राष्ट्रीय उन्नत विनिर्माण प्रौद्योगिकी संस्थान
(पूर्व नेशनल इंस्टीट्यूट ऑफ फाउंड्री एंड फोर्ज टेक्नोलॉजी)
हटिया, राँची - 834 003 (झारखन्ड)
National Institute of Advanced Manufacturing Technology
(Formerly National Institute of Foundry and Forge Technology)
Hatia, Ranchi – 834 003 (Jharkhand)

सं No. – NIAMT/S&P/282/2024-25

दिनांक Date - 11 / 4 /2025

Limited Tender Enquiry

To,

LAST DATE FOR RECEIPT OF BID
ON 6/5/25 BY 3:00 PM

OPENING OF BID
ON 6/5/25 AT 3:30 PM

Sir/Madam,

We intend to purchase the commodities specified below and invite quotations in accordance with the terms and conditions mentioned overleaf. If you are interested, kindly send your offer by Speed/Registered Post with price and complete terms on or before date mentioned above.

Item No.	Description of Item	Qty.	EMD	Performance Security
1.	Smart EV-BMS Research and training Platform (Specification enclosed in Annexure -5)	1	₹15,000	5% of P.O.

TERMS & CONDITIONS FOR SUBMISSION OF QUOTATION

1. **Rate:** The rate quoted must be net inclusive of packing, forwarding, freight, and all other incidental charges. The stores are required to be delivered at this Institute under the supplier's own arrangement free of additional charges. The risk of damage or loss in transit, if any will be the suppliers. In case the aforesaid terms are not considered, the acceptable charge payable will be required to be specified clearly at ad variorum or lump sum rate. Manufacturer's price list wherever applicable, should be submitted. Packing, forwarding, freight, entry tax etc., when not included in the price, are reimbursable at actual. If external agencies are employed, their receipts must be enclosed with the invoice.
2. **EMD:** An EMD of Rs.15,000 /- to be submitted online (RTGS/NEFT) in the following Institute a/c

a.	Name of Beneficiary:	**National Institute of Advanced Manufacturing Technology (NIAMT)**
b.	Account No.:	**2730101006939**
c.	Name of Bank:	**Canara Bank, NIFFT CAMPUS Branch,**
d.	Bank Address:	**Hatia, Ranchi – 834 003 (Jharkhand)**
e.	IFS Code:	**CNRB0002730**
f.	MICR Code:	**834015008**
g.	Swift Code:	**CNRBINBBCFD**

Bidders registered with MSME for services and upon submitting valid certificate will be exempted from submission of EMD. The details of transaction for EMD viz. Name of bidder firm, Tender Description, Transaction ID Number Transaction date, Amount of Transaction, Name of Bank, Address of Bank shall be furnished by the tenderer on their letterhead separately along with their tender.

3. **Taxes:** Excise Duty and GST should be quoted as separate items. It may be noted that the Institute is exempt and/or entitled for concessional rate. An appropriate certificate in prescribed format will be provided with the Purchase Order, wherever applicable.

4. **Warranty:** Items must be under warranty for minimum **one year**(s). The quotation must contain the terms of warranty, and extended warranty, if available.

5. **Delivery Period:** The stores are required to be delivered at our location within **30 days** from the date of issue of the Purchase Order. Purchase Order will be sent by post with a scan copy by email. All offers of delivery should be made ex-stock, and a clear note should be inserted in case exstock delivery is not possible.

6. **Quality & Specification of Stores:** The stores offered should be of the best quality available, unless otherwise specified, confirming strictly to the specifications cited. The Institute reserves the right to reject the stores as found unacceptable on these grounds.

7. **Performance Security:** To ensure due performance of contract, Performance Security is required to be submitted by successful bidder has been awarded the contract. The Performance Security will be **5%** of the value of the contract. The Performance Security may be furnished in the form of Account payee, Demand Draft, Fixed Deposit, Bank Guarantee from nationalized bank or online payment. The Performance Security shall remain valid for period 60 days beyond the date of completion of all contractual obligations of the supplier, including warranty obligations.

8. **Liquidated Damage:** If a firm accepts an order and fails to execute the order in full or part as per the terms and conditions stipulated therein, it will be open to this Institute to recover liquidated damages from the firm at the rate 0.5% of the value of the undelivered stores per week or part thereof, subject to a maximum of 10% of the value of the undelivered stores. It will also be open to this Institute alternatively, to arrange

procurement of the required stores from any other source at the risk and expense of the firm, which accepted the order but failed to execute the order.

9. **Submission of Quotation:** All quotations must be forwarded in sealed cover addressed to **Asst. Registrar (S&P), National Institute of Advanced Manufacturing Technology, Hatia, Ranchi-834003**, so as to reach within the specified date and time. The reference to the Enquiry No. and the last date for submission must clearly be super-scribed on the sealed envelope. To ensure receipt of quotations in time intending suppliers are advised to mail them sufficiently in advance. If no counter offer is made in the quotation, it will be taken for granted that the offer is strictly in accordance with the specification and terms and conditions laid down in this enquiry. Quotations may be sent by Speed/Registered Post or courier, or delivered in person. There is no provision for giving a receipt if the quotation is delivered in person.

10. **Opening of Quotation:** Quotations received within the scheduled time and date will be opened in the Administrative Building, First Floor at the time mentioned. A firm may send its authorized representative to witness the opening, if it so desires.

11. **Period of Validity:** A quotation shall remain valid for acceptance at least for a period of 180 days from the date of opening.

12. **GST & Income Tax Clearance:** Up-to-date GST & Income Tax Clearance Certificate should be attached with the quotation.

13. **Payment:** Payment will be made online by RTGS/NEFT only normally within 30 days from the date of receipt of the stores in good condition, and the invoice.

14. **Rejection of Offers:** The Institute reserves the right to ignore or reject any or all offer(s) including the lowest one without assigning any reason.

10/2/25

Asst. Registrar (S&P)

SIGNATURE OF TENDERER

ALONG WITH SEAL OF THE COMPANY WITH DATE

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Annexure – 1

PRICE REASONABILITY CERTIFICATE

This is to certify that we have offered the maximum possible discount to you in our Quotation No. .....dated.....for (Value Rs.) .....

We would like to certify that the quoted price are the minimum and we have not quoted the same item on lesser rates than those being offered to NIAMT to any other customer within last 12 months from the last date of submission of quotation nor we will do so till the validity of offer or execution of purchase order, whichever is later.

Seal and Signature of the tenderer

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Annexure - 2

Name of Equipment with Model No: .....

Name & Address of Manufacturer: .....

Price Quoted:

A. For Indigenous Equipment :

i) Cost of equipment (Rs.): .....
ii) GST (Rs.) : .....
iii) Any other charges (Rs.) : .....
iv) Total cost of equipment (in Rs.) F.O.R, NIAMT, Ranchi. : .....

B. For Imported Equipment:

i) Cost of equipment (In Foreign Currency): .....
ii) Packing and Forwarding: .....
iii) CIF Price: .....
iv) Freight charges up-to Ranchi Airport / Ranchi Railway Station: .....
v) Insurance (110% of the cost of the equipment): .....
vi) For NIAMT Ranchi: .....

Signature of Tenderer with date and seal

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Annexure - 3

BID PARTICULARS

1. Name of the Supplier:
2. Address of the Supplier:
3. Availability of demonstration of equipment: Yes / No
4. Tender cost enclosed: Yes/No if yes
5. Online EMD submission information enclosed: Yes / No
   if Yes Transaction ID/No. of
   Transfer:.....
   Transaction date: .....
   Amount of Transaction: .....
   Name of Bank: .....
   Address of Bank: .....
6. Name and address of the Officer/contact person to whom all references shall be made regarding this tender enquiry

   Name
   Address:
   Ph:
   Fax:
   Mobile:
   Email:
   Web:

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Annexure – 4A

Compliance Statement for the Tender Specifications

Tender Ref No.:

Sl. No.	Check list of documents / Undertakings	Yes / No	Remarks (give explanation if the answer is No)
01.	Is EMD details attached? (if applicable)		
02.	Is the bidder original equipment manufacturer (OEM)/authorized dealer?		
03.	If authorized dealer, recent dated certificate to this effect from OEM, attached or not?		
04.	Undertaking from OEM regarding technical support & extended warranty period.		
05.	Validity of 180 days or not?		
06.	Price Reasonability Certificate enclosed as per format?		
07.	Undertaking from bidder regarding acceptance of tender Terms & Conditions		
08.	Whether list of reputed users (along with telephone numbers of contact persons) for the past three years specific to the instrument attached?		
09.	Does the instrument comply with all the specifications detailed? Attach a separate sheet showing compliance with the specifications and explanations thereto if the equipment varies from the requested specifications.		
10.	Whether free installation, Commissioning and Application Training offered?		
11.	Whether comprehensive onsite warranty offered?		
12.	Whether Annual maintenance after expiry of comprehensive onsite warranty quoted separately?		

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Annexure – 4B

Compliance Statement of Technical Specification

Sl. No.	Parameter as per Annexure-5	Yes / No	Page No.	Remarks

Place:-

Authorized Signatory
Seal of bidders

Date:-

Annex-5

Smart EV-BMS Research and Training Platform

Introduction

The **Advanced EV and Battery Management System (BMS) Trainer** is an innovative, integrated platform designed for in-depth learning, experimentation, and research on electric vehicle (EV) technology and battery management systems. This trainer provides a unique, hands-on educational experience, combining a state-of-the-art EV trainer with an advanced BMS research module. This powerful setup enables users to gain insights into the performance, efficiency, and safety mechanisms of both EV systems and battery management technologies. Designed with a dual approach, this system offers research-focused capabilities, including real-time Kalman Filter-based State of Charge (SoC) estimation for Li-ion batteries, as well as practical IoT-enabled BMS monitoring and control for EVs, accessible through a user-friendly Bluetooth-enabled mobile app.

This trainer is ideal for academic institutions, research laboratories, and industry professionals who wish to explore the complexities of EV operation and battery management at a granular level. With IoT-enabled functionality, real-time data monitoring, and advanced safety features, the platform serves as a versatile educational and research tool for students, researchers, and engineers.

Unique Features

- **Dual Functionality**:

Combines an EV Trainer with an Advanced BMS research module to enable a comprehensive educational experience, covering both EV operations and battery management.

- **Kalman Filter-Based SoC Estimation**:

For research-oriented applications, a precise Kalman Filter algorithm is used to estimate SoC for two Li-ion batteries, enhancing accuracy in charge/discharge monitoring under various conditions.

- **IoT-Enabled Smart BMS Controller**:

Integrated IoT-enabled Smart BMS provides real-time monitoring and control via a Bluetooth-enabled mobile app, allowing seamless access to battery parameters of 13s battery pack including voltage, current, temperature, SoC, and other safety-related metrics.

- **Versatile Data Acquisition and Control**:

The platform features an advanced data acquisition system, real-time edge processing, and IoT connectivity, enabling remote control and monitoring, load adjustments, and energy management.

- **Waveform Visualization**:

Supports visualization of pulse-width modulation (PWM) control signal waveforms and output signals, essential for understanding motor control dynamics.

1. **Dynamic Load Control and Adaptive Energy Management**:

Relay-based load control and IoT-enabled load adjustments offer insights into adaptive load management, simulating real-world EV battery discharge profiles.

Specifications

1. Controller Unit

Processor Architecture: Dual-core Extensa microcontroller, 240 MHz, optimized for high-speed data processing and IoT communication.

Memory and Connectivity: 520 KB SRAM, expandable flash interface, integrated Wi-Fi (802.11 b/g/n), and Bluetooth (v4.2 BLE).

Power Management: Adaptive low-power modes for efficient energy usage, suitable for extended testing and experimentation.

2. Battery Management System (BMS) Research Module

SoC Estimation with Kalman Filter: Implements recursive Kalman filtering for high-precision SoC estimation in two Li-ion batteries, combining current (coulomb counting) and OCV measurements with adaptive variance tuning.

Extended Kalman Filter Option: Enhances accuracy by addressing nonlinear battery discharge, crucial for SoC accuracy under varying loads and environmental factors.

SoC Accuracy: Estimated precision within ±1%, ideal for rigorous research applications.

Voltage and Current Sensing: Supports up to 25V DC with ±0.05% accuracy, calibrated for 0-20A with ±0.1% resolution, allowing accurate tracking of battery behavior under experimental conditions.

3. EV Trainer with IoT-Enabled Smart BMS Controller

- **Battery and Charging System**:

Battery Type: Lithium-Ion

Battery Voltage and Capacity: 48V, 15Ah

Charging System: MOSFET-based, 180-250V AC input, 48V DC output, 4A charging current, with advanced safety features.

- **IoT-Enabled Smart BMS Controller**:

Voltage Rating: 48V, compatible with 13s Li-ion battery configurations.

Current Rating: 20A continuous, 50A peak.

Protection Features: Over-voltage and under-voltage cell protection for safe and stable operation.

Mobile App Connectivity: Real-time battery monitoring via Bluetooth on Android devices, including voltage, current, temperature, and SoC.

Real-Time Monitoring: Live display of battery health and safety parameters, accessible remotely.

4. BLDC Motor and Drive System

Voltage Rating: 48V

Power Output: 750W

Speed: Capable of reaching up to 20 km/h.

Torque: High starting torque for rapid acceleration.

Efficiency: High efficiency of 85-90%, optimizing battery usage and minimizing losses.

Motor Drive: IGBT-based motor drive rated for 48V, with 15A continuous and 30A peak current for effective speed and torque control.

5. Dynamic Load Control System

Relay-Based Load Control: High-capacity relays for flexible load modulation, simulating real-world EV battery consumption profiles.

Load Configuration: Three independently managed loads enable analysis of discharge patterns and battery response under varying conditions.

IoT-Enabled Load Adjustment: Remote control of load modulation through an IoT dashboard, adjusting energy management based on SoC levels.

6. Waveform Monitoring and Visualization
PWM Waveform Terminals: Visualization of PWM control signals for motor drive analysis.

IGBT Output Monitoring: Terminals for observing IGBT output waveforms, aiding in advanced motor control diagnostics.

7. Supporting Parts of EV
Throttle: Handle with integrated variable throttle for precise speed control.

Forward/Reverse Switch: Well-labeled switch for selecting direction.

Differential Gear Assembly: Includes wheel assembly and brake system, ensuring realistic EV operation and control.

8. Data Acquisition and IoT Gateway
Edge Processing: Quad-core ARM Cortex-A53 processor with 2 GB RAM, optimized for real-time data analytics.

Communication Protocols: Supports MQTT and HTTP protocols for secure data transmission.

Predictive Analytics: State of Health (SoH) tracking with configurable SMS/email alerts for critical threshold detection.

List of Experiments Conducted with the Advanced EV and BMS Trainer

Battery SoC Estimation Using Kalman Filter
Explore the Kalman filtering algorithm for real-time SoC estimation in two Li-ion batteries, observing algorithm efficiency under various current and voltage conditions.

- **IoT-Based Real-Time Battery Monitoring and Control**
Set up IoT connectivity for real-time voltage, current, temperature, and SoC monitoring through a mobile app, simulating remote EV diagnostics.

- **Pulse Width Modulation (PWM) Signal Analysis**
Visualize and analyze PWM control signals and IGBT output waveforms to understand motor drive control and its impact on speed and torque.

- **Battery Safety Mechanisms Testing**
Experiment with the IoT-enabled BMS to study system response to over-voltage and under-voltage conditions, validating safety protocols.

- **Throttle Response and Speed Control Dynamics**
Test and analyze throttle response for various speeds, evaluating acceleration patterns and speed control stability.

- **IoT Remote Load Modulation and Battery Response Analysis**
Test remote load adjustment through the IoT platform to observe its impact on battery parameters and overall system efficiency.

This **Advanced EV and BMS Trainer** offers a unique, comprehensive educational experience for those aiming to master EV and battery management technologies, bridging theoretical knowledge with practical, real-world applications.