		
B: 5.7	Warranty for all items under section V Part B	3 years		
B: 5.8	AMC for all items under section V Part B	For 2 years beyond the warranty period		
	NOTE	IIT KANPUR has the right to remove any of the items at the time of placing the final order.		

SECTION VI

Terms and Conditions:

1. Your quotation should contain Authorization Letter from the manufacturer, if you are not manufacturer of the machine / software.
2. Quotation must be valid for 90 days.
3. Bidder has to complete work within 01 years from date of tender allotment or within 06 months of building Handover, whichever is later.
4. The bidder will be responsible for the installation and commissioning of the Semi-Anechoic chamber including all the equipment and software.
5. Bidder will share floor planning, layout and draft for Semi Anechoic chamber, control room, amplifier room and auxiliary room. It must include the 3D drawing of the entire facility.
6. Bidder should provide a complete list of equipment with its specification as per test defined in the tender.
7. Bidders will also be responsible for getting NABL Accreditation for established EMI/ EMC Test facility at IIT Kanpur.
8. Bidder will provide demonstration, and complete training at IIT Kanpur for the installed system including software.
9. IIT Kanpur is fully exempted from payment of GST on Imported Goods against our DSIR certificate.
10. IIT Kanpur is partially exempted from payment of Customs Duty (We will provide Custom Duty Exemption Certificate, CD applicable is 5.5%).
11. IIT Kanpur is partially exempted from payment. GST will be at 5%. We will provide GST Certificate.
12. All prices are to be FOR IIT Kanpur.
13. IIT Kanpur reserves the right to remove any item/equipment that is listed in technical specification of tender
14. The Institute reserves the right of accepting / rejecting any quotations without assigning any reason thereof.
15. The final tender will however be awarded to the bidder quoting the lowest price, which is the sum of overall prices quoted in Part A and Part B. The item wise price will be used for audit and bookkeeping purposes.
16. Patent Rights:
The bidder shall, at all times, indemnify and keep indemnified IIT Kanpur, free of cost, against all claims which may arise in respect of goods and services to be provided by the bidder under this contract for infringement of any intellectual property rights or any other rights protected by patent, registration of designs or trademarks. In the event of any such claim in respect of alleged breach of patent,

registered designs, trademarks etc. being made against IIT Kanpur, it shall be brought to the notice of the bidder and the bidder shall, at his/her own expenses, take care of the same for settlement without any liability to the institute.

17. Packing and Marking

The bidder shall ensure that the proper packing is used while shipping the goods, so that they arrive at IIT Kanpur in good working condition and without any damage. The packaging should be such that, on arrival at IIT Kanpur, the sanitization of the packaged goods should not affect the contents or the performance of the goods.

Each package shall be marked with the following information:

- a. purchase order number and date
- b. item description including quantity
- c. packing list reference number
- d. country of origin of goods
- e. consignee's name and full address
- f. name and address of the manufacturer/supplier

18. Insurance:

The bidder shall make arrangements for insuring the goods against loss or damage incidental to manufacture or acquisition, transportation, storage and delivery. The insurance shall include the entire transit from the source to IIT Kanpur. The insurance shall be valid for a period of 6 months beyond the date of receipt of goods by IIT Kanpur.

If the goods are not commissioned and handed over to IIT Kanpur within 6 months, the insurance will have to be extended by the bidder at their cost till the successful installation, testing, commissioning and handing over of the goods to the consignee. In case the delay in the installation and commissioning is due to handing over of the site to the bidder by IIT Kanpur, such extensions of the insurance will still be done by the bidder, but the insurance extension charges, at actuals, will be reimbursed.

19. Documents for Clearance/receipt of Goods:

The bidder shall send all the relevant documents well in time to IIT Kanpur to enable us to clear or receive (as the case may be) the goods.

- A. For Domestic Goods, including goods already imported by the bidder under its own arrangement:

Within 24 hours of despatch, the bidder shall notify Central Stores, IIT Kanpur, the complete details of despatch and also supply the following documents:

1. Supplier's invoice showing purchase order, goods description, quantity, unit price and total amount;
2. Packing list identifying contents of each package;
3. Certificate of origin;

4. Insurance Certificate
5. Manufacturers/Supplier's warranty certificate and In-house inspection certificate.

B. For goods imported from abroad:

Within 24 hours of despatch, the bidder shall notify Central Stores, IIT Kanpur, the complete details of despatch and also supply the following documents:

1. Supplier's invoice showing contract number, goods description, quantity, unit price and total amount;
2. Bill of Lading/Airway bill, marked freight prepaid
3. Packing list identifying contents of each package;
4. Insurance certificate
5. Manufacturer's/Supplier's warranty certificate;
6. Manufacturer's own factory inspection report;
7. Certificate of origin
8. Port of Loading;
9. Port of Discharge and
10. Expected date of arrival.

Any delay or demurrage occurred during the customs clearance on account of the non-availability of technical support/ clarifications /documents from the bidder shall be borne by the bidder.

20. Warranty, Calibration, Service and Maintenance:

- a. Warranty as specified in sections A: 5.17, A: 5.18, A:5.19, B:5.7, B: 5.8.
- b. On site calibration, comprehensive service, and maintenance should be for a minimum period of three years.
- c. Warranty must start from the date of installation (including calibration and verification) at IITK.
- d. Warranty, calibration, comprehensive service, and maintenance should cover both labour and spares.
- e. The technical maintenance personnel of the company responsible for supervision and maintenance should reach the site within 3 working days after getting the request for support. Troubleshooting and rectification of failure or maintenance issues should not be extended beyond one week.
- f. If the performance of any individual equipment or system is not satisfactory, the same shall be replaced/repared by the bidder free of cost.
- g. Installation, testing, commissioning, operation, and maintenance, will be carried out in the presence of IIT Kanpur personnel.
- f. In the event of any rectification of a defect or replacement of any defective goods during the warranty period, the warranty for the rectified/replaced goods shall be extended till the completion of the original warranty period of the main equipment.

- g. All software and firmware updates should be provided free of cost during the warranty period.

21. Payment:

- A. On delivery:** Seventy percent (70%) payment of the value of the delivered goods
- B. Installation and Commissioning:** Twenty percent (20%) payment of the price of the delivered goods shall be paid on installation and commissioning.
- C. On Acceptance:** Balance ten percent (10%) payment of the value of the delivered goods would be made against Final Acceptance.

22. Performance Guarantee:

As a contract security, bidder shall be required to furnish a Bank Guarantee for an amount equal to 5% of total bid value from any Nationalized Bank in prescribed form, in favour of “The Registrar, Indian Institute of Technology Kanpur” within 30 days from the date of Letter of Acceptance/work order. The Performance Guarantee shall remain valid for a period of 180 days beyond the date of completion of the work (on final acceptance). It shall be the guarantee for the faithful and due performance of the contract by the bidder in accordance with the terms and conditions specified in this tender. The Performance Guarantee will be returned to the bidder without any interest after its expiry subject to fulfillment of all contractual obligations by the bidder.

Prof. M. Jaleel Akhtar
Professor
ACES-326, Department of Electrical Engineering
Indian Institute of Technology, Kanpur,
Kanpur, U.P., INDIA-20801

ANNEXURE – I

TENDER ACCEPTANCE LETTER

(To be given on Company Letterhead)

Date: _____

To,

Sub: Acceptance of Terms and Conditions of Tender.

Tender Reference No: _____

Name of Tender / Work:

Dear Sir,

1. I/ We have downloaded / obtained the tender document(s) for the above mentioned 'Tender/Work' from the website(s) namely _____ : _____ as per your advertisement, given in the above mentioned website(s).
2. I / We hereby certify that I / we have read the entire terms and conditions of the tender documents from Page Number _____ to _____ (including all documents like annexure(s), schedule(s), etc .), which form part of the contract agreement and I / we shall abide hereby by the terms / conditions / clauses contained therein.
3. The corrigendum(s) issued from time to time by your department/ organisation too has also been taken into consideration, while submitting this acceptance letter.
4. I / We hereby unconditionally accept the tender conditions of above mentioned tender document(s) / corrigendum(s) in its totality / entirety.
5. I / We do hereby declare that our Firm has not been blacklisted/ debarred/ terminated/ banned by any Govt. Department/Public sector undertaking.
6. I / We certify that all information furnished by our Firm is true and correct and in the event that the information is found to be incorrect/untrue or found violated, then your department/ organisation shall without giving any notice or reason therefore or summarily reject the bid or terminate the contract, without prejudice to any other rights or remedy including the forfeiture of the full said earnest money deposit absolutely.

Yours Faithfully,
(Signature of the Bidder, with Official Seal)

ANNEXURE – II

DETAILS OF EARNEST MONEY DEPOSIT (EMD)

1.	Detail of the Tender	
2.	Earnest Money Deposit (EMD)	
3.	Name of The Bank	
4.	Demand Draft Number / Netbanking Reference Number	
5.	Date of DD / Netbanking transfer Date	
6.	Amount	

Note: - Scanned Copy / E Copy of EMD payment receipt must be uploaded online and original in (Cover 1) Technical Bid by due date.

Date:

Place:

**(Signature of the Bidder
with agency seal/rubber stamp)**

ANNEXURE – III

BIDDER'S ELIGIBILITY CRITERIA

Sl. No.	Description	Consideration (Yes/ No)	Proof attached at Page Number
1.	Does your company is registered under Companies Act and have valid Registration with PAN/TAN/GST/and Service Tax Registration?		
2.	Does your company have at least 7 years of experience in the installation of similar types of EMI/EMC test facility in various organizations in India and abroad? (Provide a list of organizations with contact information).		
3.	Do the OEMs of all the products including test equipment, ferrite based absorbers, accessories etc. quoted by you to establish this facility have at least 7 years of experience in the supply of such products to various organizations in India and abroad?		
4.	Have you completed a similar work with a value of at least Rs. 5 crores?		
5.	Do you have average annual turnover of Rs. 30 crores per year in preceding three financial years?		
6.	Have you been black listed/debarred by any of the government agencies.		
7.	Does your quotation contain Authorization Letter from the manufacturer, if you are not manufacturer of the machine / software?		
8.	Whether the EMD amount paid online and scanned copy of receipt is enclosed?		
9.	Have you enclosed the compliance sheet against the technical specification mentioned technical bid?		
8.	Have you enclosed a complete list of instruments that will be required to set up this EMI/EMC test facility?		

9.	Have you completed /submitted other required Information / documents, as mentioned in the Tender Document?		
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(Signature of the Bidder with agency seal/rubber stamp)

ANNEXURE – IV

SCHEMATIC OF THE BUILDING FOR THE PROPOSED FACILITY

