

भारतीय प्रौद्योगिकी संस्थान धारवाड

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INDIAN INSTITUTE OF TECHNOLOGY DHARWAD



॥ सा विद्या या विमुक्तये ॥

भारतीय प्रौद्योगिकी संस्थान धारवाड

Indian Institute of Technology Dharwad

**TENDER DOCUMENT FOR SUPPLY & INSTALLATION OF
EQUIPMENTS FOR SOLID MECHANICS LAB & KINEMATICS
AND DYNAMICS OF MACHINERY LAB AS PER ANNEXURE-1**

Tender No. IITDh/GA/ME/025/2018-2019

**SUPPLY & INSTALLATION OF EQUIPMENTS FOR SOLID MECHANICS LAB & KINEMATICS
AND DYNAMICS OF MACHINERY LAB AS PER ANNEXURE-1**

- | | | |
|---|---|--|
| 1 | Last Date and Time for Submission of Tender | : 22/11/2018 & 12.00 hrs |
| 2 | Opening of Technical Bid | : 22/11/2018 at 14.00 hrs |
| 3 | Address for submission of bid documents | : The Assistant Registrar
Indian Institute of Technology Dharwad
Next to Dharwad High court, Dharwad
Karnataka – 580011 |
| 4 | Venue for opening of Technical Bid | : Same as above |
| 5 | Time of completion of Work | : 16 weeks from the date of issue of purchase Order |
| 6 | EMD | : Rs.2,00,000.00 |

Tender Notice for SUPPLY & INSTALLATION OF EQUIPMENTS FOR SOLID MECHANICS LAB & KINEMATICS AND DYNAMICS OF MACHINERY LAB AS PER ANNEXURE-1

Indian Institute of Technology Dharwad invites sealed tenders (under two bid system) from original Manufacturer/authorized Dealer for procurement of **SUPPLY & INSTALLATION OF EQUIPMENTS FOR SOLID MECHANICS LAB & KINEMATICS AND DYNAMICS OF MACHINERY LAB AS PER ANNEXURE-1** as per the Terms and Conditions & Specification given in the schedule annexed to the tender hereto.

Detailed tender notice can be downloaded from the website of the Institute at: www.iitdh.ac.in/announcements/tenders.

Approximate requirement of the item as per the specification enclosed at Annexure-1

SI No.	Particulars of the item	Requirement
1	SUPPLY & INSTALLATION OF EQUIPMENTS FOR SOLID MECHANICS LAB & KINEMATICS AND DYNAMICS OF MACHINERY LAB AS PER ANNEXURE-1	In the list appended

Time schedule for various bid related events:

SI No.	Event	Time and Date
1	Last date of submission of tender	12.00 hrs & 22/11/2018
2	Opening of Technical Bid	14.00 hrs & 22/11/2018
3	Schedule for opening of Commercial Bid will be intimated to the shortlisted bidders by e-mail after evaluation of the Technical Bid.	

Presence of the bidder or his/her authorized representative at the time of opening of the Commercial bid is preferable.

The right to suspend the tender process or part of the process, to accept or reject any or all the tenders at any stage of the process and/or to modify the process or any part thereof at any time without assigning any reason thereto vests with IIT Dharwad without any obligation or liability whatsoever.

Following is the procedure for submission of Tender and other important conditions to be fulfilled by the tenderer. Every page containing the said procedure for submission of tender and other important conditions are to be signed by the tenderer and to be submitted along with their Technical bids towards their acknowledgement that they have gone through all the contents in these pages and in the schedules as well and they are agreeing to comply.

TWO BID SYSTEM:

The offer/bids are to be submitted under a two bid system, namely (i) Technical Bid and (ii) Commercial Bid. The Technical Bid must contain all the details as specified in the schedules along with the terms and conditions whereas Commercial Bid must indicate rate only. THERE MUST NOT BE ANY PRICE ELEMENT IN THE TECHNICAL BID. If found, the bid is liable to be rejected.

SEALING & MARKING OF BID:

The tender should be submitted in a proper manner with index for easy identification i.e.:

Envelope Number	To be Super scribed as
A	E M D for Tender
B	Technical Bid
C	Commercial Bid

Envelope – A (duly sealed): should contain the Demand Draft towards Earnest Money Deposit. **Envelope – B (duly sealed):** should contain the documents as listed under Technical Bid below. **Envelope – C (duly sealed):** should contain the document as listed under Commercial Bid below.

All the above three envelopes should clearly be marked on top of envelopes about type of envelopes (i.e., A, B, & C), details of contents in envelopes, name of agency submitting the bid.

The envelopes (A, B & C) including the bigger envelopes shall be addressed to:

**The Assistant Registrar
Indian Institute of Technology Dharwad
Off Pune Bengaluru Highway (AH 48)
Next to Dharwad High Court
Dharwad - 580011, Karnataka**

The bigger envelopes must be sealed and must bear the following identification on top:

- a) **“Tender for SUPPLY & INSTALLATION OF EQUIPMENTS FOR SOLID MECHANICS LAB & KINEMATICS AND DYNAMICS OF MACHINERY LAB AS PER ANNEXURE-1”.**
- b) Tender Number: _____ Date: _____, and
- c) Name and Address of the Bidder. (on bottom left of the envelopes)

If the outer envelope is not sealed and marked as above, the Institute will assume no responsibility for the misplacement or premature opening of Bid.

SUBMISSION OF TENDER:

The tender can be personally dropped in the box to be kept in on all working days (except Saturday, Sunday & Holidays) between 10.00 am and 1.00 pm in the forenoon and 3.00 pm and 5.00 pm in the afternoon session on or before the date and time as specified in the Tender Notice. The tender can also be sent by register post to “The Assistant Registrar, IIT Dharwad, Off Pune Bengaluru Highway (AH 48), Next to Dharwad High court, Dharwad - 580011, Karnataka. Tender shall not be received after expiry of the time as specified on the 1st page of the tender notice.

EARNEST MONEY DEPOSIT (EMD):

Rs. 2,00,000/- (Rupees Two Lakh only) in the form of a Demand Draft drawn in favour of “Dean, IIT Dharwad” and payable at any nationalized bank at Dharwad. Photocopy / Fax copy of the demand draft will not be accepted.

Any tender without EMD would be considered as **“DISQUALIFIED”** and hence would be **REJECTED**.

RETURN OF EMD:

- The EMD of the bidders will be returned to them without any interest on receipt of written request from them within thirty days after awarding the contract to the successful bidders.
- The EMD of successful bidders will be released only after submission of Performance Bank Guarantee.

FORFEITURE OF EMD:

After receiving the Purchase Order, if the Manufacturer is unable to execute the order satisfactorily, the Earnest Money Deposit will be forfeited and the Institute will be constrained to take necessary action against the Agency.

REJECTION OF TENDER:

In the event of the following, the Technical Bid of a tenderer will not be considered at all and will in fact be summarily rejected and all the documents will be returned on a subsequent date as would be found suitable by the Committee –

- a) If the Demand Draft towards payment of EMD is not put separately in the bigger envelopes as instructed; and/or
- b) If it is to be presumed that the Demand Draft towards EMD is kept inside the sealed envelopes containing Technical Bid/Commercial Bid; and/or
- c) If the Demand Draft towards EMD is not valid and acceptable; and/or
- d) If without breaking seal of the other envelopes it cannot be detected which envelopes contains Technical Bid.

On verifying each and every point as mentioned above, the Technical bid will be opened to examine all the documents and to decide on all related aspects as per Institutes specification and requirements.

Technical BID:

The bidder must submit the following documents/information with the Technical Bid:

1. 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 enclosed.
2. The **Average Annual Turnover** of the Bidder for the last three years should be at least **Rs.10 Cr.** (Rupees Ten crores). A Printed copy of the Annual Accounts duly audited and certified by the Chartered Accountants must be enclosed with the technical bid.
3. Similar make machines should have been supplied in Premium educational institutions preferably in other IIT's and Public sector undertakings or large Industries. Bidder has to provide at least 10 or more of such customer references and users. The Bidder should provide a list of customers with contact details from IIT's/NIT's/IISc/Other Central Govt. Reputed National Organisations to whom similar/same range of equipment is supplied previously. Copies of orders received from these reputed firms on the bidding firm need to be submitted.
4. The Bidder should furnish Minimum 3 satisfactory performance certificates from the parties concerned to whom supplies were affected.
5. The Successful bidder shall provide Min. 5 Years warranty after the completion of installation.
6. The bidder should produce the Certificate of incorporation of the organization.
7. A Certificate/Undertaking on the letter head of the Company to the effect that the bidder/ Manufacturer had not been blacklisted anywhere in India or abroad by any organization.
8. They should provide convincing evidence that equipment in the bid is capable of performing the experiments that might have been specified. The evidence could be in terms of manuals or videos. Any other technical specifications should be supported with documents like drawings and catalogues.
9. The bidder should have a ISO 9000 series certification.

CRITERIA FOR QUALIFICATION IN THE TECHNICAL BID

- The tenderer must submit above documents including Annexure-2, if any, duly attested by them with signature and seal of the firm on each page of every document. In the event of non-receipt of any of the above documents with the Technical Bid, tenderer will be disqualified from the process. Any paper relating to the above documents will not be received during the Technical Bid meeting. Further, any separate correspondence in the matter shall also not be entertained.
- During evaluation of the Technical Bid, the Committee as would be constituted for the purpose will scrutinize the documents mentioned above and may forward any or all the documents to the concerned authorities for verification and authentication. In case of any document(s) as submitted by the tenderer found/reported to be fake, the tenderer will be out of the tendering process besides any legal action that may be initiated against the tenderer, as per rules. Further, the Committee **may visit the factory site** of the Manufacturer to inspect and assess the capability etc.
- Besides, scrutinizing the documents submitted with the Technical Bid, the tenderer may be interviewed by the Committee to assess the eligibility, capability, and suitability of the tenderer. As such, the presence of the tenderer or any authorized representative of the tenderer in the Technical Bid meeting is preferable.

SPECIAL CONDITIONS:

- 1) The quality of the earlier supplies of similar nature of items to the Institute by any of prospective bidder during last five years will be kept in view for qualification in the Technical Bid.
- 2) The bidder should have ISO 9000 certification.
- 3) No payment shall be made for any damage caused during the execution of work. The damages to the work will be made good by the Manufacturer at his own cost and no claim on this account shall be entertained.
- 4) The manufacturer shall at his own cost shall arrange for necessary licenses/ permission / clearance etc. if required to import the material for completion of work within the stipulated period.
- 5) If the materials used or finished works are not found acceptable, the Manufacturer shall arrange for the replacement of material required for re-execution of the work as per the contract.
- 6) Installation and training shall have to be provided on-site by supplier
- 7) Material handling like unloading and Installation arrangements etc. shall have to be arranged by supplier.
- 8) Oil, foundation bolts etc shall have to be arranged by supplier.
- 9) Equipment should carry Min. Five-year warranty.
- 10) Post-delivery maintenance support should be available (both spares and services)
- 11) The rate quoted shall be inclusive of expenditure on the requisite approval/quality assurance tests/certification to be carried out on the materials and/or work as may be decided by the Competent authority for which nothing extra shall be payable.
- 12) Inspection: Before dispatch of the equipment, manufacturer will give sufficient advance notice of the date in writing on which the equipment will be ready for inspection. The manufacturer also shall provide the purchaser all necessary facilities including appliances, tools, materials, and labour at no extra cost to carry out the specified inspection. Further, after inspection and approval, the equipment will be dispatched.
- 13) Charges for the comprehensive maintenance beyond the warranty period while concluding the contract should be given separately.
- 14) **OPENING OF COMMERCIAL BID:**
The offer/bid will be opened by a Committee, as would be constituted by the competent authority, at a pre-defined place, time and date in the presence of all such bidders and / or their authorized representatives. **The Commercial Bid of the Technically qualified bidder will ONLY be opened.** The Commercial Bid should be submitted as per the format enclosed with the tender document on the letter Head of the Firm/Agency. The rate should be clearly submitted with breakup of Basic Price, GST, etc. Commercial Bid in any other form will not be accepted and would be **SUMMARILY REJECTED.**
- 15) **BID VALIDITY:**
 - The Bid shall remain valid for the period not less than three (03) months after the last date set for bid submission.
 - A bid submitted for a bid validity of shorter period may be rejected as non-responsive.

- 16) **LATE BID:**
Any bid received after the dead line as prescribed in the tender notice will be treated as late bid and will not be considered.
- 17) **ACCEPTANCE AND REJECTION:**
The right to shortlist/reject any or all the tenders and/or to accept the whole or any part of the tenders without assigning any reason whatsoever would vest with the management of IIT Dharwad.
- 18) **DELIVERY PERIOD:**
16 Weeks from the date of placement of Purchase Order. On completion of the manufacturing of the item ordered for, the Manufacturer(s) will have to inform the same to the Officer on Special Duty (Admin, Finance & Contracts), IIT Dharwad, Next to Dharwad High Court, Dharwad – 580011 in writing, who will instruct the Manufacturer about the location for delivery of the materials and date of delivery.
- 19) **FREIGHT & INSURANCE:**
No freight and insurance charges will be provided and the materials are to be delivered at IIT Dharwad, as may be desired by the IIT Dharwad at the cost and risk of the Manufacturer.
- 20) **WARRANTY DECLARATION:**
- The Bidder/Manufacturer must give a comprehensive on-site **FIVE YEAR WARRANTY** of the items from the date of delivery/installation of the item against any manufacturing defect and also give the warranty that everything to be supplied by them shall be free from any defects and fault in materials, workmanship and shall be of the highest quality and materials of the type ordered shall be in full conformity with the specifications. A Bond is to be signed /executed by the supplier to this effect.
 - Any deviation in the equipment, and the specification from the accepted terms and conditions may be liable to be rejected and the bidder/manufacturer need to supply all the items in the specified form to the satisfaction/specifications specified in the order and demonstrate at their own cost. The payments shall be made only after receiving the materials as per required specification and quality to the satisfaction of the competent authority of IIT Dharwad.
- 21) **FAILURE OF ORDER EXECUTION:**
If a successful bidder after receiving the order fails to execute the order within the stipulated period or does not fulfill any of the terms and conditions in any respect, the Institute/ reserves the right to cancel the order unilaterally and forfeit the EMD amount. Termination of Contract: The Buyer shall have the right to terminate this Contract in part or in full in any of the following cases:-
- (a) The delivery of the material is delayed for causes not attributable to Force Majeure for more than (____ months) after the scheduled date of delivery.
 - (b) The Seller is declared bankrupt or becomes insolvent.
 - (c) The delivery of material is delayed due to causes of Force Majeure by more than (___months) provided Force Majeure clause is included in contract.
- 22) **PAYMENT TERMS:**
90% payment shall be made after successful delivery & installation of the equipment at IIT Dharwad and balance 10% of the amount will be released against submission of Warranty Bank Guarantee (WBG) to the tune of 10% of the total purchase order value valid for FIVE year. The WBG should be issued by any nationalized bank and validity of the WBG will be for FIVE year from the date of issuance. No advance is payable against part supply of equipment items.
- 23) **LIQUIDATED DAMAGES:**
The equipment should be delivered/dispatched to destination and ready for use not later than the delivery period specified. If the Manufacturer fails to deliver any or all the stores or fails to perform the service by the specified date, liquidated damages @2% per month or part thereof in respect of the value of the delayed stores or service will be deducted from the bill subject to a maximum of 10%.
- 24) **FINAL SELECTION AND AWARD CRITERIA:**
L-1 CRITERIA. The decision of the Competent authority will be final in awarding the order.

25) **DISPUTE AND JURISDICTION:**

Any legal disputes arising out of any breach of contract pertaining to the whole process of this tender shall be settled in the court of competent jurisdiction in the district of Dharwad, Karnataka.

26) **ACKNOWLEDGEMENT BY THE TENDERER:**

The following acknowledgement signed and sealed should be furnished along with the bid.

It is hereby acknowledged that we have gone through all the schedules as well as the terms and conditions mentioned above and we agree to abide by these.

Date:

Signature of the Tenderer along with official seal.

Place:

CANVASSING OR OFFER OF AN ADVANTAGE OR ANY OTHER INDUCEMENT BY ANY PERSON WITH A VIEW TO INFLUENCING ACCEPTANCE OF A BID WILL BE AN OFFENSE UNDER LAWS OF INDIA. SUCH ACTION WILL RESULT IN THE REJECTION OF BID, IN ADDITION TO OTHER PUNITIVE MEASURES RESERVED BY IIT DHARWAD WITHOUT ANY OBLIGATION OR LIABILITY WHATSOEVER.

Encl: 1) Specifications at Annexure-1

2) SELF-DECLARATION

Assistant Registrar
For and on behalf of Director, IIT Dharwad

Annexure-I

No.	Description	Information		
1	Name			
2	Address (with Contact number and mail ID)			
3	Address of the Factory site (with contact number)			
4	Name of the Proprietor with Mobile Number			
5	Name of the authorized Representative with designation and Mobile Number			
6	Trade license Number (copy to be enclosed)			
7	Permanent Account Number (copy to be enclosed)			
8	GST Registration Number (copy to be enclosed)			
9	Up to date VAT & GST (copies to be enclosed)			
10	Audited Statement of Accounts submitted for last three years (copies to be enclosed)			
11	Proof of bulk supply of similar stores in the last three years enclosed?			
12	Average annual turn-over during last three years (Rupees to be shown in crores)	2015 – 16	2016 – 17	2017– 18
14	Details of EMD	Rs. Bank : DD No. : Date :		
15	Any other information			

Acknowledgement: It is hereby acknowledged that I/We have gone through all the schedules as well as the terms and conditions laid down in the tender notice for procurement of the items for IIT Dharwad.

Declaration: I/We do hereby declare that the above information submitted by me/us are true to the best of my/our knowledge and I/We have submitted the documents in support of all the information asked for. I/We also agree to the condition that the right to suspend the tender process or part of the process, to accept or reject any or all the tenders at any stage of the process and/or to modify the process or any part thereof at any time without assigning any reasons thereto is reserved by the Competent authority of the Institute without any obligation or liability whatsoever.

Date :

Signature of the Bidder/Manufacturer
with date and seal

TO BE TYPED ON THE LETTER HEAD OF THE BIDDER/MANUFACTURER

Commercial BID

To
The Assistant Registrar
IIT Dharwad

Subject: Supply & Installation of Equipments for Solid Mechanics Lab & Kinematics and Dynamics of Machinery Lab as per Annexure-1

Ref.: Tender Notice No. _____, Date _____.

Sir,

I/We do hereby submit our Commercial Bid for the Supply & Installation of Equipments for Solid Mechanics Lab & Kinematics and Dynamics of Machinery Lab as per Annexure-1 against the tender notice under reference.

[Mention all figures in Indian Rupees, Include all charges]

Sl No.	Description (as per tender specifications)	Unit	Basic Rate	GST	Other Charges, if any	Total Price per Unit
1	Trainer for Strain Gauge (Table top)					
2	Thick-walled Pressure Cylinders					
3	Stability of Bars					
4	Apparatus for testing Creep					
5	Shear Centre and Unsymmetrical Bending					
6	Hertizan Apparatus					
7	Diaphragm					
8	Vibration Bench					
9	Balancing of rotating masses					
10	Balancing of reciprocating masses					
11	Whirling of shafts experiment					
	Post Warranty Annual Maintenance Contract on all above items					
Validity of Offer: Any other Conditions:						

Declaration: I/We do hereby accept all the terms and conditions laid down in the tender notice for the above said supply. I/We also agree to the condition that the right to suspend the tender process or part of the process, to accept or reject any or all the tenders at any stage of the process and/or to modify the process or any part thereof at any time without assigning any reasons thereto is reserved by the Competent authority of the Institute without any obligation or liability whatsoever.

Date:Signature of the Bidder/Manufacturer

With date and seal

ANNEXURE-1

Technical Specifications

1. Trainer for Strain Gauge (Table top)

- Compact, self-contained, desk-mounting trainer
- With following capabilities
 - Introduction to the equipment and different bridge connections (quarter, half and full-bridge) should be possible with aid of dummy resistors
 - Strains and stresses in a bending, torsion and tension systems
- Specifications of accessories
 - Sets of masses: The large mass set gives weights from 1 kg to 10 kg in steps of 0.5 kg. The small mass set gives weights from 10 g to 500 g in steps of 10 g units.
 - Dummy resistors: Set of three resistors that match the strain gauges. (Different bridge connections (quarter, half and full-bridge) should be possible with aid of dummy resistors)
 - Strain display shall be digital and should include: Bridge output voltage (μV), Strain reading in micro-strain ($\mu\epsilon$), Active arms (gauges) and Gauge factor.
- Specimens: Steel for bending, tensile and torsional loading; Aluminium, Brass and Copper for tensile loading
- Strain gauge shall be fixed as indicate below:
 - Flexural specimen: Atleast four standard gauges fitted on a steel beam, fixed as a cantilever. Nominal beam cross-section is 4.5-5.5 mm X 19-21 mm.
 - Torsional specimen: Atleast two sets of identical 45-degree shear/torque strain gauge rosettes fitted to a torsion bar. Nominal bar diameter is 9-10 mm.
 - Tensile specimen: Atleast two sets of identical 90-degree 'T' strain gauge rosettes fitted to a tensile test specimen. Nominal tension specimen cross-section is 1.5-2.5 mm X 9-10 mm.

WARRANTY: ATLEAST 5 YEARS

2. Thick-walled Pressure Cylinders

Data Acquisition (DAQ) for Thick Pressure vessel

- Bench-mounted and should be compatible with pressure vessel (preferred if it can also cater to other Solid Mechanics lab equipment in the list)

Thick Cylinder

- Experimental setup (Table top) for evaluating direct strain & stress in radial, tangential and axial direction in thick walled cylinder
- Test setup should include:
 - The strain gauges shall be fixed at various radial points across thickness in the vessel (to measure the radial and circumferential strains) and on the inner and outer cylindrical surfaces to measure hoop and longitudinal strains.
 - Manual hydraulic pump to generate pressure
 - Pressure gauge to measure the pressure inside the cylinder

- In-built strain displaying unit with capability of connecting to DAQ

Technical Data

- Thick cylinder Specifications
 - Metal (Preferred Aluminium alloy) and Corrosion free
 - Internal pressure: max. 6-8 MPa (60-80 bar)
- Strain gauge shall be fixed to the inside and outside wall of the cylinder to measure strains in the cylinder

WARRANTY: ATLEAST 5 YEARS

3. Stability of Bars

A structural reaction frame to study the relationships between length, end fixing conditions and buckling load of struts

- Capable of conducting following Experiments
 - Euler buckling loads
 - Relationship between strut length and critical load
 - Relationship between various end-fixing conditions and critical load
- Specifications
 - A manually-operated adjustable loading mechanism with atleast 450 N load cell at the top of the back plate to provide the load to the strut
 - A digital force display unit to display the buckling load
 - Appropriate mechanical fixtures/chucks to simulate following boundary conditions:
 - Fixed both ends
 - Pinned both ends
 - Fixed one end and pinned at the other
 - To consist of a back plate with a load cell at one end and a device to load the struts at the top.
 - A linear scale to be provided to monitor the horizontal deflection
- Test struts:
 - 5 x Metal make (preferred aluminium alloy). Dimensions to be
 - section 1.5-2 mm X 18-20 mm
 - Lengths: 275-325 mm, 350-375 mm, 400-425 mm, 450-475 mm, 500-525 mm
- Accessories included:
 - Set of different chucks
 - Vernier
 - Tools
 - Leads to connect to a digital force display

WARRANTY: ATLEAST 5 YEARS

4. Apparatus for testing Creep

A table-top equipment to study the creep of different materials under different conditions

Capabilities:

- The setup shall include a simple lever (load beam) and should have mechanical advantage to achieve the load.
- A displacement (digital/dial) indicator to measure the extension (creep) of the specimen
- A transparent enclosure to maintain a constant temperature (isothermal condition) & should facilitate study of the effect of temperature on creep by accommodating isothermal bag in the enclosure.
- Capability to show the three phases of creep (primary, secondary and tertiary)

Accessories

- To be supplied with:
 - Laboratory standard thermometer or thermocouple to measure the temperature effects of creep
 - Weight hanger(Preferred)
 - 1x 100 g weight
 - 2x 200 g weights
 - 3x 500 g weights
 - A cool pack (isothermal pack) to apply temperature on specimen (to be frozen for cold and to be heated in a pan of water for higher temperature)
- Specimens
 - Specimens: Lead, polypropylene, nylon and unplasticized PVC specimens (at least 10 Nos each)

WARRANTY: ATLEAST 5 YEARS

5. Shear Centre and Unsymmetrical Bending

An experimental setup to study unsymmetrical bending (to measure vertical and horizontal deflections) and Shear centre for different cross-sections

- Experiments
 - Horizontal and vertical deflection of different sections at various angles and loads (Unsymmetrical bending)
 - To find shear center of the sections
 - The relationship between the vertical and horizontal deflections and the principal moments of area for different sections
- Specifications
 - A structural frame to hold the test specimen subjected to unsymmetrical bending
 - Test setup should include a top plate and chuck (should be indexable in convenient steps)
 - Bottom plate to have two digital indicators able to be arranged at 90° to each other for the unsymmetrical bending experiment or parallel to each other for the shear centre experiment
 - To be supplied (Preferred) with 5x 10 g weight hangers and 150x 10 g weights
- Specimens:
 - Supplied with the following metal specimens:
 - One 'U' section
 - One 'L' section
 - One flat section
- Accessories included:
 - Steel rule and Vernier

WARRANTY: ATLEAST 5 YEARS

6. Hertzian Apparatus

Experiments

- Effect of pressure on the profile for constant angle between the contacting pads
- To study influence of different angle between pads (different relative curvature) with constant pressure

Features

- Compact, tabletop-mounted and self-contained
- Flexible material for contacting to produce magnified and easily viewed results
- Ease of use (Simple design)
- Variable relative contact angles and pressures for a range of experiments

Technical Specifications

Comprises of

- Two pads with curved surfaces
 - The upper pad (preferred transparent) has a double convex surface
 - The lower pad has a convex surface.
- A hand-operated system to force the two pads together (it can be either by use of lever or hydraulic pump and cylinder system or some other system which can accomplish the same). It must have a safety system to limit the load to prevent damage to equipment.
- To study effect of different relative curvatures, provision to rotate the lower pad along with a pointer to show the angle of rotation must be provided.
- A transparent scale to measure the contact shape and angle

WARRANTY: ATLEAST 5 YEARS

7. Diaphragm

Bench-mounted machine to examine the effect of pressure on the surface profile of a diaphragm. It should have a sturdy base containing all parts of the apparatus (for compactness).

Experiments

Experiments possible with this apparatus include the effect of pressure on:

- Measurement of effect of pressure on surface profile of a diaphragm
- Radial and circumferential strains under pressure
- Radial and circumferential strain gradients across the diaphragm

Specifications

- Diaphragm material: Metal (preferred Aluminium alloy)
- Flanges to clamp the edge of the diaphragm to provide built-in edge conditions
- Diaphragm Dimensions;
 - Nominal diameter = 150 -250 mm
 - Nominal thickness = 2-3 mm
- Self-contained, hand-operated hydraulic pressurizing system. Pressure gauge to be measured by a gauge
- Surface profile measurement: By digital indicators, with an option to be connected Data Acquisition system (DAQ)
- Strain and Strain gauge:
 - Measured by electrical resistance gauges (full bridge) and displayed digitally with an option to be connected to DAQ. The signals from each strain gauge to be shown on a digital display.
 - Gauge layout:
 - Circumferentially mounted strain gauges (atleast 3)
 - radially mounted strain gauges (atleast 3)
 - Strain gauges at 45°(atleast 1)

WARRANTY: ATLEAST 5 YEARS

8. Vibration Bench

1. Capability to do experiments on simple and compound pendulum
2. Capability to do experiments on center of percussion

3. Capability to do experiments on trifilar pendulum
4. Capability to do experiments on torsional system with multi-degree of freedom (multiple rotors).
5. Capability to do experiments on spring-mass-damper systems including multi-degree-of freedom systems.
6. Capability to do experiments on forced vibration with forcing at different frequencies.
7. Presence of sensor and data acquisition system to capture fast changing physical quantities of interest.
8. Warranty of atleast 5 years

The bid should accompany detailed manual and demonstration video on how each of the above mentioned experiments can be performed.

9. Balancing of rotating masses

1. Capability to do experiments on static and dynamic balancing of rotors in three or more planes.
2. Warranty of atleast 5 years

The bid should accompany detailed manual and demonstration video on how the experiments can be performed.

10. Balancing of reciprocating masses

Capability to do experiments on inertial forces in inline cylinder engines

1. At least four engines in inline configuration
2. Ability to change relative phase of the cranks in the engines
3. Instrumentation to asses both primary and secondary forces and moments
4. Warranty of atleast 5 years

The bid should accompany detailed manual and demonstration video on how the experiments can be performed.

11. Whirling of shafts experiment

1. Capability to observe mode shapes and measure critical speeds.
2. Ability to observe angle between the whirl plane and the line of eccentricity when eccentric disks are added on the shaft.
3. Presence of safety features to avoid excessive amplitude in the whirling of shaft.
4. Warranty of atleast 5 years
5. The bid should accompany detailed manual and demonstration video on how the experiments can be performed.

ANNEXURE- '2'

SELF-DECLARATION – NO BLACKLISTING

(Date)

The Assistant Registrar
IIT Dharwad

Dear Sir/Madam,

Ref: Tender for Supply & Installation of Equipments for Solid Mechanics Lab & Kinematics and Dynamics of Machinery Lab as per Annexure-1

In response to the Tender Document for Supply & Installation of Equipments for Solid Mechanics Lab & Kinematics and Dynamics of Machinery Lab as per Annexure-1 for IIT DHARWAD, I/ We hereby declare that presently our Company/ firm is _____ having unblemished record and is not declared ineligible for corrupt & fraudulent practices either indefinitely or for a particular period of time by any State/ Central Government/ PSU/Autonomous Body.

We further declare that presently our Company/ firm _____ is not blacklisted or debarred and not declared ineligible for reasons other than corrupt & fraudulent practices by any State/ Central Government/ PSU/ Autonomous Body on the date of Bid Submission including violation of relevant labour laws.

If this declaration is found to be incorrect then without prejudice to any other action that may be taken, our security may be forfeited in full and the bid, if any to the extent accepted may be cancelled at any stage and the contract may be terminated and we shall be barred from bidding in future against any other tender.

Yours faithfully,

Place:

Signatures _____

Date:

Name _____

Seal of the Organization