

NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA-136119

No. EED/2019/6232/1359

Dated: 13/02/19

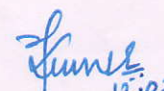
M/s Institute Website

Sub: INVITATION OF QUOTATIONS FOR MAGNETIC LEVITATION AND COUPLED TANK SYSTEM

1. You are invited to submit your most competitive quotation for the following goods:

Sr. No.	Brief Description & Specifications of Goods	Quantity	Delivery period
1.	Magnetic Levitation	01 No.	02 weeks or up to
2.	Coupled Tank System	01 No.	15.03.2019 whichever is earlier

- Necessary literature of the goods may please be sent to facilitate to take decision.
- Payment will be made Online through RTGS/NEFT within 30 days after receipt of material in good condition and according to specifications and installation of the same. The Bank detail for making online payment may be indicated in the quotation.
- The supplier shall deposit Earnest Money along with the Quotation amounting to Rs. 45000 /- in shape of Accounts Payee Demand Draft/Fixed Deposit Receipt/Bankers Cheque or Bank Guarantee from any scheduled commercial Bank in favour of the Director, National Institute of Technology, Kurukshetra. The Quotations without Earnest Money shall be rejected, the EMD will remain valid for a period of 45 days beyond the final validity period of quotation.
- Performance Security @ 5% of the total value of the equipment must be furnished in shape of Demand Draft/Fixed Deposit Receipt or Bank Guarantee from any scheduled Commercial Bank in favour of the Director, NIT Kurukshetra valid up to 60 days after the date of completion of warranty by the successful bidder.
- The items must be supplied within delivery period or delivery period extended by the Institute on the request of the supplier on genuine grounds otherwise the penalty for delayed period @ 0.5% of the amount shall be charged for every week or part thereof and the maximum 10%. The request for extension of delivery period (if any) must be made before the last date of supply as per P.O.
- Vide Notification No.45/2017-Union Territory Tax (Rate) and 47/2017- Integrated Tax Rate dated 14.11.2017 issued by the GoI Ministry of Finance, Department of Revenue towards exemption of GST, NIT Kurukshetra is eligible to get concessional GST (i.e. 5% in all cases) for the items which are supposed to be used in research activities of the Institute.
- The quotation should remain valid for a period not less than 90 days from the date of submission.
- The firm must have got GST No. printed on their quotation
- The right of accepting or rejecting any quotation and to cancel the bidding process and reject all quotations without assigning any reason is reserved with the Institute.
- The supplier must attach copies of two latest purchase orders (preferably from IITs/NITs) indicating the price for the equipment.
- The due date for receipt of quotation is 26.02.2019 and will be opened on next working day at 10:00 AM. Please quote on the top of the envelope our Ref. No. and due date of opening.


13.02.19
Prof-Incharge (Stores)

1. Magnetic Levitation System

Objective:

The MAGLEV plant is an electromagnetic suspension system acting on a solid one-inch steel ball. It mainly consists of an electromagnet, located at the upper part of the apparatus, capable of lifting from its pedestal and sustaining in free space the steel ball. The challenge of the present laboratory is to levitate a one-inch solid steel ball in air from the pedestal using an electromagnet. The control system should maintain the ball stabilized in mid-air and track the ball position to a desired trajectory.

Students Benefits:

The Magnetic Levitation system is a classic electro-mechanical experiment with interesting nonlinear dynamics and control challenges. During the course of this experiment, students will become familiar with the design and pole placement tuning of both PI current controller and PIV-plus-feed-forward ball position controller.

Technical Specifications:

Device mass	3.8 kg
Dimensions – H × W × L	15.1 cm × 15.1 cm × 27.6 cm
Ball position sensor sensitivity	0.28 cm/V
Coil inductance	412.5 mH
Coil resistance	10 Ω
Number of turns in the coil wire (approximate)	2450
Coil length	8.25 cm
Coil steel core radius	0.8 cm
Electromagnet force constant	$6.53 \times 10^{-5} \text{ N.m}^2/\text{A}^2$
Steel ball radius	1.27 cm
Steel ball travel	1.4 cm
Magnetic permeability constant	$4\pi \times 10^{-7} \text{ H/m}$

Features:

- One degree of freedom (1 DOF) - ball levitates vertically up and down
- Electromagnet made up of a solenoid coil and steel core
- Photo-sensitive ball position sensor
- Ball position sensor can be calibrated (using gain and offset knobs) according to lighting conditions
- Analog coil current sensor, Easy-connect cable and connectors
- Fully compatible with MATLAB®/Simulink®
- Fully documented system model and parameters provided for MATLAB®/Simulink® and Maple™
- Open architecture design, allows users to design their own controller

Workstation:

- Magnetic Levitation Plant, 2 Channel Data Acquisition
- Linear Voltage Controlled power Amplifier
- Real-Time control software for Matlab/Simulink
- ABET aligned curriculum with Instructor and students manual

Special requirement

- Nonlinear modelling of the system using differential equations in MATLAB Simulink and with details in soft and hard copy of manuals
- Provision to replace the controller (provided with the set-up) with some different linear/ nonlinear controllers

Warranty: 1 year

2. Coupled Tank system

Objective: The Coupled Tanks system is a process control experiment ideal for teaching and research of control topics related to liquid level control.

Students Benefits:

The Coupled Tanks system is a re-configurable process control experiment that enables students to perform a wide array of modelling and control-related laboratories.

Technical Specifications:

Device mass	6.6 kg
Dimensions (H x W x L)	30.5 cm x 30.5 cm x 91.5 cm
Pump flow constant	$3.3 \text{ cm}^3/(\text{V}\cdot\text{s})$
Pump Max Continuous Voltage	12V
Pressure sensor sensitivity	6.1 cm/V
Pressure sensor range	0 to 6.89 kPa
Tank height	30 cm
Tank inside diameter	4.45 cm
Small outflow orifice diameter	0.32 cm
Medium outflow orifice diameter	0.48 cm
Large outflow orifice diameter	0.56 cm

Features:

- Two tanks and single pump design; overall frame constructed from solid Plexiglas
- Pressure / level sensors on each tank
- Re-configurable water flow pump and tanks
- Drain tap allows water from top tank to pour directly into basin
- Three sizes for outflow orifices supplied (small, medium, and large)
- Pressure sensors can be calibrated (using gain and offset knobs)
- Fully compatible with MATLAB®/Simulink®
- Easy-connect cable and connectors
- Fully documented system model and parameters provided for MATLAB®/Simulink®, and Maple™
- Open architecture design, allows users to design their own controller

Workstation:

- Couple tank plant
- 2 Channel Data Acquisition
- Linear Voltage Controlled power Amplifier
- Real-Time control software for Matlab/Simulink
- ABET aligned curriculum with Instructor and students manual

Special requirement

- Nonlinear modelling of the system using differential equations in MATLAB Simulink and with details in soft and hard copy of manuals
- Provision to replace the controller (provided with the set-up) with some different linear/ nonlinear controllers

Warrantee: 1 year