

Cost of Tender Document Fee Rs.500/

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA-136119**

INVITATION OF TENDERS

**Eight Machines for Strength of Material Laboratory on
turnkey basis**

1. Fatigue Testing Machine with Elevated Temperature.
2. Creep Testing Machine with Elevated Temperature.
3. Computer Controlled Impact Testing Machine.
4. Computer Controlled Erichsen Cupping Testing Machine.
5. Computerized Vicker Hardness Testing Machine.
6. Digital Rocjwell Cum Rockwell Superficial Hardness Testing Machine.
7. Brinell Hardness Testing Machine.
8. Digital Portable Hardness Testing Machine.

Tender Reference : **MED/NITK/17/99**

Date of Commencement : 08.09.2017
for Sale of Tender
Documents

Last date and Time for : 12.10.2017 Upto 2:30 P.M
Receipt of Tenders

Time and date of opening : 12.10.2017 at 3:00 P.M
of Tenders

Place of opening of : **Office of the Prof-in-Charge Stores)**
Tenders **NIT, Kurukshetra**

INSTRUCTIONS TO TENDERERS
&
CONDITIONS OF CONTRACT

1. The National Institute of Technology, Kurukshetra, Haryana an Educational Institution invite tenders for Supply of above Eight Machines for Strength of Material Laboratory on turnkey basis.

The Tenders should be submitted in two parts in separate covers (Technical Bid & Financial Bid) in following manner:

- (i) Bid containing technical specifications and Earnest Money Deposit. (as per scheduled)
- (ii) Bid containing financial offer.
- (iii)

The envelopes should be marked as Technical Bid and Financial Bid with reference number and submitted in one cover.

The Technical Bid and Financial Bid will be opened in two stages on different dates. The bid containing technical specifications and Earnest Money deposit will be opened at 1st stage. The Financial Bid of technically qualified bidders will be opened on 2nd stage & will be intimated to only the successful bidders accordingly.

2. Tender must be sent in a properly sealed envelope with tender number and due date subscribed on the envelope addressed to the Prof-in-Charge (Stores), NIT, Kurukshetra.
3. The price should be quoted on prescribed price schedule. All corrections must be attested by the tenderer.
4. All the columns of the tender form shall be duly and properly filled in separately. The rates and units shall not be overwritten in the price schedule. The rates shall be quoted both in figures and words. The Tender should be signed by the authorized signatory of the firm with seal of the firm.
5. The tenderer shall deposit earnest money as specified in Schedule of Requirement alongwith Technical Bid in form of Account paying Bank Draft, Fixed deposit receipt, Bankers Cheque or Bank Guarantee from any Commercial Bank in favour of Director, National Institute of Technology, Kurukshetra. The tenders without Earnest Money shall be rejected. The Earnest money will remain valid for a period of 45 days beyond the final bid validity period.
6. In case the Tender Documents are downloaded from the website of the Institute for submission of the tender, the Tender Document Fee may be deposited through Demand Draft alongwith the Tender otherwise the tender may be rejected.
7. The successful tenderer shall furnish the Performance Security for an amount of 5% of total value of the equipment in form of Account Paying Bank Draft, Fixed Deposit Receipt, Bankers Cheque or Bank Guarantee from any Commercial Bank in favour of Director, National Institute of Technology, Kurukshetra for the period of completion of performance obligations and

warranty period. The Performance Security shall remain valid for a period of 60 days beyond completion of contractual obligations and warranty period.

8. The required delivery period must be mentioned against each item. After the order has been placed, the goods must be delivered within the stipulated period or by the delivery period extended by the Institute. In case of late delivery of goods, the Institute is entitled to recover as penalty from the tenderer a sum @ 0.5% of the total value of the goods per week and the maximum 10% of the total value of the goods for which the consignment is delayed beyond the due date.
9. The payment will be made after receipt of goods according to specifications, its installation and good working order. In case the goods are rejected these have to be removed by the supplier at his own cost. The rejected goods must be replaced by the supplier within 15 days of the dispatch of registered notice intimating that the goods have been rejected failing which the order may be cancelled and security forfeited.
10. No payment will be made in advance for any supplies under this tender. No claim for any duty, not stipulated in tender will be admitted at any stage.
11. The valid documentary proof of GST No. & details of Income Tax registration (PAN) should be submitted alongwith tender. The taxes must be quoted clearly and separately. If the taxes are not quoted separately, it will be presumed that the rates quoted are inclusive of taxes. The rates quoted should be firm and include all charges. The material may be dispatched "FREIGHT PAID" where the offer is F.O.R. destination. The Form D is not issued by the Institute.
12. In case of goods controlled by the Government, the tendered rates shall not be higher than the controlled rates.
13. Standard warrantee of the items should be mentioned in the tender. A list of users where similar equipment has been supplied in the past should be furnished with the tender.
14. Director of the Institute reserves the right to accept or reject any tender or to cancel the whole bidding process without assigning any reason.
15. The institute reserve the right to verify/seek confirmation of all original documentary evidence submitted by the venders in support of the tenders, specifications for eligible criteria. In case any information furnished by vender is found false/incorrect the tender will be rejected. The descriptive literature with full technical data and drawing/photos must be furnished alongwith the tender.
16. In case of dispute the decision of the Director shall be final. All above conditions will be enforced unless written orders of the Director are obtained relaxing any specific condition in any particular instance.
17. The tender shall remain valid for **90 days** from the date of opening of tender. Fax or conditional tenders shall not be accepted.

18. Tender received beyond the fixed date and time shall not be accepted.

19. The tenderers are required to quote their lowest rates in the very first instance and there shall be no negotiation in purchases. In case only one tender is received or only one tender remains according to specifications of the required goods, negotiations will be carried out.

20. The Specification as per list attached. The tenderer must quote all items otherwise tender will be rejected.

21. Tender Evaluation: - All bids received in time will be technically evaluated by a committee who meets our tender specification and other terms & conditions. The financial bids of those bid who are accepted by the committee will be opened.

22. Lowest Offer: - Lowest offer will be calculated on the basis of total price of all items quoted who qualifies our specification and terms conditions of our tenders. No individual item prices will be considered for comparison of prices.

PRICE SCHEDULE

Having examined the tender documents, the receipt of which is hereby duly acknowledged, we offer to supply the goods and services in conformity with the said tender documents at the rates shown below:

1	2	3	4	5	6	7	8	9	10	11
Sr.No	Particulars of the items	Unit	F.O.R	Duties inclusive, if exclusive rates be given	Packing forwarding charges if any	GST	Total Cost F.O.R Kurukshe tra	Delivery Period	Particulars of Manufacturers	Remarks

N.B.: The price column should be properly filled. In case nothing is mentioned in the columns the price will be considered inclusive of Taxes Duties, packing and forwarding etc.

Dated the _____ **Date of** _____
seal

Address with

Signature

SCHEDULE OF REQUIREMENTS

Sr. No.	Name of the Items	Qty.	Earnest Money (in Rs.)
1.	Eight Machines for Strength of Materials Laboratory.	As per list attached	2 to 5 % of the quoted amount

Name of Machines and Specifications

<p>Fatigue Testing Machine with Elevated Temperature</p> <p>The Machine should be able to test materials such as steels, aluminum alloys, ceramics, glass or carbon fiber composites, plastics, elastomers, wood etc. in different modes of test such as tension test, compression test, flexure test, dynamic test, flexure test, dynamic test, low cycle fatigue test, high cycle fatigue test, fracture toughness, shear test, friction test, peel test, bond test, da/dN vs delta K, da/dN vs G/j, CTOD, J-R curve, crack propagation, S-N Curve, DCB tests.</p>	
<p>Technical Specifications and Features Required :</p>	
Basic Unit	<p>Servo Hydraulic Computerised Universal Testing Machine</p> <ol style="list-style-type: none"> i. 100 KN servo-hydraulic universal testing machine" for characterization of materials and components subjected to axial loading in dynamic mode. ii. Precision aligned two column load frame with adjustable upper cross head. iii. Servo-hydraulic actuator assembly mounted on to the fixed crosshead. iv. A system should be in place such that the hydraulic grips cannot be opened or closed when the test is running. v. Load measurement Accuracy 0.5% of indicated load as per ISO7500-1 Class 0.5. <p>Full details of each component to be provided.</p>
Load Frame	<ol style="list-style-type: none"> i. 100 kN capacity two column load frame with Column spacing: 600 mm ii. High stiffness of Load frame at equal or better than 600KN/mm and vertical daylight: 1200 mm iii. Moveable top crosshead fitted with hydraulic lifts and clamps with provision to mount load cell on it. iv. Fixed bottom crosshead with provision to mount actuator on it. v. Load frames are of self reacting type and are free from self-induced shocks and vibrations. vi. Tablet based touch screen operator panel for all basic machine operation <ol style="list-style-type: none"> a. Switching on/off hydraulic power pack b. Jogging the actuator up and down for easy specimen mounting c. Top movable crosshead positioning vii. Emergency Stop mounted on the load frame for easy access to the operator. viii. Ergonomic routing of cables and hoses. <p>Full details of each component to be provided.</p>
Actuator	<ol style="list-style-type: none"> i. 100 kN fatigue rated double acting, double ended, equal area actuator. ii. Stroke range should be at least +/-75mm iii. Servo valve control. iv. Capacity 100KN with variable accuracy up to +/- 0.5% in the load range of 100KN to 1KN in single Load cell. v. Linear stroke measurement <= 1micron resolution <p>Full details of each component to be provided.</p>
Load Cell	<ol style="list-style-type: none"> i. Fatigue rated +/-100kN Load cell ii. Shear web type load cell mounted on the movable cross head. iii. Machine should be able to sustain loads at least as much as 150% overload iv. Non-linearity: ±0.3% of full scale v. Resolution :0.02% of Full Scale Reading vi. Fatigue life of 10⁹ cycles <p>Full details of each component to be provided.</p>
Hydraulic Power Pack	<ol style="list-style-type: none"> i. Digital user Interface based protection device for oil temperature, oil pressure, oil level, and filter condition. ii. Automatic Interlocks for high temperature. iii. Line frequency 50 Hz. iv. Operating pressure of 210 bar. v. Flow rate 40 LPM vi. Operates on three phase 230V power supply vii. Safety interlocks for the power pack

	<ul style="list-style-type: none"> viii. Ports and adaptors to connect Hydraulic lift and clamp cylinders ix. External cooling tower. x. Noise level should be less than 80 dB (details of performance curve to be provided). xi. Pressure and return line filtration with 3 micron or better filter. <p>Full details of each component to be provided.</p>
Grips and Fixtures	<ul style="list-style-type: none"> i. Standard hydraulic wedge grips for flat (0.5mm to 25mm thick) wedge width 75 mm or better and smooth round (6mm to 25mm diameter specimen ii. Standard grips for compression and Flexural testing iii. Self-aligned, backlash free Hydraulic LCF Grips for M8, M10, M12, M16 threaded specimen. iv. Hydraulic LCF grips should able to perform zero cross over test v. 3 Point bend fixture with bottom span up to 300mm, top roller of 5mm and 10mm, bottom roller of 10mm.. vi. Clevis grip for specimens of thickness 12.5mm and width of 50 mm or better vii. Compression plate diameter 100 mm and height 60 mm or better viii. Grip cooling unit ix. All Grips and Fixture should be rated for temperature up to 1000°C. (As per ASTM Standard) <p>Full details of each component to be provided.</p>
Any other fixture/Grips/Clamps	Any other fixture/grips/clamp required to test sample should be quoted as inclusive part of machine
Electronic Controller	<p>Digital servo controller featuring 300 MIPS DSP, 24-bit analog data conversion, 32-bit data acquisition and 40-bit precision servo-loop calculations.</p> <p>A.1 channel of digital encoder input</p> <p>B. Up to 8 channels of conditioned analog inputs with suitable signal conditioners</p> <ul style="list-style-type: none"> i. 1 channel for load cell input ii. 2 channels for strain-bridge extensometer/crack-opening displacement gauge input iii. Up to 4 high level inputs for <ul style="list-style-type: none"> a) Furnace Zone Temperature – 3Nos b) 1 Spare Channel <p>C. 1 channel of digital servo-control with loop update up to 6 kHz.</p> <p>D. 8 digital I/O / Logic drive and sense lines configured. or Tablet interface, Power pack ON/OFF and for Power pack fault interlocks</p> <p>E. Synchronized data acquisition into host computer up to 6 kHz.</p> <ul style="list-style-type: none"> i. 1 channel of 32-bit digital encoder readouts ii. 8 channels of 24-bit analog feedback readouts iii. 1 channel of Set Point iv. 1 channels servo-output for monitoring purposes v. 8-bits of digital I/O <p>F. User settable software safety limit interlocks on upper and lower limit readout on each control and feedback channels with individual option of Stop/Hold/Trip.</p> <p>G. Control Modes: Periodic signals(Sine/Triangular/pulse/User defined), spectrum loads: flight spectrum(rainflow - counting based)/ response spectrum, recorded time history simulation, multi- step programs.</p> <p>H. The frequency at which the wave form is generated should be able to be varied between .001 Hz to 500 Hz or better.</p> <p>Full details of each component to be provided.</p>
Strain Measurement and COD gauges	<ul style="list-style-type: none"> 1. Strain Bridge based Extensometer <ul style="list-style-type: none"> Gauge length of 12.5mm, 25 mm Measuring range of ± 1.25 mm for 12.5mm gauge length and 8/-2 for 25 mm gauge length Accuracy: $\pm 0.5\%$ of read out value as per ASTM E83 Resolution: 0.02% of full scale range Excitation: 5 to 10 VDC Sensitivity: 2 to 4 mv/V Meant for use with tensile specimens Ceramic rods for testing up to 1000°C 2. Crack tip opening displacement gauge rated for 1000°C temperature

	<p>that complies with ASTM E647 and E 1820. Gauge length of 10 mm and travel of +3/-1 mm or better.</p> <p>Full details of each component to be provided.</p>
High Temperature Furnace	<ul style="list-style-type: none"> i. Three zone split furnace. ii. Furnace Temperature Rating: 300 to 1000°C iii. Temperature overshoot should not be greater than +/- 1°C and the system should remain stable within +/- 1° from range 300⁰ t0 1000⁰. iv. Dimensions approx: 5 I.D x 14 O.D x 13 length (inches) v. Elements: Kanthal A1, embedded windings. vi. Three Zone construction of 3.33 inches per zone and a total heated length of 10 inches <p>Temperature controller</p> <ul style="list-style-type: none"> i. PID controller with digital set point and programmable heating rates. ii. Temperature display of all 3 zones. iii. The necessary grips/pull rods/cooling for doing the tests at high temperature should be supplied. <p>Full details of each component to be provided.</p>
Software	<ul style="list-style-type: none"> i. Servo control of actuator with user settable/programmable: ii. Mode control (Load, Stroke, Strain) iii. Static ramping of Load / displacement/ strain with independently settable ramp rate. iv. Cyclic loading with ramp/sine waveform and user settable mean, amplitude and phase at frequency of up to 50 Hz and restricted as per the actuator performance curve, with better than 2% accuracy in loading through adaptive control. v. Provision for multi-step static and cyclic loading, with provision to switch control mode(s) as required. vi. User settable limit interlocks on servo-control with option of Stop/Trip vii. Login/Password can be created for different users <p>General purpose application software capable of</p> <ul style="list-style-type: none"> a. Performing Static Test b. Performing Dynamic Test c. Performing Multi Step Programming d. Export data to Excel format and plot graph e. Tensile and Compression Testing Software (As per ASTM E8 and ASTM E9) f. Low Cycle Fatigue Testing Software (As per ASTM E606) g. Tension-tension fatigue (ISO 13003, ASTM D3479) and open-hole fatigue response (ASTM D7615) of polymer matrix composites h. Axial Fatigue (ASTM 466) and Flexural fatigue on flat, round, threaded and flexural specimen on metals , polymers and composites i. Fatigue Crack Growth Testing Software (As per ASTM E647) j. Fracture Toughness Software for K_{Ic}, J_{Ic} and CTOD Testing (As per ASTM E1820 and E399) <p>Full details of each component to be provided.</p>
Computer System	<p>Host computer with Windows 7 or higher version of operating system and suitable application software for ease of performing tests under specified conditions with provision for report generation by way of multiple worksheet XL-tables including raw data arranged suitably as columns for individual channels. Both host computer and application software should provide expansion of system capability including integrated control and data acquisition from other external devices including furnace.</p> <p>Additional, easy to use Tablet/Smartphone with WiFi interface to host computer to permit easy stroke positioning by operator during specimen mount/dismount through local access to readouts and device control/status. Tablet mounting with power supply to be provided at convenient location, with provision to remove as required to facilitate access at any location on the load frame.</p> <p>At least one hardwired E-Stops located on the frame and enclosure for easy access.</p> <p>UPS for PC and Controller to guarantee safe shut down and unloading in the event of power failure</p>

	<p>Provision for application software customization.</p> <p>PC desktop (from reputed vendor) capable of supporting the UTM system software and also interfacing with the UTM controller hardware and having at least Intel i7 6th generation or equivalent processor and at least 8 GB RAM, minimum 1 TB hard drive, with DVD read-write drive, SD card reader, USB 3.0 ports, HDMI port, Ethernet port and wifi capable and 24 inch HD monitor with HDMI cable.</p> <p>Laser Multifunctional colour Printer and online 1.0 KVA UPS for PC should also be included</p> <p>Full details of each component to be provided.</p>
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Creep Testing Machine with Elevated Temperature

Creep is high temperature progressive deformation at constant stress. "High temperature" is a relative term dependent upon the materials involved. The Machine should be able to test materials that involve high temperatures under load. It is a machine that measures the alteration of a material after it has been put through different forms of stress.

Servo Electric Universal Testing Machine with closed loop control required for Monotonic test, slow strain rate deformation test and quasi static test of metals, plastic, wood, ceramic, composites and automotive components. It should be capable of graphic display of load vs displacement, stress vs strain, load vs time, temperature vs time, strain vs temperature etc.

Technical Specifications and Features Required :

Basic Unit	<p>Servo Electric Computerised Universal Testing Machine</p> <ol style="list-style-type: none"> i. The 100kN system can conduct creep tests under load, stress, strain, position and true stress control. ii. The test system shall include two column load frame, servo electric actuator, digital control electronics, computer control and data acquisition system. iii. The system shall can conduct tests at triangular, trapezoidal and any other complex wave forms under strain or load control defined by the user. iv. It must be possible to conduct creep-test at strain rate of 10^{-6} /min. v. High stiffness of Load frame at equal or better than 600kN/mm vi. It should have load frame mounted control panel for emergency stop, Actuator jog up & down, slow & fast, locking and unlocking at any desired position, hydraulic grips closed or open etc. <p>Full details of each component to be provided.</p>
Load Frame	<ol style="list-style-type: none"> i. 100 kN capacity two column load frame with Column spacing: 600 mm or more ii. Fixed top crosshead fitted with provision to mount load cell on it. iii. Fixed bottom crosshead with provision to mount actuator on it. iv. Total daylight: 1200 mm v. Minimum Daylight 300 mm or nearer vi. Load frames are of self reacting type and are free from self-induced shocks and vibrations. vii. Load frames aligned to high precision and have adequate factor of safety and high stiffness (600 kN/mm). viii. Touch screen based operating control panel mounted on load frame for controls and E-STOP. ix. ± 100 kN fatigue rated, high performance servo-electric actuator with digital encoder for position measurement <p>Full details of each component to be provided.</p>
Servo Electric Actuator	<ol style="list-style-type: none"> i. Fatigue rated servo electric actuator with integrated servo drive and servo motor. ii. ± 100 kN fatigue rated, high performance servo-electric actuator with digital encoder for position measurement iii. Resolution of stroke measurement: 0.1 μm iv. Accuracy of stroke measurement: $\pm 0.5\%$ of read out value v. Total stroke: 150 mm vi. Speed range: 0.01 mm/min to 100 mm/min. <p>Full details of each component to be provided.</p>
Load Cell	<ol style="list-style-type: none"> i. Fatigue rated +/-100kN Load cell ii. Shear web design iii. Machine should be able to sustain loads at least as much as 200% overload. iv. Non-linearity: $\pm 0.10\%$ of full scale or better v. Accuracy: ISO7500-1 Class 0.5 vi. Resolution :0.02% of Full Scale Reading vii. Fatigue life of 10^9 cycles <p>Full details of each component to be provided.</p>
Grips and Fixtures	<ol style="list-style-type: none"> i. The system shall have High Temperature Pull rods (rated for temperature up to 1000 °C) sufficiently long enough to accommodate and suitable to fix M8, M10, M12, M16 Threaded type specimen

	<ul style="list-style-type: none"> ii. Suitable adaptor for M8, M10, M12, M16 Threaded type specimen ii. Standard hydraulic wedge grips for flat (0.5mm to 25mm thick) wedge width 75 mm or better and smooth round (6mm to 25mm diameter specimen) And hydraulic line to be tapped from power pack that will be installed at Fatigue testing machine of capacity 100KN. iv. Self-aligned, backlash free Hydraulic LCF Grips for M8, M10, M12, M16 threaded specimen v. 3 Point bend fixture with bottom span up to 300mm, top roller of 5mm and 10mm, bottom roller of 10mm.. vi. Clevis grip for specimens of thickness 12.5mm and width of 50 mm or better vii. Compression plate diameter 100 mm and height 100 mm or better viii. Cooling unit for grip cooling during high temperature Test ix. All Grips and Fixture should be rated for temperature up to 1000°C. (As per ASTM Standard) x. Capable of performing test as per ASTM Standard E328 ,E1820,E 399 <p>Full details of each component to be provided.</p>
Any other fixture/Grips/Clamps	Any other fixture/grips/clamp required to test sample should be quoted as inclusive part of machine
Electronic Controller	<p>Digital servo controller featuring 300 MIPS DSP, 24-bit analog data conversion, 32-bit data acquisition and 40-bit precision servo-loop calculations.</p> <ul style="list-style-type: none"> A.1 channel of digital encoder input B. Up to 8 channels of conditioned analog inputs with suitable signal conditioners <ul style="list-style-type: none"> i. 1 channel for load cell input ii. 2 channels for strain-bridge extensometer/crack-opening displacement gauge input iii. Up to 4 high level inputs for <ul style="list-style-type: none"> c) Furnace Zone Temperature – 3Nos d) 1 Spare Channel C. 1 channel of digital servo-control with loop update up to 6 kHz. D. 8 digital I/O / Logic drive and sense lines configured. or Tablet interface, Power pack ON/OFF and for Power pack fault interlocks E. Synchronized data acquisition into host computer up to 6 kHz. <ul style="list-style-type: none"> i. 1 channel of 32-bit digital encoder readouts ii. 8 channels of 24-bit analog feedback readouts iii. 1 channel of Set Point iv. 1 channels servo-output for monitoring purposes v. 8-bits of digital I/O F. User settable software safety limit interlocks on upper and lower limit readout on each control and feedback channels with individual option of Stop/Hold/Trip. G. Control Modes: Periodic signals(Sine/Triangular/pulse/User defined), spectrum loads: flight spectrum(rainfallow - counting based)/ response spectrum, recorded time history simulation, multi- step programs. H. The frequency at which the wave form is generated should be able to be varied between .001 Hz to 500 Hz or better. <p>Full details of each component to be provided.</p>
Strain Measurement	<ul style="list-style-type: none"> 1. Strain Bridge based Extensometer <ul style="list-style-type: none"> Gauge length of 12.5mm, 25 mm Measuring range of ± 1.25 mm for 12.5mm gauge length and 8/-2 for 25 mm gauge length Accuracy: $\pm 0.5\%$ of read out value as per ASTM E83 Resolution: 0.02% of full scale range Excitation: 5 to 10 VDC Sensitivity: 2 to 4 mv/V Meant for use with tensile specimens Ceramic rods for testing up to 1000°C 2. Crack tip opening displacement gauge rated for 1000°C temperature that complies with ASTM E647 and E 1820. Gauge length of 10 mm and travel of +3/-1 mm or better. <p>Full details of each component to be provided.</p>

High Temperature Furnace	High temperature chamber furnace for creep testing machine should be compatible with high temperature chamber furnace of Servo Hydraulic Universal Testing Machine of 100KN capacity mentioned above, as only one HTCF will be used for both the machines.
Software	<ul style="list-style-type: none"> i. Servo control of actuator with user settable/programmable: ii. Automated data analysis in terms of creep strain, creep strain-rate, etc iii. Programmable test parameters such as constant stress, stress relaxation, etc. iv. Creep Test: Testing under load, stress, strain, position and true stress control. (as per ASTM E328) v. User defined data logging interval vi. Option to program initial loading rate, initial hold time and creep time. vii. Option to view online graphs-Load vs time, stress vs time, elongation vs time. viii. Option to view online stress, strain, elongation etc ix. Report generation in excel format <p>Full details of each component to be provided.</p>
Computer System	<p>Host computer with Windows 7 or higher version of operating system and suitable application software for ease of performing tests under specified conditions with provision for report generation by way of multiple worksheet XL-tables including raw data arranged suitably as columns for individual channels. Both host computer and application software should provide expansion of system capability including integrated control and data acquisition from other external devices including furnace.</p> <p>Additional, easy to use Tablet/Smartphone with WiFi interface to host computer to permit easy stroke positioning by operator during specimen mount/dismount through local access to readouts and device control/status. Tablet mounting with power supply to be provided at convenient location, with provision to remove as required to facilitate access at any location on the load frame.</p> <p>At least one hardwired E-Stops located on the frame and enclosure for easy access.</p> <p>UPS for PC and Controller to guarantee safe shut down and unloading in the event of power failure</p> <p>Provision for application software customization.</p> <p>PC desktop (from reputed vendor) capable of supporting the UTM system software and also interfacing with the UTM controller hardware and having at least Intel i7 6th generation or equivalent processor and at least 8 GB RAM, minimum 1 TB hard drive, with DVD read-write drive, SD card reader, USB 3.0 ports, HDMI port, Ethernet port and wifi capable and 24 inch HD monitor with HDMI cable.</p> <p>Laser Multifunctional color Printer and online 1.0 KVA UPS for PC should also be included</p> <p>Full details of each component to be provided.</p>

Computer Controlled Impact Testing Machine

Impact tests are designed to measure the resistance to failure of a material to a suddenly applied force. The test measures the impact energy, or the energy absorbed prior to fracture. The most common methods of measuring impact energy are Charpy Test and Izod Test. The Charpy impact test, also known as the Charpy V-notch test, is a standardized high strain-rate test which determines the amount of energy absorbed by a material during fracture. Izod impact testing is an ASTM standard method of determining the impact resistance of materials. A pivoting arm is raised to a specific height (constant potential energy) and then released. The arm swings down hitting the sample, breaking the specimen.

Technical Specifications and Features Required :

Basic Unit	<ul style="list-style-type: none"> i. The Machine suitable to perform Charpy test as well as Izod Test. ii. To carry out the functions of zero cleaning and automatic return, capturing the value of lost or absorbed impact energy and pendulum cycle by means of setting up the computer program and the results can be monitored. iii. Machine will be computer controlled and closed loop operation. It is capable of controlling the test procedures as the pre-set programs & also displaying, recording & Printing the test results, the testing curves can be drawn automatically in real time. \ <p>Full details of each component to be provided.</p>
Applied Standard with proper Test Jigs	<ul style="list-style-type: none"> i. Strictly designed according to ISO 148 and DIN 10045 ii. For special it can be ASTM-E23, for determining the impact resistance of metal materials under dynamic load and capable of doing large number of impact test continuously. <p>Full details of each component to be provided.</p>
Technical Parameters for Charpy Test	
Impact Energy	250J, 500J
Impact Velocity	5.5 m/s
Raised Angle	150 ⁰
Standard Span	40 mm
Round Angle of Jaws	R 1 - 1.5 mm
Round Angle of Striking Edge	R 2 - 2.5 mm
Size of Specimen	10 mm X 10 mm X 55 mm
Power Supply	Three Phase
Full details of each component to be provided.	
Technical Parameters for Izod Test	
Impact Energy	150J
Corner radius of the Izod striker	0.5~1mm
Full details of each component to be provided.	
Standard Accessories	
Pendulum 250 J(Charpy Test)	1 set
Pendulum 500J(Charpy Test)	1 set

Pendulam 150J(Izod Test)	1 set
Span specimen plate(L = 40mm)	1 set
Specimen Centring Tong (L = 40mm)(U, V)	2 pieces
Detacher	2 pieces
Simple Head spanner(S = 30mm)	2 pieces
Inner Hexagon spanners (S = 12mm)	4 Pieces
Anchor Bolts (M16*300mm)	2 pairs
Grips(Including Support)R=1mm	2 pieces
Striker of 8mm nose radius size as per ASTM E23.	1 No.
Computer Sytem and Software meets to standard ISO 148-1983, DIN 10045 and ASTM E23.	1 Piece
Safety cover-aluminium frame with tempered glass.	
Full details of each component to be provided	
User Interface & Control	
Digital Readout/Graphic Display & Computer interface for saving & print test results	Machine must have inbuilt PC interface and real time graph/ test results recording system to save data and print. Machine should have facility to interface with system with USB or Ethernet. Full details of each component to be provided.
Application Software	i. Should have features for Windows-10 based graphical user interface.

	<ul style="list-style-type: none"> ii. The software package should have different functions to calculate results of Impact Energy, Impact Toughness etc. iii. Support Multi Languages iv. Can export data in form of word or Excel. Displays two ranges of Impact energy after calibration. v. Recording Test results of Min., Max, Mean, Standard deviation of batch test. <p>Full details of each component to be provided.</p>
Computer System	<p>PC desktop (Dell/HP/Lenovo) capable of supporting the system software and also interfacing with the controller hardware and having at least Intel i5 7th generation or equivalent processor and at least 8 GB RAM, minimum 1 TB hard drive, with DVD read-write drive, SD card reader, USB 3.0 ports, HDMI port, Ethernet port and wifi capable and 20 inch or better HD monitor with HDMI cable.</p> <p>Laser colour Printer and online 1.0 KVA UPS for PC should also be included</p> <p>Full details of each component to be provided.</p>
Controls	<p>To Control through Computer system for control, data collecting, data processing, data storage, and test result printing etc. functions of the testing machine.</p> <p>Full details of each component to be provided.</p>
AC Driven Charpy / Izod Notch Broaching Machine	
Basic System Features	<ul style="list-style-type: none"> i. Robust design cuts the notches (V or U) very accurately by means of specially designed multi-toothed Broach ii. Simple to use, accurate & reliable. iii. Machine accurately cuts the desired notches as per respective standard in just a single pass within few seconds. Just to press a push button to start. iv. Suitable for Ferrous & non-Ferrous samples v. Equipped with broach guard & Longer broach Life vi. Ball Screw for uniform cutting action vii. Hardened rods with LM bushes for smooth motion viii. Micrometer for fine feed ix. Excellent notch finish & Excellent Repeatability. x. The machine is equipped with variable frequency drive to adjust the speed. xi. Front door access for easy maintenance <p>Full details of each component to be provided.</p>
Function	<p>Test piece as specified by ASTM, BS, DIN, IS or equivalent standard is clamped on adjustable vice, which is at comfortable working height & whose Y-axis motion can be minutely adjusted by micrometer. Linear motion is imparted to the broach through motor, Pulley mechanism & finally through ball screw & Linear guide shaft mechanism. Up-down motion of broach is controlled by limit switch, which is also equipped with over travel safety trip mechanism. After pushing down the switch, the broach traverses & produces desired V or U notch in the test piece.</p> <p>The switch, the broach traverses & produces desired V or U notch in the test piece.</p> <p>Full details of each component to be provided.</p>
Speed of broach traverses across the specimen	1400 mm/min or better
Broach	<p>Pull type specially designed broach 17" long with 90 numbers of teeth made of HSS M2 with a capability of cutting test pieces with a hardness of 25 HRC.</p> <p>Full details to be provided.</p>
Accessories	Broach Guard (For Safety), Fine Micrometer adjustment.

Computer Controlled Erichsen Cupping Testing Machine

The Erichsen cupping test is a ductility test, which is employed to evaluate the ability of metallic sheets and strips to undergo plastic deformation in stretch forming. The test consists of forming an indentation by pressing a punch with a spherical end against a test piece clamped between a blank holder and a die, until a through crack appears. The depth of the cup is measured.

Technical Specifications and Features Required :

Basic Unit	The Load Cell based Ball Screw Cupping Testing machine with precise technology, which will be used for sheet metal & strip steel rolled stock etc. It can complete test of plastic deformation for sheet metal & strip steel rolled stock. Full details to be provided.
Applied Standard	Confirms to ASTM E 643-78 or better. Full details to be provided.
Features	<ul style="list-style-type: none"> i. Constant punching speed control, testing speed variable ii. Constant clamping force by the Servo hydraulic cylinder, no slippage during the test; iii. High precision load cell for force measuring iv. Photoelectric encoder for measuring the displacement of punching head v. High control accuracy and fast response to stop the punching head instantly vi. Dual servo systems (punching & constant clamping force) integrated in one machine; vii. High automation: after setting the test parameter, the testing can be done with one click. viii. Deep Drawing Test features used to measure the metal sheet draw ability. Full details of each component to be provided.
Specifications	
Capacity or maximum cupping load	100KN
Load Accuracy	±0.5%
Stroke Speed	0.005 to 250 mm/min
Speed Accuracy	±0.5%
Thickness of Sheet	0.1 to 2 mm(Standard), 2 - 3mm(Non Standard)
Maximum Width of Sheet Material	110 mm
Maximum Clamping Load	100KN Closed loop Servo Hydraulic.
Cupping Value Resolution	0.01 mm
Standard Die specification (mm)	Punch ball: 20±0.05 Pattern Hole: 33±0.1 Fixed pattern hole: 27±0.05
Non-standard Die specification(mm)	Punch ball: 20, 15, 8, Pattern Hole: 40, 21, 11 Fixed pattern hole: 33, 18, 10
Deep Drawing Test	Deep drawing test is used to measure the metal sheet drawability in accordance with related testing standard. The testing will be using spherical punch, and put the specimen being clamped into the die, then punch the specimen until cracks appear. The deep drawing depth is the testing result.' this test is usually carried out on cupping testing machine.
Full details of each component to be provided.	
Standard Accessories	
Testing machine, servo clamping power pack, software for cupping test	1 no.

module;	
Cupping test fixture.	1 no.
Double-acting hydraulic servo pump.	1 no.
Sheet metal specimen.	1 no.
Full details of each component to be provided	
Computer System	PC desktop (Dell/HP/Lenovo) capable of supporting the system software and also interfacing with the controller hardware and having at least Intel i5 7 th generation or equivalent processor and at least 8 GB RAM, minimum 1 TB hard drive, with DVD read-write drive, SD card reader, USB 3.0 ports, HDMI port, Ethernet port and wifi capable and 20 inch or better HD monitor with HDMI cable. Laser colour Printer and online 1.0 KVA UPS for PC should also be included Full details of each component to be provided.
Controls	To Control through Computer system for control, data collecting, data processing, data storage, and test result printing etc. functions of the testing machine. Full details of each component to be provided.

Computerized Vicker Hardness Testing Machine

The Vickers hardness test method consists of indenting the test material with a diamond indenter, in the form of a right pyramid with a square base and an angle of 136 degrees between opposite faces subjected to load. The full load is normally applied for 10 to 15 seconds. The two diagonals of the indentation left in the surface of the material after removal of the load are measured using a microscope and their average calculated. The area of the sloping surface of the indentation is calculated. The Vickers hardness is the quotient obtained by dividing the Kgf load by the square mm area of indentation.

The Vickers hardness testing machine is a simple and accurate means to produce and measure the diamond indentation. The machine is suitable for measuring the hardness of precision metallic parts with wide testing range – from soft to hard.

Technical Specifications and Features Required :

Total Load	1, 5, 10 ,20, 30, 50 Kgf
Digital Hardness value Measurement through PC	Yes
Diagonal Measuring Range (mm)	0.05-0.4
Max. Test Height (mm)	200 or better
Depth of Throat (mm)	135 or better
Optical Measuring Range	0.1-1 mm
Scale Least count(mm)	0.001
Standard	IS 1754-2002 or above
Features	Online indentation setting and focus on PC monitor, User friendly software with windows features, Direct & accurate measurement of Vickers hardness number using “State of the art” image processing technology, Motorized loading and unloading cycles.
Additional accessories	Standard Test Block (01), Diamond Indentors (02), Weights (2 sets), Flat anvil (01), Vee type Anvil (Big & small) (01each), Spanners (02), Electric cord & PC interface cord (01), Video capture (01), Software (01),Instruction manual (02), Machine Cover (01), Reference Test Blocks
Computer System	PC desktop (Dell/HP/Lenovo) capable of supporting the system software and also interfacing with the controller hardware and having at least Intel i5 7 th generation or equivalent processor and at least 8 GB RAM, minimum 1 TB hard drive, with DVD read-write drive, SD card reader, USB 3.0 ports, HDMI port, Ethernet port and wifi capable and 20 inch or better HD monitor with HDMI cable. Laser colour Printer and online 1.0 KVA UPS for PC should also be included Full details of each component to be provided.

Digital Rockwell cum Superficial Hardness Testing Machine

The Rockwell scale is a [hardness](#) scale based on [indentation hardness](#) of a material. The Rockwell test determines the hardness by measuring the depth of penetration of an indenter under a large load compared to the penetration made by a preload. There are different scales, denoted by a single letter, that use different loads or indenters. The result is a dimensionless number noted as HRA, HRB, HRC, etc., where the last letter is the respective Rockwell scale. When testing metals, indentation hardness correlates linearly with [tensile strength](#). This important relation permits economically important non-destructive testing of bulk metal.

Rockwell and Rockwell Superficial Hardness Testing Machine consists of forcing an indenter (Diamond or Ball) into the surface of a test piece in two steps i.e., first with preliminary test force and thereafter with additional force and then measuring depth of indentation after removal of the additional test force (remaining preliminary test force active) for measuring of hardness value.

Technical Specifications and Features Required :

Type	Digital Rockwell & Rockwell Superficial
Total Load (Kgf)	15, 30, 45, 60, 100, 150
Minor Load (kgf)	3, 10
Max. Test Height (mm)	230 (minimum)
Depth of Throat (mm)	133 (minimum)
Operation Cycle	Automatic Load/Dwell/Unload
Test Force Selection	By external dialing
Set Position	With LCD bar indicator
Key board entry	Through membrane switches for scale, GO-NO GO & dwell time selection
Power Supply	220VAC/50Hz/1phase
Resolution	0.1 Rockwell or 0.1 Rockwell Superficial
Additional accessories	Testing table 50mm dia. (01), Testing Table 38mm dia with 'V'groove for round jobs 6 to 45mm dia. (01), Diamond Indenter-Rockwell SF (02), Steel Ball Indentor 1/16'' with 5 spare balls (1 set), Test Block Rockwell 'C' (02), Test Rockwell 'B'(02), Test Rockwell 'A'(02), Test Block HR 30 N(02), Allen Spanners (05), Wooden Box for Accessories (01), Telescopic Sleeves for Elevating screw protection (01), Spare Fuse 1 Amp (10), Power Cable (01), Instruction manual (02), Machine Cover (01) , Screw Driver (01), Clamping Device (01)

Brinell Hardness Testing Machine

The Brinell hardness test method is used to determine Brinell hardness. Most commonly it is used to test materials that have a structure that is too coarse or that have a surface that is too rough to be tested using another test method, e.g., castings and forgings. Brinell testing often use a very high test load (3000 Kgf) and a 10 mm wide indenter so that the resulting indentation averages out most surface and sub-surface inconsistencies.

Brinell hardness test consists of forcing a hardened ball into surface of a test piece with a specified test force and measuring the diameter of indentation for evaluation of Brinell hardness number.

Technical Specifications and Features Required :

Type	Computerized (PC based) Fully Automatic Brinell Hardness Testing Machine conforming to IS:2281, BS10003-2 ASTM E -10
Total Load (Kgf)	250 to 3000 in stages of 250
Max. Test Height (mm)	380 or better
Depth of Throat (mm)	200 or better
Maximum depth of elevating screw below base(mm)	180 or better
Machine height	1185 mm or better
Dwell timer	1-99 seconds
Measuring Accuracy with CCD camera and built in optics	0.01 mm
Raising/Lowering	240 mm/min
Power Supply	415V AC/50Hz/ 3phase
Additional accessories	Testing table 200mm dia. (01), Testing Table 70mm dia (01), Ball Holder 5mm (01), Ball Holder 10mm (01 set), Test Block HB-5/750 (02), Test Block HB-10/3000 (2), Telescopic Cover for elevating screw protection (01), Instruction Manual (02), Machine cover (01)
Software	Advanced Window based software Latest GUI features with user friendly software. On line indentation setting and focusing on PC monitor. Advanced image processing: Algorithms implemented for precise calculations of hardness numbers with various options to cover all ranges of specimens. Batch files processing: Option for data/storage and reports generation. Statistical Evaluation: Software for calculating standard deviation, mean, median, frequency distribution graph, variation graph etc. Calibration mode facility. Extendibility for future advanced image processing analysis, requirements. Auto measurement start from machine.
Computer System	PC desktop (Dell/HP/Lenovo) capable of supporting the system software and also interfacing with the controller hardware and having at least Intel i5 7 th generation or equivalent processor and at least 8 GB RAM, minimum 1 TB hard drive, with DVD read-write drive, SD card reader, USB 3.0 ports, HDMI port, Ethernet port and wifi capable and 20 inch or better HD monitor with HDMI cable. Laser colour Printer and online 1.0 KVA UPS for PC should also be included Full details of each component to be provided.

Digital Portable Hardness Testing Machine

The impact type portable hardness tester is designed for testing metallic materials, the hardness of which ranges from very low to very high values. Hardness testing can be performed directly on-site & in any position. Typical applications for this Impact type of hardness tester are for large, heavy work pieces, which are difficult to access. It is especially suitable for applications in which static testing is not feasible or not economical.

Technical Specifications and Features Required :

Application	<ul style="list-style-type: none"> i. Hardness testing of mass-produced parts during manufacturing operation. ii. Hardness tests on installed machines or steel structures. iii. Rapid testing of multiple measuring areas for examining hardness variations over large regions. iv. Control measurement for rapid determination of a specific thermal treatment result, e.g. annealed or quenched & tempered. v. Work pieces for which the indentation made by the hardness test must be as small as possible & may not leave sharp edges, e.g. on rolls or ground surfaces of machine parts.
Specifications	<ul style="list-style-type: none"> i. Weight of component of Compact Shape On a Solid Support coupled ranging from 0.1 Kg to 15 Kg. ii. Should be able to work on minimum Thickness of Layer for Surface Hardened Component from 0.1 mm or better. iii. Should be able to work on Min. Thickness of sample: - 5.0 mm. (Coupled 3.0 mm.) or better. iv. Measuring accuracy:- Mean uncertainty +/- 2.0 % (corresponding to +/- 1.6 HRC at 58 HRC) on standard test block. Or +/- 10 BHN on brinell test block. <p>Measuring Range: Brinell: 30- 650 or better Vicker: 80 - 940 Rockwell: 20 - 100(covering HRB and HRC scales)</p> <p>Machine should have digital display with keypad function like Save data, Restart, on/off, print facility.</p> <p>For comparison between Impact Hardness Value & hardness number of other systems, such as Brinell, Vickers, Rockwell, etc., conversion formula should be there.</p> <p>Should be light in weight to carry and battery operated.</p> <p>The instrument has compensation for the angle of probe with respect to vertical while testing.</p> <p>Immediate conversion between available conventional scales of hardness.</p> <p>Standard deviation & average results up to nine readings can be taken or better.</p> <p>The readings can be recorded & recalled for later viewing. The max capacity being 500 readings. The readings are stored serially & the serial number being displayed.</p> <p>There is a batch number facility as well to distinguish from batch to batch. The entire batch readings can be cleared or the batch number can be reset using the specific keys.</p> <p>The machine calibration can be done using the keyboard & there is no need of any expertise to recalibrate the machine.</p> <p>Should be able to work on following metals ST- Low to medium low alloyed carbon steel Cold work tool steel, Gray Cast Iron, Nodular Cast Iron, Copper/ Zinc Alloys(Brass), Alloys(Bronze), Cast Aluminium Alloys, Wrought Copper Alloys, Carbon Graphite, Stainless Steel etc.</p>
Additional accessories	<p>All probes satisfying job as per specifications and covering all scales should be included.</p> <p>Adaptors for flat jobs or curved surface should be there.</p> <p>Printer cable and all related accessories should be included.</p> <p>Standard Test block for different range for Vickers, Rockwell and Brinell to be provided as a part of system.</p> <p>Samples to be provided for performing test</p>

GENERAL TERMS AND CONDITIONS

Installation and Commissioning	The bidder should take full responsibility for supply, erection and installation and training of all the Eight Machine in the SOM lab of the department on tunkey basis and performance of the machines demonstrated to the satisfaction of the users. Necessary fittings and fixtures required for the installation will be in the scope of the bidder only.
Maintenance and service support of system during and after the warranty Period	<p>a) The bidder should have competent and reliable service network in India for quick and necessary repair and maintenance of the machine.</p> <p>b) The bidder should provide the list of minimum three users of the same make (viz. IITs, NITs, reputed national Labs like DRDO, NAL etc., reputed public limited firms) along with the satisfaction certificate and their contact details.</p> <p>c) Details of the nature of service support the vendor can provide should be provided.</p> <p>d) Warranty should be for at least three years (3 years) after installation. At least 2 years of annual maintenance contract (AMC) after 3 years warranty should be provided without any additional cost.</p> <p>e) The bidder should commit to provide maintenance service and supply necessary spares for the machine for at least 10 years after successful installation and commissioning.</p> <p>f) Two sets of operation and maintenance manuals along with all necessary drawings should be supplied along with the machine.</p> <p>g) Specimen samples for all the tests that can be performed on the machine must be provided.</p> <p>h) The bidder should enclose all the relevant technical documents and catalogues for all the components.</p> <p>i) There should be OEM or Authorized agency in India for at least the last 3 years to ensure strong ties inside India for future maintenance/warranty convenience for the machine</p> <p>j) The supplier should provide NABL Certificate for each year for every machine throughout period of warranty and AMC.</p> <p>k) Turnover of bidder for each year should be 30 Crores or more for last three years and balance sheet need to be attached along with Bid.</p> <p>l) Bidders not providing point wise detailed technical specifications of the offered machines in the compliance statement shall be summarily rejected.</p> <p>m) Bidder should arrange pre award demo during technical evaluation if required. Institute has the right to reject the bid if pre award demo is not found up to the satisfactory level.</p> <p>n) Predispatch inspection is required.</p> <p>Full details of each component to be provided.</p>
Other conditions	<p>a) Maximum education discount, if any, should be offered and rates should be FOR NIT Kurukshetra.</p> <p>b) Training to laboratory personnel to their satisfaction by the experts after installation and commissioning at NIT Kurukshetra.</p> <p>c) Prices should include the installation and training cost.</p> <p>d) Should carry proper certifications like agency certificate, Proprietary certificate, etc.</p> <p>e) Compliance statement needs to be provided by bidders clearly specifying specifications against the requirements with remarks of all of the points. Only Comply/Ok/Yes will not be considered and NIT Kurukshetra has right to reject without notification.</p> <p>g) Up gradation of software free for 15 years that will be compatible to any higher version of windows operating system.</p> <p>h) Annual Calibration Certificate during warranty and free AMC period.</p> <p><i>This Tender is on Turnkey basis and need to be quoted as a package of all machines and not as individual machines.</i></p> <p>Full details of each component to be provided.</p>