

NATIONAL INSTITUTE OF TECHNOLOGY AGARTALA

Fax: 0381 254-6360, Website: http://www.nita.ac.in

No.F.NITA.39(44-EIE)/Purchase/CTT_Lab/2024/115-18

Date: 6 /19/2024

E-Tender Notice

On behalf of National Institute of Technology Agartala, bids are invited in sealed cover from the reputed resourceful Manufacturers / Authorized Distributors/ Authorized Suppliers for supply of item(s)/goods as per specification mentioned in Annexure of tender document available at our website www.nita.ac.in.

Sl. No	Department / Section	Ref. No.	Items	Estimated cost (Rs.)	Last date of receipt of tender	Time and date of opening of Technical bid
1	Electronics and Instrumentation Engineering	No.F.NITA.39(44- EIE)/Purchase/CTT _Lab/2024	Laboratory and Scientific Equipment	10,64,848.00	30/12/2024 Up to 3:00 PM	3 / الـــــــــــــــــــــــــــــــــــ

The interested Manufacturers / Authorized Distributors/Authorized Suppliers may arrange online submission of the tender through www.eprocure.gov.in along with scan copy of essential documents mentioned in the tender document.

Tender(s) is/are to be submitted only online through central public procurement portal i.e. "http://eprocure.gov.in". All the documents are to be scanned and uploaded along with the tender documents.

Tender sent by any other mode will not be accepted.

Registrar

Registrar

NIT Agartala

Copy to:

- 1. The P.S. to the Director for kind information.
- 2. The Nodal Officer, e-Procurement, NITA with a request to kindly arrange uploading the Tender Documents in the CPP portal https://eprocure.gov.in/cppp.
- 3. Mr. Kamal Kanti Paul, System Administrator, Computing & ICT Unit with a request to uploading the Tender documents in the Institute website site.
- 4. The Deputy Registrar (F & A).

Registrar NIT Agartala



National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

No.F.NITA.39(44-EIE)/Purchase/CTT_Lab/2024/ 4215-18

Date: 06/ 12/2024

E- Tender Enquiry

IMPORTANT INFORMATION

Name of the Institute

: NATIONAL INSTITUTE OF TE CHNOLOGY

AGARTALA

GST Number of the Institute

: 16AAAGN0550K1ZG

PAN of the Institute

: AAAGN0550K

TAN of the Institute

: SHLN00719F

DSIR No.

: TU/V/RG-CDE(1053)/2022 dated 18/12/2022

Institute Bank A/C No.

: 030936141729 (IFSC: SBIN0011491) under SBI, NIT

Agartala Branch.

Name of Department / Branch

: Electronics and Instrumentation Engineering

Enquiry / Reference Number

: No.F.NITA.39(44-EIE)/Purchase/CTT_Lab/2024/

Some important/Critical dates:

Uploading on CPP Portal a Department's web-site	nd Date:	09 / 12/2024	Time: 5:00 PM
Bid submission start date	Date:	09 / 12 /2024	Time: 5:00 PM
Bid submission end date	Date:	30 / 12/2024	Time: 3:00 PM
Opening of technical bid	Date:	31 / 12/2024	Time: 3:00 PM





National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

Details of e-tender document.

NIT, Agartala intends to purchase the commodities/serrie(s) specified in Annexure enclosed and invites quotations in accordance with the terms and conditions detailed in the bid document. If you are interested, kindly submit your offer with prices within the time mentioned above fulfilling all the terms and conditions marked in the bid documents.

Registrar

National Institute of Technology Agartala – 799 046, Tripura

Encl:

- (1) Schedule of requirement, specifications, dates etc.
- (2) Bid document containing detail terms and conditions.



National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

Schedule of requirements

SI. No.	Description of Goods/Service	Quantity
EL SME	Sampling & Reconstruction	02 no
01	2. Delta, Adaptive Delta and Delta Sigma	02 no
	Modulation/Demodulation	00
	3. Data Formatting and Carrier Modulation/Transmitter	02 no
	4. Data Reformatting & Carrier Demodulation Receiver	02 no
	5. Delta, Adaptive Delta, Sigma Delta Modulator &	
	Demodulator.	02 no
	6. 4-Channel TDM-PCM Transmitter and Receiver Time	02 no
	Division Multiplexing-Pulse Code Modulation	
	7. OFDM Modulator and Demodulator Training System	02 no
	8. Multiplexer/De multiplexer-Coder/Decoder	02 no
	Understanding Block Code Encoder	02 no
	10. Understanding Block Code Decoder	02 no
	11. TDM Pulse Amplitude Modulation Demodulation	02 no
	12. TDM Pulse Code Modulation Transmitter	02 no
	13. TDM Pulse Code Modulation Receiver	02 no
	14. PAM-PPM-PWM Modulation & Demodulation	02 no
	(Details as per Sl No.1 to 14 at Annexure-A).	

Specifications and allied Technical Details

- 1. Sampling & Reconstruction
- 2. Delta, Adaptive Delta and Delta Sigma Modulation/Demodulation
- 3. Data Formatting and Carrier Modulation/Transmitter
- 4. Data Reformatting & Carrier Demodulation Receiver
- 5. Delta, Adaptive Delta, Sigma Delta Modulator & Demodulator.
- 6. 4-Channel TDM-PCM Transmitter and Receiver Time Division Multiplexing-Pulse Code Modulation
- 7. OFDM Modulator and Demodulator Training System
- 8. Multiplexer/De multiplexer-Coder/Decoder
- 9. Understanding Block Code Encoder
- 10. Understanding Block Code Decoder
- 11. TDM Pulse Amplitude Modulation Demodulation
- 12. TDM Pulse Code Modulation Transmitter
- 13. TDM Pulse Code Modulation Receiver
- 14. PAM-PPM-PWM Modulation & Demodulation (Details as per Sl No.1 to 14 at Annexure-A).

1. Estimated Cost

₹ 10.64.848.00

- 2. Quotations should be valid for a period of **180** days from the opening date of the technical bid.
- Bid Security or EMD: 2% of the estimated cost of the tender or Bidders should submit "Bid Security Declaration Form" on company letter head as per annexure-D of this tender document.
- 4. Performance Security: The amount of the Performance Security shall be 5%(five percent) (not applicable for consumable item(s)) of the Purchase Order / Contract value, valid up to 60 days after the date of completion of contract obligations including warranty obligations.
- 5. Delivery Option: 60 (sixty) days after receipt of the purchase/work order(s).
- 6. Please go through the enclosed "bid document" carefully for other bidding instructions.
- 7. For any technical details, you may contact through email-id: nitapurchasesection2@qmail.com.

Yours sincerely,

Registrar

National Institute of Technology Agartala – 799 046, Tripura



National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

No.F.NITA.39(44-EIE)/Purchase/CTT_Lab/2024/

Date: /

/2024

BID DOCUMENT

Instructions to the bidders:

- 1.1 Bids are invited through e-tender on behalf of the National Institute of Technology Agartala, Tripura, Agartala-799046 from the intending bidders for supply of the goods/stores/ equipments/Learning resources for the Institute as detailed in the enquiry letter.
- 1.2 The bidders should quote their rates in clear terms without ambiguity. The quotation should be only in Indian Rupees.
- 1.3 The last date & time for submission of the bid is marked in the enquiry.
- 1.4 The bids should be submitted online through www.eprocure.gov.in before the last date & time of submission specified in tender document.
- 1.5 Bids received after the deadline of receipt indicated in para 1.4 above, shall not be taken into consideration.
- 1.6 Each bidder shall submit only one bid **against one enquiry**. A bidder, who submits more than one bid against single enquiry, shall be disqualified and considered non-responsive.
- 1.7 The bidder has to enclose a check list at per Annexure C duly filled in along with all relevant/supporting documents while submitting technical bid through www.eprocure.gov.in.
- 1.8 Opening of Bids by the Purchaser will be done as per the provisions of the eprocurement system.
- 1.9 At any time prior to the due date for submission of bids, the Purchaser may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the bidding documents by amendment.
- 1.10 All prospective bidders are expected to surf the website before formulating and submitting their bids to take cognizance of the amendments.
- 1.11 Custom Duty Exemption Certificate will be provided from the Institute for availing Custom Duty Exemption in trams of notification No. 51/96-Custom dated 23-07-1996, amended by notification No. 43/2017 dated 30-06-2017, further amended by notification No. 42/2022 dated 13-07-2022, as amended from time to time in case of imported items per OM No. F.4/1/2021-PPD dated 01-09-2021.

Yours, sincerely,

Registrar

National Institute of Technology Agartala – 799 046, Tripura



National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

No.F.NITA.39(44-EIE)/Purchase/CTT_Lab/2024/

Date: / /2024

2. General Terms & Conditions:

- 2.1 The rates quoted by the Supplier/Bidders should preferably be on basic price, Annual Maintenance Charges(if applicable), packing, forwarding, freight, Insurance and all other incidental charges including delivery of the Materials at National Institute of Technology, Agartala.
- 2.2 All taxes and duties will be paid extra and such amounts of mandatory/statutory taxes & duties shall be explicitly mentioned in BOQ while submitting of bid. If GST amount not quoted in the BOQ (price bid), the total cost will be treated as inclusive of GST.
- 2.3 Price has to be filled through CPP portal as per BOQ (https://www.eprocure.gov.in). The scanned copy of Price Bid, dully filled in, has to be uploaded on the above e-procurement site. The prices filled in the e-procurement site will be treated final and shall be binding to the vendor.
- 2.4 Insurance: The Goods supplied under the Contract shall be fully insured against any loss or damage incidental to manufacture or acquisition, transportation, storage and delivery up to the final destination.
- 2.5 All the Machines/Equipments/goods will be covered by Annual Maintenance Contract (AMC) / CMC/ Warranty beyond the normal warranty/guarantee period. Interested bidders are requested to quote price against AMC/Extended warranty as an optional item in the price bid. Optional items will not be taken into consideration while selecting L₁ bidder.
- 2.6 AMC/CMC/Extended Warranty will be awarded after completion of standard warranty period. AMC/CMC/Extended Warranty may be carried out only after receipt of confirmation letter from this Institute. The Institute will not be responsible for any due payments / obligations may arise as a result of execution of AMC/CMC/Extended Warranty without confirmation letter from this Institute.
- 2.7 Conditional discount, if any, offered by the bidder shall not be considered at the time of evaluation.
- 2.8 The bidders who are registered as a Micro or Small Enterprise as per latest definitions under MSME rules, Govt. of India for exemption of submitting EMD/Bid security must enclose relevant documentary proof of authentication of their firm's registered as a Micro or Small Enterprise as per latest definitions under MSME rules, Govt. of India.





National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

- 2.9 If the bidder is a Micro or Small Enterprise as per latest definitions under MSME rules, the bidder shall be exempted from the requirement of "Bidder Turnover" criteria and "Experience Criteria". If the bidder is OEM of the offered products, it would also be exempted from the "OEM Average Turnover" criteria. In case any bidder is seeking exemption from Turnover /Experience Criteria, the supporting documents to prove his eligibility for exemption must be uploaded with technical bid.
- 2.10 If the bidder is a Startup, the bidder shall be exempted from the requirement of "Bidder Turnover" criteria and "Experience Criteria". If the bidder is OEM of the offered products, it would also be exempted from the "OEM Average Turnover" criteria. In case any bidder is seeking exemption from Turnover / Experience Criteria, the supporting documents to prove his eligibility for exemption must be uploaded with technical bid.
- 2.11 National Institute of Technology, Agartala is following and abide with the Public Procurement (Preference to Make in India), Order 2017, DIPP, MoCI Order No. P-45021/2/2017-B.E.II dated 15th June 2017 and subsequent amendments to the order. Accordingly preference will be given to the Make in India products while evaluating the bids, however, it is the sole responsibility of the bidder(s) to specify the product quoted by them is of Make in India product along with respective documentary evidence as stipulated in the aforesaid order in the technical bid itself. A self-declaration as per Annexure- G should be enclosed in the technical bid.

2.12 On site Comprehensive Warranty:

- The successful bidder shall provide a Comprehensive Warranty for minimum period of 3 years (not applicable for consumable item(s)) after the installation and commissioning of the instrument / software/items. If within a warranty period after installation any such product or component is proven to be defective such product shall be repaired or replaced by the supplier/vendor. Such repair and replacement shall be sole obligation of supplier/vendor. Supplier / vendor shall be responsible for payment for all charges (to-and-fro) for repair/ replacement. Any design defects or installations deficiencies or any outer defects, if noticed during the warranty/ maintenance period, shall be rectified promptly by the successful bidder with no cost at all the places, which also includes the field installations.
- Down-time call attendance should be within 48 hrs.
- In case the Equipment / System remains non-operational for more than 5 days then warranty period will be extended for the equal period for which Equipment / System remained non-operational. Warranty extension in such case shall be done without prejudice to any other Term & condition of the contract.



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- 2.13 The documentary evidence of the bidders qualification to perform the contract if the bid is accepted shall establish to the purchasers satisfaction that:
 - (a) The bidder meets the qualification criteria listed in bidding documents, if any.
 - (b) Bidder who doesn't manufacture the goods it offers to supply shall submit Manufacturers' Authorization Form using the form specified in the bidding document to demonstrate that it has been duly authorized by the manufacturer of the goods to quote and / or supply the goods/services.
- 2.14 The successful bidder has to furnish "Performance Guarantee/Security" (not applicable for consumable item(s)) for an amount specified in the enquiry by E-Payment System to NITA Account within 15(fifteen) days of intimation of contract/supply order.

Alternatively, "Performance Guarantee/Security" will be retained by the Institute from the billed amount of the contract/supply order which will be released two months after the completion of warranty period (not applicable for consumable item(s)).

2.15 **Delivery Schedule**: As per e-Tender.

The item(s)/goods are required to be delivered at the indenting Department of National Institute of Technology, Agartala, and must be dispatched within specified days from the date of placement of the supply/purchase/work order.

If the supplier fails to Supply, Install and Commission the system/instrument as per specifications mentioned in the order within the due date, the Supplier is liable to pay liquidated damages of 0.5% of order value per week or part thereof of delay subject to a maximum of 10%, as the case may be, beyond the due date. Such money will be deducted from any amount due or which may become due to the supplier. Any exemption towards delay without LD can be resolved through mutual consent under exceptional circumstances.

- 2.16 Force Majeure: Notwithstanding the provisions of clauses relating to Extension of Time, Penalty and Termination for Default the Supplier shall not be liable for forfeiture of its Performance Security, Liquidated Damages or Termination for Default, if and to the extent that, its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.
- 2.17 Evaluation of Bid: The Technical Bid shall be evaluated on the basis of technical and other parameters usually taken in to consideration. Financial bid shall be evaluated on the basis of financial parameters. Govt. of India rules shall be taken in to account for evaluating both technical and financial bids.
- 2.18 The successful bidder(s) may be required to execute a contract on the basis of evaluation as per annexure(s) (as applicable).



National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

- 2.19 NIT Agartala will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive or coercive practices in competing for the Contract in question.
- 2.20 The bidder has to submit valid trade license, GST registration certificate, Last filled ITR and last filed GST return.
- 2.21 Payment: **100% will be made in INR (Indian National Rupees)** after successful Installation, Commissioning of item against submission of Performance Guaranty (PG) otherwise an equal amount of PG will be retained by the Institute till the completion of warranty obligations.

Note: All payments due under the contract shall be paid after deduction of statutory levies at source (like ESIC, IT (TDS), GST, LBT / Octroi etc.), wherever applicable.

- 2.22 In the event of any dispute arising out of the bid or from the resultant contract, the decision of the Competent Authority, National Institute of Technology, Agartala shall be final.
- 2.23 The bid document/resultant contract will be interpreted under Indian Laws.
- 2.24 National Institute of Technology, Agartala will not take any responsibility for arranging road permit/way bill or clearance from tax department for delivery of goods. All such requirements should be completed by the bidder for delivery of goods at National Institute of Technology, Agartala. GST payment, if required, should be paid by successful bidder and if GST not paid, National Institute of Technology, Agartala will deduct the applicable amount from successful bidder's bills and pay the same to Tax Authority. If there is any mandatory tax(es) other than GST/other taxes mentioned in this tender document, imposed by State Govt., the same may also be deducted from the bills of the successful bidder, as applicable.
- 2.25 Competent Authority of National Institute of Technology, Agartala reserves the right to cancel the entire e-tendering process at any stage of the procurement process without mentioning any reason.
- 2.26 Legal disputes, if any with NIT Agartala will be restricted within the jurisdiction of Agartala only.

Yours sincerely,

Registrar

National Institute of Technology Agartala – 799 046, Tripura



National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

No.F.NITA.39(44-EIE)/Purchase/CTT_Lab/2024/

Date:

/2024

3. Special Terms & Conditions:

- 3.1 Acceptance of Technical bid strictly depends on National Institute of Technology, Agartala's requirements credentials, manufacturing capability, quality control systems, past performance, after-sales service, financial background, commercial terms & conditions etc. of the supplier(s).
- 3.2 Detailed Specifications, brand, make, model & parts number, tolerance limit, resolution, corresponding ISO standard etc. of quoted Equipments/Items should be mentioned with supported leaflet/catalogue/brochure and list of buyers for acceptance of technical bid.
- 3.3 The technical bid and the financial bid should be submitted through www.eprocure.gov.in. The technical bids shall be opened and evaluated by the competent committee/authority. At the second stage, financial bids of only the technically qualified bidders shall be opened for further evaluation and recommendations for awarding the purchase order/contract.

It may specifically be mentioned whether quotation is strictly as per terms and conditions of the tender. Deviation, if any, must be spelt out specifically in technical bid. In the absence of this, the quotation may be rejected.

- 3.4 Installation & Commissioning: Within 15 (fifteen) days after delivery (if applicable).
- 3.5 The Quantity of each Item(s)/Equipment(s) may increase (as per Govt. Norms) or decrease at the time of issued of Purchase / Supply / Work Order. The Institute reserves right to purchase partly or not to purchase any item / cancel the entire process at any stage of procurement process.
- 3.6 Penalty: Penalty will be charged @ 0.5 % of per week or part thereof except for force majeure conditions for the unexecuted part of the supply/work order.
- 3.7 Arbitration: All disputes should be attempted to be resolve mutually between the National Institute of Technology, Agartala and the suppliers failing which jurisdiction of any Court of Agartala shall be applicable.
- 3.8 The successful bidder has to give at least 3-4 days on site training for each & every items/equipments by Certified Person (if required).
- 3.9 Model No. of the product should be given with catalogue (if any).
- 3.10 Items/Goods should be sent through Registered Transporter (preferably).
- 3.11 Bidders are required to upload a declaration on letter head stating that the bidder has not been black-listed & holiday listed by any Ministry/Department/Organization.



National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

- 3.12 Bidder(s) is/are required to upload a self-certificate as per applicability (Annexure- E or F) regarding offered item(s) as per Office Memorandum No. 6/18/2019-PPD dated 23-07-2022 & 24-07-2020 and Office Memorandum No. F.18/37/2020-PPD dated 8th February, 2021 issued by Department of Expenditure, Procurement Policy Division, Ministry of Finance, Govt. of India.
- 3.13 Bidders are requested to provide valid e-mail ID and phone number for further communication.
- 3.14 Bank A/C in the Exact Name of Bidder/Firm/Supplier with Name, A/C No., IFSC code must be furnished with technical bid.
- 3.15 Bidder has to submit annual turnover not less than 5 lakhs per year with technical bid for last 3 (three) years. Bidder also has to submit OEM turnover not less than 40 lakhs per year for last 3(three) years (if bidder is not OEM).
- 3.16 If bidder itself OEM, has to be submit turnover not less than 40 lakhs per year for last 3 (three) years with technical bid.

Yours sincerely,

Registrar

National Institute of Technology Agartala – 799 046, Tripura



Communication Theory and Telemetry Laboratory Instruments With Required Specifications

•Crystal Frequency : 7.0 MHz(±10%) •Sampling Frequency : 50, 100, 200 8 •On-board Generator : Synchronized Sine wave generator (1, 2, 3 and 4 KH +/-5V	Delta, Adaptive Delta and Delta Sigma Modulation/ Demodulation	Sampling & Reconstruction •Crystal Frequency: 8MHz(±10%) •Sampling Frequency: 20,50, 80, 100, 200 & 400 l selectable) •On-board Generator: Synchronized 1 KHz sine w •Duty cycle: pp 0 - 90% in Decade steps (switch se •Low Pass Filters: 2 & 4 order Butterworth filters •Cut-off frequency: 3.4 KHz each (±10%) •Test Point: 40 nos. •Interconnections: 2 mm sockets •Power Consumption: 3 VA (approximately) •Mains Supply: 110-220 V, ±10%, 50 Hz •Operating Conditions: 15-45 C, 85% RH Included Accessories 2mm Patch cord 16": 11 nos or more •Power Supply: 1 no. •Power cord: 1 no.	SI Item No. (As per specific
 Crystal Frequency: 7.0 MHz(±10%) Sampling Frequency: 50, 100, 200 & 400 KHz (switch selectable) On-board Generator: Synchronized and adjustable amplitude Sine wave generator (1, 2, 3 and 4 KHz) seperate variable DC level +/-5V 	Delta Sigma Modulation/	±10%) 0, 80, 100, 200 & 400 KHz (switch chronized 1 KHz sine wave (5 V) lecade steps (switch selectable) der Butterworth filters z each (±10%) ockets (approximately) ±10%, 50 Hz .45 C, 85% RH os or more	Item Description (As per specification below or better)
•Study of Delta Sigma Modulation and Demodulation	Study of Delta Modulation Demodulation Study of Adaptive Delta Modulation and Demodulation	 Study of signal Sampling and Reconstruction techniques. Study the effect of II order and IV order LPF on reconstructed signal. Study the effect of Sample Amplifier and Sample and Hold Amplifier on reconstructed signal. Study the Nyquist Criteria for Sampling and Reconstructing signal. Study the effect of Sample /Hold Circuitry on reconstructed waveform Effect of sampling pulse duty cycle on the reconstructed Waveform in sample and sample hold output. To study and compare responses of 2nd order and 4th order LPFs. To verify sampling and reconstruction data transmission scheme for a. External sampling signal b. Audio signal 	Range of experiments
02		02	required

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• Carrier Demodulation Receiver • Carrier Demodulation : ASK — Diode Detector, FSK — PLL • Carrier Demodulation : ASK — Diode Detector, FSK — PLL • Detector, PSK — Square Loop Detector, QPSK — Fourth Power Loop Detector • Power Consumption : 6 VA (approximately) • Test Points: 35 nos • Interconnections: 2 mm Sockets • Power Supply : 110-220V, 50/60 Hz • Operating Conditions : 0-40 C, 85% RH • Included Accessories Patch cord 16" : 34 nos.or more	(Manchester), Biphase (Mark). •Carrier modulation: ASK, FSK, PSK, DPSK, QPSK •On-board carrier: Sine waves synchronized transmitted data at 1.6 MHz,960 KHz, (0 deg. phase) 960 KHz, (90 deg. phase) •Test Point: 40 nos. •Interconnections: 2 mm sockets •Power Supply: 110-220 V ±10%, 50/60 Hz •Power Consumption: 4 VA (approximately) •Operating Conditions: 0-40 C, 85% RH •Included Accessories 2mm Patch Cord 16": 30 nos.or more 2mm Patch Cord 32": 5nos. Mains Cord & Power Supply:1 no.	•Test Point: 40 nos. •Interconnections: 2 mm sockets •Interconnections: 2 mm sockets •Power Supply: 110-220 V ±10%, 50/60 Hz •Power Consumption: 4 VA (approximately) Included Accessories. 2mm Patch cords 16": 18 nos.or more •Power Supply& Mains cord: 1 no. •Power Supply& Mains cord: 1 no. •Crystal Frequency: 4.0 MHz(±10%) •Data formats: NRZ (L), NRZ (M), RZ, AMI, RB,Biphase
 Study of Data Formats Study of Amplitude Shift Keying Study of Frequency Shift Keying Study of Phase Shift Keying Study of Differential Phase Shift Keying Study of Quadrature Phase Shift Keying Study of Differential Quadrature Phase Shift Keying 	Study of Differential Phase Shift Keying Study of Quadrature Phase Shift Keying Study of Differential Quadrature Phase Shift Keying Addulation of	Study of Data Formats Study of Amplitude Shift Keying Study of Frequency Shift Keying Study of Phase Shift Keying
02	92	

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 Time Division Multiplexing & Demultiplexing with Pulse Code 	4-Channel TDM-PCM Transmitter and Receiver Time Division
Demodulator output Study and analysis of the low pass filter output of Adaptive Delta Demodulator	
 Study and analysis of the Adaptive Delta 	
 Study and analysis of channel effects: Study and analysis of the Clock and Data Recovery 	Included accessories: 2mm Patch cord - 10nos or more
Analyze the advantages of Adaptive delta modulation system	 Digital Filter: Decimation filter (16:1) Power Supply: 110V - 260V AC, 50/60Hz Operating Conditions: 0-40C, 85%
Study and analysis of accumulator output at Grant and the formulator output at Output Outpu	 Number of Test Points: 40 nos. Low Pass Filter: Cut-off frequency-5KHz
•Study and analysis of step register output at	 Integrator step: Normal & 3 times Selection Mode: Push switches
 Study and analysis of sampled signal with following Sampling Frequency 8 KHz, 16 KHz, 32 KHz, 64 KHz and 128 KHz 	•Crystal Frequency : 8.0MHz (±10%) •Sampling Frequencies: 16KHz, 32KHz, 64KHz, 128KHz, 256KHz
Adaptive Delta Modulator	 Transmission Effect: Attenuation (7dB & 10dB) Noise Filter
 Study and analysis of the low pass filter output of 	 SMD LED Indicators: 48 nos for DDS signal selection, DDS signal frequency selection, Sampling selection, Technique selection
•Study and analysis of the Delta Demodulator	Frequency: 500Hz to 3.5KHz
 Study and analysis of the Clock and Data Recovery (CDR) output 	Types of Signal: Sine, Square, Triangle, Arbitrary signals
Study and analysis of channel effects:	Frequency: 500Hz, 1KHz, 2KHz, 3KHz
Analysis of slope overloading and granular noise	Types of Signal : Sine, Square, Triangle, Arbitrary signals
system	 Internal Signal Generator: Direct Digital Synthesizer
gain control • Analyze the advantages of a delta modulation	Techniques : Delta, Adaptive Delta, Sigma Delta First order, Sigma
Analyze the effect of integrator by changing the	Delta, Adaptive Delta, Sigma Delta Modulator & Demodulator Modulation & Demodulation
	Patch cord 32" : 4 nos. Power Supply & Mains Cord : 1 no

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• Technique: OFDM with QPSK modulation & Demodulation • Software programmable data rate. • Built in real-time data acquisition system with time domain signal analysis. • Built in Two channel Additive White Gaussian Noise Generator • I & Q Channel DACs-10 bit. • Anti aliasing low pass filter with 3dB bandwidth of I & Q channel filter: Sallen Key 6-pole Butterworth. • Block Level LED indication on . • Mains Supply: 110-220 V AC, 50/60Hz . • Operating Conditions: 15-45 C, 80% RH . Included Accessories • Power Supply, Power Cord & Patch Cord: 1 no. • Host to Device USB cable: 1 no.	 Techniques: Two channel TDM-PCM and Four channel TDM-PCM Internal Signal Generator: Four dedicated Direct Digital Synthesizer Generators for each channel Types of Signal: Sine, Triangle, Arbitrary signal Frequency: 500Hz, 1KHz, 1.5KHz, 2KHz, 3KHz SMD LED Indicators: 50 nos for DDS signal selection, DDS signal frequency selection, Sampling selection, Technique selection and Interconnect path Crystal Frequency: 8.0MHz(±10%) Sampling Frequencies: 8KHz, 16KHz, 32KHz TDM techniques based on: Bell lab system Selection Mode: Push switches Number of Test Points: 40 nos. Low Pass Filter: 4nos. Cut-off frequency-5KHz (±10%) Power Supply: 110V - 260V AC, 50/60Hz Operating Conditions: 15-45 C, 85% Includedaccessory: 2mm Patch cord - 10nos or more
OFDM Modulator and Demodulator Experiment with and without noise gain. Signal Analysis at various stages like, Transmit data & Received data, IFFT & FFT, Symbol mapper & demapper per channel, Cyclic prefix & its removal. Cyclic prefix & its removal.	 Achannel & 4 channel Time Division Multiplexing Sample & Hold output at different channel by varying the Sampling as well as Signal frequency. Parallel to Serial conversion by varying the line speed clock at the different channel. Single bit PCM output at different line speed clock at the different channels. Single bit multiplexed PCM output at Modulator side. Pulse Code Demodulation at the different channel. Serial to Parallel conversion at the Demodulator. Analyze the final demodulated output with Second order Low Pass Butterworth filter.
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-	• Study of Hamming Code (Decoding) without bit	
		Mains cord: 2 nos
		Patch cord 8 : 10 flos. of filore
-		•Included Accessories :
		•Internal Power supply: +5V DC
		•Operating Conditions : 15-45 C, 80% KH
-	With double bit error	•Power Supply : 110-220 V ±10%, 50/60 Hz
-	With single hit error	•Test points : 4 nos
	Without error	•Interconnections : 2 mm sockets
	•Study of Hamming Code (7,4)-bit Generation	Data Format : NRZ
		Codeword Length: 7 bits code
-	• Study of Hamming Code (Encoding) of BCD bit	Word Length : 4 bits
		•Crystal Frequency : 10 MHz (±10%)
	• Study of Hamming Code (Encoding) without bit	Understanding Block Code Encoder
1	estudy of Hamming Code (7.4)-bit Generation	Mains cord: 1 no.
		Patch cord 16" (2mm): 10 nos.or more
Eur		•Included Accessories
- Control of the Cont		Power Consumption: 2 VA(approximately)
		Power Supply: 230 V, ± 10%, 50 Hz / 60 Hz
		•Interconnections : 2mm sockets
-		•Test Points : 25nos.
		 Coding: Manchester Coding and Decoding.
		16 Channel Digital).
		 Multiplexing: Time Division Multiplexing (4 Channel Analog and
		Modulation : Pulse Position Modulation.
		MHz) Clock Generator 8 bit data.
	•Study of Mancriester county and become	 On Board Digital Outputs: 16 Square wave frequencies(1 KHz - 2)
	Modulation/Defloculation	(Adjustable Amplitude) .
	Study of raise rosition	On Board Analog Signals: 250 Hz, 500 Hz, 1 KHz, 2 KHz
	and DemunipleAng	Digital Input Channels: 16 nos.
	n	Analog Input Channels: 4 nos.
	Study of 4-channel Time Division Multiplexing	•Crystal Frequency : 4.MHz(±10%) .
	Study of 4-channel liftle Division Demultiplexing	Multiplexer / De multiplexer- Coder / Decoder
	or the state of th	BNC to BNC cable : 2 nos.

Priyenka Roy hormani

	 Study of synchronization and control signals Study the switching delay and its control 	TDM Pulse Code Modulation Transmitter	12
		Included Accessories 2mm Patch cord 16"-10 nos. or more Power Supply - 1 no Mains cord - 1 no.	47
		• Operating Conditions: 15-45 C, 85% RH	
		•Interconnections : 2 mm Sockets	
		•Test points : 50 nos.	
		Clock Regen. at Receiver: Using PLL	
		steps.	
		Sampling Pulse : With duty cycle variable from 0-90% in decade	11
9	signal reconstruction	•Sampling Rate : Four sampling signals 32, 40, 30 & 60 km²/	
	Effect of varying duty cycle of sampling pulse on	separate variable DC level)	
	DAM & demodulation technique	wave synchronized to sampling pulse) Adjustable amplitude and	
	• Effect of different sampling frequencies on TDM-	On Board Analog Signal: 500 Hz, 1 KHz, 2 KHz and 4 KHz (Sine	
	PLL as Frequency Multiplier to generate clock	Modulation : Pulse Amplitude Modulation	
	and receiver	 Multiplexing: Time Division Multiplexing 	
	Three modes of operation between transmitten	 Analog Input Channels : 4 channels 	
	Time Division Multiplexing and Demultiplexing	•Crystal Frequency : 8 MHz (±10%)	
	Pulse Amplitude Modulation Technique	TDM Pulse Amplitude Modulation Demodulation	
		Mains cord: 2 nos	_
		Power supply: 2 nos.	_
		Patch cord 8" : 12 nos. or more	_
		•Included Accessories :	
		•Internal Power supply: +5V DC	•
		Operating Conditions : 15-45 C, 80% RH	•
	With double bit error	•Power Supply : 110-220 V ±10%, 50/60 Hz	
	With single bit error	•Test points : 5 nos	•
	Without error	•Interconnections : 2 mm sockets (Gold plated)	•
	•Study of Hamming Code (7,4)-bit Generation	Data Format : NRZ (Not Return to Zero)	•
	sequence in manual mode.	Codeword Length: 7 bits code	•
	Study of Hamming Code (Decoding) of BCD bit	•Word Length : 4 bits	•
	error	Crystal Frequency : 10 MHz (±10%)	•

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•Pow •Inclu 2mm	• Test • Inter • Baud • Powe • Ope	•Error code	•Input •Demc •Clock •Opera	TDM P	2mm P Power	Power Includ	Baud r Powe Opera	•Test Po	•Operat	Modul Sync Si Error (•Input C	•On Boa to samp level)
 Power Consumption: 4 VA (approximately) Included Accessories 2mm Patch cords 16": 10 nos. or more 	 Test Points: 45 nos. Interconnections: 2 mm sockets Baud rate: Selectable from 300 to 2400 Power Supply: 110-220 V ±10%, 50/60 Hz Operating Conditions: 15-45 C, 85% RH 	 Error Detection (Single bit): Off-Odd- Even parity & Hamming code Error Correction: Hamming code 	 Input Channel: Time Division Multiplexed Serial Input Demodulation: Pulse Code Demodulation Clock Regeneration: By Phase Locked loop Operating Speeds: Fast - 320 KHz/Channel, Slow 1.9 Hz / Channel approximately 	TDM Pulse Code Modulation Receiver	2mm Patch cords 16" - 10 nos or more Power Supply & Mains cord - 1 no	Power Consumption : 4 VA approximately Included Accessories	 Baud rate: Selectable from 300 to 2400 Power Supply: 110-220 V, ±10%, 50 /60 Hz Operating Conditions: 15-45 C, 85% RH 	Test Points: 45 nosInterconnections: 2 mm Sockets	 Operating Mode: Fast: 240 KHz / channel approximately Slow: 1.9 Hz / channel approximately 	 Modulation: Pulse Code Modulation Sync Signal: Pseudo Random Sync Code Generator Error Check Code: Off - Odd - Even - Hamming 	Input Channels: 2 nos.Multiplexing: Time Division Multiplexing	 On Board Analog Signal: 2 KHz, 4 KHz (Sine wave synchronized to sampling pulse Adjustable amplitude and separate variable DC level)
•Included Accessories 2mm Patch cords 16": 10 nos. or more	 Interconnections: 2 mm sockets Baud rate: Selectable from 300 to 2400 Power Supply: 110-220 V ±10%, 50/60 Hz Operating Conditions: 15-45 C, 85% RH 	Hamming code Error Correction : Hamming code Tast Points : 45 nos	Input •Demodulation: Pulse Code Demodulation •Clock Regeneration: By Phase Locked loop •Operating Speeds: Fast - 320 KHz/Channel, Slow 1.9 Hz / Channel approximately •Error Detection (Single hit): Off-Odd- Even parity	•Input Channel : Time Division Multiplexed Serial			 Study the working of a TDM-PAM Transmitter and Receiver at one Channel Communication 	•Study the working of a TDM-PAM Transmitter and	 Study the working of a TDM-PAM Transmitter and 	•Study of complete TDM-PAM System and the over all effect of the individual parameter/ mode on the	samples •Study the working of the Phase Lock	
		02										

Priyenks Ray hornem

e Study of Pulse Alliphicute Modulation Demodulation with Sample, Sample & Hold & Flat Top Study of PPM using DC Input Study of PPM using Sine wave Input Study of PPM Demodulation Frequency Study of Pulse Width Demodulation Study of Voice Link Using Pulse Amplitude Modulation Study of Voice Communication using Pulse Width Modulation Modulation Modulation Modulation Modulation	•Study of Voice Modulation	Main cord: 1 no. Head phone: 1 no.
id & Flat	•Study of Voice Modulation	Main cord: 1 no.
ld & Flat	•Study of Voice Modulation	
ld & Flat	•Study of Voice Modulation	Patch cord 16": 10 nos. or more
id & Flat	•Study of Voice Modulation	•Included Accessories
ld & Flat	•Study of Voice Modulation	Operating Conditions : 15-45 C, 85% RH
id & Flat	•Study of Voice	•Mains Supply: 110V - 260V AC, 50/60Hz
ld & Flat		Power Consumption : 3 VA (approximately)
ld & Flat	Modulation	Test Points : 25 nos
ld & Flat	 Study of Voice Link 	• Interconnections : 2mm banana sockets
ld & Flat	Modulation	ACAIIDIIICE : With adjusted
ld & Flat		 Voice communication: Voice link using dynamic Mic & speaker AC Applifier: With adjustable Gain Control
in Sample, Sample & Hold & Flat ing DC Input ing Sine wave Input impudulation sing different Sampling	-	Low Pass Filter: 4 order BW filter
in Sample, Sample & Hold & Flat sing DC Input sing Sine wave Input smodulation sing different Sampling	Frequency	•Squarewave : 1KHz & Z KHZ
in Sample, Sample & Hold & Flat sing DC Input sing Sine wave Input smodulation	•Study of PWM L	Sinewave: 1 KHz & 2 KHz (Gain adjustable)
h Sample, Sample & Hold & Flat sing DC Input sing Sine wave Input	 Study of PPM Demodulation 	On-board Generator
h Sample, Sample & Hold & Flat sing DC Input	 Study of PPM using 	• Frequencies (pulse) . 32 Milz, of Milz
h Sample, Sample & Hold & Flat	Study of PPM using	Oll-Board Samping Commy 20 KH7
h Sample, Sample & Hold & Flat	Top	On hoard Campling: 8 KH7 16 KH2
Inhillane Modelation &	Demodulation wi	Prilse Width Wodulation
malitude Modulation &	Study of Pulse Amplitude Modulation &	Price Width Modulation
ing sample & note sampling	Study of PAM using	• Pulse Amplitude Modulation
Sampling and sampling	Natural & Flat top Sampling	Pulse Modulation Techniques
Study of Pulse Amplitude Modulation using	Study of Pulse /	PAM-PPM-PWM Modulation & Demodulation
litude Modulation using	Power supply & Mains cold : 2	Power Supply & Mains cord: 1 no.

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National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

No.F.NITA.39(44-EIE)/Purchase/CTT_Lab/2024/

Date:

/2024

ANNEXURE - B

PRICE BID

As per BOQ



National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

No.F.NITA.39(44-EIE)/Purchase/CTT_Lab/2024/

Date:

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ANNEXURE - C

Documents for Comprising the Bid

Sr.No.	TENDER REQUIREMENT	COMPLIANCE	Document Submitted
1	Name of the Firm / Agency / Dealer / Supplier with full address including contact number and email id etc.	Yes / No	Yes / NA
2	Trade License issued by Government / Statutory Body or Company Registration on the item(s) related to this tender.	Yes / No	Yes / NA
3	GST Registration of the Supplier/Firm/Bidder.	Yes / No	Yes / NA
4	PAN Registration of the Supplier/Firm/Bidder	Yes / No	Yes / NA
5	Financial Solvency issued by Bank(as per RBI guidelines) (in case of estimated cost is Rs.25.00 lakhs and above).	Yes / No	Yes / NA
6	Up to date GST return / any other tax clearance certificate. (last filed GST return, GSTR 9 and 9B)	Yes / No	Yes / NA
7	Annual Turnover	Yes / No	Yes / NA
8	Up to date Income Tax Return (Last filled ITR)	Yes / No	Yes / NA
9	"Bid Security Declaration form" on Company Letter Head (Scanned copy to be uploaded along with Technical bid).	Yes / No	Yes / NA
10	Service Support details (if applicable)	Yes / No	Yes / NA
11	Certification of holiday and non-black listing (Self Certification)	Yes / No	Yes / NA
12	Certification as per memorandum No. F.18/37/2020-PPD dated 8th February 2021, Dept. of Expenditure, Ministry of Finance, Govt. of India (Self Certification)	Yes / No	Yes / NA
13	Proprietary Certificate from OEM to be uploaded along with the Technical Bid in case of Proprietary items	Yes / No	Yes / NA
14	Manufacturers Authorization Form (MAF) (if applicable)	Yes / No	Yes / NA
15	Certificate under MSME, NSIC, Make-in-India & Startup as per Govt. of India Norms (if applicable).	Yes / No	Yes / NA
16	Experience, if any, with govt. sector /Public Undertaking /Private sector (if applicable) (May be relaxed for MSME, NSIC & Startup as per Govt. of India Norm)	Yes / No	Yes / NA
17	Any other criteria related to this tender.	Yes / No	Yes / NA
18	Supplier/Firm/Bidder should accept all Terms & Conditions and specification of the items given in the Tender Document.	Yes / No	

(Signature of the bidder)



National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

No.F.NITA.39(44-EIE)/Purchase/CTT_Lab/2024/

Date: / /2024

Annexure-D
Bid Securing Declaration Form
Date: Tender Ref. No: Tender ID:
To (insert complete name and address of the purchaser)
I/We. The undersigned, declare that:
I/We understand that, according to your conditions, bids must be supported by a Bid Securing Declaration.
I/We accept that I/We may be disqualified from bidding for any contract with you for a period of one year from the date of notification if I am /We are in a breach of any obligation under the bid conditions, because I/We
a) have withdrawn/modified/amended, impairs or derogates from the tender, my/our Bid during the period of bid validity specified in the form of Bid; or
b) having been notified of the acceptance of our Bid by the purchaser during the period of bid validity (i) fail or reuse to execute the contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with the Instructions to Bidders.
I/We understand this Bid Securing Declaration shall cease to be valid if I am/we are not the successful Bidder, upon the earlier of (i) the receipt of your notification of the name of the successful Bidder; or (ii) thirty days after the expiration of the validity of my/our Bid.
Signed: (insert signature of person whose name and capacity are shown)
in the capacity of (insert legal capacity of person signing the Bid Securing Declaration)
Name: (insert complete name of person signing he Bid Securing Declaration)
Duly authorized to sign the bid for an on behalf of (insert complete name of Bidder)
Dated on day of (insert date of signing)
Corporate Seal (where appropriate)
(Note: In case of a Joint Venture, the Bid Securing Declaration must be in the name of all partners to the Joint Venture that submits the bid)



National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

No.F.NITA.39(44-EIE)/Purchase/CTT_Lab/2024/

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Annexure-E

(Compliance to be submitted in the bidder's letterhead) (as applicable)

Sub: Compliance to Government of India order OM No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020 and OM No. F.18/37/2020-PPD dated 8th February, 2021 regarding restrictions under Rule 144 (XI) of the General Financial Rules (GFRs), 2017.

Item Name:	
Enquiry No.:	
read the clau Procurement D PPD dated 23.0	(name of the bidder company) have sees pertaining to the Department of Expenditure's (DoE) Public bivision Order (Public procurement no 1,2 & 3 vide ref. F.No.6/18/2019-07.2020 & 24.7.2020) regarding restrictions on procurement from a bidder at shares a land border with India.
We hereby cert this tender.	ify that we are not from such a country and eligible to be considered for
	mpliance of above said GoI Order and its subsequent amendment, (if any), s) shall lead to commercial rejection of their bids by NIT-Agartala)
For and behalf	of(Name of the bidder)
(Signature, dat	te & seal of an authorized representative of the bidder)



National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

No.F.NITA.39(44-EIE)/Purchase/CTT_Lab/2024/

Date:

/2024

Annexure-F

(Compliance to be submitted in the bidder's letterhead)
(as applicable)

Sub: Compliance to Government of India order OM No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020 and OM No. F.18/37/2020-PPD dated 8th February, 2021 regarding restrictions under Rule 144 (XI) of the General Financial Rules (GFRs), 2017.

Item Name:	
Enquiry No.:	
read the clau Procurement D PPD dated 23.0	(name of the bidder company) have uses pertaining to the Department of Expenditure's (DoE) Public Division Order (Public procurement no 1,2 & 3 vide ref. F.No.6/18/2019-07.2020 & 24.7.2020) regarding restrictions on procurement from a bidder at shares a land border with India.
registered with	such a country which shares a land border with India & have been the Competent Authority as specified in the above-said order. We hereby fulfill all requirements in this regard and are eligible to be considered.
Evidence of va	lid registration by the Competent Authority is attached.
	mpliance of above said GoI Order and its subsequent amendment, (if any), s) shall lead to commercial rejection of their bids by NIT-Agartala)
	of(Name of the bidder) e & seal of an authorized representative of the bidder)



National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

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Annexure -G

Self-Certification on the letterhead of the company			
In line with Government Public Procurement Order 15.06.2017, P-45021/2/2017-PP (BE-II) dated 28.05.201 dated 29.05.2019 and P-45021/2/2017-PP (BE-II) dated 16.001	8, P-45021/2/2017-PP (BE-II)		
We hereby certify that	content% nst Enquiry / Tender No		
Details of the location at which local value addition will b	e made are as follows:		
We also understand false declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permitted under law.			
Date: Place:	Signature: Name and Designation: Mobile no: Office Telephone No: Email ID: Office Seal		



National Institute of Technology Agartala AGARTALA - 799 046 (TRIPURA)

No.F.NITA.39(44-EIE)/Purchase/CTT_Lab/2024/

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/2024

Annexure -H

NON BLACKLISTING SELF CERTIFICATE

submitted on letterhead]

[10 be submitted on lette	emead
I/We hereby certify that the/ / firm] has not been ever blacklisted/debarred by any Undertaking / University / Institute on any account.	Central / State Government / Public
I/We also certify that firm will provide material as Agartala and also abide all the terms and conditions st	per the specification given by NIT tipulated in the bid document.
I/We also certify that the information given in bid is to any case at a later date it is found that any details contract given to the concerned firm or participation any stage, the firm will be blacklisted and NIT Again the rules.	s provided are false and incorrect, n may be summarily terminated at
Date: Place:	Name:
	Business Address:
	Signature of Service Provider:
	Seal of the Service Provider: