

DOCUMENT**Open Competitive Bid (OCB)****For****Supply and Installation of equipments to****Materials Characterization Lab****and****Materials Testing and Processing Lab of****Metallurgical & Materials Engineering Dept.****at the three campuses of****Rajiv Gandhi University of Knowledge
Technologies****Proprietary & Confidential****RAJIV GANDHI UNIVERSITY OF KNOWLEDGE
TECHNOLOGIES****Ground Floor, Vindhya C4 Building,
IIT-H Campus, Gachibowli****HYDERABAD- 500 032 Phone: 040-23001830**

Proprietary & Confidential


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News paper advertisement

Tender Notice

	<p>RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES</p>
	<p>Ground Floor, Vindhya C4 Building, IIT-H campus, Gachibowli, HYDERABAD- 500 032 Phone: 040-23001830</p>
<p>Sealed Tenders are hereby invited from reputed Manufacturers or Authorised dealers for supply and installation of equipments of the following labs at the three campuses of RGUKT located at Basar (Adilabad District), Nuzvid(Krishna District) and RK Valley (YSR Kadapa District) of Andhra Pradesh:</p>	
<ol style="list-style-type: none">1) Manufacturing Process Lab of Mechanical Engineering Department2) Materials Characterization Lab& Materials Testing and Processing Lab for Metallurgical and Materials Engineering Department.	
<p>Last date of submission of tender along with EMD as specified in the bid document is on 03.01.2013 before 04:00 PM.</p>	
<p>Interested parties can collect the Tender document from 17.12.2012 to 02.01.2013 against payment of Rs. 1,000/- towards the cost of Tender document fee (non-refundable) separately for each department through D.D. from any Nationalized Bank payable to REGISTRAR, RGUKT at Hyderabad from the office of the RGUKT. For further details visit our website www.rgukt.in</p>	
<p>Date:15.12.2012</p>	<p>-Sd- Registrar</p>

Time schedule of various Short tender related events

Bid calling date	15.12.2012
Sale of document	From 17.12.2012 to 02.01.2013 up to 05:00 P.M
Pre bid meeting	20.12.2012 at 4.30PM
Bid closing date/time	03.01.2013 at 04:00 P.M
Technical Bid Opening date/time	03.01.2013 at 05:00 P.M.
Price Bid opening date/time	05.01.2013 at 04:00 P.M
Bid Document fee	Rs.1,000/-
Contact person	Registrar, RGUKT
Reference No	RGUKT/Proc/MME/MCL&MPL / T29/2012

Note: Tender documents purchased bidders are only allowed to participate in Pre-Bid meeting

Registrar,
RGUKT

TENDER FORM

Not transferable

Reference. No. RGUKT/Proc/ MME/MCL&MPL/T 29/2012

Dated 15.12.2012

Subject: Invitation of Tenders for Supply, installation and commissioning of Materials Characterization Lab and Materials Testing and Processing Lab Equipments to the Metallurgical & Materials Engineering Departments at three campuses of RGUKT located at Basara (Adilabad Dist), Nuzvid (Krishna Dist) and RK Valley (YSR Kadapa Dist) of Andhra Pradesh.

Last date and time for submission of the TENDER AT RGUKT, Vindhya-C4, IIIT Campus, Gachibowli, HYDERABAD is **03.01.2013 up to 4:00PM**

Dear Sir/Madam,

- A. RGUKT invites sealed tenders comprising technical bid and price bid separately from reputed manufacturers (or) authorized dealers for three RGUKT IIITs located at Basara (Adilabad Dist), Nuzvid (Krishna Dist) and R K Valley (Kadapa Dist) of Andhra Pradesh.
- B. The Tender form consists of **48 pages of which pages from 7 to 18** are instructions and **page No.39** contains the format for financial bid. The duly completed Technical Bid together with a copy of the bid document (this tender) signed on all pages by the Bidders authorized signatory and the Price Bid should be kept in separate sealed covers. These sealed covers must be submitted in a sealed master envelope super scribed "Tender for Supply, Installation & Commissioning of Materials Characterization Lab and Materials Testing and Processing Lab Equipments to the Metallurgical & Materials Engineering Departments at the three campuses of RGUKT. The last date for submission of bid is **03.01.2013 and closing time is 04:00 PM.**
- C. The Sealed Tenders should be deposited in the Tender box kept in the office of Registrar, RGUKT, Hyderabad up to **04:00 P.M. on 03.01.2013.**

For any clarification and further details on the above tender please contact by Telephone No: 040-23001830 or Contact in Person during office hours.

Thanking you

Yours faithfully,

Registrar,
RGUKT.

STATEMENT OF IMPORTANT LIMITS/VALUES RELATED TO BID

Item	Description
EMD	Rs. 1,00,000/-by way of Demand Draft drawn from any Nationalized Bank or by way of irrevocable bank guarantee from any Nationalised Bank only. DD/BG from other than Nationalised Banks will not be accepted.
Bid Validity Period	90 days from the date of opening of Financial bid
EMD Validity Period	90 days from the date of opening of Financial bid
Warranty Period	3 years comprehensive warranty
Variation in quantities/number of residents	+ 40 %
Period for furnishing performance Security Deposit	Within 10 days from date of receipt of award
Delivery Schedule	Bidder shall deliver the goods in one single lot within 30days from the date of award of the contract.
Performance security value	5% of contract value by way of irrevocable Bank Guarantee from any Nationalised Bank
Performance security validity period	38 months from award of contract (including 30 days of installation period)
Period for signing the order Acceptance	Within 7 days from date of receipt of notification of award

Payment terms	
On delivery at user site	<p>Payment for goods and services shall be made in Indian rupees as follows.</p> <ol style="list-style-type: none"> 1. 80% of payment will be paid after installation, commissioning 2. Balance 20% will be paid after 3 months after obtaining the satisfactory certificate from the Director, RGUKT IIITs.
Maximum Liquidated Damages for late deliveries	<p>For delays:- If the supplier fails to deliver any (or) all of the goods or perform the services within the time period specified in the contract the purchaser shall without prejudice to its other remedies under the contract deduct from the contract price as liquidated damages a sum equivalent to 0.25% of the contract value per day until actual delivery or performance up to a maximum deduction of 10% of the delayed goods or services contract price. Once the maximum deduction is reached, the purchaser may consider the termination of the contract duly forfeiting the performance security etc.,</p>

ELIGIBILITY CRITERIA

- 5.1. This bid is open to all firms within India who are eligible to do business under relevant Indian laws as in force at the time of bidding, subject to meeting the pre-qualification criterion. They should provide list of customers of previous supply of similar/ same items to IITs, NIT's or Central Universities or any Academic Institute of National repute with contact details. Copies of orders received from the reputed firms on bidding firm need to be submitted.
- 5.2. The bidder should have servicing facility or work shop with in India so the provision of service is possible at a short notice and without incurrance of delay.
- 5.3. The Bidding firm should have minimum turnover as follows:

Bid Value offered against the tender call	Last financial year's business turnover
25 lakhs	50 lakhs
50 lakhs	1 crore
50-100 lakhs	2 corers
Greater than 100 lakhs	3 Crores

The bidder should have adequate experience in supply of such materials/ equipment as required in the tender. Bidder should furnish proof of having supplied such materials as required in the tender in the previous financial year ending 31st March 2012 as mentioned above. A certificate of the bidder's turnover in Rupees must be enclosed and be duly certified by a firm of chartered accountants. In this certificate the turnover of subject material during 2011-2012 (ending with 31.03.2012) must be covered.

- 5.4. The bidder should furnish satisfactory performance certificate from the parties concerned to whom bulk supplies were effected, in case such supplies were made. RGUKT may contact any such parties to elicit details.
- 5.5. Bidder should be registered under VAT Act/CST Act with the relevant State Sales Tax Authorities. He should furnish along with the bid document, the relevant VAT/CST Registration Document and PAN / TAN Card copies.
- 5.6. All bidders shall also include the following information and documents with their tenders (in the Technical bid cover)
- 5.6.1. Copies of original documents defining the constitution or legal status, place of registration, and principal place of business of the bidding firm/entity; written power of attorney of the signatory of the Bid to commit the Bidder.

- 5.6.2. Machinery/equipment owned by the bidder and number of employees.
 - 5.6.3. Latest Income Tax returns and VAT/CST Returns filed.
 - 5.6.4. List of Present Clientele with contact addresses & telephone numbers.
- 5.7. All the certificates furnished along with technical bids should be attested by a Gazetted Officer, counter signed by bidder along with their seal.

The bidders must submit all relevant documentary evidence in support to their claim for eligibility in placing bid. **The tenders received without the above documents will be rejected.**

Requirement of Materials Characterization Lab Equipments

S. No	Item	Total qty required
1	Floor Mounted High Resolution Laboratory X-ray Diffract meter (MCL)	03
2	Field Emission Scanning Electron Microscope(MCL)	03
3	Metallurgical Optical Microscopic System (MCL)	03

1. Floor Mounted High Resolution Laboratory X-ray Diffractometer

Usage: System to be used for Phase analysis of Powder samples:

Overview :

The XRD system offered must be of latest generation state of the art system which is suitable to work in either Bragg-Brentano or Parallel Beam Geometry using appropriate hardware and software. The XRD system should be preferably equipped with automatic component recognition system in real mode including the type and focus direction of the xraytube, optics in both primary and secondary side to be used during a particular XRD experiment.

Specifications:

a. Goniometer:

- Vertical Goniometer with variable measuring Circle Diameter useful for intensity and resolution based XRD application
- θ/θ Geometry useful in both reflection and transmission mode by keeping the Sample stage in horizontal position
- Scanning range (2θ): from 0.5° to 165° or better
- Minimum Step size - better than 0.0002°
- Angular reproducibility (2θ): 0.0001° or better
- Angular positing mechanism: Motor driven with highly accurate optical encoders

b. X-Ray Generator: 3KW (20-60 kV, 5-60 mA) in steps of 1kV and 1 mA with high stability of better than $\pm 0.01\%$ per 10% variation of mains voltage.

- c. X-ray Tube: Cu (2.2 KW, 60 KV), Long fine focus (one line and one point focus), ceramic insulated is to be included in the basic system. The changeover from line focus to point focus and vice-versa must be completed without any realignment. Necessary beta filters for Cu should be included.
- d. Sample Stage: Sample stage for mounting flat powder samples should be provided with adequate sample holders.
- e. Detector: Very-fast solid state 1 Dimensional detector without the use of any Gas/Liquid Nitrogen in its operation. The detector should have big active area for wide 2theta angular coverage. The Detector must be able to operate in both fixed and scanning mode. Necessary hardware & software must be in-built to reduce the fluorescence while working with the samples which yields fluorescence using Copper radiation. It must be able to work in both 0 dimensional and 1 dimensional mode. Necessary application note/ product details must be enclosed with the offer to support the above requested facility.
- f. Slits: Programmable automatic divergence slit and secondary anti scatter slits capable of operation in fixed or automatic mode.
- g. Radiation Control: As per the latest international safety norms. The offered XRD system must comply with the requirements of the Machinery Directive 2006/42/EC for European Manufacturer or equivalent norm for non-European Manufacturer.
- h. Software: Windows based full instrument control, auto alignment for the XRD system, Data acquisition, Processing, Search match, Background subtraction, α_2 stripping, Smoothing, XRD system diagnostic facility, printing for publication purpose, Phase analysis, Rietveld refinement software for Lattice parameter refinement, indexing, crystallite size determination, micro-strain determination, standard-less Quantitative analysis, Profile Fitting, Ab-initio method based structure solution from Powder data, remote diagnostics and remote operation facility. All software and hardware must be original licensed version and to be provided with individual catalogue no.
- i. Standard sample for calibration: The NIST standard sample for periodic checking of system alignment to be included in the basic system.
- j. Other Accessories:
 - 1. Suitable 2Ton (cooling rate minimum 6000 kcal/hour) external water chiller for XRD (1 phase) from reputed manufacturer.
 - 2. Latest desk-top computer with 19" TFT LCD color monitor.

3. Color Laser printer
 4. Additional Cobalt x-ray tube with ceramic insulation, long fine focus (one line and one point focus) with necessary beta filters.
 5. ICDD PDF2 and ICSD database
 6. Rotating sample stage with facility to control the rotation speed through software. The sample stage should be usable for both reflection and transmission measurement.
- k. **Warranty:** The entire XRD system including Indigenous items must carry a warranty for 36 months including the X-Ray tube and spares from the date of installation. No additional charges will be paid against the warranty as asked in the tender. The XRD manufacturer must guarantee that all the warranty replacement parts should be delivered to our installation site on DDP (Delivery Duty paid) basis. Institute will not pay any customs duty or any other charges during these warranty replacement.
- l. **System Upgradability:** The Quoted XRD system must be upgradable at site in future for High Temperature, Low Temperature Phase analysis, Residual Stress and Texture, SAXS measurement, Thin Film analysis etc. The manufacturer must confirm this facility clearly in their tender document.
- m. Training should be offered by the application experts for all the mentioned application including Rietveld analysis and routine maintenance and trouble shooting at our site for at least 15 working days.
- n. Users list and certificates of successful completion issued by the clients during the last 3 years must be enclosed.
- o. The following manuals must be provided with supply of the item.
- 1) Installation and Operation manual
 - 2) Maintenance manual with trouble shooting procedures
 - 3) Service manual with circuit diagrams of sub systems and electronic boards.
- p. Power: Single phase, 230 V operations.
- q. Technical compliance Statement with original XRD manufacturer's seal and stamp in original must be enclosed.

2. Field Emission Scanning Electron Microscope

Description of item

Scanning electron microscope for High-resolution morphological and compositional analysis of materials such as metals, metal oxides, semiconducting materials, polymers, nano-composites etc.

Specifications of scanning electron microscope

A. Microscope

- Resolution: 1.0 nm (at accelerating voltage 15 kV); 1.5 nm (at accelerating voltage 1 kV).
- In low vacuum (SE) (2.0nm at 30kV)
- Magnification range: X 25 to X 1,000,000
- Accelerating voltage: 0.1 to 30 kV
- Probe current: Up to 200nA at 15kV
- Electron gun: Schottky field emission with In-Lens gun with warranty for three years or more.
- Specimen Stage: PC controlled large eucentric stage with 5 axes motorized movements.
X=70mm, Y= 50mm, Z= 1.5 to 25mm and tilt -5 to 70°, tilt = 360°.
- Specimen size: 150mm or better.
- Ability to view non-conducting specimens
- Specimen exchange: Easy sample introduction through an air lock mechanism
- Multi Specimen Holder: For introducing many specimens
- Detectors: Upper and Lower SE Detector, BSE, EDS and Low Angle Backscatter Electron Detector, ET secondary electron detector, Low vacuum SE detector
- Nano-area analysis: Controlled Spot size with high-resolution analysis.
- Scanning/Display System: A high-definition display system with 1280 X 960 pixels or better for high quality image in real time under graphical user interface.
- Vacuum System: Fully automated ION pumps & Turbo Molecular pump.
- Safety Devices: Devices for protect ion against vacuum, water, power, nitrogen gas pressure failures and ground fault.

System Control

- Appropriate microscope control software for alignment, image capture and archival etc. (system should be capable of automatic gun alignment)
- Should offer both automatic and manual control of features like dynamic focus, topographical contrast, compositional contrast, astigmatism correction.
- Dell/HP make PC with Intel Pentium dual core processor or better, 8GB DDR RAM or better, 320 GB hard disk or better, minimum 2 No. of USB ports accessible from the front panel, 52 x or better read/write DVD drive, 2 No. of 24" LED monitors, wireless keyboard and mouse.
- Anti-vibration table for chamber, microscope column and support for monitor.
- Latest Microsoft Windows based operating system (preferably windows 8)
- State of the art software for image acquisition and post processing. All software features should be open for access with proper licensing.
- Utilities such as data archiving software, report generation wizard, multiple image alignment software and different contrast enhancement
- Software: Complete software for image analysis.

B. Energy Dispersive X-Ray EDS Detector Peltier cooled and LN2 Free Spectroscopy (EDS) System:

1. Motorized Detector Movement
2. Resolution: 127eV or better at MnK_{α}
3. Detection : from Be to U
4. Computer with 24" Monitor
5. Software for Qualitative and Quantitative analysis, Mapping and
6. Point & ID Navigators
7. EDS system software should be designed to be extremely user friendly catering to applications (a) Elemental analysis, multi element mapping with chemic information, (b) in built help, (c) Customized reporting,(d) Automatic qualitative & quantitative analysis, Smart map, Pt& ID – Image correlated area analysis and automatic data collection in specified analysis area, (e) phase analysis, (f) spectrum synthesis, etc.

C. Optional : STEM Attachment for Transmission Electron Detecting device, sputter coater

(2) EBSD attachment

- D. Future Upgradeability:** The specimen chamber should be large and compatible to accommodate other detectors such as EBSD, WDS, CLD and CCD Camera for future requirements.
- E. Chiller:** Cooling Water Circulator.
- F. Battery Backup unit:** For maintaining the vacuum and electron gun.
- G. Sputter Coater (Optional):** Carbon Coating of the non-conducting specimens.
- H. Standard specimens:** For demonstrating the maximum resolution and magnification capability of FE-SEM and performances of EDS and STEM attachments.
- I.** A separate computer with dedicated quantitative image analysis software is to be provided for image analysis and corresponding data storage. The software should provide at least the following basic features:
 - Point, linear and area measurements (for
 - volume fraction, particle size and spacing, grain size etc.,)
 - Line profile
 - Annotation
 - Image archival and retrieval
 - Database (with functionalities)

Spares and consumables

- Equipment supplier should provide a complete set of spare and consumables(including filaments) for three year troublefree operation (Please provide a complete list of spares with item-wise price)

Calibration standards

- Standard samples to check system calibration and other parameters should be supplied.
- Documentation: At least two hard copies in original form need to be provided. The manual shall explain the Safety instructions, general information about system, testing procedure, instruction for routine and periodical maintenance, instruction for operation, error message manual, machine calibration manual, preventive maintenance manual, trouble-shooting manual, electrical and electronic circuit diagrams, complete list of parts with identification numbers.

Manuals and circuit diagrams

- ❖ Complete set of manuals for the operation and the servicing of the equipment. All circuit diagrams, block diagrams and other electrical and mechanical

schematics must be provided for main unit, subsystems and accessories (Including bought-out items).

- ❖ A list of laboratories in India where same/similar models from the manufacturer are already in use must be furnished with the bid.
- ❖ The instrument shall bear 3 years comprehensive warranty.

Pre-Installation Requirements •

- ❖ Pre-installation requirements such as room size, required power rating, utility requirements – CC chiller, gases (argon, N2) etc. are to be clearly mentioned.
- ❖ Site inspection and qualification must be performed by vendor's authorized representative, well in advance of system delivery

Post installation training

- ❖ One week training on the instrument after its successful installation and commission will be provided for 4 people on the equipment's operation, maintenance and trouble shooting.

3. Metallurgical Optical Microscopic System (MCL)

A. Microscope

- ❖ Fully automatic Metallurgical Microscope with bright-field, dark-field and DIC/NIC and polarizing contrast observation modes.
- ❖ A contrast manager for automatically changing the contrast of image.
- ❖ DIC function should be automatic by just touch of a button –or the polarizer, analyzer and DIC prisms should be brought in the optical path or by computer control
- ❖ System integrated automated z-focus with programmable multi-steps. Bid must specify the no of levels possible in automatic z-focus
- ❖ Binocular tube
- ❖ 12V 100W illumination with built in power supply AC 90-250V or LED illumination with separate control box with 2- RS232 and 2- USB ports
- ❖ Switching of Objective: switching shall be either automatic or manual
- ❖ The objective turret is motorized/ coded objectives with provision for at least 5 objectives.

- ❖ Manual override facility for the z-focus.
- ❖ Microscope shall have a manual/motorized reflector turret
- ❖ It shall have motorized field diaphragm and aperture diaphragm
- ❖ Parfocality management in sharp images
- ❖ Constant color intensity control for maintaining the color temperature of the illumination at 3200 K.
- ❖ Optional facility to store several settings of microscope and camera for specific samples including the specific objective used, so Just by selecting the method microscope and camera will be ready for operation or system prompts for manual intervention to progress towards the set parameters
- ❖ Basic stand shall have programmable buttons to change functions like
 - ❖ Illumination manager
 - ❖ Focus functions
 - ❖ Camera port operation
 - ❖ Magnification
 - ❖ Fluorescence functions
 - ❖ Control element for Z and X-Y-stage movement
 - ❖ Manual stage
 - ❖ Position memory slot for fast travel to selected Z positions
 - ❖ Semi Apo Chromatic Objectives between 5x to 100x
 - ❖ Eyepiece 10x/25x
 - ❖ Motorized port for attaching camera
 - ❖ C-mount adapter for Camera

B. Digital camera

- Fast, full color real-time live imaging
- 5 Megapixel High resolution CCD camera
- 12/16/32 bit analog-digital conversion for optimum color reproduction 36 bit color depth
- Color or gray-scale images
- Large 3.4 μm x 3.4 μm pixel size for high sensitivity Binning facility
- Exposure time of 1 ms to 60 seconds

- Intuitive user interface with convenient image capture and image editing functions
- Shading correction applied to live and captured images
- FireWire B interface for compatibility with a wide range of computers
- Ultra compact metallic housing for thermal noise dissipation

C. Computer interface

- PC with high end graphics card, 22" LCD monitor & HP/Canon laser monochrome printer
- Any peripheral required for interfacing and operation of computer with other elements of the microscopic system

D. Camera Control Software

Camera should be supplied with software with following facility.

- Complete control of the camera functions like white balancing, Gamma, color saturation, exposure time should be possible.
- Facility for both Monochrome and color images should be possible
- Facility to invert the images both vertically and horizontally should be possible
- Control facility for the microscope should be possible
- If the details of objective, eyepiece, magnification changer and C-mount is fed in the software, it should do automatic calibration .
- Facility for manual calibration with stage micrometer should be possible
- Facility to compare live image and stored image side by side on the screen should be possible.
- Stitching the individual images manually for getting the mosaic image of the sample should be possible.
- Micron marker, point to point length measurement, Annotation should be possible

E. Software

Microscope system software conforming to applicable ASTM, ISI,DIN and JIS standards:

- Basic Software enabling the functionality of microscope, enabling the interfacing the other application softwares and report generation capability
- Quantitative metallography software that demonstrates interactively the point, lineal, areal, aspect ratio measurements on the sample.

- Phase analysis software
- Nodularity and nodule count analysis software for cast irons
- Grain size, shape analysis software.

F. Optional items

All additional add-ons (both hardware and software) that enhance/extend the capability of configuration need to be quoted as optional items.

G. Manuals

Operation and maintenance manual: At least two hard copies in original form need to be provided. The manual shall explain the Safety instructions, general information about system, testing procedure, instruction for routine and periodical maintenance, instruction for operation, error message manual, machine calibration manual, preventive maintenance manual, trouble-shooting manual, electrical and electronic circuit diagrams, complete list of parts with identification numbers.

Requirement of Materials Testing and Processing Lab Equipments

S. No	Item	Total qty required
1	Creep Stress Rupture Testing Systems	09
2	Instrumented Pendulum Impact Tester (450 J Capacity)	01
3	Portable / Laboratory Induction Melting furnace	03

1. Creep Stress Rupture Testing Systems:

Scope:

Fabrication, testing, delivery and commissioning of creep testing machines.

This specification provides general & special requirements of supply, fabrication, testing, installation and commissioning of creep and stress rupture machines for testing in air environment in accordance with ASTM E139 testing standard.

A. General specifications of the systems :

1. The machine shall comprise a loading frame with an integral control cabinet. A load of up to 50kN is to be applied through a lever arm with a single lever ratio of 1 : 20 and a load accuracy of +/- 0.5 %.
2. The machine shall be equipped with a three zone furnace to carry out the tests at high temperature in the range 373 K to 1273 K with an accuracy of +/- 1 K. The uniform hot zone temperature will be ensured on the test specimen over a length 150 mm.
3. High precision, high accuracy temperature controller and power control unit is to be employed to achieve the above mentioned temperature accuracy.
4. Separate controllers would be employed to control the temperature of each zone. The detailed specifications of the furnace and temperature controller with power supply unit are specified below. Since the creep tests are of longer duration, the furnace shall perform uninterruptedly during the creep test.
5. Automatic load lever beam leveling device with over travel trips shall be given. Provisions shall be made to prevent the motorized draw head assembly from exceeding the limits during manual or mechanical operations.
6. There shall be a provision to manually operate the draw head motor (i.e. the motor and gear assembly which supports the creep specimen train) electrically to move it up or down. During the test, it shall be ensured the draw head motor moves down automatically by the above said beam-leveling unit.
7. There shall be a provision to de-clutch the motor assembly from the gear assembly so that (hand wheel or equivalent) the specimen train assembly can be moved up or down manually.
8. The specimen elongation (strain) shall be measured by using Linear Variable Differential Transformer (LVDT) during the test.
9. Signal conditioner and scanning unit for LVDT shall also be supplied.
10. Continuous temperature and strain measurements and also storage and analyses of data are required through computer controlled data acquisition system.
11. There shall be a provision to automatically shut off the electrical power to the machine when the specimen breaks.
12. The operating power for the whole control cabinet and the furnace would be of 230 volts single phase 50 Hz.
13. The main switch and the other switches for temperature controllers, elevator motors etc. shall be provided with suitable good quality circuit breaker for the safety reasons.
14. Fuses shall be used wherever required and the fuse points shall be easily accessible.

15. Spirit level shall be mounted on top of lever arm in each machine, so that the horizontal position of the beam can be confirmed periodically or as and when required.
16. Provision shall be there, to put off the power to the furnace, in case of overshooting of temperature due to malfunctioning of any of the temperature controllers.

B. Mechanical Systems :

The mechanical system shall comprise of the following:

- a. Frame: The material for the frame is of suitable mild steel (MS) or equivalent. All the MS components shall be painted or powder coated.
- b. Lever Arm.
- c. Clutch and Draw Head Assembly
- d. Elevator
- e. Hand Wheel
- f. Motorized Load Train assembly
- g. Three pairs of adaptors / grippers shall be supplied with each machine. M8, M10, M12 with standard pitch.
- h. Clevis and Coupling
- i. Stud
- j. High temperature Creep Extensometer
- k. Weights of denominations suitable to entire range of 5000 Kgf(Lever Arm is 1:20} . Weights have to be supplied in Newtons. Conformity by the supplier shall be done.

C. Furnace Specifications:

Number : One with each machine

Type: Three-zone vertical cylindrical furnace shall be of split construction hinged in the rear. Other end will have provision for locking at top and bottom using CAMLOC type of assembly or equivalent.

Top and bottom finish insulation: shall be low thermal conducting (low „K“ factor) vacuum cast ceramic fiber insulation to provide minimum heat loss, high temperature capability and for rigid structure.

Exterior Finish: The outer shell shall be made by a bright stainless steel 1.4 mm thick or above. Closures at top and bottom of the furnace shall fit snugly around pull bars and reduce the heat loss at these points.

Provisions shall be there to seal the top and bottom of the furnace by the compressed cast ceramic fiber insulation.

Clamps or equivalent can be provided to keep the tight fitting of the above thermal insulation boards to seal the leakages.

Dimensions : (Approximate.)

Outer Diameter : 14" (350 mm or more.)

Inner Diameter : 3"

Height : 15" (375 mm or more upto 400 mm)

Uniform temperature zone at the middle of the furnace shall be of 150 mm.

The power supply terminals to the furnace shall be kept near the hinges

Heating Element: Kanthal – A1

Max Temperature: 1100 deg C

Operating Voltage: 230 V AC single phase 50 Hz.

The rear-hinged part of the furnace shall be mounted on the machine frame such that the frame position of the furnace is adjustable vertically.

D. Detailed Specifications of PID Temperature Controllers and Thyristor Power Control Units

- PID Temperature Controller : Three Numbers with each machine m
- High quality controllers of EUROTHERM Make or equivalent
- **Input :**
 1. Temperature Range : 0 – 1373 K
 2. Input Range : +/- 100 mV and 0 to 10 VDC (Auto ranging)
 3. Sample rate ; 9 Hz (110 mS)
 4. Calibration accuracy : 0.25 % of reading +/- 1 LSD, +/- 10 C/F
 5. Resolution : < 1uV for +/- 100 mV range, < 2.0 mV for +/- 10 VDC range.
 6. Linearization Accuracy :< 1.0 of reading
 7. Input filter : 1.0 to 999.9 seconds
 8. Zero filter : shall be available
- **Thermocouple :**
 1. Cold Junction compensation Automatic
 2. Thermocouple break protection shall be available
 3. Output Relay output and control output (4-20 mA)
- **Control Functions :**
 1. Modes PID or PI with overshoot inhibition, PD, PI, P only on/off

2. Application Heating and cooling
3. Auto/manual Bump less transfer
4. Set point rate limit 0.01 to 99.99 degrees or displays units per minute
5. Cooling algorithms Linear
6. Tuning: One-shot tune Automatic calculation of PID and overshoot inhibition parameters
7. Automatic droop Automatic calculation of manual reset value when using PD control
8. Alarm types Full scale high or low, Deviation high, low, or band.

- **General :**

1. Display Dual, 4 digit x 7 segment high intensity LED
2. Dimensions 48 x 48 x 103 mm (width, height and depth respectively)
3. Supply 230 V AC, 50 Hz, 10 Watts max
4. Temperature and RH 0 to 55 deg C RH: 5 to 90 % non-condensing
5. Panel sealing
6. Non-volatile EERPOM shall be available

- **Thyristor Power control units : One number for each Zone (High quality type from reputed)**

1. Load type Constant resistance
2. Power supply 230 V AC, 50 Hz
3. Heater voltage 230 V AC
4. AC current rating 15 A
5. Firing mode Phase angle
6. Input 4-20 mA DC
7. Manual Input Input impedance 330-kilo ohms
8. Slave output +10 V
9. Operating temperature upto 50 deg C
10. Mounting Din Mounting
11. Current limit Adjusted from 10 to 100%
12. Compatibility Will be compatible with the above temperature controller

- **Detailed Specifications of LVDT**

Linear Variable Displacement Transducer (LVDT):[One Number with each machine]

- Inductive Spring loaded type

- 0-10 mm range, Stroke + / - 5 mm or + / - 10 mm
- Linearity deviation: +/- 0.5 % of full scale
- Repeatability: +/-0.1 % of full scale
- Excitation: 1 V rms ~ 4 kHz sinusoidal
- Sensitivity: Better than 20 mV/V/mm
- minimum 3 m long coaxially shielded cable with matching connectors at both ends
 - Programmable Eurotherm 12 (twelve) channel 6100A DATA LOGGER, facility to log LVDT, Thermocouple, load cell etc.
 - Computer , Printer and Workstation : [One SET]
- Latest Pentium series CPU workstation, with 22" LCD Monitor x Key Board x HP Laserjet B & W Printer + UPS for 25 minutes battery backup.

E. Optional Grips& Accessories

- * Additional SET of inserts per SET of any sizes (for Round / Flat specimens)
- * Load Cell Capacity: 50kN with Amplifier [Optional]

- Packing, Freight, Forwarding and Insurance Charges must be quoted separately
- Installation and commissioning has to be carried out at three campuses of RGUKT by the supplier.
- Performance tests have to be demonstrated at RGUKT's laboratories.

Two Personnel of RGUKT have to be trained for a week on the installed machines

2. Instrumented Pendulum impact tester (450 J capacity)

Item description

Bid for the Supply, installation, commissioning, and user training of notched bar impact testing of metallic materials system for carrying out tests of standard Impact energy determination tests including Ductile Brittle Transition Temperature determination, and dynamic fracture toughness evaluation as per GB/T19748-2005, ISO 14556: 2000(E), ASTM E23 etc

1. Specifications:

The machine, accessories shall provide experimental capability with sufficient accuracy in controlling test and data acquisition parameters for the following types of tests:

Instrumented Charpy tests for steels to determine dynamic fracture toughness and dynamic load-deflection behavior with specimens of sizes of 10 x 10 x 55 mm,

- Fixture or attachment for low to above ambient temperature shall be quoted as optional item.

The instrumented tups, anvils and fixtures supplied shall be capable to conduct above mentioned impact tests on specimens specified therein.

2.1 Essential features of machine:

A. Main frame and accessories

- The machine shall provide the impact energy in the range of up to 450 J with a resolution better than or equal to 0.1 J
- The total friction and windage losses of the machine during the swing in the striking direction shall not exceed 0.5 % of the scale range capacity.
- The instrumented striker assembly for the Instrumented Charpy test should be attached with integral force transducer, Full scale ± 50 kN with 0.01 kN or better resolution.
- The velocity of the striker on the point of impact shall be adjustable over a wide range of 1m/s to 5 m/s.
- The overall system shall be designed to be very rigid, to minimize vibration and machine compliance issues.
- The system shall ensure minimum energy loss due to base flexure.
- Charpy fixture shall be able to accommodate different specimen dimensions by using appropriate sized Charpy supports precisely positioned via set pins/other suitable means.
- Quick-change adapter plates shall be supplied to adapt the pendulum impact tester to different specimen widths.
- Option for manual control for setting up the impact point with the specimen shall be provided.
- The suitable fixture shall be supplied to ensure that anvils are accurately positioned relative to the tup.

- Anvils shall be designed to be easily and inexpensively replaced independently of the supports or adapter plates.
- Control systems shall provide electrically driven motorized system fitted with brake for positioning and releasing of the pendulum.
- Power Supply: 230 V, 50 Hz AC

B. Safety

- 1) Access to specimen area should be protected when impact mass are in unsafe position.
- 2) Adequate Safety enclosure with electric interlock and clear visibility for easy viewing of the specimen during testing shall be provided.
- 3) Projectile resistant arrangements must be ensured.
- 4) All safety systems should be dual circuit and fail-safe.
- 5) No unsafe release of the impact mass shall be possible under any of the following conditions:
 - a. Failure of mains power supply
 - b. Failure of compressed air supply
 - c. Failure of control software
- 6) Any other added safety feature may be described fully and quoted separately.
- 7) The impact tester must have a safety encompassing and safety regulations must comply with CE and other international norms.

C. Direct Dynamic Force Measurement System

The machine must be accompanied by a system for directly measuring the dynamic force/displacement/energy of the specimen as a function of time during contact of striker with the specimen for a temperature range of $-180\text{ }^{\circ}\text{C}$ to $+200\text{ }^{\circ}\text{C}$.

- Force-time data must be precisely triggered and shall be accomplished by continuously monitoring the load signal and saving data when a significant rise in load occurs.
- The system shall be capable of recording rapid load change events of the specimen.

- The energy measurements shall be obtained with a resolution better than or equal to 0.1 J
- The data acquisition speed should be 3,000,000 readings per second or better.
- A detailed catalogue of the offered system should accompany the bid.

D. Control and Data Acquisition System

- I. The machine must be accompanied by state of the art PC based system with the requisite hardware and software for accurate control of the tests, data acquisition and analysis. It should be equipped to record and display the Load Vs Time and Load Vs Displacement and Displacement vs Time data with following minimum accuracy:

Sampling rate: 3,000,000 data points per second or better. Provision for selection of appropriate sampling rate by the user should be available.

Resolution: 16 bits or better

Data points captured per impact: 1000000 or higher

Calibrated load accuracy: $\pm 0.1\%$ or better

Time-base accuracy: $\pm 0.01\%$ or better

Triggering of data acquisition from force signal, laser/photodiode detector or any external trigger should be possible.

The system should be equipped with online UPS in order to ensure that the control system does not fail due to power supply failure and also to minimize pick up of noise.

- I. In addition to load and displacement channels, 4 input channels for synchronous sampling of any other parameters, input ± 10 Volts full scale shall be provided.
- II. The instrumentation should be equipped with integrated software and hardware packages for plotting, overlaying and analyzing the results. The system shall include signal conditioning unit, impact velocity measuring system with digital display unit and triggering unit.

The Graphical User Interface (GUI) should provide both control of the impact test (impact parameters and data acquisition parameters) and analysis of the resulting data. These should include Impact parameter (Impact angle, velocity or energy), Data acquisition parameters (sample rate, sweep length). Test control and data acquisition hardware and software must generate information of Impact velocity, impact time,

impact energy, absorbed energy, displacement, crack forming energy, crack extension energy, yield load, yield time, peak load, time of peak load, displacement of peak load, energy of peak load, unstable crack extension start load, unstable crack extension stop load, unstable crack extension start energy etc from test. Details of the measured parameters, and those obtained by data conditioning and manipulation must be specified.

E. Calibration Certificates

Calibration certificates from internationally recognized authorities for the load and displacement measurement systems should be provided according to ASTM E23.

F. Other requirements:

- The quote shall also include the non-contact angle measuring system.
- The quote shall include the details of pendulum length, dimensions (with/without protection device) and approximate weight.
- Packing and protection requirement for transit
- Installation requirements must be clearly mentioned.
- The quote shall include Tool box, any special spanners/tools etc. for normal maintenance of the machine.
- Complete set of service manuals in English
- An updated list of users for the machine and environment chambers supplied to India.
- Installation & Commissioning: The bid cost should include installation and commissioning of the equipment with all accessories at user's site. The supplier should demonstrate the performance of the equipment to the specifications by conducting trial tests. Complete set of manuals for operation, maintenance and safety along with circuit/block diagrams should be provided. Pre-installation requirements along with their detailed technical specifications for smooth running of the equipment should be specified. Also specify requirement of electric.

E. Spares

The offer shall include, separately, the bid for supply of sufficient spares for 3 years of trouble-free and smooth operation of the systems.

3. Portable / Laboratory Induction Melting furnace (MTPL)

Induction melting furnace shall have

- Fully automatic control.
- Automatic power regulation.
- PID controller with digital temperature indicator
- Feather touch controls.
- Simple in operation.
- All safety precautions and circuitry.
- Lower power consumption.
- Reduced metal loss on remelting
- Continuous melting of metal with chilling plant provided
- Perfect mixing of alloys due to auto stirring

Technical Specifications:	
Power Supply/Voltage	415V-3Phase- 50Hz
Absorbed Power	Up to 15 kw
Capacity of Crucible	5 Kg of liquid Copper
Maximum Temperature	Ability to melt both ferrous and nonferrous
Insulation	Low thermal mass
Melting Time (batch)	20-30 min.
Temperature Measurement	Digital/ Thermocouple type
Maximum operating	1400 °C.
Furnace controller	Eurotherm
Cooling Water Temperature	20 to 35 degree
Water Pressure	4 Bar
Maximum Water Flow	Commensurate with cooling requirements
Chilling Unit	Capacity As required

NOTE

A complete set of bidding documents may be purchased by interested bidders from the RGUKT contact person upon payment of the bid document price which is non-refundable. Payment of bid document price should be by demand draft drawn from any Nationalized Bank only in favour of “Registrar, Rajiv Gandhi University of Knowledge Technologies” and payable at Hyderabad (India).

- ❖ Tender documents purchased bidders are only allowed to participate in Pre-Bid meeting