

INDIAN INSTITUTE OF TECHNOLOGY GOA

At Goa Engineering College Campus

Farmagudi, Ponda, Goa 403401

E-mail: purchase@iitgoa.ac.in

GSTIN: 30AABAI1653D1ZF

PAN: AABAI1653D

TAN: BLRI08261B

Enquiry No: IITGOA/2019-20/028

Date: 28/10/2019

IIT Goa invites sealed quotations in two bid form for the supply of below mentioned item.

Sl. No.	Description of Item	Qty
1	Engine Test Setup Variable Comp Ratio (Detailed Specifications Attached)	01 No.

Terms and conditions:

1. Quotation must be valid for at least 90 days.
2. The GSTIN should invariably be mentioned in your offer.
3. Kindly attach a compliance certificate along with the technical quote.
4. Prices:
 - I) **For Import Supplies:**
 - a) It is mandatory to quote prices in FOB basis only.
 - b) In case of multiple options of same product, bidders are requested to quote only one best option and not multiple options.
 - c) Payment terms: 90% payment by letter of credit and balance 10% will be paid by wire transfer after satisfactory installation and commissioning.
 - II) **For Indigenous Supplies:**
 - a) In case of multiple options of same product, bidders are requested to quote only one best option and not multiple options.
 - b) Payment terms: Within 30 days after the delivery and installation of the item at IIT GOA.
5. Delivery and installation should be made within 6 weeks of getting a confirmed order.
6. The suppliers shall provide the banking details along with their quote on their letterhead duly signed and stamped.

7. Quotations shall be submitted in two parts;
 - 1) **Part – I (Technical)** should contain all the technical details and specification of the product. It should contain unpriced bid along with terms and conditions, compliance certificates, proprietary certificates (if applicable), any other certificates/details etc. This envelope should be marked as “Technical Bid”
 - 2) **Part -II (Financial)** The financial bid of the above item should be in a sealed envelope marked as “Financial Bid” and should contain financial terms and conditions.
8. For any clarification, you may kindly contact Dr. Anirudha Ambekar (E-mail: anirudha@iitgoa.ac.in and Stores & Purchase Department (email: purchase@iitgoa.ac.in) till 08/11/2019.
9. All sealed quotations must reach to the Assistant Registrar (Stores & Purchase), IIT Goa, at Goa College of Engineering Campus, Farmagudi, Ponda, Goa, 403 401 by 17.00 Hrs on or before 18/11/2019.

Sd/-
Asst. Registrar (S&P)

Specifications for Computerized Engine Test Rig – I

Pre-Qualification Criteria:

The Vendor needs to meet all the following pre-qualification criteria and other requirements in order for their technical bids to be considered.

1. The vendor should represent a reputed international company with at least 5 supplies of similar equipment to CFTIs, IITs, IISERs and other Govt. of India organizations.
2. Vendor must attach a reference list of supplies in last 5 years with contact details (Name, Phone, email address) of at least 5 users. Additionally, the vendors should submit copies of suitable documents in support of their reputation, credentials and past performance.
3. The vendor must be the original equipment manufacturer (OEM)/authorized dealer/sole distributor of the item, the certificate to this effect should be attached.
4. An undertaking from the Original Equipment Manufacturer (OEM) is required stating that they would facilitate the vendor on a regular basis with technology/product updates and extend support for the warranty.
5. The original catalogue/brochure or official letter giving full technical details should be included with the technical bid to verify the specifications quoted in the tender.
6. The manufacturer of the item must be an ISO 9001 company certificates must be attached.
7. Non-compliance of tender terms, non-submission of required documents, lack of clarity of the specifications, contradiction between vendor specifications and supporting documents, furnishing of wrong/ambiguous information in the compliance statement etc. may lead to rejection of the bid and blacklisting of the vendor.

Other requirements:

1. Warranty:
 - a. The complete instrument and accessories excluding consumables should be under warranty for a period of three years from the date of installation.
 - b. In case of breakdown during the warranty period, service engineer of the vendor should make as many visits as are necessary to rectify the problem and replace the faulty parts. Vendor should provide all spares required for making the instrument operational.
2. Maintenance and Repair:
 - a. Vendor should be easily accessible and available on demand within 24 hours of any problem in the instrument.
 - b. One compulsory visit per year for maintenance must be included apart from the installation visit.
 - c. Annual Maintenance Contract (AMC): Financial involvement for two years on site AMC after the expiry of warranty period should be provided.
3. Installation and Training:
 - a. Vendor should provide training on operation and application for each of the equipment mentioned in the tender at IIT Goa after installation. The training event needs to be performed once a year for three years.
4. Spares: The vendor of the instrument must confirm in writing that the spares for the entire instrument will be available for a period of at least ten years after the installation of the instrument.
5. Manual: One set of operating manual and service manual (in English) should be provided with the instrument. The manual should be presented in both, hard and soft copy.
6. Company traceable Certificate (Vendor's working standard of company) must be provided.

Technical Specifications:

Engine type	Computerized, 1- cylinder, 4-stroke, variable compression ratio, multi-fuel, including EGR
Starting	Electric motor starter
Mounting	Sturdy base frame with provision for relocation of the setup
Displacement	400 to 700 cc
Power Output	3 to 5 kW at approximately 1500 to 2000 RPM,
Fuel type	Diesel, petrol, ethanol, biofuels, convertible to use gaseous fuels (optional)
Injectors	Port fuel injector as well as direct injector. Solenoid type.
Dynamometer	Eddy current type with capacity matching the engine. Water/ air cooled
Fuel system	Fuel tank with glass fuel level indicator and automatic fuel metering
Air system	Air box with air flow transmitter
Exhaust system	Shell in tube exhaust gas calorimeter with rotameter
EGR system	Electronically controlled EGR valve. EGR cooler (optional)
VCR	Compression ratio should be variable approximately from 5 to 20.
Engine cooling	Pumped water engine cooling system with rotameter
Control	<p>Open ECU system capable of real time sensor measurement and actuator control must be included. The ECU should provide following functions...</p> <ol style="list-style-type: none"> 1. Optimization of engine performance with various fuels and operating conditions. 2. Engine control during idling and operation. dwell time control, and electronic throttle control. 3. Setting the start and end crank angle for pilot and main fuel injector as well as angle for spark initiation. 4. It should allow multiple injections. 5. Setting the injection time and injection pressure. 6. Setting the EGR flow.
Sensors	<ol style="list-style-type: none"> 1. Non-contact RPM sensor 2. Crankshaft and Camshaft position sensor (Crank angle sensor/encoder should have a 1° resolution with TDC pulse). 3. Sensors for mass flow rate of air and fuel. 4. sensor and sensors for and pressure. 5. The injector pressure, inlet manifold, combustion, and exhaust pressure should be measured with piezo sensors having accuracy $\pm 1\%$ FSO or better. 6. Temperature sensors (thermocouples/ RTD) and appropriate signal conditioner for measuring manifold temperature and exhaust gas calorimeter temperatures. 7. Dynamometer load sensor (strain gauge and transmitter). 8. Smoke meter with a range of 0 to 10 FSN (filter smoke number), detection

	<p>limit of 0.002 FSN or 0.02 mg/m³, and resolution of 0.001 FSN or 0.01 mg/m³.</p> <p>9. Exhaust gas analyzer to measures five gases including hydrocarbons (HC), carbon monoxide (CO), carbon dioxide (CO₂), oxygen (O₂), and oxides of nitrogen (NO_x) for both diesel & petrol application</p> <p>All sensors must be provided with a calibration certificate.</p>
Other features	<ol style="list-style-type: none"> 1. Upgradation to supercharged operation (optional) 2. Multi-fuel operation should not need changing the engine head or any disassembly. 3. Panel/ console made of corrosion resistant materials. 4. Engine performance analysis software and combustion analysis software. 5. DAQ Sampling at approximately 200 kHz, appropriately interfaced with the computer for live monitoring, storage, and processing of data.
Teaching tools	<p>The setup should facilitate the following engine performance and combustion studies</p> <ol style="list-style-type: none"> 1. Measurement of indicated power, break power and friction power 2. Measurement of specific fuel consumption and break-specific fuel consumption 3. Measurement of volumetric, mechanical, and thermal efficiency 4. Plotting the PV and P-θ diagrams