Ref. No.: NIT-AP/ME/Thermal Engineering/Lab/2021-22/5 **DATE: 06.09.2021**

NOTICE INVITING TENDERS

(Box Tenders/Open Tenders)

(FOR SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF THERMAL ENGINEERING LABORATORY AT NIT ANDHRA PRADESH, TADEPALLIGUDEM)

National Institute of Technology- Andhra Pradesh,
Near National Highway 16, Kadakatla, Tadepalligudem-534102,
West Godavari District, Andhra Pradesh.

Proprietary & Confidential:

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Contents:

Advertisement

Tender Notice:

NIT Andhra Pradesh,
Tadepalligudem

Ref. No.: NIT-AP/ME/Thermal Engineering/Lab/2021-22/5

Box Tenders/Open Tenders are hereby invited from reputed Registered Firms/ /Agencies/Contractors/Suppliers for providing the following services at NIT Andhra Pradesh, Tadepalligudem, West Godavari district.

"For Supply, Installation, Testing and Commissioning of Thermal Engineering Laboratory at NIT Andhra Pradesh, Tadepalligudem"

Tender Schedules can be downloaded from NIT Andhra Pradesh website from **06.09.2021** onwards. Bidders need to submit hard copy with relevant documents attested by gazette officer.

The last date for submission of tenders is 27.09.2021 up to 05.00 pm.

For further details regarding Tender notification & specifications, please visit www.nitandhra.ac.in/main/tender

Date: 06.09.2021
NIT Andhra Pradesh,
Tadepalligudem.

Time Schedule of various tender related events

(For Supply, Installation, Testing and Commissioning of Thermal Engineering Laboratory at NIT Andhra Pradesh, Tadepalligudem)

Bid Document downloading Start date	**06.09.2021**
Bid Document downloading End Date/ Time	26.09.2021 at 05.00 pm
Prebid meeting	**16.09.2021 at 03.00 pm** (at Room No. 036, Sarvepalli Radhakrishnan Academic Complex, NIT-Andhra Pradesh, Tadepalligudem)
Last Date and Time for the receipt of Bids	**27.09.2021 at 05.00 pm**
Technical Bid Opening Date /Time	**28.09.2021 at 03.00 pm** (at Room No. 036, Sarvepalli Radhakrishnan Academic Complex, NIT-Andhra Pradesh, Tadepalligudem)
Financial Bid Opening Date / Time	Will be intimated later
Contact Person	The HOD Mechanical Engineering Dept., NIT Andhra Pradesh, Tadepalligudem. hod_mech@nitandhra.ac.in with cc to purchase@nitandhra.ac.in
Reference No:	**NIT-AP/ME/Thermal Engineering/Lab/2021-22/5**

Signature of the Bidder with stamp

CLARIFICATIONS

Queries, if any, can be made through e-mail only to **hod_mech@nitandhra.ac.in, and CC To: purchase@nitandhra.ac.in** on or before **15.09.2021**. Queries received via any mode other than e-mail id mentioned above shall not be entertained. The queries should only be sent in the following format on the official letter head of the company.

S. No.	Page No. (Tender Ref.)	Clause (Tender Ref.)	Description (Tender Ref.)	Query

If there is any addendum/corrigendum related to tender, it shall only be published on NIT Andhra Pradesh website (www.nitandhra.ac.in/main/tender). The Bidders are advised to check NIT Andhra Pradesh website regularly. No other mode of notice will be given.

The Bidders are requested to submit the bids after issue of clarifications duly considering the changes made, if any. Bidders are totally responsible for incorporating/complying the changes/ amendments issued, if any, during pre-bid meeting in their bid.

If the last date of receiving/opening of the bids coincides with a holiday, then the next working day shall be the receiving/opening date.

The Technical Bid along with relevant documents should be attached with original EMD and Tender processing fee. Physical submission of Price bid only shall be considered.

-Sd/-
I/C REGISTRAR
NIT ANDHRA PRADESH

For any clarification and further details on the above tender, please contact.

For Technical queries Email: hod_mech@nitandhra.ac.in

For Non-Technical queries Email: purchase@nitandhra.ac.in

BID

Ref No.: NIT-AP/ME/Thermal Engineering/Lab/2021-22/5 **Dated: 06.09.2021**

Subject: Tender for "For Supply, Installation, Testing and Commissioning of Thermal Engineering Laboratory at NIT Andhra Pradesh, Tadepalligudem".

Sir/Madam,

Bids are invited on the Box/Open Tender platform from the reputed Registered Firms Agencies/Contractors/Suppliers from the experienced premises of Thermal Laboratory equipment Supply, Installation, Testing and commissioning business. The details of bidding conditions and other terms can be downloaded from the NIT Andhra Pradesh Website.

The attested copies of all the documents of technical bid, signed undertaking of Bidder should be submitted offline mode only to the Director, NIT Andhra Pradesh, Tadepalligudem, on or before opening of bid.

The participating Bidder/s shall have to pay tender processing fee (non-refundable) and EMD for the amounts specified in the Statement related to bids, in the form of DD drawn in favour of the Director, NIT Andhra Pradesh, Tadepalligudem.

Further, the Successful Bidder shall furnish a part of a bid as Performance Guarantee specified in the Statement related to bids, to be paid in the form of BG as mentioned in the Tender Schedule.

NIT Andhra Pradesh, Tadepalligudem, will not accept the tenders from blacklisted companies or undependable suppliers, whose past performance with NIT Andhra Pradesh was found poor due to delayed and/or erratic supplies and those with frequent product failures, and also against whom there have been adverse reports of sub-standard quality/poor services, as defined in the other parts of the bidding documents.

For any clarification and further details of the above tender, please contact.

For Technical queries Email: hod_mech@nitandhra.ac.in

For Non-Technical queries Email: purchase@nitandhra.ac.in

Signature of the Bidder with stamp

STATEMENT RELATED TO BIDS

Bid Document Fee/Tender processing Fee (Non-refundable)	Rs. 5,000/- by way of DD from any Nationalized bank drawn in favor of The Director, NIT Andhra Pradesh, Payable at Tadepalligudem.
EMD	Rs. 3,50,000/- by way of DD from any Nationalized bank drawn in favor of the Director NIT Andhra Pradesh, Payable at Tadepalligudem.
Bid Validity Period	90 days from the date of opening of Financial bid
EMD Validity Period	90 days from the date of opening of Financial bid
Estimated Contract Value	Rs. 1,05,00,000/- (Rupees one crore five lakhs only)
Period of furnishing Performance Guarantee	Within 7 days from date of receipt of LOA
Performance Guarantee Value	5% on the work order value (in the form of BG)
Performance Guarantee Validity Period	3 years on-site warranty from the date of commencement of services
Period for signing the order of acceptance	Within 7 days from date of receipt of LOA
Deputation of one / more technician at NIT Andhra Pradesh for Six Months from the date of successful completion of installation and Training: Successful bidder should depute one / more technicians / service engineers who can train / maintain / demonstrate all of the equipment / software's supplied against this tender inquiry @ Free of cost.	

Signature of the Bidder with stamp

TENDER SCHEDULE

PREMEABLE:

National Institute of Technology, Andhra Pradesh, is the 31st NIT among the chain of NITs started by the Government of India. NIT Andhra Pradesh is established in the state of Andhra Pradesh in the academic year 2015 – 2016.

SUBJECT:

Notice inviting Tenders for "For Supply, Installation, Testing and Commissioning of Thermal Engineering Laboratory at NIT Andhra Pradesh, Tadepalligudem".

TENDER DETAILS:

1. OVERVIEW:

a. NIT Andhra Pradesh is desirous of inviting tenders for the said purpose subjected above.

b. Bids are invited from eligible Bidders directly based on the eligibility criteria and general terms and conditions mentioned below. Interested Bidders may download the copy of the document(s) from website, i.e. **www.nitandhra.ac.in/main/tender .**

c. Interested Bidders are required to pay a **Tender processing fee** of **Rs. 5,000/-** (Rupees Five Thousand only) and **Earnest Money Deposit (EMD)** of **Rs. 3,50,000/-** (Rupees Three Lakhs Fifty Thousand only) as prescribed in the Statement related to bids.

d. Tender processing fee and EMD must be attached to the Technical Bid only and **NOT** to the Financial Bid.

e. Bids received without EMD and Tender processing fee shall be summarily rejected.

f. The Successful Bidder shall furnish a Performance Guarantee of an amount equivalent to 5% on work order value, in the form of bank guarantee from any Nationalized bank. Also, the Bank Guarantee shall be returned only after completion of warranty period and a satisfactory report obtained from Competent authority of NIT Andhra Pradesh.

g. EMD of Bidder shall be forfeited, if the Bidder withdraws or amends its bid or impairs or derogated from the bid in any respect within the period of validity of its bid. Further, if the successful Bidder fails to furnish the Performance Guarantee within the specified period, his EMD shall be forfeited.

h. In case the Bidders / Successful Bidder(s) are found in breach of any condition(s) at any stage of the tender, EMD / Performance Guarantee shall be forfeited.

i. EMD will be returned to both Successful and Unsuccessful Bidders without any interest whatsoever, after allotment of Letter of Award.

j. The return of EMD to the contractor (successful Bidder) shall be released only after the receipt of Performance Guarantee.

2. TERMINOLOGY:

Definitions – Throughout this Tender Document, unless inconsistent with the subject matter or context:

a. **Supplier/ Contractor/ Vendor** – Selected Bidder under this Tender Document.

b. **Company/ Purchaser/ NIT Andhra Pradesh** - Reference to the "NIT Andhra Pradesh", "Company" and "Purchaser" shall be determined in same context and referred as "NIT Andhra Pradesh, Tadepalligudem".

c. **Proposal/ Bid** – the Bidder's written reply or submission in response to this

d. Tender Document

e. Tender Document – the request for proposal in its entirety, inclusive of any addenda that may be issued by NIT Andhra Pradesh, Tadepalligudem.

3. ELIGIBILITY CRITERIA:

Following eligibility criteria required to be fulfilled by the tenderer (Scanned copies of following documents to be attached):

i. The bidder(s) should have carried out at least Three Similar works related to **Supply and Installation of Thermal Engineering Equipments**, preferably at any Central / State Government Educational / Research Institute or Institute of National Repute / any Organization of National Repute.

ii. The Equipment supplier must be a principal/reputed company (Original Equipment Manufacturer). They must have after sales service and training centers at all the metros & important cities in the Southern Region especially in Andhra Pradesh/ Telangana.

iii. The bidder(s) should have their own manufacturing facility in India.

iv. The bidder(s) should produce back up documents like purchase orders, work commissioning and satisfactory certificates for the above-mentioned work in support of their claims.

v. All the laboratory equipment / kits, hardware, software, training media etc. specified in the tender, should be supplied by the bidder. Part bidding of the tender is not permitted.

vi. The manufacturer should assure for availability and supply of spares for next 5 years for the materials to be supplied. Self-declaration in this regard need to be enclosed.

vii. The Bidder(s) should be CE / ISO certified or certified by equivalent quality standards and necessary copy of ISO / equivalent certificate is to be enclosed.

viii. Joint Ventures shall not be accepted.

ix. **Annual Financial Turnover:** Should have had average annual financial turnover of at least 3.0 crores during the last three years from the overall business ending March 31, 2020. (Scanned copy of Form

26AS, audited balance sheets/ Turnover certificate from chartered accountant with UDIN to be attached) and should not have incurred any loss in the last three years.

a) Registration of GST

b) Copy of Registration of firm

c) PAN (Permanent Account Number) of the Firm/Bidder

d) IT returns for the Financial years **2017-18, 2018-19, and 2019-20**

e) Self-declaration, declaring Bidder has not been blacklisted by a Central/ State / Local Government Organization/ Academic Institution/PSU as per Annexure-III

4. METHOD OF SUBMISSION OF BIDS:

- The bids should be filled in two bid formats with all the required documents as enclosures in separate sealed covers i.e. (a) Part-I Technical bid, (b) Part-II Financial bid
- Two separate sealed covers should be specifically super-scribed as **(a) ''Technical bid For Supply, Installation, Testing and Commissioning of Thermal Engineering Laboratory at NIT Andhra Pradesh, Tadepalligudem''** and **(b) ''Financial bid For Supply, Installation, Testing and Commissioning of Thermal Engineering Laboratory at NIT Andhra Pradesh, Tadepalligudem"**. Both the sealed envelopes (a) and (b) are to be kept in another larger envelope, which should also be sealed and submitted.
- The larger envelope should be super-scribed with **"Quotation for Supply, Installation, Testing and Commissioning of Thermal Engineering Laboratory at NIT Andhra Pradesh, Tadepalligudem"** and shall be addressed to The Tender Box, C/o Director, National Institute of Technology Andhra Pradesh, Near National Highway 16, Kadakatla, Tadepalligudem-534102, West Godavari District, Andhra Pradesh.
- Last date for submission of bid documents is **27.09.2021 up to 05.00 pm.**
- Bids received after the due date and time shall be summarily rejected.
- Incomplete bids or bids not submitted in prescribed format are liable for rejection.

5. EVALUATION PROCEDURE:

- At the first stage, the Technical Bids shall be opened in the presence of Bidders, who may like to be present on **28.09.2021 at 03.00 p.m** in Room No. 036, Sarvepalli Radhakrishnan Academic Complex, National Institute of Technology Andhra Pradesh, Near National Highway 16, Kadakatla, Tadepalligudem-534102, West Godavari District, Andhra Pradesh.
- A Committee duly constituted by the Competent Authority would evaluate the Technical bids submitted by the Bidders.
- Prior to detailed evaluation, the Institute will determine the substantial responsiveness of each bid to the tender document. A substantially responsive bid is one which conforms to all the terms and conditions of the bidding/tender document and is without any material defects and deviations. Deviations from, or objections or reservations to critical provisions such as those concerning qualification/eligibility criteria, availability of facilities and amenities as needed, availability of government/statutory approvals and clearances, ready and explicit willingness to accept and honour the terms and conditions of contract etc. will be deemed to be material deviations.
- If a bid is not substantially responsive, it will be rejected by the Institute and may not subsequently be made responsive by the Bidder by correction of the non-conformity.
- Only those Bidders whose technical bids have been found to be substantially responsive would be evaluated.
- The Financial bids of those Bidders only shall be opened who qualified in the Technical Evaluation. The Institute will award the contract to the Successful Bidder, whose Financial bid is the lowest price bid among all the quoted bids. The decision of the Director, NIT Andhra Pradesh, Tadepalligudem, is final in this regard.
- Tenders with revised/modified rates/offer after opening of the tenders shall be summarily rejected and the entire Earnest Money Deposit (EMD) submitted with the tender shall be forfeited
- The tender is not transferable under any circumstances.
- Telegraphic, conditional or incomplete tenders shall not be accepted. Canvassing of any kind, direct or indirect, shall lead to disqualification of the Bidder.
- Institute reserves the right to reject any or all the tenders at any stage or accept them in part or reject the lowest tender without assigning any reason thereof and the decision of the Institute in this respect shall be final.
- The Institute reserves the right to cancel the tender process at any stage without assigning any reason.

I / we accept all the terms and conditions of the tender notice.

Date: ……

Place: ……..

Name and Signature of Bidder with Seal

6. GENERAL TERMS & CONDITIONS:

1. The Bidders, who do not meet the eligibility criteria; or do not submit all the necessary documents in support of the eligibility criteria; or do not submit documents that are complete and valid - shall be disqualified.

2. In the event of increase in the taxes and levies implemented by the Government(s) during the contract period, the same shall be paid by Bidder.

3. Validity of prices quoted in financial bids: The validity of prices quoted in the financial bid by the Bidders is for a period of 90 days from the date of opening of the financial bid.

4. NIT Andhra Pradesh, Tadepalligudem, shall correspond only with the technically Qualified Bidders.

5. Irrespective of the offers received or their competitiveness, the final decision on choosing a Bidder, will vest in entirety with the NIT Andhra Pradesh, Tadepalligudem.

6. The Bidder is expected to examine all instructions, terms and specifications in the tender document. Failure to furnish all information required or to submit a bid not substantially responsive to the tender document in every respect will be at the Bidder's risk and may result in the rejection of the bid.

7. "Bidder must ensure to quote rate of each item. If any cell is left blank and no rate is quoted by the Bidder, rate of such item shall be treated as "0" (ZERO). However, if a tenderer quotes nil rates against each item in item rate tender or does not quote any percentage above/below on the total amount of the tender or any section/sub head in percentage rate tender, the tender shall be treated as invalid and will not be considered as lowest tenderer".

8. If any stage, it is found that any of the details/documents furnished by the Bidder is false/misleading/fabricated, his/her/its bid would be liable for cancellation without intimation to the Bidder.

Signature of the Bidder with stamp

7. SCOPE OF SUPPLY:

For Supply, Installation, Testing and Commissioning of Thermal Engineering Laboratory at NIT Andhra Pradesh, Tadepalligudem.

SPECIFICATIONS:

1. *Compact Saturated Steam Turbine with Boiler and DAQ*

Product / Component Specification

Product	Compact Saturated Steam Turbine with Boiler and DAQ
Pressure Vessel	3 Liter Capacity
Pressure Vessel Material	Stainless Steel
Max Operating pressure	25 Bar
Drain Connection Size	¼" BSP
Filling Connection Size	¼" BSP
Fill Valve Pressure Range	25 Bar
Pressure relief valve	¼" BSP Spring Loaded
Electrical Heater	2 Kw immersion heater
Temperature Control	PID Controller
Digital Temperature Indicator	2 Nos
Temperature Sensor	2 Nos
Pressure Gauge	0-20 Kgs/cm^2
Sensors and data acquisition with windows-based software	
Temperature Sensors	Type: PT100 Temperature sensor with signal conditioner Range: 0-100°C Location: Ambient Type: PT100 Temperature sensor with signal conditioner Range: 0-1200°C Location: Internal vessel
Pressure Sensor	Type: Piezo electric with inbuilt Signal Conditioner Range: 0-100 Bar Location: Internal vessel
Data Acquisition System	Analogue input channels: 8 Digital Input Channels: 5 Data Acquisition Speed: 200 Ks/s
Software	Data Logging Signal Analysis Process Control – Heater temperature control Real-Time Display of sensor values Tabulated Results Graph of Experimental Results - Variation of saturated steam pressure with temperature & Confirmation of the Antoine equation
Panel	Powder Coated
Computer	Desktop i3 Processor

2. Computerized Four Stroke Three Cylinder Water Cooled Diesel Engine Test Rig with CRDI Programmable ECU - Variable Injection Timing and Variable injection Pressure

Product / Component Specification

Product	Computerized Four Stroke Three Cylinder Water Cooled Diesel Engine Test Rig with CRDI Programmable ECU	
Engine	Swept Volume Number of Cylinders Torque Emission Type Fuel Cooling Starting Fuel System On-board diagnostic Tool	: 1500cc (Approx.) : Three : 100 Nm @ 1500-2200 Rpm : Bharat Stage VI (or BS-VI) : Diesel : water : Electric Start : Programmable ECU for CRDI Diesel Fuel Injection with Live Tuning Facility : On-board diagnostic Tool (OBD Tool) for the above ECU
Dynamometer	Type Cooling Torque Max Speed	: Eddy Current Dynamometer : Water/Air cooled : 120 Nm : 4000 Rpm
Coupling	Tyre Coupling	
Calorimeter	Single shell and tube	
Air tank	500mm cubic-Mild steel	
Panel	Mild steel powder coated panel with provision for mounting computer, ups, printer and instrumentation	
Base frame	C channel-Mild steel	
Combustion pressure sensor	Piezo-electric 0-100 bar	
NOx Sensor	YSZ Electrode Type	
Crank angle encoder	360 ppr, 1 Deg resolution with TDC pulse	
Air measurement	DP sensor with inline transmitter	
Fuel measurement	Optical liquid level sensor constant volume, fully automatic	
Dynamometer load	Strain gauge load cell with inline transmitter	
Temperature	“k” type with inline signal transmitter	
Water flow	Rota meter-Acrylic	
DAQ	200 Ks/s	
Software	Software for engine combustion analysis and performance analysis, should be capable to measure and compute the below mention parameters 1. Measure Actual volume of Air. 2. Measure AFR 3. Measure NOX 4. Calculate Volumetric Efficiency. 5. Calculate specific fuel consumption (SFC). 6. Calculate brake Thermal Efficiency. 7. Calculate Brake power. 8. Heat Balance chart. 9. Calculate mechanical efficiency. 10. Calculate Frictional Power	

<table>
<tr><td></td><td>11. Calculate indicated Power.
12. PV and P-θ diagrams
13. Calculate 5% -99%Mass Fraction Burnt Angle
14. Estimated End of Combustion Angle (EEOC)
15. Calculate Gross IMEP
16. Calculate Maximum Heat Release Rate
17. Calculate Maximum Heat Release rate crank angle
18. Calculate Maximum pressure rise rate
19. Calculate Maximum pressure rise rate crank angle
20. Calculate Maximum pressure
21. Calculate Maximum pressure crank angle
22. Calculate Start of Combustion
23. Calculate Total heat release</td></tr>
<tr><td colspan="2">Sensors & other Components for Programmable ECU for CRDI (Diesel) with Live Tuning Facility</td></tr>
<tr><td>Crankshaft position</td><td>Crank trigger wheel</td></tr>
<tr><td>Camshaft position</td><td>Cam trigger wheel</td></tr>
<tr><td>Crank position sensor</td><td>Variable reluctance sensor</td></tr>
<tr><td>Cam position sensor</td><td>Hall effect sensor</td></tr>
<tr><td>Electronic Throttle Pedal</td><td>Dual potentiometer</td></tr>
<tr><td>Software</td><td>Should be capable to change all the parameters (Live when the engine is running) as mentioned in the below column (Programmable ECU for CRDI).</td></tr>
<tr><td>High pump</td><td>Unit Pump with metering valve (The rail pressure regulation should be carried out at the suction side of the high-pressure pump to avoid fuel heating in the rail)</td></tr>
<tr><td>Programmable ECU for CRDI</td><td>

Closed loop control for idling - (ECU controls the injection until engine idle)
Pilot injection Quantity- (The user can set the start of injection angle as desired) 3D Map Description for Pilot injection Quantity
<table>
<tr><td>Table Size</td><td>8 X 8</td></tr>
<tr><td>Y-Axis</td><td>Throttle Position in %</td></tr>
<tr><td>X-Axis</td><td>Engine Speed in r/min</td></tr>
<tr><td>Z-Axis</td><td>Injection Quantity in mm^3/injection</td></tr>
</table>
Start angle of Pilot injection - (The user can set the start of injection angle as desired) 3D Map Description for Start angle of Pilot injection
<table>
<tr><td>Table Size</td><td>16 X 16</td></tr>
<tr><td>Y-Axis</td><td>Total Injection Quantity in mm^3/injection</td></tr>
<tr><td>X-Axis</td><td>Engine Speed in r/min</td></tr>
<tr><td>Z-Axis</td><td>Pilot injection Start Angle in degree Angle</td></tr>
</table>
Start angle of main injection- (The user can set the start of injection angle as desired) 3D Map Description for main injection
<table>
<tr><td>Table Size</td><td>16 X 16</td></tr>
<tr><td>Y-Axis</td><td>Total Injection Quantity in mm^3/injection</td></tr>
<tr><td>X-Axis</td><td>Engine Speed in r/min</td></tr>
</table>

</td></tr>
</table>

	Z-Axis: Main injection Start Angle in degree Angle • Injection Duration - (The user can vary Injection duration using throttle pedal as desired) • Open loop rail pressure - (This is a special feature in which a user can set the Injection Pressure in terms Bar, variable from 200 to 1100 bar) 3D Map Description for Rail Pressure Table Size: 16 X 16 Y-Axis: Total Injection Quantity in mm^3/injection X-Axis: Engine Speed in r/min Z-Axis: Rail Pressure in Bar • EGR - (The user can set the EGR flow as desired) • Calibration charts are provided for Injection Quantity at various pressure should be provided

3. Computerized Four Stroke Three Cylinder Water Cooled Petrol Engine Test Rig with Programmable ECU and Morse Test Rig

Product / Component Specification

Product	Computerized Four Stroke Three Cylinder Water Cooled Petrol Engine Test Rig with Programmable ECU
Engine	Swept Volume : 796cc-900cc (Approx.) Number of Cylinders : Three Torque : 60 Nm @ 3000-3500 Rpm Emission Type : Bharat Stage VI (or BS-VI) Fuel : Petrol Cooling : water Starting : Electric Start Fuel System : Programmable ECU for Port Fuel Injection (Petrol) with Live Tuning Facility On-board diagnostic Tool : On-board diagnostic Tool (OBD Tool) for the above ECU
Dynamometer	Type : **Hydraulic/Eddy Current Dynamometer** Cooling : Water/Air cooled Torque : 70 Nm Max Speed : 4000 Rpm
Coupling	Tyre Coupling
Calorimeter	Single shell and tube
Air tank	500mm cubic-Mild steel
Panel	Mild steel powder coated panel with provision for mounting computer, ups, printer and instrumentation
Base frame	C channel-Mild steel
Combustion pressure sensor	Piezo-electric 0-100 bar
NOx Sensor	YSZ Electrode Type
Lambda Sensor with Indicator	Bosch LSU 4.9 wide band lambda sensor with provision to indicate the values in both AFR or Lambda (selective option)
Crank angle encoder	360 ppr, 1 Deg resolution with TDC pulse

Air measurement	DP sensor with inline transmitter
Fuel measurement	Optical liquid level sensor constant volume, fully automatic
Dynamometer load	Strain gauge load cell with inline transmitter
Temperature	"k" type with inline signal transmitter
Water flow	Rota meter-Acrylic
DAQ	200 Ks/s
Software	Software for engine combustion analysis and performance analysis, should be capable to measure and compute the below mention parameters 1. Measure Actual volume of Air. 2. Measure AFR 3. Measure NOx 4. Calculate Volumetric Efficiency. 5. Calculate specific fuel consumption (SFC). 6. Calculate brake Thermal Efficiency. 7. Calculate Brake power. 8. Heat Balance chart. 9. Calculate mechanical efficiency. 10. Calculate Frictional Power. 11. Calculate indicated Power. 12. PV and P-θ diagrams 13. Calculate 5% -99%Mass Fraction Burnt Angle 14. Estimated End of Combustion Angle (EEOC) 15. Calculate Gross IMEP 16. Calculate Maximum Heat Release Rate 17. Calculate Maximum Heat Release rate crank angle 18. Calculate Maximum pressure rise rate 19. Calculate Maximum pressure rise rate crank angle 20. Calculate Maximum pressure 21. Calculate Maximum pressure crank angle 22. Calculate Start of Combustion 23. Calculate Total heat release
Sensors & other Components for Programmable ECU for PFI (Petrol) with Live Tuning Facility	
Crankshaft position	Crank trigger wheel
Camshaft position	Cam trigger wheel
Crank position sensor	Variable reluctance sensor
Cam position sensor	Hall effect sensor
Electronic Throttle Pedal	Dual potentiometer
Throttle Body	Electronic Throttle Body Drive by Wire
Software	Should be capable to change all the parameters (Live when the engine is running) as mentioned in the below column (Programmable ECU for PFI).
PFI Open ECU Capabilities	• Set idle Speed - (The user can set the required idle speed of the engine) • Closed loop control for idling - (ECU controls the injection until engine idle) • Start angle of injection - (The user can set the start of injection angle as desired)

	3D Map Description for Start angle Injection Table Size: 16 X 16 Y-Axis: Throttle Position in % X-Axis: Engine Speed in r/min Z-Axis: Injection Angle in deg angle • Start angle for spark ignition - (The user can set the start of injection angle as desired) 3D Map Description for Start angle of Injection Table Size: 16 X 16 Y-Axis: Throttle Position in % X- Axis: Engine Speed in r/min Z-Axis: Ignition Angle in deg angle • Target AFR - (The user can set the Target AFR as desired) 3D Map Description for Start angle of Injection Table Size: 16 X 16 Y-Axis: Throttle Position in % X- Axis: Engine Speed in r/min Z-Axis: Target AFR • Injection Duration - (The user can vary Injection duration using throttle pedal as desired) • Injection pressure - (3bar) • EGR - (The user can set the EGR flow as desired) • Calibration charts are provided for Injection Quantity at various pressure

4. Computerized Variable Compression Ratio Multi-Fuel Engine Test Rig with Programmable Separate ECU for CRDI, PFI and Manifold Gas Injection Kit

Product / Component Specification

Product	Computerized Variable Compression Ratio Multi-fuel Engine Test Rig with Programmable Separate ECU for CRDI, PFI and Manifold Gas Injection Kit
Engine	Bore Diameter : 93mm Stroke Diameter : 93mm Torque : 38 Nm @ 1200-2200 Rpm Emission Type : Bharat Stage VI (or BS-VI) Compression Ratio Variable : 10:1 to 20:1 (The required Compression ratio should be achieved without removing or dismantling the engine head. Fuel : Diesel & Petrol & Gas Injection No of cylinder : One Cooling : water or Air Speed : 1200-2200 Rpm Power : 11HP Starting : Electric Start Fuel System : Programmable ECU for CRDI (diesel) with Live Tuning Facility Programmable ECU for Port Fuel Injection (Petrol) with Live Tuning Facility Programmable ECU for Port Fuel Injection (Gas) with Live Tuning Facility Dedicated separate ECU's are required for different fuels

	On-board diagnostic Tool : Dedicated separate On-board diagnostic Tool (OBD Tool) are required for the above ECU's
Dynamometer	Type : Eddy Current Cooling : Water/Air cooled Torque : 50 Nm Max Speed : 3000 Rpm
Coupling	Tyre Coupling
Calorimeter	Single shell and tube
Air tank	500mm cubic-Mild steel
Panel	Mild steel powder coated panel with provision for mounting computer, ups, printer and instrumentation
Base frame	C channel-Mild steel
Combustion pressure sensor	Piezo-electric 0-100 bar
NOx Sensor	YSZ Electrode Type
Lambda Sensor with Indicator	Bosch LSU 4.9 wide band lambda sensor with provision to indicate the values in both AFR or Lambda (selective option)
Crank angle encoder	360 ppr, 1 Deg resolution with TDC pulse
Air measurement	DP sensor with inline transmitter
Fuel measurement	Optical liquid level sensor constant volume, fully automatic
Dynamometer load	Strain gauge load cell with inline transmitter
Temperature	"k" type with inline signal transmitter
Water flow	Rota meter-Acrylic
DAQ	200 Ks/s
Software	Software for engine combustion analysis and performance analysis, should be capable to measure and compute the below mention parameters 1. Measure Actual volume of Air. 2. Measure AFR 3. Measure NOx 4. Calculate Volumetric Efficiency. 5. Calculate specific fuel consumption (SFC). 6. Calculate brake Thermal Efficiency. 7. Calculate Brake power. 8. Heat Balance chart. 9. Calculate mechanical efficiency. 10. Calculate Frictional Power. 11. Calculate indicated Power. 12. PV and P-θ diagrams 13. Calculate 5% -99%Mass Fraction Burnt Angle 14. Estimated End of Combustion Angle (EEOC) 15. Calculate Gross IMEP 16. Calculate Maximum Heat Release Rate 17. Calculate Maximum Heat Release rate crank angle 18. Calculate Maximum pressure rise rate 19. Calculate Maximum pressure rise rate crank angle 20. Calculate Maximum pressure 21. Calculate Maximum pressure crank angle

<table>
<tr><td></td><td>22. Calculate Start of Combustion
23. Calculate Total heat release</td></tr>
<tr><td colspan="2">Sensors & other Components for Programmable ECU for CRDI (Diesel) with Live Tuning Facility</td></tr>
<tr><td>Crankshaft position</td><td>Crank trigger wheel</td></tr>
<tr><td>Camshaft position</td><td>Cam trigger wheel</td></tr>
<tr><td>Crank position sensor</td><td>Variable reluctance sensor</td></tr>
<tr><td>Cam position sensor</td><td>Hall effect sensor</td></tr>
<tr><td>Electronic Throttle Pedal</td><td>Dual potentiometer</td></tr>
<tr><td>Software</td><td>Should be capable to change all the parameters (Live when the engine is running) as mentioned in the below column (Programmable ECU for CRDI).</td></tr>
<tr><td>High pump</td><td>Unit Pump with metering valve (The rail pressure regulation should be carried out at the suction side of the high-pressure pump to avoid fuel heating in the rail)</td></tr>
<tr><td>Programmable ECU for CRDI</td><td>

Closed loop control for idling - (ECU controls the injection until engine idle)
Pilot injection Quantity- (The user can set the start of injection angle as desired) 3D Map Description for Pilot injection Quantity
<table>
<tr><td>Table Size</td><td>8 X 8</td></tr>
<tr><td>Y-Axis</td><td>Throttle Position in %</td></tr>
<tr><td>X-Axis</td><td>Engine Speed in r/min</td></tr>
<tr><td>Z-Axis</td><td>Injection Quantity in mm^3/injection</td></tr>
</table>
Start angle of Pilot injection - (The user can set the start of injection angle as desired) 3D Map Description for Start angle of Pilot injection
<table>
<tr><td>Table Size</td><td>16 X 16</td></tr>
<tr><td>Y-Axis</td><td>Total Injection Quantity in mm^3/injection</td></tr>
<tr><td>X-Axis</td><td>Engine Speed in r/min</td></tr>
<tr><td>Z-Axis</td><td>Pilot injection Start Angle in degree Angle</td></tr>
</table>
Start angle of main injection- (The user can set the start of injection angle as desired) 3D Map Description for main injection
<table>
<tr><td>Table Size</td><td>16 X 16</td></tr>
<tr><td>Y-Axis</td><td>Total Injection Quantity in mm^3/injection</td></tr>
<tr><td>X-Axis</td><td>Engine Speed in r/min</td></tr>
<tr><td>Z-Axis</td><td>Main injection Start Angle in degree Angle</td></tr>
</table>
Injection Duration - (The user can vary Injection duration using throttle pedal as desired)
Open loop rail pressure - (This is a special feature in which a user can set the Injection Pressure in terms Bar, variable from 200 to 1100 bar)

</td></tr>
</table>

<table>
<tr><td></td><td>3D Map Description for Rail Pressure
<table>
<tr><td>Table Size</td><td>16 X 16</td></tr>
<tr><td>Y-Axis</td><td>Total Injection Quantity in mm^3/injection</td></tr>
<tr><td>X-Axis</td><td>Engine Speed in r/min</td></tr>
<tr><td>Z-Axis</td><td>Rail Pressure in Bar</td></tr>
</table>

EGR - (The user can set the EGR flow as desired)
Calibration charts are provided for Injection Quantity at various pressure should be provided
</td></tr>
<tr><td colspan="2">Sensors & other Components for Programmable ECU for PFI (Petrol) with Live Tuning Facility</td></tr>
<tr><td>Crankshaft position</td><td>Crank trigger wheel</td></tr>
<tr><td>Camshaft position</td><td>Cam trigger wheel</td></tr>
<tr><td>Crank position sensor</td><td>Variable reluctance sensor</td></tr>
<tr><td>Cam position sensor</td><td>Hall effect sensor</td></tr>
<tr><td>Electronic Throttle Pedal</td><td>Dual potentiometer</td></tr>
<tr><td>Throttle Body</td><td>Electronic Throttle Body Drive by Wire</td></tr>
<tr><td>Software</td><td>Should be capable to change all the parameters (Live when the engine is running) as mentioned in the below column (Programmable ECU for PFI).</td></tr>
<tr><td>PFI Open ECU Capabilities</td><td>

Set idle Speed - (The user can set the required idle speed of the engine)
Closed loop control for idling - (ECU controls the injection until engine idle)
Start angle of injection - (The user can set the start of injection angle as desired)
3D Map Description for Start angle Injection
<table>
<tr><td>Table Size</td><td>16 X 16</td></tr>
<tr><td>Y-Axis</td><td>Throttle Position in %</td></tr>
<tr><td>X-Axis</td><td>Engine Speed in r/min</td></tr>
<tr><td>Z-Axis</td><td>Injection Angle in deg angle</td></tr>
</table>
Start angle for spark ignition- (The user can set the start of injection angle as desired)
3D Map Description for Start angle of Injection
<table>
<tr><td>Table Size</td><td>16 X 16</td></tr>
<tr><td>Y-Axis</td><td>Throttle Position in %</td></tr>
<tr><td>X- Axis</td><td>Engine Speed in r/min</td></tr>
<tr><td>Z-Axis</td><td>Ignition Angle in deg angle</td></tr>
</table>
Target AFR- (The user can set the Target AFR as desired)
3D Map Description for Start angle of Injection
<table>
<tr><td>Table Size</td><td>16 X 16</td></tr>
<tr><td>Y-Axis</td><td>Throttle Position in %</td></tr>
<tr><td>X- Axis</td><td>Engine Speed in r/min</td></tr>
<tr><td>Z-Axis</td><td>Target AFR</td></tr>
</table>
Injection Duration - (The user can vary Injection duration using throttle pedal as desired)
Injection pressure - (3bar)
</td></tr>
</table>

	• EGR - (The user can set the EGR flow as desired) • Calibration charts are provided for Injection Quantity at various pressure
Sensors & other Components for Programmable ECU for PFI (Gas) with Live Tuning Facility	
Gas Pressure Regulator	1 Bar
Injection Timing	Variable from 0 to 720 deg CA
Injection Quantity in time based	500 Micro sec to 5000 Micro sec

8. SERVICE TERMS & CONDITIONS:

1. The vendor/contractor will be responsible for any mishap or accident during the installation/Commissioning of the equipment which may occur due to negligence on part of the vendor.
2. The vendor/contractor shall pay and be responsible for payment of all taxes, duties, levies, fees, costs or charges in respect of the products/ Equipment and services rendered to NIT Andhra Pradesh, Tadepalligudem, as part of the contract. The vendor/contractor shall indemnify and keep indemnified NIT Andhra Pradesh, Tadepalligudem, against claims in respect of above taxes, levies, duties, fees, costs, charges etc. All of the aforesaid taxes, duties, levies, fees, cost and charges shall be to the vendor/ contractor's account and NIT Andhra Pradesh, Tadepalligudem, shall not be required to pay any additional or extra amount on account of variation of the above charges if any, till the completion of work as per the contract to the satisfaction of NIT Andhra Pradesh, Tadepalligudem, and no extra claim on this account will be entertained in any case.

9. SPECIAL TERMS & CONDITIONS:

1. Bidders are expected to substantiate their offers by providing all necessary datasheets and testimonials of existing installations. Bids with commercial for all the items will be selected for subsequent process.
2. Rates quoted by Bidder in the Price bid is Inclusive of For Supply, Installation, Testing and Commissioning of Thermal Engineering Laboratory and 3-years warranty.

10. SUPPLY AND PAYMENT SCHEDULE:

Phase of Supply	Duration	Quantity to be supplied (in nos.)	% of payment made on total quoted amount
I	30 days from the date of Purchase order	Total Quantity as per Purchase Order	90% against quantity supplied

Note:

- The retention amount shall be released only after submitting installation reports, manuals, manufacturer warranty cards, etc., to the institute.
- TDS and other taxes/duties will be deductible as applicable as per Government of India rules.

Delivery Period: The contractor should supply the Thermal Laboratory equipment within 30 days from the date of issue of Purchase order.

Warranty period: Warranty period of 3 years (Bidder will have to quote all prices with 3-year warranty) will start from the date of installation and satisfactory commissioning and acceptance. Any defects or others faults which may appear with in defect liability/warranty period of 3 years from the satisfactory working conditions or date of satisfactory report of the institute level final inspection committee whichever is later, arising in the Thermal Laboratory due to material or workmanship should be corrected and replaced/repaired with the parts of original specifications and makes by contractor at his own cost.

PENALTY FOR DELAYED SUPPLY AND INSTALLATION:

Time is the essence of the contract and the supplier shall pay or allow the institute to realize the sum equivalent to 01 (one) percent of the total order value per week, subject to a maximum limit of 10% of the order value, as agreed compensation for delay for the period during which the supply and installation shall remain incomplete beyond the offered time of completion / execution or beyond the time duly extended in writing by the institute. The institute may deduct such damages from any money due to the supplier

ADVANCE PAYMENT: NIT Andhra Pradesh, Tadepalligudem, will not pay any advance payment

(s) against supply material or against Proforma invoice to vendor.

ARBITRATION: All disputes in connection with the execution of contract shall be settled under the provisions of Arbitration and Conciliation Act 1996 and the rules framed there under and in force shall be applicable to such proceedings. The Competent Authority of NIT Andhra Pradesh, Tadepalligudem, or a person nominated by him/her shall be the sole Arbitrator.

JURISDICTION: The Courts of Tadepalligudem alone will have jurisdiction to try any matter/dispute or reference between the parties arising out of any conflict.

Supply and Installation of thermal engineering lab equipments

The Successful Bidder should arrange for supply and installation of the equipments as soon as they receive the Purchase Order. Incase, it is found that there is delay in Supply and installation then the NIT Andhra Pradesh, Tadepalligudem, at its sole discretion may cancel the Purchase Order and the Performance guarantee shall be forfeited without any further reference to the Bidder.

DISCLAIMER:

Even though adequate care has been taken in the preparation of this Tender Schedule the Bidder should satisfy himself that the Schedule is complete in all respects.

NIT Andhra Pradesh not their employees make any representation or warranty as to the accuracy, reliability or completeness of the information in this Tender Schedule and it is not possible for the NIT Andhra Pradesh to consider the investment objective, financial situation and particular needs of each party who reads or uses the Tenders Schedule. Certain prospective Bidders may have a better knowledge of the scope of work than others. Each prospective Bidder should conduct his own investigations and analysis and check the accuracy, reliability and completeness of the information in the Tender Schedule and obtain independence advice from appropriate sources.

The Director, NIT Andhra Pradesh reserves the right to change any or all of the provisions of this request for Proposal. Such changes would be intimated to all parties procuring this request for Proposal.

The Director, NIT Andhra Pradesh reserves the right to reject any or all the Bids submitted in response to this request for Proposal at any stage without assigning any reasons whatsoever.

Signature of the Bidder with stamp

Annexure-I

PART-I (TECHNICAL BID)

All the commercial conditions shall also be indicated in this part. Deviations, if any, to our specifications shall be brought out very clearly. Bidders shall mention point-wise confirmation with regard to technical specifications given in our Enquiry.

S No.	Particulars	Details
1	Bidder's name	
2	Registered Office and address	
3	Working Place of the office	
4	Year of Establishment	
5	Type of Firm (Ownership, Partnership, Pvt Ltd or Ltd Co.	
6	Details of ownership (Name and Address of the Board of Director, Partners etc)	
7	Name of the authorized signatory who is authorized to sign all the relevant documents (power of attorney, if any to be submitted)	
8	**Contact Details**	
	Name of the contact person	
	Designation	
	Telephone Number (Office)	
	Mobile Number	
	Email Id	
9	Address for communication	
10	**Registration Numbers:**	
	Firm Registration No.	
	GST No.	

11	PAN Number	
12	Total Annual Turnover for last three years	2017-18: Rs 2018-19: Rs 2019-20: Rs
13	Whether Agency has been blacklisted by any Govt or Semi-Govt. organization or any other organization? If yes, provide details	YES/NO
14	Do you accept all terms and conditions of tender document and signed the tender document?	YES/NO
15	Do you agree to provide services as per the Institute's requirement?	YES/NO
16	No. of years of service in the field of Supply, Installation, Testing and commissioning of Thermal Laboratory Equipment's	
17	Have you submitted the relevant work order(s), work completion and satisfactory certificate(s), IT returns, audited accounts statement / bank statement etc.?	YES/NO
18	DD Number, Amount and Date of the EMD submitted	
19	**Bank Particulars**	
	Account name	
	Type of A/C: (SB/CA/CC)	
	A/C No.	
	IFS code	
	Name of the Bank	
	Branch	

Enclose all certificates in support of above statements.

Date:

Place:

Authorized Signatory
Name:
Designation:
Company:
Contact No.

Company Seal

Annexure-II

PART II – FINANCIAL BID

1. Name of the Bidder:

TABLE:

Sl. No.	Item Description	Quantity (Unit)	Unit Rate Rs.	Total Amount Rs.
Supply, Installation, Testing and Commissioning of Thermal Engineering Laboratory at NIT Andhra Pradesh, Tadepalligudem				
1.	Compact Saturated Steam Turbine with Boiler and DAQ	1		
2.	Computerized Four Stroke Three Cylinder Water Cooled Diesel Engine Test Rig with CRDI Programmable ECU - Variable Injection Timing and Variable injection Pressure	1		
3.	Computerized Four Stroke Three/Four Cylinder Water Cooled Petrol Engine Test Rig with Programmable ECU and Morse Test Rig	1		
4.	Computerized Variable Compression Ratio Multi-Fuel Engine Test Rig with Programmable Separate ECU for CRDI, PFI and Manifold Gas Injection Kit	1		
			Total Cost	
			(Taxes as applicable)	
			Grand Total in words	

Note: a. If there is a discrepancy between the rates quoted in words and in figures, the amount quoted in words shall prevail.

b. The total amount quoted above will be including for supply, installation, testing and commissioning shall be treated for determining the Lowest Bidder (L1). No partial supply shall be assigned to any of the vendor(s). Hence, the vendor should quote/supply all the items mentioned at clause (7) titled "Scope of supply" else the bid shall be treated invalid.

Signature

Name and Address of the Bidder with stamp

Place

Date

PROFORMA FOR BANK GUARANTEE

To

WHEREAS_____(Name of Bidder) (hereinafter called "the Bidder" has submitted its BID dated_____(Date) for the supply of (Name of Contract and/ or description of the goods)_____(hereinafter called "the BID") in favour of_____(hereinafter called the " Client ");

KNOW ALL MEN by these presents that we,_____Bank, having its Registered Office at

_____(address of bank) (hereinafter called "the Bank") are bound unto_____(name of the Client) for the sum of Rs___ (Rupees_____ _____only) for which payment will and truly to be made to the said Client, the Bank binds itself, its successors and assigns by these presents; Sealed with the common seal of the said Bank this_____day of _ 20_.

THE CONDITIONS of this obligation are:

1) If the Bidder withdraws its BID during the period of BID validity specified in the BID Form; or Does not accept the correction of errors in accordance with the bidding documents;
2) If the Bidder having been notified of the acceptance of his BID by the Client during the period of BID validity;
   a) Fails or refuses to execute the contract, if required; or
   b) Fails or refuses to furnish the performance Guarantee or security Deposit, in accordance with of Terms and Conditions of this BID.

We undertake to pay to the Client up to the above amount upon receipt of his first written demand without the Client having to substantiate his demand, provided that in his demand the Client will note that the amount claimed by him is due to him owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

Notwithstanding anything contained herein,
our liability under this Bank Guarantee shall not exceed Rs_____
(Rupees_____only).

The Bank Guarantee is valid up to_____and we are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or before_____(mention period of the Guarantee as found under clause (ii) above plus claim period)

Dated_____day of_____20_.

SEAL & SIGNATURE OF THE BANK

*The Bank Guarantee Should be in favour of The Director, NIT Andhra Pradesh, Tadepalligudem

Annexure - III

DECLARATION

(To be provided on letter head of the Bidder)

I/We _____ do hereby certify that our firm is not blacklisted and no enquiries / cases are pending against us by Govt. of India / Govt. of Andhra Pradesh or by any State Board Universities, since inception of the firm / company.

All the terms and conditions given in the tender draft "**For Supply, Installation, Testing and Commissioning of Thermal Engineering Laboratory at NIT Andhra Pradesh, Tadepalligudem**" issued by NIT Andhra Pradesh, Tadepalligudem are acceptable to us.

We also certify that the information mentioned in the submitted documents is true and complete in any every respect and explicitly agree that in case at a later date it is found out by the Institute (NIT Andhra Pradesh, Tadepalligudem) that any details provided herein by us are incomplete/incorrect, any contract given to us may be summarily terminated forthwith, our firm may be blacklisted, and that the Institute may also initiate any other legal/penal proceedings, as deemed fit by it.

Date:

Place:

Authorized Signatory

Name:

Designation:

Company: Contact

No. Company Seal: