

# INDIAN INSTITUTE OF TECHNOLOGY GOA

At Goa Engineering College Campus

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**Enquiry No: IITGOA/2018-19/054**

**Date: 26/12/2018**

IIT Goa invites sealed quotations in two bid format for the supply of below mentioned items;

Sl. No.	Description of Items	Qty
1	<b>PC based Modular Servomotor workstation with pendulum modules</b> (Detailed Specifications Attached)	04 Nos.

## 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. Supplier should provide free delivery and installation at IIT Goa.
5. The Bidder must be an Original Equipment Manufacturer (OEM) or his Authorized Dealer/Authorized Distributor/ Authorized Stockist/ Channel Partner having a Direct Purchase and Support agreement with the OEM. In case, if the Bidder is a Dealer/Distributor, a valid LETTER OF AUTHORIZATION from the Original Equipment Manufacturer for Dealership should be produced.
6. The Average Annual Turnover of the Bidder for the last three years should be at least Rs.25 lacs. (Rupees Twenty-Five lacs). A Printed copy of the Annual Accounts duly audited and certified by the Chartered Accountants must be enclosed with the technical bid.
7. The Bidder should provide a list of customers of previous supply of a similar/ same range of equipment to IIT's / NIT's / Universities with contact details. Copies of orders received from the reputed firms on bidding firm need to be submitted.
8. The Bidder should furnish Minimum 5 satisfactory performance certificate from the parties concerned to whom supplies were affected in case such supplies were made.
9. The Successful bidder shall provide Min 1 Years warranty after the completion of installation.
10. The bidder should produce the Certificate of incorporation of the organization

11. Certificate/Undertaking on the letterhead of the Company to the effect that the bidder/Manufacturer had not been blacklisted anywhere in India or abroad by any organization.
12. The bidder should have ISO 9000 certification.
13. Prices should be quoted in Indian Rupees inclusive of any shipping/transportation charges.
14. Delivery and installation must be made within 6-8 weeks of getting a confirmed order.
15. Payment: Within 30 days after the delivery and successful installation.
16. The suppliers shall provide the banking details along with their quote on their letterhead duly signed and stamped.
17. IIT Goa reserves the right to accept and/or reject any/all bids without assigning any reason.
18. For any clarification, you may kindly contact Dr. Sheron Figarado (e-mail: [sheron@iitgoa.ac.in](mailto:sheron@iitgoa.ac.in)) and Stores & Purchase Department (email: [purchase@iitgoa.ac.in](mailto:purchase@iitgoa.ac.in)) till 14/01/2019.
19. 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), other certificates 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.
- 20) All sealed quotations must reach to the Assistant Registrar (Stores & Purchase), IIT Goa, at Goa College of Engineering Campus, Farmagudi, Ponda - Goa by 17:00 Hrs on or before 16<sup>th</sup> January, 2019.

Sd/-

Asst. Registrar (S&P)

## **Specifications for PC based Modular Servomotor workstation with pendulum modules**

PC based Modular Servomotor workstation is expected to help the user to perform rotary pendulum experiments and DC motor position and speed control experiments allowing to learn practical control aspects from introductory to advanced levels. It should be fully compatible with MATLAB/Simulink. A detailed course material, connecting the laboratory experiments with the classical and advanced control theory is expected to be supplied along with the system. The control is expected to be done through a computer using MATLAB interface.

### **Scope of supply**

Servomotor module, inertial load for the DC servomotor, rigid pendulum modules with different lengths attachable to servomotor, analog interface (amplifiers and signal conditioning for sensors etc) and data acquisition system, software compatible to MATLAB, connecting cables, Power supply units for motor, amplifiers and DAQ, Manuals, Detailed Course materials including sample Simulink files.

### **List of Experiments**

#### **DC motor speed experiments**

Study of dynamic model of DC motor : Modelling by physics, Second-Order System response

Speed control of DC motor: Proportional, PI control

Position control of DC motor: Proportional, PI control, Minor loop control with position and speed feedback.

#### **Pendulum Module experiments**

Pendulum Modelling, Classical PID control, Swing up control

### **Necessary Features**

- Should be Direct-drive brushed DC motor
- Table top/ compact unit for portability: setup should weigh less than 2 kg.
- Low power motor : Power > 5W and less than 40W
- DC motor supply voltage : 24V or less
- DC motor speed: 4500 rpm or less.
- Power supply connection to AC mains should be rated for 230V,50Hz.
- Highest motor dimension: less than 30cm.
- Should have high resolution feedback signal (e.g:-optical encoder) for measuring speed and position. Resolution: 1 degree or better.
- Maximum Pendulum length: less than 20cm.

- More than one pendulum length links should be provided.
- PWM amplifier with suitable rating and current sensing for the given DC motor.
- Real-time control interface software Fully compatible with MATLAB®/Simulink®: Full compatibility for Simulink® external mode, including scopes, floating scopes, displays, to workspace, online parameter tuning, etc.
- Software interface should allow open architecture design, such that users are able to design their own controllers, not just preset controllers.
- PC connectivity: USB 2.0 or higher.
- OS compatibility: Windows 10
- Fully documentation for system model and parameters should be available for MATLAB®/Simulink® to enable comparative study by simulation and experiment.
- Hardware and Software interface should support networking mode to allow the set up to be configured as a remote laboratory experimental set-up, and IoT applications.

#### Desirable features

- Separate encoders for the pendulum links for better control.
- Fully compatible with LabVIEW™
- Support for model referencing, allowing modular object-oriented model design and incremental compilation and linking for accelerating the development of large models
- Ability to interface controllers with MATLAB GUIs, LabVIEW panels, Java GUIs, c/C++ etc.
- Native support of TCP/IP, UDP, serial, shared memory, named pipes, SPI, I2C, CAN, ARCNET and other protocols
- Support for MATLAB running on Linux based PCs.