Tender Conditions and procedure to be abided by the tenderers

1. INTRODUCTION

1.1. This tender is for procurement of the following equipments for Annamalai University, Annamalainagar, Chidambaram, India.

S. No.	Item No.	Equipment
1.	GUCC/DST-PURSE2 /Eqi-1/2018	Single Crystal X-Ray Diffraction System
2.	GUCC/DST-PURSE2 /Eqi-4-1/2018	Atomic Absorption Spectrometer
	GUCC/DST-PURSE2 /Eqi-4-2/2018 (b)	Electro Chemical Work Station
3.	GUCC/DST-PURSE2 /Eqi-8/2018	GDI Engine with Emission Analyser
4.	GUCC/DST-PURSE2 /Eqi-9/2018	Flow Cam Plankton identifier
5.	GUCC/DST-PURSE2 /Eqi-10/2018	Direct Metal Laser Sintering (DMLS) System

The specification for the above mentioned equipments is given in Schedule A

1.2. Applicability of Tamil Nadu Transparency in Tenders Act and Rules: This tender will be governed by the Tamil Nadu Transparency in Tenders Act 1998 and Rules 2000 as amended from time to time.

2. ELIGIBILITY CRITERIA

2.1. A tenderer will be eligible for tendering only if he satisfies the eligibility criteria as given below:

a) A tenderer should be a manufacturer possessing a valid manufacturing license from the competent authority for manufacturing the items quoted and should have at least three years' experience. (Documentary evidence to be furnished)

b) The manufacturer should be an ISO:9001 / Equivalent certified company. Documentary evidence should be enclosed.

c) Authorized Dealer / Distributor / Supplier can also bid with authorization from the Manufacturer. (Documentary evidence to be furnished). A manufacturer shall not authorize more than one dealer / distributor for participating in this tender.

d) In case a tenderer is participating as an authorized Dealer/Distributor/Supplier the manufacturer of the item should satisfy the conditions mentioned at (a) and (b) above.

e) The tenderer should have a Tamil Nadu Value Added Tax Registration / Central Sales Tax Registration. Copy of the Registration Certificate should be enclosed.

f) The Tenderer should be an Income Tax assesse. (Return filed should be enclosed)

2.2. The tenderer should not have been blacklisted or debarred from participating in tenders by any Central / State Government agencies or autonomous bodies or universities/ institutions. (An undertaking to this effect should be furnished)

2.3. The tenderer submitting their offer must have supplied similar items to other Universities or institutions or Government agencies. Copies of such order must be enclosed this tender document.

3. COST OF TENDERING

The Tenderer shall bear all costs associated with the preparation and submission of this Tender and the tender inviting authority will in no way be responsible or liable for these costs.

The Tenderer may also download the application format from University Web-site at free of cost.

3.1 Cost of Tender Document:

The cost of the tender document is Rs. 2100/-. The demand draft should be in favour of "The Registrar, Annamalai University" payable at Annamalainagar or Chidambaram.

4. GENERAL INSTRUCTIONS

4.1. The tenderers are requested to go through the instructions, terms and conditions and specifications given in the tender. Failure to furnish all required information in every aspect will be at the tenderer's risk and may result in the rejection of the tender.

For any queries tenderer may contact **Registrar, Annamalai University, Annamalainagar, Chidambaram – 608 002. Tamil Nadu, INDIA.**

4.2. Clarification on the tender

A prospective tenderer requiring any clarification on the tender may request the Office of the Registrar, Annamalai University by a letter or by fax. Registrar, Annamalai University will respond in writing to any request for clarification in the tender.

4.3. Amendments to the Tender

i. Tender Inviting Authority may amend the tender wherever it is felt that such an amendment is absolutely necessary.

ii. Amendment to tender may also be given in response to clarifications by prospective tenderers and it is solely the discretion of the Tender Inviting Authority. Any amendment to the tender will be uploaded on the website **www.annamalaiuniversity.ac.in. It is the responsibility of the tenderer to verify the amendments if any and get the amendment documents before the submission of the tender provided no such change could be effected 48 hours prior to the time fixed for opening of the tender.**

4.4. The **Tender document is not transferable** under any circumstances

5. EARNEST MONEY DEPOSIT (EMD)

5.1. The tenderer should furnish **Earnest Money Deposit (EMD) 1% of the total cost** along with the tender by way of Demand Draft/Bankers cheque obtained from any Nationalized/ Scheduled Bank and drawn in favour of "**The Registrar, Annamalai University**" payable at **Annamalainagar or Chidambaram**.

5.2. Any tender without required EMD will be considered as NON-RESPONSIVE and will be SUMMARILY REJECTED.

5.3. The Tender Inviting Authority will arrange to refund the Earnest Money Deposit to the unsuccessful tenderers after publishing the list of successful tenderers, within a reasonable time.

5.4. No interest will be paid on the EMD.

5.5. The EMD is liable to be forfeited if:

i. The Tenderer withdraws his tender at any stage after the last date and time fixed for submitting the tender.

ii. The Tenderer on becoming successful, fails to furnish the required security deposit or sign the agreement, within the stipulated time limit.

6. PERFORMANCE SECURITY :

i. Successful tenderer has to furnish Security Deposit equivalent to 5% of the tendered value either in form of Demand Draft drawn in favour of "The Registrar, Annamalai University" or in the form of irrevocable bank guarantee obtained from any Nationalized/Scheduled bank.

ii. The EMD of the Successful Bidder will be adjusted towards Security Deposit (SD). Security Deposit will be released only after the expiry of the warranty period as mentioned in clause 8.5.

7. SUBMISSION OF TENDER:

7.1. Due Date for Tender Submission

i. The tender document duly filled in, signed on all pages shall be submitted in sealed cover to **the Registrar, Annamalai University at his office till 3.00 PM on 29.06.2018** as per the procedure laid down herein. The tender can be submitted on all working days upto the above closing date and time. In the event of this day being declared as a holiday, the tenders can be submitted up to 3.00 P.M. on the following working day.

ii. The tender inviting authority will not be held responsible for any delay in the receipt of the Bank Draft or any delay in the receipt of the document by the tenderer including loss of the document in transit or delay in obtaining any document / certificate or on any other account. No extension of the date and time for the submission of the documents will be given for any such delay.

iii. The tender inviting authority may extend the due date for submission of tender by issuing an amendment in which case all the rights and obligations of the Tender Inviting Authority and the Tenderers previously subject to the original due date for submission will then be subject to the new date for submission.

iv. **Any tender received** by the Tender Inviting Authority **after the due date and time will not be considered and will be returned to the tenderer.**

7.2. Procedure for Submission of Tender

i. Tenderers are advised to go through the tender documents and understand all the provisions and stipulations contained therein before submitting the tender.

ii. The tender shall be submitted as per the procedures and requirements stipulated herein.

iii. Tender submitted by fax will not be accepted and will be summarily rejected.

iv. The Commercial bid should be neatly typed. Hand written offers will be rejected. Any deviation in the offer shall lead to rejection.

v. **The tenderer who are supplying imported material, must be registered with the Competent Authority/Department of the Government of India.**

vi. *The purchaser shall not be responsible for any postal delay in receipt of the offer. Any bid received by the Purchaser which does not fulfil the desired terms and conditions shall*

be rejected outrightly and no communication in this regard shall be sent. Delayed/Late bids will not be accepted, at any circumstances.

vii. *All the bids will be opened in the presence of bidders representatives, who, chose to attend the same as per the date and time specified in the Tender Document.*

viii. ***This tender is based on two-cover systems i.e. Technical bid and price bid***. *Therefore the tender shall be submitted in two parts viz. Cover A and Cover B. Each part shall be placed in an independent sealed envelope and shall be super scribed as follows*

Cover-A : "TECHNICAL BID COVER"

"**TENDER FOR SUPPLY OF _____ EQUIPMENT TO ANNAMALAI UNIVERSITY"**

TENDER NUMBER:

Cover-B : "PRICE BID COVER"

"**TENDER FOR SUPPLY OF _____ EQUIPMENT TO ANNAMALAI UNIVERSITY"**

TENDER NUMBER:

ix. The contents of each of the two covers shall be as described in the subsequent clauses. For all other references, these covers will be referred to briefly as "**Technical Bid Cover"** and **"Price Bid Cover".**

Both the covers i.e. Cover-A and Cover-B, shall be placed inside an outer cover and shall be superscribed as follows:

"**TENDER FOR SUPPLY OF _____ EQUIPMENT"**

TENDER NUMBER:

x. The sealed tender envelope shall be addressed to

The Registrar,
Annamalai University,
Annamalainagar,
Chidambaram-608 002, Tamil Nadu, India

xi. The tender envelope shall carry the name and address of the Tenderer prominently with Phone No. / email ID / and FAX No.

xii. The **Technical Bid Cover** (**Cover-A**) shall contain the following as per the sequence indicated below.

1.	Earnest Money Deposit (EMD) of as per clause-5 of the Tender document.
2.	Application form for supply of equipment as per Appendix-1
3.	Documentary evidence for payment of income tax (latest income tax return should be

	furnished)
4.	Letter of Tender as per Appendix-2
5.	Documentary evidence for registration under Tamil Nadu Value Added Tax / Central Sales Tax.
6.	Documentary evidence for ISO:9001 / equivalent certified company
7.	A copy of Manufacturing license/Registration Certificate
8.	Authorization from Manufacturer in case of Authorized Dealers/Distributors/Supplier
9.	Documentary evidence of supplying similar items to other Universities/Institutions/Govt. agencies.
10.	In addition to the above any document or certificates etc., mentioned anywhere in the tender document shall also be a part of the technical tender requirements.

xiii. The **PRICE BID COVER** (**Cover-B**) shall contain the Price Bid as per the format given in Appendix-3.

The tenderer shall not carry out any alteration in the format prescribed for Price Bid. The tenderer shall not enclose any other document or statement that will influence the price. In such an event, the tender inviting authority shall summarily reject the tender.

7.3. Signing of the Tender

The tender shall be signed by a person or persons duly authorized to sign on behalf of the Tenderer. All pages of the tender shall be signed by the person or persons signing the tender. The tenderer shall enclose a certified copy of the power of attorney authorizing the signatory or signatories to sign the tender document. This certification shall be from the Managing Director or the Legal Manager of the firm.

The tender shall contain no alterations or additions, except those to comply with instructions issued by the Tender Inviting Authority, or as necessary to correct errors made by the tenderer, in which case such corrections shall be signed by the person or persons signing the tender.

8. GENERAL TERMS AND CONDITIONS

8.1. DELIVERY SCHEDULE:

The Price Quoted should be FOR CHIDAMBARAM

i. Materials should be door delivered at Annamalai University, Annamalainagar, Chidambaram, Tamilnadu.

ii. Delivery must be made within a period of 45 days from the date of the issue of order either directly or through their dealer network unless otherwise specified.

iii. If the supplier fails to deliver the equipment ordered within the allotted delivery period as specified above, the Purchaser may procure goods or services similar to those un-delivered upon such terms and in such manner as it deems appropriate from any other firm at the risk and cost of the supplier.

8.2 PAYMENT TERMS:

i. Payment will be made within 30 days from the date of delivery, installations, commissioning and demonstration of the equipment and acceptance by concerned Department/ Section.

ii. ***Payment shall be made by Cheque or such other mode***/ electronic fund transfer offered by the Bank / by this institution.

8.3 Taxes& Duties :

i. As per Govt. Notification No.10/97-CE dated 1st March 1997, Annamalai University, Chidambaram is exempted from Excise Duty for SCIENTIFIC / TECHNICAL INSTRUMENTS WHICH ARE USED FOR RESEARCH PURPOSE ONLY. The University shall provide all the documents under this notification to enable the supplier to clear the goods without payment of excise duty, whenever required. Supplier should state clearly that this certificate is required.

ii. As per Govt. of India Notification 51/96 Customs dated 23rd July 1996, Annamalai University, Chidambaram, is exempted from Custom duty for all research equipment. The University shall provide all the documents under this notification to enable the supplier to clear the goods without payment of Custom duty, whenever required. Supplier should state clearly that this certificate is required.

iii. GST may be charged as applicable. Any statutory variation will be paid to supplier on documentary evidence. Supplier should clearly indicate the percentage of GST applicable.

iv. Clearing & forwarding charges should also be mentioned

8.4 Loss, Damage & shortage :

Annamalai University shall not be responsible for any loss, damages and shortage during transit. Payment shall be made for the material received in good condition only.

8.5 Warranty

The equipment supplied under the contract shall expected to carry a warranty for a maximum of 5 and not less than two years. Supplier shall attend free maintenance service promptly during the warranty period.

8.6 Commissioning and Demonstration

The Supplier shall be responsible for commissioning of the equipment. Supplier should also arrange for demonstration of the equipment to the Staff of the University.

8.7 Annual Maintenance

The University reserves the right to entrust Annual Maintenance of the equipment supplied under this tender to the concerned supplier. Therefore the tenderer shall mention the annual maintenance charges AMC/SMC in the price schedule. Tenderer should also give a brief write up about the services to be covered under Annual Maintenance charges quoted by him.

8.8 General:

The acceptance of the offer will rest with the Annamalai University who reserves the right to reject/accept partially or wholly the tenders received, without assigning any reason.

i. Mere submission of tender/ proposal does not imply acceptance of the same at this end and the firms will be finalised only after meeting the laid down qualifying parameters for which decision of the Tender Inviting Authority / Tender Accepting Authority shall be final and binding on the parties.
ii. Printed terms and conditions of the applicant on their quotation Form/ Literature/ Letter etc. if any, will not be binding on the University.

8.9 Liquidated Damages :

Timely delivery is essence of the contract and hence should any consignment be delayed, liquidated damages at the rate 0.5% of the value of the delayed consignment, for each week or part thereof shall be levied and recovered from the supplier subject to a maximum of 5% of the total order value.

8.10 Acceptance / Rejection:

The Tender Accepting Authority reserves the right to accept a quotation in part or in full or to reject all quotations or any of the quotations received, for non-compliance of any of

the above items, conditions or instructions or for any other reason without assigning any reason thereof.

9. TENDER OPENING PROCEDURE

9.1. TENDER OPENING

i. Tender will be opened in the presence of the tenderers or their authorized representative who choose to be present and the tender scrutiny committee at **4.00 P.M. on 29.06.2018.** The representative of tenderer who attend the tender opening must produce their **identification proof** and **authorization letter** from the companies / tenderer.

ii. In the event of the specified date of Tender opening being declared a holiday, the tenders will be opened at the same time on the next working day.

iii. **Cover-A containing "Technical Bid" shall be opened first.**

iv. On opening the tender, the details such as name of the tenderer, address, EMD details, etc., will be read out.

v. Tenders found without the EMD or with an invalid EMD or insufficient EMD, will be summarily rejected. Unopened tenders will be returned to such tenderers.

vi. On verifying the EMD, the Technical bids will be examined to decide their service suitability for the said work. Tenderers whose Technical bids are not found acceptable will be advised of the same and their sealed covers containing the respective Financial Bids will not be opened. Their EMD will also be returned to them.

vii. **Price bids of only those tenderers whose Technical bids are substantively responsive, will be opened.**

9.2. Process to be Confidential

i. Information relating to the examination, clarification, evaluation and comparison of tenders and recommendations for the award of contract shall not be disclosed to tenderers or any other persons not officially concerned with such process until the award to the successful tenderer has been announced.

ii. **Any effort by a tenderer to influence the tender accepting authority, scrutiny / evaluation committee or its members in the processing of tenders or award decisions may result in the rejection of his tender.**

9.3. Criteria for Technical Evaluation

(Evaluation of Technical Bid)

i. The tender accepting authority will determine whether the tenderer has fulfilled all the tender conditions as stipulated in the tender document and whether the tender is substantially responsive or not.

ii. A responsive tender is one which conforms to all the terms, conditions and specifications of the tender documents without material deviation or reservation. A material deviation or reservation is one:

a) Which affects in any substantial way the scope, quality or performance of the contract.

b) Which is a substantial way is inconsistent with the Tender conditions, the tender accepting authority's rights or the Tenderers obligations under the Contract, or

c) Whose rectification would affect unfairly the competitive position of other Tenderers presenting substantively responsive Tenders.

iii. Tenderers who have not fulfilled the tender conditions shall be a non-responsive tender and will not be taken up for further evaluation and Price Bid opening.

iv. To assist the examination, evaluation and comparison of Tenders, the tender accepting authority may at its discretion, ask any tenderer for clarification on his Tender. The request for clarification and the response shall be in writing or by fax but no change in the substance of the Tender shall be so sought, offered, or permitted

v. When a tender fails to be responsive, it will be rejected by the tender accepting authority and may not subsequently be made responsive by correction or addition / withdrawal of the non-conforming deviation or reservation.

9.4. Price Bid Opening and Evaluation of Price Bid

i) The Tender inviting Authority will then proceed with opening of **Cover-B,** i.e., "PRICE BID COVER" of those tenderers whose technical bid has been found substantively responsive. The opening of the "**Price Bid cover**" will be done in the presence of those tenderers or their representatives who choose to be present. The Tender Inviting Authority will inform such tenderers in advance about the acceptance of their technical tender and the date and time of opening of the "Price Bid Cover".

ii. The tender will be evaluated based on the prices offered by the tenderers for the concerned equipments.

iii. The tender who has bid the lowest evaluated price will be determined considering the following factors:-

a) the quoted price shall be corrected for arithmetical errors;

b) in cases of discrepancy between the prices quoted in words and in figures, lower of the two shall be considered;

iv. The evaluation shall include all central duties such as customs duty and central excise duty and sales tax as a part of the price, as per the details below

a) In evaluation of the price of an imported item, the price has to be determined inclusive of the customs duty;

b) In evaluation of the price of articles which are subject to excise duty, the price has to be determined inclusive of such excise duty.

c) In a tender where all the tenderers are from within the State of Tamil Nadu, or where all the tenderers are from outside the State of Tamil Nadu, the (Value Added Tax) shall be included for the evaluation of the price; and

d) In a tender where the tenderers are both from the State of Tamil Nadu as well as from outside the State of Tamil Nadu, [the Value Added Tax levied under Tamil Nadu Value Added Tax Act, 2006 (Tamil Nadu Act 32 of 2006)] shall be excluded for the evaluation of the price.)

v. Annual Maintenance charges will not be included while evaluating the tender.

10. **AWARD OF TENDER**

10.1. The award of the tender shall be made strictly in accordance with the "Tamil Nadu Transparency in Tenders Act 1998 and Rules 2000 and no deviation will be made.

10.2. Notwithstanding anything that is said herein, the Tender Accepting Authority reserves the right to accept or reject any tender or all tenders, and to cancel the tendering process and reject all tenders, at any time prior to the award of tender, without thereby incurring any liability to the affected tenderer or tenderers or any obligation to inform the affected tenderer or tenderers on the grounds for the tender accepting authority's action.

11. NOTIFICATION OF AWARD

11.1 The tenderer whose tender has been accepted will be notified by the Tender Accepting Authority, in writing.

11.2. Upon furnishing the security deposit by the successful tenderer or tenderers and upon signing the Agreement (Appendix-4), the EMD will be returned to the unsuccessful tenderer within a reasonable time period.

12. DISPUTES AND JURISDICTION:

Any legal disputes arising out of any breach of contract pertaining to this tender process shall be settled in the court of competent jurisdiction located within the **town of Chidambaram** in Tamil Nadu.

13. ACKNOWLEDGEMENT:

It is hereby acknowledged that we have gone through all the conditions mentioned above and we agree to abide by them.

Date: Signature of Tenderer
Place:

Official seal and address

Appendix-1

APPLICATION FORM FOR SUPPLY OF _____ EQUIPMENT

S.NO.	**VENDOR DETAILS**	
1	Name and Address of the Manufacturer/Firm/Vendor	
	Phone Number	
	Fax	
	E-Mail	
	Contact Person Name	
	Mobile Number	
2	Name and Address of the Local Authorized Dealer/Distributor/ Supplier	
	Phone Number	
	FAX	
	E-Mail	
	Contact Person Name	
	Mobile Number	
3	GST No / TIN No. of the Firm/Dealer (copy to be enclosed)	
4	PAN No. of the Firm / Dealer (Copy to be attached)	
5	EMD (DD No., Date & Amount and issuing Bank)	
6	Name of the University/ Government Institutes who have purchased similar equipments from your concern (attach copies)	

7. **Declaration by the tenderer.**

i.) We hereby declare that all the particulars given in this application are true and complete to the best of our knowledge and belief and we will produce all the relevant documents promptly, if necessary or as and when asked for by Annamalai University, Chidambaram. We understand that information provided by us will serve as Prequalification Criteria for supply of equipments under this tender and in the event of any information being found false or incorrect or ineligibility being detected even after the award of Contract, Our contract may be cancelled and all our claims may be forfeited by the Annamalai University, Annamalainagar. We have read and understood all the terms and conditions of the tender and we fully agree to it.

ii.) We also declare that we will not sell our products at a lesser price to other parties than those supplied to Annamalai University and in the event of happening of such situation, we will be bound to refund the difference and our contract may also be cancelled at the discretion of Annamalai University.

iii.) We also undertake that all the terms such as Product Range, Price, Discount, Delivery/other charges, Terms of Payment and also the name/s of the Dealer/ Distributor will remain unchanged during the contract period and no alteration will be done without the approval of Annamalai University.

Date :

Place :

Signature :

Name :

Designation :

Seal of the firm :

Appendix – 2

TENDER FOR SUPPLY OF ____________ EQUIPMENT TO ANNAMALAI UNIVERSITY

LETTER OF TENDER

To

The Registrar,
Annamalai University,
Annamalai Nagar,
Chidambaram – 608 002.

Sir,

Sub: Tender for Supply of _____________ Equipment.

*****

1) I / We, the undersigned do hereby tender and undertake to Supply of ___________ equipment to Annamalai University in strict accordance with and subject to the terms and conditions set forth or mentioned in the Tender documents and appendices.

2) I / We have gone through the instructions in the tender and carefully read all the conditions of tender and agree to abide by all the conditions mentioned there in.

3) I / We hereby state that I/we have remitted ________________ (Rupees … only) in the form of Demand Draft/Bankers Cheque No. ____________ Dated : _________________ drawn on ____ Bank ____ Branch, in favour of the Registrar, Annamalai University, as Earnest Money Deposit and agree to have it forfeited to the Annamalai University in case of my / our failure to supply the equipment.

4) I / We hereby certify that the price offered is final and I / We will not come forward for any revision or alteration in rates quoted subsequently due to hike in prices or any other reasons. However I/we are aware of the university's right to negotiate the discount rate while evaluating the tender.

5) I / We confirm that our Tender is in conformity with the technical specifications and commercial terms & conditions as stipulated in the Tender Document and without any deviations whatsoever. I am / We are aware that our Tender is liable for disqualification in the event of technical and commercial deviations observed by the Tender Accepting Authority at a later date during the process of evaluation of our Tender.

6) I / We further declare that the information and documents furnished in the Tender submitted by us are correct and genuine. I am / we are aware of the Tender Inviting Authority's right to forfeit

the Earnest Money Deposit and / or Security Deposit and blacklisting me / us if, any information furnished by us proved to be false at the time of inspection and not complying with the tender conditions.

7) I / We state that I / We have not been blacklisted or debarred from participating in tenders by any Central / State Government agencies or autonomous bodies or universities / institutions.

8) In the event of my / our tender becoming successful, I / We undertake and agree to forward to the Registrar, Annamalai University in ten (10) days, after the notification of the acceptance of this tender has been received by us.

9) We undertake and agree that we will not withdraw this Tender during the period that will be required for intimation of acceptance or non-acceptance as stipulated in clause 10 of the Tender document. If I / we do so withdraw, I / we shall forfeit the Earnest Money Deposit to Annamalai University. I / We agree to execute at our cost the Agreement in ten (10) days after the notification of the acceptance of our Tender has been received by us. In the event of our failing to make the Security Deposit or to execute the Agreement in the said manner, the Earnest Money Deposit accompanying this Tender shall be forfeited to the Annamalai University and this concluded Contract shall in such case be considered as having been cancelled or terminated and I / we agree to be liable, irrespective of the forfeiture aforesaid for all damages, losses, costs, charges and expenses arising from or by reason of such failure and arrangements.

As witness our hand this.....day of.....of 2018.

Signature of the Tenderer :

Name & Address :

Company Seal :

Appendix-3

PRICE BID

1	Price (Both in figure and words) in Rs.	
2	GST	%
		Amount in Rs.
Total Amount in Rs.		

Important Note:

1. The price quoted above shall be inclusive of all taxes and charge except GST.
2. GST shall be mentioned separately.
3. FOR; Destination as given in the purchase order.

Other Information to be provided:

1.	Warranty period in years
2.	Annual maintenance charges (applicable after expiry of warranty period)
3.	After First expiry year of the warranty
4.	After second year of the warranty
5.	After third year of the warranty
6.	After fourth year of the warranty
7.	After fifth year of the warranty

Signature:

Name:

Designation:

Seal of the firm:

Appendix – 4

FORMAT OF CONTRACT AGREEMENT

THIS AGREEMENT made on the ………… day of …………. 2018 between The Registrar, Annamalai University, Annamalainagar, Chidambaram – 608 002. (Herein after "the Purchaser") of the one part and …………………………….. (Name of Supplier) of ………….. (Address of the Supplier) (herein after called "the Supplier) of the other part:

WHEREAS the Purchaser is desirous of procuring _______________ equipment as per the tender reference No…………………. and has accepted a bid by the Supplier for the above said equipment price offered by the Supplier is Rs.___________________(Rupees in words …)

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Tender referred to, and they shall be deemed to form and be read and construed as part of this agreement.

2. The following documents shall be deemed to form, be read and construed as part of this Agreement, viz;

a) The letter of Acceptance issued by the purchaser.

b) The Notice Inviting Tender.

c) The supplier's bid including enclosures, appendixes, documents, Price Catalogue etc.

d) The Tender Document including various Terms and Conditions.

e) Any other document listed in the Tender document.

3. In consideration of the payments to be made by the Purchaser to the Supplier within thirty (30) days from the date of delivery and acceptance by concerned department/ section.

4. The warranty period is ___________ years.

5. The AMC/SMC for the subsequent year after the warranty period will be as follows.

After First expiry year of the warranty	
After second year of the warranty	
After third year of the warranty	
After fourth year of the warranty	
After fifth year of the warranty	

IN WITNESS whereof the parties here to have caused this Agreement to be executed in accordance with their respective laws the day and year first above written.

Signed, Sealed and Delivered by the Said …….. (For the Purchaser) in the presence of ……

Signature

Name Address

Signed, Sealed and Delivered by the Said …….. (For the Supplier) in the presence of ……

Signature

Name Address

Signed, Sealed and Delivered by the Said …….. (For the Purchaser)
in the presence of ……

Signature

Name Address

SPECIFICATIONS

Sl. No. 1: GUCC/DST-PURSE2 /Eqi-1/2018
SINGLE CRYSTAL XRD

Technical specifications for a fully automated State of the Art 4-circle Kappa single crystal X-ray diffractometer with CMOS area detector with low temperature device attachment.

Single crystal X-ray diffractometer system: An advanced floor mounted Single crystal X-ray diffractometer system (equipped with low temperature device) for small molecule single crystal data collection and structure determination of organic, inorganic and organometallic compounds with X-ray Generator, CMOS/HPAD detector, microfocus X-ray source, goniometer with other accessories and peripherals required to fully integrate the system including cooling system for crystals during the data collection, uninterrupted powder supply unit (UPS) with one hour backup and all hardware and software starting from mounting of crystal, data collection, structure determination and to the generation of crystallographic information file. All necessary integrated software for these purposes should also be provided. The system offered should be complete with all respect having the following specifications.

1	**Mounting**: Floor mounted system for dedicated use in University
2	**Sample/Detector Positioning System:** **Goniometer**: The SC-XRD system should have a fully automated four-circle appa (4-circle goniometer consisting of φ, ω, κ, and θ axes) Goniometer with various axes controlled through system computer. Recalibration of the goniometer on-site is a requirement. a) Fully automated Goniometer with axes capable of rotating both the crystal and the detector allowing for high precision. b) It is necessary that the goniometer is of a design which can be recalibrated on-site c) The detector shall be mounted on the remotely controlled, motorized track so that the distance from the sample to the detector is variable, with high accuracy. The detector to sample distance; minimum 30 mm and maximum ≥ 150 mm d) The goniometer shall be constructed in such a way that the extended directions of the axes intersect at one point, with an error not greater than 10 microns and the theta arm shall have a universal mount which is compatible with vendor"s full range of detectors. e) Vendors are also encouraged to provide a table with maximum/minimum speed, angular ranges, accuracy, and reproducibility for each of the axis.
	Video microscope and Illumination: The system must include a color video microscope to magnify the crystal, to capture screen frames and to measure and index crystal faces coupled with provided software for the required motion video. For numerical absorption correction, the software should allow the indexing of crystal faces by interactive use of video pictures or movies of the crystal investigated.

3	**X-ray Detector & Beam Optics:** **X-ray Detector:** State of the art large area X-ray detector system [Complementary Metal Oxide Sensor (CMOS) or Hybrid Pixel Array Detector (HPAD)] with no dead areas for detecting the diffracted X-rays and accurately measuring their intensities of diffraction pattern from single crystal. As the detector is the costliest and most important part of the instrument, the detector must have a warranty of 3 years irrespective of system warranty. The detector should be suitable for X-ray diffraction data collection from both Mo and Cu radiation with highest sensitivity and latest technology with 1:1 data acquisition without the taper demagnification. It should be maintenance free. Adequate cooling system should be provided for the detector. Regarding the beam optics involved relevant monochromator with all the necessary accessories/optics for use in Mo microfocus radiation with enhanced flux must be provided. (a) The active area of the large area detector should be ≥ 10 × 10 cm2 (b) Gain > 250 electron/X-ray photon for Mo Kα. (c) Should have very high signal to noise ratio with adequate cooling facility. (d) Should be able to detect or measure weak reflections more accurately. (e) The detector should be capable of shutter less data acquisition which will help in reducing data collection time.
4	**X-ray Generator:** Computer controlled, sealed X-ray generator with power output ≥ 50W, maintenance free remote controlled operation, high speed/safety shutter and fail-safe switch generator stability, alarm and functions indicator for overloading, tube current, line voltage, target cooling, adjustable maximum load capability, display of kV and mA, and adjustable through computer program. The X-ray generator must have a warranty of 3 years irrespective of system warranty. The X-ray generator must be in house designed and manufactured by the SCXRD manufacturer as mentioned earlier and it must be repairable at our site; the manufacturer of the XRD must confirm this in the quotation.
5	**X-ray Tube:** The system shall be equipped with manufacturer‟s in house designed, developed and manufactured air cooled sealed micro focus tube with a graded multi layer optics in the range of 50watts or more for Mo radiation with a minimum of 3 years of warranty (composing of tube, generator, HV Cable, tube shield and optics) not exceeding a loss of more than 20 % - 25% intensity during the warranty period while complying to the strictest safety regulations with a heavy duty X-ray safe main shutter. Details specification on Mo K Alpha micro focus source : (i) Beam Divergence (mrad) : < 5.0 (ii) Spot Size (mm) : < 0.15 (iii) Flux Density (cps / mm2) : ~ 2.0 x 109 / better
6	**Low Temperature attachment:** Diffractometer should be equipped with the low temperature device based on the use of liquid nitrogen which must be capable of maintaining a stable sample temperature of 80K – 500K. Two liquid nitrogen storage tanks (1 No of 60 L and 1 No of 125 L capacity) with auto fill accessory, pressure regulator, transfer line heater and necessary valves should be included. The system must use very low liquid Nitrogen consumption and no icing effect (formation of ice on the crystal) should be strictly ensured. One transportable liquid nitrogen container should also be included.

	Temperature Control Unit (for data collection at low temperature using of Liquid Nitrogen) **OXFORD Cryosystem 800 plus model**: The diffractometer shall be equipped with an OXFORD Cryosystem (800 plus) temperature control device based on the use of liquid nitrogen (LN2), which must be capable of maintaining a stable sample temperature of 80 to 500 K with an error not larger than ±1K over the whole temperature range with necessary attachments like drier unit, nozzle alignment tool, support stand, etc. software for remote monitoring and control of cryostream (b) Liquid nitrogen storage tanks for 125 L and 60 L capacity with auto re-fill accessory and necessary valves should be included.
7	**Environment:** (a). Operating Temperature: Approximate: 18 – 32ºC, (b). Operating Humidity: Approximate 5-80% RH.
8	**Radiation enclosure:** Fully X-ray protected enclosure as per international safety norms with certificates complying the instrument safety.
9	**Computers and Printer:** (a) Computer for offline data processing, structure determination, report generation for publication and detailed structure analysis with following main configuration. INTEL® XEON® E5-2667 v3 processor -8 cores, 3.2 GHz speed or better, 64-bit Operating System with latest windows OS (Life time validity), ~2TB HDD with 7200 rpm, ~16 GB RAM, compatible Intel mother board, NVIDIA Quadro K620 2GB Graphics, 24 x DVD RW, Full HD LED monitor 27 inch, 3 Years warranty. (b) Computer for attachment to polarizing microscope for grabbing the photos, videos, image processing and corrections with following main configuration. Intel® Xeon® E3-1240v3 (3.4GHz/4-core/8MB/80W) Processor, cache memory 6MB, 64-bit Operating System with latest windows OS (Life time validity), 08 GB RAM expandable to 16 GB, ~1TB HDD with 7200 rpm, NVIDIA 2GB Graphics, Full HD LED monitor 23 inch, 3 Years Warranty. (c) One color Laser Jet Printer
10	**Polarising microscope:** Leica / Carl Ziess Polarising optical microscope with video camera for crystal screening and image grabbing. **Polarizing Microscope and Camera:** **(a) Stereo Zoom Microscope With Rotatable Pol. Stage** i. Zoom: 1X to 8X ii. Working Distance 75 mm @ 1X objective iii. Additional Objective 2X APO (600 lines pair /mm resolution) iv. Field of View: 23 mm with 10X eyepiece v. Eyepiece 2 Nos 23 mm field of view with graticule vi. Total Magnification: 10X to 80 X with 1X objective and 20X to 160X with 2X objective vii. Transmitted light base: 20 W halogen or LED viii. Rotatable Pol. Stage: 360°rotatable, graduated with build in polarizer and analyzer. Spare glass plates 6 Nos. ix. X, Y Movement: XY stage for easy slide movement. **(b) Digital Camera**: i. 20 Mega Pixel or more, HD, USB interface ii. It should be compatible with existing Leica MZ75 iii. Suitable for live and captured images. iv. Build in basic measurement tools (micron bar)

	(c) Software: Live image builder software for video capturing and uneven rough surface (similar to multifocus). Software should capture real time and high resolution images and should allow the measurements and documentations. **Optional** **Heating Stage:** Suitable crystal heating stage ambiance to 420°with camera, programmable PC interface and recording facility for studying thermal behavior and phase transition of crystalline sample.
11	**Crystal mounting accessories:**. Goniometer heads: Suitable goniometer heads (5 Nos) should be provided for crystal mounting along with mounting pins (100 Nos). Cryo-loop: 50 cryo-loops for cryo-mounting. **Cryomounting oil**: Parabar 10312 (previously known as Paratone)– 100 ml x 10 bottles Capillary Cutting Stone: One No. (c) Capillary Sealants: Duco® Cement 29 ml × 10. (d) Red Sticky Wax 5 box vii. **Magnetic Mounts & Supports for Capillary and glass fiber mounts**: **(a)** Adjustable Crystal Mount 50 nos. **(b)** Brass Specimen Pin with Platform 200 nos.
12	**Test crystal:** One test crystal should be provided.
13	**Application software: Application software:** WINDOWS and LINUX based application software on GUI platform for instrumental control for single crystal, twins, low temperature, charged density and modulated structure. The software should be able to perform complete data acquisition, scaling, absorption correction, space group determination, structure determination, auto structure determination and final report generation for publication purpose. License software‟s for Morphology/face indexing measurement, detecting and indexing type 2 twinning should also be included. The offered data acquisition software package must be compatible with SHELX and WinGX. No public domain software is acceptable. Manufacturer must offer five licensed software (5.no) developed by them with certificates. Periodical updates of the software should be provided free of cost for a period of five years.

14	**General requirements:** **(a) Comprehensive Warrantee:** The single crystal X-ray diffractometer total system including X-ray tube, cooling systems and UPS quoted for it should be warranted for a period of 12 months from the date of installation. A 3 year Annual Maintenance Contract (AMC) after the expiry of warranty (i.e. after 1 year) should be offered free of charge. Any variation in warranty terms may lead to rejection of your tender as it has cost implications. **(b) Qualification criteria:** The data collected in the offered SXRD system must be publishable as per IUCr guidelines.

	(c) Manuals / Circuit-Diagrams and Instruction Sheets: All the manuals including circuit diagrams and instruction sheets (X-ray diffractometer system, chiller, microscope, UPS and others) must be supplied in English for the purpose of in house service engineer‟s reference. **(d) Pre-Installation requirement:** Necessary pre-installation advice, room plan, electrical requirements should be sent immediately after the placement of the order. (**e) Installation in India:** Detailed lists of Indian users for the CMOS/ HPAD based XRD quoted model. **(f) Installation, commissioning and Application Training:** Free of cost at site for minimum 10 working days for a group of scientists/technical staff/students for operating the instrument starting from the initial stages to complete structure determination/solution in three phases (At the time of installation, acquaintance and familiarity, advanced technical and application training). **(g) Safety**: The system must be fully CE compliant, including but not limited to AC with maximum X-ray safety equipped with at least two safety circuits with radiation level significantly below 1 micro-Sievert/h under measurement conditions or better. o Machinery Directive (2006/42/EC) o Electrical Equipment (2006/95/EC) o Electromagnetic compatibility (2004/108/EC) **(h) Service facility in India:** Supplier should clearly mention about their service set up in India for prompt service support along with number of service engineers specially trained on the offered system. Down-time call attendance should be within 24 hours under the period of warranty and annual maintenance. **(i) UPS for the single crystal X-ray diffractometer system:** Vendor should specify the required capacity of the three phase UPS for the system includes instrument, chillers (pump & Compressor), and computers, with one hour backup **(j) Spares:** The supplier should undertake the responsibility of spares for the next ten years after installation/discontinuation of the system/model.

Sl. No. 2: GUCC/DST-PURSE2 /Eqi-4-1/2018

TECHNICAL SPECIFICATION FOR ATOMIC ABSORPTION SPECTROPHOTOMETER

Atomic Absorption Spectrophotometer	Suitable for 220/240 V operation
Burner	With fully programmable GAS control system with 50 mm and 100 mm universal burner Air- Acetylene,Nitrous Oxide burner with Graphite Furnace Atomiser
Wavelength range	180-900nm
Wavelength accuracy	Better than +/- 0.25 nm
Resolution	Two spectral lines of Mn at 279.5 nm and 279.8 nm can be separated with the spectral band width of 0.2 nm and valley peak energy ratio less than 30%
Baseline stability	0.004A/30 min
Background correction	Quad line (Continum)/D2 background correction maximum error of 2%
Band pass	0.2,0.5 and 1.0 nm Adjustable
Light Source System	
Lamp turret	6 lamp auto aligning turret with 6 lamp power supplies (independent power supply) accommodating uncoded or data coded single or multi elements
Lamp and Current adjustment	Hollow cathode lamps with auto selection or adjustment towards particular element.Zn,Cu,Fe.Mn,Ca,Mg, B, Mo,Ni, Pb,Cd,Ar Hg, Cr,Va,Ti,Al,Be,Nb,Tu,Ce
Optical system & other parameters	
Monochrometer	Double beam, High energy, Silica coated, optical system with self calibrating Ebert monochromator /Czerny monochrometer employing full temperature compensation. Covering wavelength range 180-900 nm by use of an R955 PMT
Grating	1800 line /mm
Focal length	270 mm or better
Dispersion	Reciprocal linear dispersion 1.5 to 2,0 nm per mm
Slit width	0.1 to 2.0 nm selectable. Automatic selection of wavelength, slit width gas ratios for individual elements by software
Atomiser/Flame	Universal air- cooled burner for acetylene and nitrous oxide with chamfered slot design giving solid handling, excellent flame stability and low carbon build up burner; burner height is automatically adjustable. Facility for automatic flame ignition, flame shut down and software controlled oxidant changeover and fuel gas Full safety interlocks, including pressure sensors on both lines , power failure protection, burner interlock and flame sensor. Fuel and oxidant flow rates are software controlled.
Nebulizer	Nebulizer is made up of high strength, corrosion resistance material(Platinum iridium capillary venturi) auto burner height optimization. Fully inert nebulizer
Hydride System	For the determination of the hydride forming elements giving improved sensitivity and reduced interference. Employs the continuous floe principle for high precision and auto cleaning after each sample. Suitable for 220/240V operation

Detection and Data Processing System	
Detector	Photo Multiplier Tube (PMT) with high sensitivity and wide spectral range.
Operational software of equipment compatible to latest computer	Software should be compatible with windows of all latest versions and should be user friendly. SOP should be provided with comprehensive user manual. Automatic trouble detection system and trouble shooting methods should be provided. It should control main unit and all the accessories like auto sampler and auto dilutor and other accessories also.

Essential Accessories and other requirements	
1	Microwave Digestor (Micro processor controlled) with delivered power output of 1200 Watts and above suitable for soil, plant sample digestion
2	LENOVA All in one Computer with i7 Processor and Laser printer
3	Acetylene Gas cylinder
4	Acetylene Regulator
5	Nitrous oxide Gas cylinder
6	Nitrous oxide Regulator plus heater
7	Air Compressor
8	Fume Hood
9	All gas purification system Suitable air compressor
10	OGENERAL Split A/C 2 ton capacity
11	Standard solutions for Hallow cathode lamps mentioned above
12	15 KVA online sin wave UPS WITH 2 Hours backup. 24V system, Battery Tubular 150 AH
13	Training for two person should be provided by the company (abroad)
WARRANTY	5 years Warranty for Total instruments and Further 5 years period of AMC (FROM 6^{TH} YEAR ONWARDS)

Each point of the specification should be clearly mentioned in the quote.

Sl. No. 2: GUCC/DST-PURSE2 /Eqi-4-2/2018

TECHNICAL SPECIFICATION FOR ELECTRO CHEMICAL WORK STATION

S.No.	Name of Item	Quantity	Scope of Work
1.	Electrochemical Workstation : Potentiostat / Galvanostat	01	Supply, Installation and training for item 1 in the specification table below:

Item of specification	Specification /Essential range
Compliance Voltage	± 10 V or more
Maximum Current	± 0.25 A or more
Gain Band Width	1MHz or more
Input impedance	10^{12} Ω or better
Input Bias Current	< 10 pA
Current Ranges	±10 nA to ± 0.25 A
Scan rates	0.1 mV/s to 200 V/s
D/A converter	16 bit multi channel
Interface	USB/RS232 or other interface for PC

The system should be supplied with a software capable of performing following electrochemical techniques:

- Cyclic Voltammetry (CV)
- Linear Sweep Voltammetry
- Staircase Voltammetry
- Tafel Plot
- Chronoamperometry
- Chronocoulometry
- Differential Pulse Voltammetry
- Normal Pulse Voltammetry
- Differential Normal Pulse Voltammetry
- Square Wave Voltammetry
- AC Voltammetry
- 2nd Harmonic AC Voltammetry
- Fourier Transform AC Voltammetry
- Amperometric i-t Curve (i-t)
- Differential Pulse Amperometry
- Double Differential Pulse Amperometry
- Triple Pulse Amperometry
- Integrated Pulse Amperometric Detection
- Bulk Electrolysis with Coulometry
- Hydrodynamic Modulation Voltammetry
- Sweep-Step Functions
- Multi-Potential Steps
- AC Impedance
- Impedance - Time
- Impedance - Potential
- Chronopotentiometry
- Chronopotentiometry with Current Ramp
- Multi-Current Steps
- Potentiometric Stripping Analysis
- Electrochemical Noise Measurement
- Open Circuit Potential – Time
- Galvanostat
- RDE control (0-10V output)
- Full version of CV simulation and fitting program
- Limited version of CV simulation and fitting program
- Impedance simulation and fitting program
- iR Compensation
- External Potential Input

Essential Accessories:

1. Electrochemical Cell with glass cell of 50 ml Volume, suitable lid, Stand rod, base plate, Pt wire counter electrode, Glassy Carbon Counter Electrode with shaft, Ag/AgCl reference electrode, 2 mm dia Pt working electrode with contact pin, polishing set should be offered with the system.

2. **Desktop with following configuration:**

Operation System : Windows 10
Monitor : 23 inch, 1920 x 1080 full HD
Processor: 4th Generation, i7 with at least 3.45 GHz
RAM: 16 GB or better
Hard Disc: 500 GB or better
DVD RW Drive: Yes
USB Ports: At least 4 ports with USB 3.0
Lan Port: Yes
Graphics Card: 1 GB or better
Wired Keyboard and Mouse
UPS- Capacity: 650 VA
03 Years onsite Warranty

Sl. No.3: GUCC/DST-PURSE2 /Eqi-8/2018

TECHNICAL SPECIFICATIONS OF GDI ENGINE WITH EMISSION ANALYSER

1.1 Engine Specifications: Medhaavi brings one of the best engine for research in the area of GDI technology. Following are the specifications of the Engine.

S.No.	Description	Specification
1.	Engine Type	Gasoline
2.	Fuel System	GDI (Gasoline Direct Injection)
3.	Number of Cylinders	03
4.	Capacity	999 (cc)
5.	Compression Ratio	10:1
6.	Bore x stroke	71.9 mm x 82 mm
7.	Turbocharger	Yes (ECU Controlled)
8.	Cam Shaft Mechanism	
9.	Max Power output in PS(KW)/RPM	125(92)@6000 RPM
10.	Max. Torque	(Nm/RPM) 170@1400-4500 rpm
11.	Cooling	Water

1.2 Salient Features:

- Developed at Ford's Dunton Technical Centre in the UK
- Eco Boost Gasoline Direct-Injection turbocharged engine technology adds128 patents and patent applications to Ford's 4,618 active and thousands of pending U.S. patents.
- Multiple “International Engine of the Year” awards
- Ultra special flywheel design to ensure satisfactorily smooth running without the use of energy sapping balance shafts.
- Block: Cast Iron, Head: Aluminum
- Turbocharger (ECU Controlled) with Intercooler
- Variable Displacement Oil Pump
- Variable Valve Timing Control (Independent)
- Gasoline Direct Injection Technology
- Unique control for Injection Pressure (Angle Based)
- Smart Coils
- Electronic Throttle Control (Drive by wire)
- Wideband Lambda Sensor
- Advanced Open ECU Control

1.3 GDI Fuel System:

GDI fuel system mounted on engine, comprises of following:

- High Pressure Fuel Pump
- Fuel Rail
- Peak & Hold Injectors for Direct Injection
- **Sensors:**
  - Crank Position Sensor
  - Intake Cam Position Sensor
  - Exhaust Cam Position Sensor
  - Throttle Position Sensor (Part of ETM)
  - Driver Demand Sensor
  - Engine Temperature

- Inlet Air Temperature
- Manifold Air Pressure
- Boost Pressure Sensor
- Boost Air Temperature
- Injection Pressure Sensor
- Wideband Lambda Sensor

➢ **Actuators:**

- Peak & Hold Injectors (3 Nos.)
- Inlet Metering Valve (Angle based Control)
- Electronic Throttle Module
- Electrical Fuel Pump
- Turbo Control Valve

2. Open ECU (Medhaavi Open ECU System for GDI Engine)

Medhaavi Open ECU System comprises of following Components:

1. Open ECU Hardware - 1 No.
2. Engine Control Strategies (Firmware) – 1 No.
3. Data File – 1 No.
4. PC based Engine Control Software – 1 No.
5. Communication Cable – 1 No.
6. Wiring Harness – 1 No.
7. Fuel System – 1 Set (Part of Engine System)

2.1 Open ECU: Following are the specifications of the ECU.

S.No.	Description	Specification
1.	Model	MXD3-i7
2.	Operating Voltage	12v
3.	No. of Connectors	02
4.	No. of Pins	105 + 91 = 196
5.	Type	Open (Configurable through PC based Software)
6.	Analog Inputs	30
7.	Digital Inputs	15
8.	PWM Outputs	18
9.	Relay Outputs	4 (Low Side)
10.	H – Bridge	4
11.	Injector Driver	Solenoid (8)
12.	Communication	CAN Bus
13.	Ignition	Control Signal (+5v high)

2.2 Engine Control Strategies (Firmware):

In order the put the power ECU Hardware to use, a firmware file will be supplied along with the ECU. The file will contain the below mentioned software logics, various maps, curves & variables which can be configured. The file could be opened in the PC based Engine Control Software. At the start of project, the maps & curves will have base data to start the engine & will be further optimized during the course of project.

S.No.	Functions	Status
1.	Sensor Data Evaluation	Yes
2.	Fuel Mass Calculation (Lambda based – Open Loop)	Yes
3.	Injection Control (Timing)	Yes
4.	Angle based Fuel Pressure Control (PID)	Yes
5.	Inlet Camshaft Control (PID)	Yes
6.	Exhaust Camshaft Control (PID)	Yes
7.	Main Relay / Fuel Pump Control	Yes
8.	Identification of Individual TDCs	Yes
9.	Communication - High Speed CAN	Yes
10.	Ignition Control	Yes

Note: An ECU Software manual will also be supplied explaining the complete software logics.

2.3 PC based Engine Control Software:

PC based engine control software is used to control/tune the ECU/Engine. It is also used to log data for subsequent analysis while the engine is running. By using it and applying your knowledge of engine tuning you can prepare for the calibration effort by entering certain parameters for your specific engine. This gives you a base calibration which will save you time later when you connect to ECU.

Calibration Software installs on a PC and connects to ECU via a communication cable plugged directly into the USB port.. Main functions of the calibration software:

S.No.	Functions
1.	Selection of Measurement Channels (RPM, Fuel, Pressure etc) for online monitoring
2.	Selection of Maps, Curves, Variables.
3.	Online (+ Offline) modification ofMaps
4.	Recording of parameters for offline analysis.
5.	Calibration Preparation + Saving of file.
6.	Configuration of ECU Software as per the Engine
7.	Sensor Configuration

2.4 Communication Cable:

With this cable, PC based calibration software connects to ECU in order to facilitate data exchange.

It's a CAN dongle, one end of which connects to USB port of the laptop & other end connects to the CAN-H & CAN-L terminals of ECU communication port.

BITRATE
5-1000 kbps

TEMP RANGE
-20 - 75 °C

MESSAGES PER SECOND RECEIVE
8000 mps

2.5 Wiring Harness:

A set-up of Wiring Harness will be supplied which will be designed as per the test – bed requirements. The sensors & actuators will connect to the corresponding pins of ECU using wiring harness.

3. Dynamometer with Controller & Drive Shaft

Dynamometer System comprises mainly of following Components:

1. Eddy Current Dynamometer (Water Cooled) – 1 No.
2. Water Filter – 1 No.
3. Propeller Shaft – 1 No.
4. Guard for Propeller Shaft – 1 No.
5. Calibration Arms with PAN & Counter Weight – 1 No.
6. Standard Masses – 1 Set
7. Load Cell – 1 No.
8. Magnetic Pick-up – 1 No.
9. Dynamometer Controller – 1 No.
10. Rack – 1 No.
11. Installation Material – 1 Set

3.1 Dynamometer: DynaLac

Following are the specifications of the dynamometer:

S.No.	Description	Specification
1.	Type	Eddy Current
2.	Power & Torque	150 kW & 200 NM
3.	Cooling	Water Cooled

3.2 Water Filter:

Following are the specifications of the water filter:

S.No.	Description	Specification
1.	Location	Dyno water inlet
2.	Material	SS

3.3 Propeller Shaft:

Following are the specifications of the propeller shaft:

S.No.	Description	Specification
1.	Flange	10 mm or better, 8 hole

3.4 Guard for Propeller Shaft:

Following are the specifications:

S.No.	Description	Specification
1.	Material	MS (4 mm or more thick plate)

3.5 Calibration Arms with PAN & Counter Weight: Following are the specifications:

S.No.	Description	Specification
1.	Purpose	For dyno calibration

3.6 Set of Standard Masses: Following are the specifications:

S.No.	Description	Specification
1.	Purpose	For dyno calibration

3.7 Load Cell: Following are the specifications:

S.No.	Description	Specification
1.	Make	Sensortronics or HBM or equivalent
2.	Capacity	200 Kg

3.8 **Magnetic Pick-up:**
Following are the specifications:

S.No.	Description	Specification
1.	Type	Reluctance (with magnet for sensing) 2
2.	Connector	3 Pins

3.9 **Dynamometer Controller:**
Following are the specifications:

S.No.	Description	Specification
1.	Make	DynaLac
2.	Supply	220v AC, 50 Hz, 1-Phase
3.	Mounting	Rack Type
4.	Modes	M,N, External (Manual)
5.	Digital RPM Indication	Range: 0 -9999,
6.	Digit	LED
7.	Digital Torque Indication	Range: 0-350.0 Nm, 4 Digit LED

3.10 **Rack:**
Following are the specifications:

S.No.	Description	Specification
1.	Purpose	To accommodate the instruments

3.11 **Installation Material:** Following are the specifications:

S.No.	Description
1.	Mainly comprises of cable loom for instrumentation, conduit pipes, connectors, hardware, anchor bolts etc.

4. Motoring Provision
Motoring System mainly comprises of following Components:

1. Motor – 1 No.
2. VFD with Control Panel – 1 No.
3. Magnetic Clutch – 1 No.

4.1. Motor: Following are the specifications:

S.No.	Description	Specification
1.	Type	AC, 3-Phase , 440v
2.	Make	Siemens or CG or better
3.	Power	25 HP
4.	Speed	500 to 4000 rpm

4.2. VFD: Following are the specifications:

S.No.	Description	Specification
1.	Mode	Speed Control
2.	Make	Siemens or Toshiba or Fuji or better
3.	Control Panel	Clutch ON/OFF, Motoring Speed

4.3. Clutch: Following are the specifications:

S.No.	Description	Specification
1.	Type	Magnetic , 24V

5. Combustion Analysis System

1. **Combustion Pressure Sensor with charge amplifier**
2. **Intake Pressure Sensor with charge amplifier**
3. **Exhaust Pressure Sensor with charge amplifier**
4. **Trigger Signal**
5. **High Speed Data Acquisition System (Multichannel)**
6. **Combustion Analysis Software**

Combustion Analysis System:

For effective analysis for combustion & post processing of the data, following components will be provided:

- Combustion Pressure Sensor along with Charge Amplifier – Optrand USA
- Intake Pressure Sensor along with Charge Amplifier – Optrand USA
- Exhaust Pressure Sensor along with Charge Amplifier – Optrand USA
- Crank Trigger
- High Speed Data Acquisition Card
- Combustion Analysis Software
- Spark Pick-up Sensor for Ignition Timing

5.1 Combustion Pressure Sensor along with Charge Amplifier – Optrand USA

Benefitting from a metal coated optical fiber and ultra-high temperature glass seal, the sensor head (process connection) of Optrand's pressure sensor can be exposed for thousands of hours to high temperatures without cooling.. The sensor is located in an adapter which is mounted as close as possible to the spark plug cavity minimizing errors caused by long pressure passages found in custom built sensor/spark plug systems. By using a production spark plug, flame formation and propagation characteristics are not affected.

All three cylinders will be instrumented with Combustion Pressure Sensors

5.2 Intake Pressure Sensor along with Charge Amplifier – Optrand USA

5.3 Exhaust Pressure Sensor along with Charge Amplifier – Optrand USA

5.4 Crank Trigger

The system comes along with revolutionary "Encoder less" technology where a special target wheel is used to trigger the acquisition of combustion pressure data.

The smart software calculates the TDC through algorithms developed putting

together years of experience in combustion analysis.

5.5 High Speed Data Acquisition Card
The system deploys NI card for high speed data acquisition.

5.6 Combustion Analysis Software:

Online Monitoring (Individual Cycle / Individual Cylinder):

- Combustion Pressure Vs Crank angle
- Compression Pressure Vs Crank angle
- Combustion Temperature Vs Crank angle

6. Engine Instrumentation & Other Accessories
Engine Instrumentation & Other Accessories mainly comprises of following Components:

1. Air flow Measurement System
2. Fuel Consumption Measurement System
3. Temperature Sensors
4. Controller
5. Touch Panel
6. Safeties
7. Common Frame

6.1 Air Flow Measurement System:
Following are the specifications:

S.No.	Description	Specification
1.	Location	Fitted to Engine (In the air path)
2.	Quantity	01
3.	Type	Turbine type

6.2. Fuel Consumption measuring system:
Following are the specifications:

S.No.	Description	Specification
1.	Location	Fitted to Engine (In the fuel line)
2.	Quantity	01
3.	Sensor type	Gravity - DP sensor

6.3. **Temperature Sensors:** Following are the specifications:

S.No.	Description	Specification
1.	Exhaust Temperature	
2.	Inlet Air Temperature	
3.	Oil Temperature	
4.	Water Outlet Temperature	
5.	Fuel Temperature	
6.	Ambient Temperature	

6.4. Controller: All of the signals will be connected to the controller, which will process & display on touch panel. Following are the specifications:

S.No.	Description	Specification
1.	CPU	PLC Controler
2.	Analog Channels	Temp. in: 08, Analog in : 04,Digital in: 06, Digital Out: 04
3.	Operating Voltage	24 VDC

6.5. Touch Panel: All of the signals connected to the controller , are displayed on 7inch touch panel for easy visibility .

6.6. Safeties: Following safeties will be provided:

- Dyno Temperature Limit
- Engine Temperature Limit
- Power OFF à Engine Off
- Oil Temperature Limit
- RPM Limitation

6.7. Common Frame:

The engine & dynamometer will be mounted on a rigid common frame along with rubber mounts to dampen the vibrations.

S.No.	Topic	Description	Make	Quote Ref.No.
7	**Emission Analyser/Smoke Meter**	Smoke Meter, Gas Analyser	AVL	Engine / Vehicle analyzer with exhaust emission system, running on Diesel, biodiesel, Hybrid, Petrol, LPG, CNG.
8	**Bomb Calorimeter**	All fuels		Computerized

Sl. No.4: GUCC/DST-PURSE2 /Eqi-9/2018

TECHNICAL SPECIFICATIONS OF FLOW CAM PLANKTON IDENTIFIER

Flow cam Plankton Identifier consisting of following configurations and accessories:

1.	Main Application	:	Plankton Imaging, Identification and analysis
2.	Analysis	:	Constant Imaging, Fluorescence Triggering, Individual Particle measurement.
3.	Fluorescence	:	633 NM LASER Excitation / Appropriate for plankton research. Two Channel Fluorescence detection.
4.	Camera Configuration	:	High resolution – 1920 x 1200 and above CMOS colour camera Auto Focus, Shutters upto 120 frames per second.
5.	Fluidics	:	Computer controlled micro syringe Pump with multiple syringes of size 0.5 ml, 1.0 ml, 5.0 ml and 12.5 ml.
6.	Objectives	:	4 X, 10 X and 20 X objective kit (inclusive of respective Flow cell, Flow cell Holder, collimator as appropriate with 20X kit and auto focus beads.
7.			600uM FOV (600um x 1750um Field of View Machined Cuvette Flow Cell with Tubing)
8.	Computer & Software	:	For operation and post processing data analysis, including visual recognition and automated classification.
9.	Other essential Items	:	May be included.

Optional accessories

1. Auto sampler

2. Spare flow cells, cleaning and maintenance kit, tubing kit, beads and standards.

3. Other spares and consumables necessary for 2 years operation.

Warranty and CMC

1. One year warranty from the date of installation with one more year extended warranty

2. Two years AMC/CNC after warranty expiry

Installation and training : Free at customer cite

Shipment : FOB destination (Annamalai University)

Sl. No. 5: GUCC/DST-PURSE2 /Eqi-10/2018

TECHNICAL SPECIFICATIONS OF DIRECT METAL LASER SINTERING (DMLS) SYSTEM

Specification	Description
General Specs to meet	➢ e-Manufacturing system of latest specifications to deliver metal prototypes and Tooling using additive fabrication technique. The process should be able to sinter / melt metal powder and should be free from non metallic binders. ➢ All parts which are integral of the machine should be CE certified. Information should be clearly stated in technical bid on locally purchased items. ➢ Machine quoted should have options to upgrade both with reactive and non reactive material for currently available material and also for future materials
Size of prototype	250×250×300mm .
Technology used	Laser Sintering technology with atleast 400W Yb-Fibre laser from IPG with in built N2 generator and a supply for Argon gas.
Materials of Prototype machine can handle	Aluminium, steel materials, Titanium alloys, Nickel base alloys
Inert Gas System	-Machine should have in built N2 generator, and Argon bottles.
Mechanical properties of built material	➢ The mechanical properties of build shall be near to original material standard properties. Key properties are yield strength, UTS, % elongation, hardness, density etc ➢ Also the building method should incorporate a rotated exposure method inorder to get homogenous part property and also to avoid job crashes and errors. Degree of rotation should be mentioned in the technical document. ➢ Complete data sheet should be provided of the laser sintering part properties
Accuracy achievable	$\pm$ 20 to 50 micrometer
Safety requirements	Argon sensor and Oxygen sensor. Material default jobs should be able to predict the correct inert atmosphere
Environment and other infrastructure requirements	Air-conditioning, Dehumidifier, compressor, UPS and 99.998 Argon bottles to run reactive materials if needed. Vacuum cleaner and liquid filled Vacuum cleaner for reactive materials.
Training needs including post equipment operation	5 days of training
Technical support extent and convenience	Complete German trained Technical Support team from the manufacturer in India. To provide the resume of the support staff in india in the format provided in the tender with a copy of his certification to support the metal machines.

Essential spares	Maintenance parts needed should be provided for 2 years with the manufacturer service person to provide service every 6 months for 2 years.
Power and space	12 KW Power and space needed is 5m x 5m for complete installation
Laser Warranty	At least 2 years from the supplier
Minimum Layer thickness	20-50 microns
Minimum wall thickness possible	0.3 to 0.4 mm
Software Features	Since metal parts needs support beyond a certain angle different supporting methods like Angle support, Gap support , Volume support and teeth support are needed for freedom of part orientation and production to build every kind of geometry and for faster data preparation. All these supports details and advantages should be demonstrated during the technical evaluations Also the data software should have the following informations which should be demonstrated by the vendor during technical evaluation. Cuculation of time – Build platform position- collector position – platform temperature – Exposure area- recoating time- Oxygen concentration- Argon hold / fill details- laser status – laser position monitoring- machine maintenance status- scanner referencing position and repeatability – report all changes during job for QA- Mileage counter of recoater axis- job quality report- part quality report- also in case of errors / warnings , identification of which parts could be affected should be indicated- provide statistical reports on errors and material changes. The process software should be able to have the following -Laser Power Monitoring system to check the laser power for every nth layer and reporting option of the laser quality via a QC software -Reference point calibration for building on performs. All these software features and advantages should be demonstrated by the vendor to the technical committee during technical evaluation.
Manufacturer's credentials	-Own office in India atleast for 5 years -Should have atleast 5 metal machines of the same model installed in India with reference to be provided -Support for this model available in India -Stock of the spares in India. stock list to be attached -Technical Helpline Support in India to be mentioned -Should provide the credentials of the installed machines from the customers

OEM / vendor credentials	The OEM should be a company which provides the total solution by having R&D , Development and Production of system, software, materials, process and Quality controls. -Machine supplied should have factory certificate issued as per ISO 9001 standards . sample factory certificate should be attached with the technical bid. -manufacturer should be able to provide test reports of materials processed on atleast 40 consecutively produced metal machines on the mechanical properties like modulus of elasticity , yield strength, Tensile strength, elongation at break and density of the core. Sample report to be attached with the technical bid. Mill test certificates duly signed by the vendor should be attached for the powders supplied along with the machine. Sample Mill test certificate should be attached with the technical bid
Productivity feature	- The machine should have an option where within the same layer itself it should intelligently switch from a smaller focus to a larger focus area based on the geometry in order to provide high quality parts in faster time.
Usage of 3rd party material options	The vendor should supply the necessary R&D open source code software license which can be readily used to develop parameters for 3rd materials and this open source code license acts as a platform for 3rd party materials usage of the machine. • Support of different layer thicknesses of already made available. • Suitable for a wide range of materials which are able to be laser-sintered • Equipped with multiple proved exposure strategies • Optional single or double exposures of contours as well as of edges

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