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एकलप्युग: जकवतु, इड लखडल ललु बलगकन]

प्रयागराज-211004 (भारत)

Motilal Nehru National Institute of Technology Allahabad  
 Prayagraj-211004 (India)

An Institute of National Importance as Declared by NIT Act, GOI, 2007

### INVITATION FOR SUPPLY AND INSTALLATION OF 3-D ANTENNA

[Open Tender (for goods costing upto ₹25 lakhs); Two Bid System (Simultaneous receipt and opening of Technical & Financial Bids)]

1	Tender Start Date & Time	23/10/2019; 1800 Hrs.
2	Closing Date/Time for submission of Quotations	13/11/2019; 1530 Hrs.
3	Opening Date/Time of Quotations	14/11/2019; 1530 Hrs.
4	Quotations to be submitted	Online at CPPP viz. <a href="http://www.eprocure.gov.in/eprocure/app">www.eprocure.gov.in/eprocure/app</a>
5	Place of opening of quotations	Room No. 205, Purchase Office, MNNIT Allahabad, Prayagraj-211004
6	Earnest Money Deposit (EMD)	₹42,500/- (Forty Two Thousand Five Hundred only), to be paid through NEFT/RTGS. The bank details of MNNIT Allahabad is as under:- Name of the Bank Account: Director, MNNIT Allahabad Account No.: 718401012000062 Name of Bank: Vijaya Bank IFSC Code: VIJB0007184 Note: Please upload the transaction receipt.

Motilal Nehru National Institute of Technology Allahabad invites Online Bids for the following goods/equipments. The complete Bid Document can be viewed/download from CPPP viz. [www.eprocure.gov.in/eprocure/app](http://www.eprocure.gov.in/eprocure/app) and Institute website [www.mnnit.ac.in](http://www.mnnit.ac.in).

Sl. No.	Brief Description of the Items/Equipments	Quantity	Place of Delivery	Installation requirement
1.	3-D Antenna (0.3 GHz – 3.8 GHz with wireless communication application) (Detailed specifications of item attached at Annexure-B)	02 Nos.	MNNIT Allahabad, Prayagraj	Yes

Bids must be submitted online at CPPP viz. [www.eprocure.gov.in/eprocure/app](http://www.eprocure.gov.in/eprocure/app) and shall be opened in the presence of bidder's authorized representatives, who choose to attend and shall sign a register evidencing their attendance.

The Bid NOT submitted in the prescribed format or Incomplete in any respect shall be outrightly rejected.

No physical Bids shall be submitted in the Institute.

Assistant Registrar (Purchase)  
 MNNIT Allahabad

## INSTRUCTIONS FOR ONLINE BID SUBMISSION

The bidders are required to submit soft copies of their bids electronically on the CPP Portal, using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP Portal.

More information useful for submitting online bids on the CPP Portal may be obtained at: <https://eprocure.gov.in/eprocure/app>.

### REGISTRATION

- 1) Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal (URL: <https://eprocure.gov.in/eprocure/app>) by clicking on the link "Online bidder Enrollment" on the CPP Portal which is free of charge.
- 2) As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.
- 3) Bidders are advised to register their valid email address and mobile numbers as part of the registration process. These would be used for any communication from the CPP Portal.
- 4) Upon enrolment, the bidders will be required to register their valid Digital Signature Certificate (Class III Certificates with signing key usage) issued by any Certifying Authority recognized by CCA India (e.g. Sify / nCode / eMudhra etc.), with their profile.
- 5) Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSC's to others which may lead to misuse.
- 6) Bidder then logs in to the site through the secured log-in by entering their user ID/password and the password of the DSC/e-Token.

### SEARCHING FOR TENDER DOCUMENTS

- 1) There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, Organization Name, Location, Date, Value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as Organization Name, Form of Contract, Location, Date, Other keywords etc. to search for a tender published on the CPP Portal.
- 2) 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.
- 3) The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.

### PREPARATION OF BIDS

- 1) Bidder should take into account any corrigendum published on the tender document before submitting their bids.
- 2) Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents - including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.
- 3) Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document / schedule and generally, they can be in PDF / XLS / RAR / DWF/JPG formats. Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document.
- 4) To avoid the time and effort required in uploading the same set of standard documents which are required to be submitted as a part of every bid, a provision of uploading such standard documents (e.g. PAN card copy, annual reports, auditor certificates etc.) has been provided to the bidders. Bidders can use "My Space" or "Other Important Documents" area available to them to upload such documents. These documents may be directly submitted from the "My Space" area while submitting a bid, and need not be uploaded again and again. This will lead to a reduction in the time required for bid submission process.

**Note:** My Documents space is only a repository given to the Bidders to ease the uploading process.

If Bidder has uploaded his Documents in My Documents space, this does not automatically ensure these Documents being part of Technical Bid.

### SUBMISSION OF BIDS

- 1) Bidder should log into the site well in advance for bid submission so that they can upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay due to other issues.
- 2) The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.
- 3) Bidder has to select the payment option as "offline" to pay the tender fee / EMD as applicable and enter details of the instrument.
- 4) Bidder should prepare the EMD as per the instructions specified in the tender document.  
The original should be posted/couriered/given in person to the concerned official, latest by the last date of bid submission or as specified in the tender documents. The details of the DD/any other accepted instrument, physically sent, 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.
- 5) Bidders are requested to note that they should necessarily submit their financial bids in the format provided and no other format is acceptable. If the price bid has been given as a standard BoQ format with the tender document, then the same is to be downloaded and to be filled by all the bidders. Bidders are required to download the BoQ file, open it and complete the white coloured (unprotected) cells with their respective financial quotes and other details (such as name of the bidder). No other cells should be

changed. Once the details have been completed, the bidder should save it and submit it online, without changing the filename. If the BoQ file is found to be modified by the bidder, the bid will be rejected.

- 6) The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission.
- 7) All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128 bit encryption technology. Data storage encryption of sensitive fields is done. Any bid document that is uploaded to the server is subjected to symmetric encryption using a system generated symmetric key. Further this key is subjected to asymmetric encryption using buyers/bid opener's public keys. Overall, the uploaded tender documents become readable only after the tender opening by the authorized bid openers.
- 8) The uploaded tender documents become readable only after the tender opening by the authorized bid openers.
- 9) Upon the successful and timely submission of bids (i.e. after Clicking "Freeze Bid Submission" in the portal), the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.
- 10) The bid summary has to be printed and kept as an acknowledgement of the submission of the bid. This acknowledgement may be used as an entry pass for any bid opening meetings.

#### **ASSISTANCE TO BIDDERS**

- 1) 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.
- 2) Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24x7 CPP Portal Helpdesk.

#### **GENERAL TERMS & CONDITION (GCC)**

##### **1. Bid Price**

- (a) The contract shall be for the full quantity as described above. Corrections, if any, shall be made by crossing out, initialing, dating and rewriting.
- (b) All duties, taxes and other levies payable by the contractor under the contract shall be included in the total price.
- (c) The rates quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.
- (d) The prices should be quoted in Indian Rupees only for indigenous items. For imported items/Equipments, the prices should be quoted in foreign currency.
- (e) Each bidder shall submit only one quotation.

##### **2. Validity of Quotation**

Quotation shall remain valid for a period not less than **120 days** after the deadline date specified for submission.

##### **3. Formats and Signing of Bid**

- Each & every pages of the submitted bid must carry the page numbers.
- The bidders are not allowed to make additional and alteration in the tender document, any additions and alteration in the tender document, any additions and alterations shall be at bidder's risk. Conditional/modified tender are liable to be rejected.
- The tender/quotations NOT submitted in the prescribed format or Incomplete in any respect will be outrightly rejected.
- If the bid submitted without compliance sheet details of equipments the bid will be outrightly rejected.
- The bid shall be typed or written in indelible ink and shall be signed by the Bidder/Tenderer or a person or persons duly authorized to bind the Bidder/Tenderer to the Contract. All pages of the bid, except for unamended printed literature, shall be initialed by the person or persons signing the bid.
- Any interlineations, erasure or overwriting shall be valid only if they are initiated by the persons or persons signing the bid.
- The Bidder shall furnish information as described in the Form of Bid on commissions or gratuities, if any, paid or to be paid to agents relating to this Bid, and to contract execution if the Bidder is awarded the contract.

##### **4. Evaluation of Quotations**

- (a) The purchaser will evaluate and compare the quotations determined to be substantially responsive, i.e., which
  - (i) are properly signed; and
  - (ii) conform to the terms and conditions, and specifications.
  - (iii) will be with tender fees, and EMD required, if any.
- (b) The Quotations would be evaluated separately for each item.

##### **5. Award of Contract**

The Purchaser will award the contract to the bidder whose quotation has been determined to be substantially responsive and who has offered the lowest evaluated quotation price.

- Notwithstanding the above, the Purchaser reserves the right to accept or reject any quotations and to cancel the bidding process and reject all quotations at any time prior to the award of contract.
- The bidder whose bid is accepted will be notified for the award of contract by the Purchaser prior to expiration of the quotation validity period. The terms of the accepted offer shall be incorporated in the purchase order if falls under Govt. purchase rules, i.e., GFR-2017

##### **6. Delivery 08 weeks from the date of receipt of Purchase Order.**

## 7. Liquidated Damages

While granting extension of the delivery period, where the delivery of stores or any installment thereof is accepted after expiry of the original delivery period, the CA may recover from the contractor, as agreed, the LD a sum equivalent to 0.5 (Half) per cent of the prices of any portion of stores delivered late, for each week or part thereof of delay. The total damages shall not exceed 10 (Ten) percent of the value of delayed goods. The LD cannot exceed the amount stipulated in the contract.

## 8. Force Majeure

A Force Majeure (FM) means extraordinary events or circumstance beyond human control such as an event described as an act of God (like a natural calamity) or events such as a war, strike, riots, crimes (but not including negligence or wrong-doing, predictable/seasonal rain and any other events specifically excluded in the clause). An FM clause in the contract frees both parties from contractual liability or obligation when prevented by such events from fulfilling their obligations under the contract. An FM clause does not excuse a party's non-performance entirely, but only suspends it for the duration of the FM. The firm has to give notice of FM as soon as it occurs and it cannot be claimed ex-post facto. There may be a FM situation affecting the purchase organisation only. In such a situation, the purchase organisation is to communicate with the supplier along similar lines as above for further necessary action. If the performance in whole or in part or any obligation under this contract is prevented or delayed by any reason of FM for a period exceeding 90 (Ninety) days, either party may at its option terminate the contract without any financial repercussion on either side.

## 9. Payment condition

Payment condition: 100% Payment shall be released only after delivery, installation & satisfactory acceptance of goods. PBG as noted in para 5 of Instruction/Guidelines to Bidder (ITB) shall form part of the condition for release of payment. **Advance payment is not permitted.**

i) Normal Commercial warranty/guarantee shall be applicable to the supplied goods.

ii) Payment will be cleared through e-payment mode (*Format of e-payment form given at Annexure-D*)

## INSTRUCTIONS/GUIDELINES TO BIDDERS (ITB)

1. Bidders who had supplied the Government departments, PSUs/NITs/IITs/IIITs and reputed Institutions and Organizations should only apply.
2. The bidder should enclose the client list with contact address along with Phone/Fax for reference, for the quoted item.
3. Please quote the prices of F.O.R. Motilal Nehru National Institute of Technology Allahabad, Prayagraj.

**[NOTE: Custom/Excise Duty Exemption Certificate and GST Exemption Certificate will be provided by MNNIT Allahabad after receiving your request letter for the same.**

**(i)** MNNIT Allahabad avails Custom Duty Exemption in terms of Government Notification N. 51/96-Customs dated 23 July, 1996, and Central Excise Duty Exemption in terms of Government Notification N. 10/97-Central Excise dated 01 March, 1997, as amended from time to time.

**(ii)** MNNIT Allahabad avails GST Concession under Notification No. 47/2017 Central Tax (Rate) dated 14 November, 2017, as amended from time to time.

4. The Bidders are requested to submit their Quotation online alongwith proof of submission of EMD. Quotation without EMD will be summarily rejected. EMD's of all Bidders will be returned back after the purchase order /contract agreement is issued to successful bidder.
5. Successful Bidders must have to submit the performance security @10% of the purchase order or contract value and it will be retained up to the warranty period.
6. The bidder should enclose relevant documents wherever necessary to substantiate his eligibility.
7. The Institute is eligible for and can provide necessary documentation for Custom/Excise and Octroi exemption on demand, if permitted under rule.
8. Motilal Nehru National Institute of Technology Allahabad, Prayagraj, reserves the right to reject, accept any or whole or part of any of the tender without assigning any reason thereof and no claim will be heard. In case of dispute, the decision of The Director, MNNIT, Allahabad will be final and binding.
9. If the successful bidder is not able to supply the goods items within the delivery date specified in the purchase order, the purchase order will be automatically treated as cancelled after expiry of delivery date period. The vendor will have to submit an undertaking in this regard that this condition is acceptable to him. In case of extra ordinary circumstances the vendors must send a request for extension of validity of purchase orders, with proper justification prior to the expiry of validity date for consideration.
10. In case of sophisticated equipments, an on-site training needs to be provided with no extra cost.
11. The quotation must be accompanied by leaflets/operation manuals/books etc.
12. Wherever applicable the vendors must quote the branded /desired items.

**CHECK LIST  
(ON THE LETTER HEAD OF THE BIDDER)**

The Bid will be the compilation of following documents, along with required supporting documents. No document in support of minimum eligibility criteria will be accepted / entertained after opening of tender.

Sl. No	Documents
1.	Cover letter by bidder (On the Letter Head of the Bidder)
2.	Earnest Money Deposit (EMD), if required
3.	Cliential List for quoted item
4.	<b>Annexure-A</b> : Bid Proposal Sheet (On the Letter Head of the Bidder)
5.	<b>Annexure-B</b> : Compliance of bidder with reference to various equipments (On the Letter Head of the Bidder)
6.	<b>Annexure-C</b> : PROFORMA FOR PRICE REASONABILITY CERTIFICATE (On the Letter Head of the Bidder)
7.	<b>Annexure-D</b> : PROFORMA FOR DIRECT PAYMENT/TRANSFER TO BANK ACCOUNT BY MNNIT ALLAHABAD

**ANNEXURE-A**

**BID PROPOSAL SHEET  
(ON THE LETTER HEAD OF THE BIDDER)  
[To be uploaded]**

To  
Assistant Registrar (Purchase)  
MNNIT Allahabad, Prayagraj

**Subject:** Supply and Installation of "3-D Antenna" at MNNIT Allahabad, Prayagraj.

Dear Sir,

We, the undersigned having read and examined in detail the specifications as specified in this document in respect of Supply and Installation of **3-D Antenna** at MNNIT Allahabad, Prayagraj do hereby propose to supply the required products and services.

EMD submitted		YES / NO (Please strike off whatever is not applicable)	
Amount	Mode	Date of payment	UTR No.

- (i) **ADDITIONAL PURCHASE/WORK ORDER:** We understand that the MNNIT Allahabad, Prayagraj, in case of the requirements may also place repeat purchase order/work order on the company. In such cases, we shall accept and execute all the purchase/work order placed on us by MNNIT Allahabad, Prayagraj.
- (ii) **BID PRICING:** We further declare that the prices stated in our proposal are in accordance with your Terms & Conditions in the bidding document. We further understand that the quantities as specified in this Tender may increase or decrease at the time of Award of Purchase Order as per the requirements of MNNIT Allahabad, Prayagraj.
- (iii) **QUALIFYING DATA:** We confirm that we satisfy the qualifying criteria and have attached the requisite documents as documentary proofs. In case you require any further information/documentary proof in this regard during evaluation of our bid, we agree to furnish the same in time to your satisfaction.
- (iv) **CONTRACT PERFORMANCE SECURITY:** We hereby declare that in case the contract is awarded to us, we shall submit the performance Guarantee Bond in the form of Bank Guarantee for the amount mentioned at **clause No. 5 in ITB** of the total order value.
- (v) **PAYMENT TERMS:** We hereby declare that in case the contract is awarded to us, we agree with payment terms specified in the tender documents.
- (vi) **CERTIFICATE AND DECLARATION:**
  - a) I/We certify that no addition/modification/alteration has been made in the Original Tender Document. If at any stage addition /modification /alteration is noticed in the Original Document, I/We will abide by the terms and conditions contained in the original tender document, failing which MNNIT Allahabad reserves the right to reject the tender and/or cancel the contract
  - b) It has been certified that all information provided in tender form is true and correct to the best of my knowledge and belief. We hereby declare that our proposal is made in good faith, without collusion or fraud. No forged /tampered document(s) are produced with tender form for gaining unlawful advantage. We understand that MNNIT Allahabad is authorized to make enquiry to establish the facts claimed and obtained confidential reports from clients.
  - c) In case it is established that any information provided by us is false / misleading or in the circumstances where it is found that we have made any wrong claims. Further MNNIT Allahabad is also authorized to blacklist our firm/company/agency and debar us in participating in any tender/bid in future.
  - d) I / We assure the Institute that neither I /We, nor any of my /our workers, will do any act which is improper / illegal during the execution in case the tender is awarded to us.
  - e) I / We assure the Institute that I / We will NOT be outsourcing any work specified in the tender document, to any other firm.
  - f) Neither I / We, nor anybody on my /our behalf will indulge in any corrupt activities /practices in my /our dealing with the Institute.
  - g) Our Firm / Company / Agency is not been blacklisted or banned by any Govt. Department, PSU, University, Autonomous Institute or any other Govt. Organization.
  - h) I/We certify that, I have understood all the terms & conditions (GCC and ITB etc.), as indicated in enquiry of the tender document, and hereby accept all the same completely.
  - i) I/We, further certify that I/We, possess all the statutory /non-statutory registrations, permissions, approvals, etc., from the Competent Authority for providing the requisite services,
  - j) We understand that you are not bound to accept the lowest or any bid you may receive.
  - k) I/We hereby declare that this tender on acceptance communicated by you shall constitute a valid and binding contract between us.
  - l) I/We certify that the submitted quotation is duly paginated and contains from page no. 1 to .....

Date:

Technical Compliance of Goods  
(ON THE LETTER HEAD OF THE BIDDER)  
[To be uploaded]

Descriptions/Specification	Quantity	Compliance (Yes/No)	Quoted Model
<b>3-D Antenna</b>	02 Nos		
<b>Specifications</b> TRANSCEIVER Functions: Built-in Spectrum Analyzer, Oscilloscope, Constellation Display, Vector Signal Generator, Vector Signal Analyser			
• Transmit Receive Frequency Range	• 100MHz to 6GHz		
• 3D Positioner RCS	• <-20dBsm		
• 3D Software Compatibility	• MATLAB		
• 3D Plot Compliance	• IEEE Standard 149-1979		
• Frequency Resolution	• 100Hz		
• Transmit/receiver Modulation Bandwidth	• 160MHz analog interface, 96 MHz Digital SISO		
• Compatibility	• Works with Linux GnuRadio, MATLAB, Simulink		
• Accessibility	• OSI layers for signal processing and development		
• Wireless transmission and reception	• Over the air transmission reception through antenna		
• Modulations supported	• Any, Custom Modulations possible		
• Mode	• Full Duplex, TDD, FDD		
• Maximum RF Output Power	• -10dBm at 1GHz Typical		
• Maximum Receiver Sensitivity	• -120 dBm at 1GHz Typical		
• TX/RX SMA Impedance	• 50 Ohm		
• TX/RX Gain Control Range & Step	• > 60dB & 1dB Typical		
• Minimum Rx Noise Figure	• < 6dB at 1GHz Nominal		
• IQ Amplitude Error	• 0.5dB/-70dBc Image Typical		
• PLL Settling time	• <20us Typical		
• ADC/DAC Resolution & SFDR	• 12 bits & >60dBc SFDR Typical		
• Power	• USB Powered		
• THETA Start/ Stop Angle & Resolution	• 0 to 360 degrees in 0.1 degree		
• PHI Start/ Stop Angle	• 0 to 180 degrees in 0.1 degree		
• Power	• 24 V		
• Positioner Control	• Software control via USB Cable		
• Loading Capacity	• 0.5 kg		
• Shipping List Deliverable	• ATS04 Transceiver Unit, 3D Positioner, 20 Antennas and Accessories		
• RF Cable	• RG316 SMA-SMA X 2		
• Frequency Band Upgradable	• Other 5G bands 3.8-12.4 GHz optional, 18-26GHz optional, 26-40GHz Optional		
• Reference Antennas	• Planar Reference Horn 0.8GHz – 4 GHz X 2		
• 3D Plotting of 20 Antennas as per IEEE-149-1979. • Microstrip Antennas: • Microstrip inset fed patch • Microstrip Dipole Antenna • Microstrip Series fed Patch Antenna • Microstrip Yagi (3el) Antenna • Microstrip Slot Antenna • Microstrip Folded Dipole Antenna • Microstrip Endfire Antenna • Microstrip Broadside Antenna • Microstrip Monopole Antenna • Dual Patch array Antenna • Microstrip Transformer fed Patch Antenna • Microstrip Log Spiral Antenna • Microstrip Log Periodic Antenna (LPDA) • Microstrip Right handed Circular Polarized Patch • Patch array 2X2 Antenna			

<ul style="list-style-type: none"> <li>• Microstrip Spiral Slot</li> <li>• Microstrip Loop</li> <li>• Microstrip circular patch</li> <li>• Microstrip Left handed Circular Polarized Patch</li> <li>• Cable High Speed USB 3.0 Serial Cable</li> <li>• Directional Coupler Broadband Coaxial</li> </ul> <p>• <b>Software GUI features:</b> Audio, Boolean, Byte Operators, Channelizers, Channel Models, Coding, Control Port, Debug Tools Deprecated, Equalizers, Error Coding, File Operators, Filters, Fourier Analysis, GUI Widgets, Impairment Models, Instrumentation, Level Controllers, Math Operators, Measurement Tools, Message Tools, Misc, Modulators, Networking Tools, NOAA, OFDM, Packet Operators, Pager, Peak Detectors, Resamplers, Sinks, Sources, Stream Operators, Stream Tag Tools, Symbol Coding, Synchronizers, Trellis Coding, Type Converters, Variables, Waveform Generators</p> <p><b>Scope of Experimentation</b></p> <ul style="list-style-type: none"> <li>• Introduction to Hardware and Software.</li> <li>• Radiation pattern of an Omni and directional antenna.</li> <li>• Vertical, Horizontal and Circularly polarized antennas.</li> <li>• Polarization discrimination linear &amp; circular antennas</li> <li>• Resonant and non-resonant antenna, Reciprocity of antenna</li> <li>• Current distribution of antenna, Comparative study of antennas</li> <li>• Radiation pattern E &amp; H Plane - Polar &amp; Cartesian Plots</li> <li>• Directive gain, beam width (Half Power/10dB), front to back ratio, plane of polarization, side lobe level &amp; angle.</li> <li>• Antenna parameters: Antenna resonance, VSWR and bandwidth using directional coupler of 20 antennas</li> <li>• On air transmission &amp; reception using Analog modulation &amp; demodulation techniques like AM, DSBSC, SSB, Narrowband FM, Wideband FM, Stereo FM.</li> <li>• On air transmission &amp; reception using Digital Modulation &amp; Demodulation techniques like ASK, FSK, BPSK, DBPSK, MSK, GMSK, DQPSK, QPSK, OQPSK, pi/4QPSK, 8PSK, 16QAM, 64QAM, 256QAM, CPFSK, GFSK, and other variants,</li> <li>• Multiplexing techniques like TDM, FDM/WDM, SDM, Polarization, Spatial, Packet Switching, MC-SS, OFDM etc.</li> <li>• Analog Channel Models like Noise (Uniform, Linear, Laplacian, Gaussian, Phase noise), Interference (Cross talk, Co-channel, Inter symbol), Distortion (Inter modulation), Frequency response (Attenuation &amp; phase shift), Group delay, Propagation Doppler shift, Fading modeling slow, fast, selective/dispersive, Multipath, Rayleigh, Rician)</li> <li>• Channel Coding &amp; decoding-Convolutional, Viterbi, Trellis.</li> <li>• Channel performance measurements (spectral bandwidth, Symbol Rate, Bit Rate, Channel Capacity, Channel Utilization, Signal to noise ratio, Bit Error Rate BER, Latency, Jitter, Eye Diagram, Constellation diagram, Oscilloscope, Spectrum Analyser, Waterfall display.</li> <li>• Line Coding &amp; Decoding Digital Baseband</li> <li>• Filters-IIR, FIR, Pulse Shaping-RRC root raised cosine, High pass, Low pass, Bandpass, Band stop, FFT, frequency translating filter,</li> <li>• Synchronizers-Costas Loop, Clock Recovery, Frequency locked loop, phase locked loop, correlate and sync, carrier acquisition, Modeling mathematical equations, On air link for Voice, Data, Video.</li> </ul>			
1. Microstrip Yagi	2. Folded Dipole		
F <sub>c</sub> : 3.8±0.1 GHz S <sub>11</sub> :10 +2dB Polarisation: Linear Feed: Microstrip balun Impedance: 50 Ohms Connector: SMA Masking: Selective Plating: Gold	S <sub>11</sub> :>10dB Bandwidth: 3.6±0.2GHz Gain: 2dBi Beamwidth: E plane 70° Beamwidth: H plane 180° Polarisation: Linear Front to Back Ratio: 0dB Connector: SMA Masking: Selective Plating: Gold		
3. Microstrip Dipole	4. Microstrip Slot		
F <sub>c</sub> : 3.6±0.1 GHz S <sub>11</sub> :10 +2dB Polarisation: Linear X Pol discrimination: 20dB Gain: 2dB	F <sub>c</sub> : 3.8±0.1 GHz S <sub>11</sub> :>10dB Gain: 2dBi Beamwidth: E plane 60° Beamwidth: H plane 180°		

Feed: Microstrip balun Impedance: 50 Ohms Connector: SMA Masking: Selective Plating: Gold	Polarisation: Linear Front to Back Ratio: 0dB Connector: SMA Masking: Selective Plating: Gold			
5. Loop	6. Endfire Phased array			
S11:>10dB Bandwidth: 3.8+0.2GHz Gain: 2dBi Beamwidth: E plane 70° Beamwidth: H plane 180° Polarisation: Linear Front to Back Ratio: 0dB Connector: SMA Masking: Selective Plating: Gold	S11:>10dB Bandwidth: 3.6+0.2GHz Gain: 3dBi Beamwidth: E plane 60° Beamwidth: H plane 120° Polarisation: Linear Front to Back Ratio: 0dB Connector: SMA Masking: Selective Plating: Gold			
7. Broadside Phased array	8. Coplanar wave guide CPW Bow tie slot Antenna			
S11:>10dB Bandwidth: 3.6+0.2GHz Gain: 3dBi Beamwidth: E plane 60° Beamwidth: H plane 120° Polarisation: Linear Front to Back Ratio: 0dB Connector: SMA Masking: Selective Plating: Gold	Fc: 3.6+0.1 GHz S11:10 +2dB Polarisation: Linear Gain: 2dB Impedance: 50 Ohms Connector: SMA Masking: Selective Plating: Gold			
9. Wideband Bow tie Dipole Antenna	10. Reference Logperiodic			
Fc: 3.8 ± 2 GHz S11:10 +2dB Polarisation: Linear Gain: 2dBi Impedance: 50 Ohms Connector: SMA Substrate: Glass Epoxy Masking: Selective Plating: Selective Gold	S11:>10dB Bandwidth: 1 to 6 GHz Gain: 4dBi Beamwidth: E plane 60° Beamwidth: H plane 180° Polarisation: Linear Front to Back Ratio: 10dB Connector: SMA			
11. Left Circularly Polarized Patch	12. Right Circularly Polarized Patch			
Fc: 3.8+0.1 GHz S11:10 +2dB Polarisation: LHCP Gain: 3dBi Impedance: 50 Ohms Connector: SMA Masking: Selective Plating: Gold	Fc: 3.8+0.1 GHz S11:10 +2dB Polarisation: RHCP Gain: 3dBi Impedance: 50 Ohms Connector: SMA Masking: Selective Plating: Gold			
13. Spiral Slot	14. Log Spiral			
Fc: 3 + 1 GHz S11:10 +2dB Polarisation: Linear Gain: 2dBi Impedance: 50 Ohms Connector: SMA Masking: Selective Plating: Gold	Fc: 3 + 1 GHz S11:>10dB Gain: 2dBi Beamwidth: E plane 80° Beamwidth: H plane 120° Polarisation: Circular Front to Back Ratio: 0dB Connector: SMA Masking: Selective Plating: Gold			
15. Monopole	16. Vivaldi (Planar Horn: Aperture Antenna)			
S11:>10dB Bandwidth: 3.6+0.2GHz Gain: 1dBi	S11:>10dB Bandwidth: 3±2GHz Gain: 1dBi			



Beamwidth: E plane 70° Beamwidth: H plane 180° Polarisation: Linear Front to Back Ratio: 0dB Connector: SMA Masking: Selective Plating: Gold	Beamwidth: E plane 80° Beamwidth: H plane 180° Polarisation: Linear Front to Back Ratio: 0dB Connector: SMA			
17. Microstrip Circular Patch Array 2x2	18. Patch Array 2x2			
F <sub>c</sub> : 2.4+0.1 GHz S <sub>11</sub> :10 +2dB Polarisation: Circular Gain: 7dBi Impedance: 50 Ohms Connector: SMA	F <sub>c</sub> : 2.4+0.1 GHz S <sub>11</sub> :10 +2dB Polarisation: Linear Gain: 8dBi Impedance: 50 Ohms Connector: SMA Masking: Selective Plating: Gold			
19. Dual Rectangular Patch	20. Series Fed Patch Array			
F <sub>c</sub> : 3.8+0.1 GHz S <sub>11</sub> :10 +2dB Polarisation: Linear Gain: 8dBi Impedance: 50 Ohms Connector: SMA Masking: Selective Plating: Gold	S <sub>11</sub> :>6dB Bandwidth: 3.6+0.2GHz Gain: 4dBi Beamwidth: E plane 40° Beamwidth: H plane 40° Polarisation: Linear Front to Back Ratio: >8dB Connector: SMA			
21. Directional Coupler	22. H & E Probe			
Bandwidth: 1-6 GHz Insertion S <sub>12</sub> : 1.5 + 0.5dB Coupling S <sub>13</sub> : 20+2dB Isolation S <sub>14</sub> : 20+2dB Directivity S <sub>23</sub> : 15+3dB Impedance: 50 Ohms Polarisation: Linear Connector: SMA Usage:Antenna forward and reverse power & VSWR measurements	H probe Type: Loop Rejection E/H: 40dB Frequency: up to 800MHz Sensitivity: High Diameter: 6cm E probe Type: Narrow Rejection H/E: 30dB Frequency: up to 3GHz Sensitivity: Low Size: 0.6cm			
23. Transceiver	24. Antenna Plotting Software			
Transmit & Receive Frequency range:270MHz to 3.8 GHz Frequency Resolution: 100Hz Maximum RF Output Power:-10dBm at 1 GHz Typical Maximum Receiver Sensitivity:-120 dBm at 1GHz Typical	USB interface with 3D plotting software along with cartesian and polar plots, 3dB/10dB beam-width, Gain, Front to back, Side lobe level and position, Plot rotate, File edit, save, get.			
25. Coaxial Slotted Line & OSL	26. 3D Positioner			
S <sub>11</sub> >15dB, S <sub>12</sub> :<1.5dB Resolution: 0.05mm/0.15 degree at 1.5GHz Coupling Factor:20Db Connector: SMA Residual VSWR:<1.2 Velocity Propagation:1.818x10 <sup>8</sup> m/s Wavelength/3600 phase:121 mm at 1.5GHz Total Length: 200mm 50 Ohms, Short & Open	Software Compatibility: MATLAB Compliance IEEE Standard 149-1979 THETA Start/Stop Angle & Resolution: 0 to 360 degrees in 1 degree PHI Start/Stop Angle: 0to 180 degrees in 1 degree			

**PROFORMA FOR PRICE REASONABILITY CERTIFICATE**  
**(Company's/Firm Letterhead)**  
**PRICE REASONABILITY CERTIFICATE**  
**[To be uploaded]**

It is certified that the rates quoted against Enquiry No. .... dated .....for the supply of items vide our Quotation No. ....dated ..... for (Currency/Value)..... addressed to MNNIT Allahabad are exclusively for supply to ACADEMIC and RESEARCH Institutions and are not more than as charged to other Government /PSU's for same supplies made in recent past.

We would like to certify that the quoted price are the minimum and neither we have quoted the same item on lesser rates, than those being offered to MNNIT Allahabad, to any other customer for same supplies made in recent past, and nor we will do so till the validity of offer or execution of purchase order, whichever is later.

If these rates are approved by the Director, MNNIT Allahabad and if at any stage the quoted rates are found higher than the rates applicable to supply to Government, then in such condition MNNIT Allahabad will have the right to cancel the approved rates/Purchase order and to take legal action against the tenderer.

Yours faithfully,

(Signature with date)

Name:

Designation:

Seal:

Duly authorized to sign tender/enquiry for and on behalf of

**PROFORMA FOR DIRECT PAYMENT/TRANSFER TO BANK ACCOUNT BY MNNIT ALLAHABAD**  
**[To be uploaded]**

SI. No.	Particulars	Information
1.	Firm [Beneficiary] Name	
2.	Complete Bank Account No. of the Firm [beneficiary]. [in case of change in bank account vendor should write to Accounts Office]	
3.	Bank Name	
4.	Branch Address	
5.	IFSC Code No.	
6.	Permanent Account Number	
7.	Mobile No. [for SMS]	
8.	Email ID [for information]	

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

[Seal and Signature of the firm]