

DOCUMENT

Open Competitive Bid (OCB)

For

**Supply and Installation of
Chemical Metallurgy Lab equipments 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,
IIIT-H Campus, Gachibowli**

HYDERABAD- 500 032

Phone: 040-23001830

Proprietary & Confidential

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News paper advertisement

Short Tender Notice



RAJIV GANDHI UNIVERSITY OF KNOWLEDGE
TECHNOLOGIES

Ground Floor, Vindhya C4 Building, IIIT-H campus,
Gachibowli, HYDERABAD- 500 032
Phone: 040-23001830

Separate Sealed Tenders are hereby invited from reputed Manufacturers or Authorised dealers for supply and installation of Lab equipments for the following labs of Metallurgical & Materials Engineering Departments at the three campuses of RGUKT located at Basar (Adilabad District), Nuzvid(Krishna District) and RK Vally (YSR Kadapa District):

- 1) Chemical Metallurgy Laboratory
- 2) Physical Metallurgy Laboratory
- 3) Corrosion and Environmental Degradation Laboratory
- 4) Material Testing and Processing Laboratory
- 5) Heat Treatment Laboratory

Last date of submission of tender along with EMD as specified in the bid document is on 09.08.2012 before 04 .00 pm.

Interested parties can collect the Tender document for each laboratory from **25.07.2012 to 08.08.2012** against payment of Rs. 5,000/- towards the cost of Tender document fee (non-refundable) 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

Date: 25.07.2012

Sd/
Registrar

Time schedule of various Short tender related events

Bid calling date	25.07.2012
Last date for sale of document	08.08.2012 at 05:00 P.M
Pre bid meeting date/ time	31.07.2012 at 11.30AM
Bid closing date/time	09.08.2012 at 04:00 P.M
Technical Bid Opening date/time	13.08.2012 at 03:00 P.M.
Price Bid opening date/time	14.08.2012 at 04:30 P.M
Bid Document fee	Rs.5,000/-
Contact person	Registrar, RGUKT
Reference No	RGUKT/Proc/MME/CM/T21/2012

Registrar,
RGUKT

TENDER FORM

Not transferable

Reference. No. RGUKT/Proc/ MME/CM/T 21/2012

Dated 25.07.2012

Subject: Invitation of Tenders for Supply, installation and commissioning of Chemical Metallurgy 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 **09.08.2012 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 **45 pages of which pages from 6 to 17** are instructions and **page No.35 to 36** 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 Chemical Metallurgy Lab Equipments to the Metallurgical & Materials Engineering Departments at the three campuses of RGUKT. The last date for submission of bid is **09.08.2012 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 09.08.2012.**

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.2,00,000/- by way of Demand Draft from any Nationalised 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	365 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
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>

5. ELIGIBILITY CRITERIA

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.
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.
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.

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. 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.
6. All bidders shall also include the following information and documents with their tenders (in the Technical bid cover)
 - a) 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.

- b) Machinery/equipment owned by the bidder and number of employees.
 - c) Latest Income Tax returns and VAT/CST Returns filed.
 - d) List of Present Clientele with contact addresses & telephone numbers.
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 Chemical Metallurgy Lab Equipments

S.No	Item	Total qty required
1	Laboratory Analytical Balance	03
2	Digital Hot Plate with Magnetic Stirrer	12
3	Digital Multi-Position Stirrers	09
4	Digital pH Meter	06
5	Electric Bunsen Burner	15
6	High Temperature Oxidation Furnace	03
7	Hull Cell	03
8	Laboratory / Analytical Balance	03
9	Laboratory oven	03
10	Magnetic Stirrer	03
11	ORSAT Apparatus Specifications	03
12	Peristaltic Pump	06
13	THE OPTICAL SPARK EMISSION SPECTROMETER	03
14	Specifications Thermogravimetric Analyzer	03
15	Tubular Horizontal Furnace Temp. Range: 1350°C	06
16	Tubular Horizontal Furnace Temp. Range: 1050°C	06
17	Specifications of Ultrasonic Cleaner	06
18	Thermostatic Water Bath	06

1. Specification of Laboratory Analytical Balance

- Readability : Dual range 0.1mg and 0.01mg
- Maximum Capacity >100g for 0.1mg and 40g for 0.01mg
- Repeatability : 0.05mg for 0.1mg and 0.1mg for 0.01mg
- Calibration : Fully automatic self calibration and adjustment function with temperature controlled calibration.
- Display : LCD/LED
- Tare : Facility over full range
- Maximum operating temperature >40 °C
- Sensitivity Temperature drift : 2ppm per °C or less
- Stabilization time : < 2s
- Overload Protection : Weighing cell should have overload protection
- Protective cover : for sealed key panel and glass draft shield to protect the balance.

2. Digital Hot Plate with Magnetic Stirrer

- Maximum stirring volume: 2000ml
- Stirring speed: up to 1000 rpm
- Top plate size: approximately 120 x 120 (mm)
- Panel material: stainless steel
- Digital monitor for showing temperature
- Temperature range: room temp to 100°C
- Temperature accuracy: $\pm 1^{\circ}\text{C}$ (<100°C)
- Timer
- Power requirement: 220V/50Hz

3. Digital Multi-Position Stirrers

- Four individually controlled stirring positions
- Dual digital display controls both temperature and stir speeds for each position
- Pre-set buttons store up to three programs with one-touch recall
- Precise controls for stir (1 rpm) and temperature (1°C)
- single-knob design controls both heating and stirring
- Seamless, easy-to-clean white ceramic top to enhance sample visibility

- Heating Surface : 10.25 x 10.25in (26.7 x 26.7cm)
- Stir Range (RPM) : 50 - 1200
- Operating Temperature Range : 1 - 370°C

4. Digital pH Meter Required features

- Measures pH & mV
- Highly Stable and Accurate
- Auto Temperature Compensation
- 3½ Digit Display
- Auto Polarity & Decimal Indication
- Battery & Mains Operated Available
- pH range 0-14 with an accuracy of ± 0.01 pH
- Input impedance : $> 10^{12}$ ohm
- Input power : single phase AC mains

5. Electric Bunsen Burner

Should have the following features

- Full Stainless Steel body
- Max. Temperature 800° C
- Power consumption about 350 Watts
- Operates on 220-240 V single Phase A/C
- Built-in Energy regulator
- Light Weight construction

6. Specification of High Temperature Oxidation Furnace

- **FURNACE**
- 1. Shell size and useful volume : 600 x 600 x 600 mm and 200 x 60 mm
- 2. Shell Construction : M. S. Body and M. S. Angle"s structure with proper stiffeners and neat powder coat painting
- 3. Furnace stands & panel box : Control panel box with a door coupled with furnace stand to a height of 1 meter
- 4. Tubular material : Alumina (99.8%) (□ 60 X 70 x1000mm) (Zero porosity and withstand up to 1800° C
- 5. Alumina content : 99.8% (minimum)

- 6. Maximum operating temperature : 1400 deg C
- 7. Tube sintered temperature : 1400 deg C for 12 hours of soaking
- 8. Porosity : 0% at RT
- 9. Permeability of Oxygen : 0% at Room temperature
- 10. Expected porosity and permeability at elevated temperature : nil
- 11. Insulation : Double Layer (Mullite and Zr blended fibers)
- 12. Fittings for controlled atmosphere : Stainless steel fittings are provided with water cooling arrangement and Viton o-ring gasket seal
- 13. Port for pulling gases and Purging gases : minimum one each required
- 14. O-ring gasket fittings : Two numbers should be fixed either side
- 15. Purging gas regulator : Special rotometer (0 to 5 liter/hour) fixed for regulating the purging gases and calibrated to oxygen
- 16. Corrosion metal holder : Made with high temperature ceramic material

- **HEATING SYSTEM**

- 1. Heating elements : APM
- 2. Type of element : Solid type
- 3. Hot zone length : 200mm
- 4. Furnace operation : SINGLE PHASE / AC
- 5. Power : Min 4 KW
- 6. Maximum temperature : 1250 \pm C
- 7. Working temperature : 1200 \pm C
- 8. Heating rate : 1 – 10 °C/ minute

- **CONTROL SYSTEM**

- 1. Temperature control : PID programmer and Digital Temperature Indicator
- 2. Temperature sensor : K type thermocouple
- 3. Power control : through the phase angle controlled thyrister
- t. Indications required : a) Ammeter b) Mains Indicator c) Output Indicator
- 6. Control switches : Mains on, out-put on
- 7. Safety : Input, output fuses

7. Technical Specifications of Hull Cell.

A. Hull-Cell Rectifier:	1 No
1. Output DC 12 Volt / 10 Amps Constant Voltage-Constant Current type	
2. LCD Display for Volt & Amperes.	
3. 0 to 20 mints timer with buzzer	
4. Ripple in DC output:< 1 %	
5. Protection:-Against overload short circuits & over voltage.	
B. Hull Cell Pot (Acrylic) 267 ML. with heater, thermostat and air coil	1 No
C. Hull Cell Pot (Acrylic) 267 ML. With Air Coils	1 No.
D. Hull Cell Pot (Acrylic) 267 ML. in PVC body for Chrome Plating	1 No.
E. Air pump suitable for Hull Cell pot	1 No
F. Brass Hull Cell Panel –Polished & Laminated	100
No.	
G. M.S.Hull Cell Panel –Polished & Laminated	100 No.

8.Specification of Laboratory / Analytical Balance

- High weighing chamber with easy-access top and side sliding doors
- Large, powerful back-lit display, automatic calibration, multiple weigh modes
- Capacity 210 g
- Resolution 0.0001 g
- Display Digital Display
- Output Serial; USB

9.Specifications of Laboratory oven

- Chamber volume capacity -80-120 liters
- Temperature- 350°C max
- Digital PID controller/w 0.1°C resolution
- Equipped with wait-off timer, alarm, auto-tuning and in-built temperature calibration function

10.Magnetic Stirrer

- compact designed stirrers shall be for viscous liquid, having stainless steel top housing, and 500 ml capacity,
- Stirring shall be by a teflon coated magnetic paddle placed in the contain, with heater, supply 230 v, single phase 50 Hz.

11.ORSAT Apparatus Specifications

1. Orsat apparatus consists of measuring 100 ml burette 250 ml leveling bottle 3 or 4 absorption pipettes.
2. Filled with glass tubes and 1 with glass tube containing Cu spirals and manifold with 4 glass stopcocks.
3. Complete with rubber and 3 bulb rubber type expansion bags.
4. Removable front and back panels

12.Peristaltic Pump :

With features like

- Variable speed drive.
- No contamination of the fluid or pump.
- Self priming that can safely run dry.
- Positive displacement pump ensuring no back flow.
- Ideal corrosive acidic solutions.
- Instant Start / Stop and reverse facility.
- A maximum flow rate up to 1 litre/minute.

13.THE OPTICAL SPARK EMISSION SPECTROMETER

It should consists of

- CCD –DETECTORS WITH CLEAR SPECTRUM TECHNOLOGY
- SPARK STAND
- VACUUM SYSTEM / INERT GAS SYSTEM
- 400mm ROWLAND CIRCLE OPTICS
- 2400 GROVES PER MM GRATING
- PASCHEN RANGE MOUNTING
- EXCITATION SYSTEM,SPECTRO PLASMA GENERATOR
- SPECTROMETER CONTROL
- READOUT SYSTEM
- SPARK ANALYZER SOFTWARE
- PROPOSED ANALYTICAL PROGRAMME –(AS ANNEX - A B C)
- SET OF RECALIBRATION SAMPLES FOR FE,AL &CU BASE

DETAILED DESCRIPTION OF THE COMPONENTS

- ❖ CCD – OPTIC (Charge Coupled Device)
- ❖ High resolution CCD Multi detectors
- ❖ Effective wavelength range: 165 – 800 nm
- ❖ Drift free and stabilized against fluctuations in temperature
- ❖ Automatic profiling
- ❖ Analysis Modules must be freely selectable and expansion by adding additional modules must be possible
- ❖ Spark Stand
- ❖ Optimized UV – light path
- ❖ Sample clamp
- ❖ Optimized Argon flow
- ❖ Integrated shutter system for optimum plasma viewing
- ❖ Easily exchangeable spark stand plate- rapid sample change facility
- ❖ Argon save module for minimum consumption of Argon
- ❖ Suitable adaptors to hold samples of small size & thickness
- ❖ Exhaust system for flushing out of toxic vapors
- ❖ Ensure workers safety
- ❖ Open spark stand for high sample throughput and various kinds of sample geometrics.
- ❖ Excitation System
- ❖ Plasma Generator
- ❖ Fully digitized plasma generator with digital discharge definition, digital pulse generation and digital offline pulse control
- ❖ 32 MHz micro-controller
- ❖ Analytical time possibly less than 1 minute
- ❖ Spectrometer control
- ❖ Serial source interface
- ❖ 16 inputs for 16 CCDs
- ❖ High speed 12 Bit ADC
- ❖ DSP-Controller with 66 MHz
- ❖ Spectrometer PC Control
- ❖ External computer system comprising
 - INTEL – i 5 processor or better
 - Memory –8 GB RAM
 - Operating system windows 7 professional
 - Hard disk drive -500GB
 - DVD / CD –RW combo drive
 - Second network card for TCP/IP interface

- Set of SUS / recalibration samples for Fe, Al & Cu Base Keyboard and mouse
- LED 22" flat screen
- HP laser jet printer

Analytical Software

- ❖ User friendly system under Windows
- ❖ Function keys for routine operation
- ❖ Intelligent calibration – only one sample for standardization
- ❖ Concentration unit selectable (%, ppm)
- ❖ Output of results in various concentrations and intensity mode
- ❖ Statistical data output- average, relative standard deviation
- ❖ Matrix correction
- ❖ Automatic programme selection for calibration, calculation of concentration proportions
- ❖ Automatic / user controlled storage / printout of analytical results and statistical data
- ❖ Quality check and quality identification function
- ❖ Software controlled Argon- saver
- ❖ Automatic hardware error diagnostic
- ❖ Calibration Software-
 - Manual or automatic selection of polynomial order of curve fit
 - Calculation of spectral interferences and inter element corrections
 - Graphic display of calibration curves and calculated correction factors
- ❖ Identification of calibration standards by group
- ❖ Standards library
 - a. System should have calibration programme for following elements in Fe base alloy C,Si, Mn,P,S,Cr,Mo,Ni,Al,Co,Cu,Nb,Ti,V,W,Sn,Mg,Sb,Zn,Pb, Sn,As,Bi,Ce,B,La,Zr, Se,Ca,N,Ta. (for concentration ranges see Appendix 1)
 - b. System should have calibration programme for following elements in Al base alloy Si, Fe, Cu, Mn, Mg, Cr, Ni, Zn, Ti, Ag, B, Ba, Bi, Be, Cd, Ce, Ga, Li, Na, P, Sb, Sr, V, Hg, Ca, Jn, Mo,As,Co,Pb,Sn. (for concentration ranges see Appendix 2)

c. System should have calibration programme for following elements in Cu base alloy Zn,Pb,Sn,P,Zi,Mn,Fe,Ni,Si,Mg,Cr,Te,As,Sb,Cd,Bi.Ag,Co,Al,S,Be,Zr,Au,C,Se, O, B, Ti, Nb.

(for concentration ranges see Appendix 3)

Important Accessories

1. Ultra high pure Argon gas cylinders 2 No's with explosive certificates along with regulator & Hose Pipe of stainless steel body.
2. UPS with 30 min. backup facility
3. Supplier should provide standard reference or certified material for each calibration

SPECIFICATION FOR DISC GRINDER

1. 3H.P. , 2800 RPM, 3Phase motor for rotating disc and suction Blower, Rotating Disc 300 mm Diameter
2. Polishing Papers of 60 grit with 350 mm dia and 40 mm bore (to fit 1 above)
3. Spare and consumables for 1 year

Important requirements

1. Spares and consumables for 12 months of operation must be included in the bid.
2. Bidding firm should provide an undertaking that prompt on-site support shall be available to trouble shoot the problems arising during use during the warranty period.
3. Bidder must ensure availability of spares for a period at-least 10 years from the date of commissioning of equipment.
4. Necessary training is to be given after installation and commissioning at the site of installation.
5. Bidding firm has to ensure the supply of operating and service manuals both in hard copy and softcopy forms.

6. Spectrometer should be pre-calibrated and a set of the samples should be provided to standardize the spectrometer for routine calibration.

Appendix 1 **PROPOSED ANALYTICAL PROGRAM FOR Fe BASE**

Element	Fe- Global		Fe in Low Alloy steels		Fe in Cast Irons	
	Minimum	maximum	Minimum	maximum	Minimum	maximum
C	0.0050	4.50	0.0015	1.50	1.7000	4.50
Si	0.0010	6.00	0.0015	1.70	0.0020	5.00
Mn	0.0020	19.00	0.0005	2.50	0.0005	1.50
P	0.0050	1.20	0.0010	0.08	0.0010	1.20
S	0.0015	0.70	0.0005	0.12	0.0010	0.15
Cr	0.0050	35.00	0.0020	5.50	0.0020	1.30
Mo	0.0100	11.00	0.0010	1.40	0.0010	1.40
Ni	0.0050	46.00	0.0015	6.50	0.0015	1.80
Cu	0.0050	8.00	0.0005	0.80	0.0005	1.50
Al	0.0050	3.00	0.0010	1.10	0.0010	0.12
As	0.0020	0.10	0.0010	0.09	0.0010	0.09
B	0.0010	1.10	0.0002	0.01	0.0002	0.10
Bi	0.0010	0.12	0.0070	0.02	0.0070	0.02
Ce	0.0050	0.25	0.0025	0.05	0.0040	0.23
Co	0.0050	10.00	0.0005	0.90	0.0015	0.11
Mg	0.0050	0.12			0.0050	0.12
Nb	0.0010	3.00	0.0010	0.33	0.0010	0.07
Pb	0.0010	0.25	0.0030	0.25	0.0030	0.03
Sb	0.0010	0.15	0.0050	0.11	0.0050	0.15
Sn	0.0050	0.19	0.0005	0.13	0.0005	0.20
Ta	0.0030	0.55	0.0300	0.55		
La	0.0020	0.08	0.0010	0.03	0.0010	0.07
Ti	0.0010	2.50	0.0002	0.35	0.0005	0.30
V	0.0050	11.00	0.0005	0.80	0.0005	0.25
W	0.0010	19.00	0.0050	3.30	0.0050	0.06
Zn	0.0020	0.03			0.0010	0.03
Zr	0.0020	0.10	0.0010	0.10	0.0010	0.04
Se	0.0050	0.40			0.0030	0.03

Ca					0.0001	0.01
N	0.005	0.65	0.005	0.65	0.005	0.65

Appendix 2

PROPOSED ANALYTICAL PROGRAM FOR AI BASE

Element	Al- Global		Al-Low Alloys		Al-Si alloys	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Si	0.0050	25.00	0.0003	2.00	5.0000	25.00
Fe	0.0020	3.30	0.0020	3.30	0.0020	1.60
Cu	0.0010	22.00	0.0010	0.45	0.0010	5.00
Mn	0.0020	1.30	0.0005	1.10	0.0005	0.70
Mg	0.0010	11.00	0.0001	1.70	0.0001	1.50
Cr	0.0020	0.37	0.0003	0.27	0.0020	0.27
Ni	0.0020	4.50	0.0010	0.30	0.0020	4.50
Zn	0.0020	12.00	0.0010	0.12	0.0020	5.50
Ti	0.0010	0.30	0.0001	0.18	0.0005	0.22
Ag	0.0005	1.10	0.0002	0.02		
B	0.0003	0.03	0.0002	0.03		
Ba	0.0010	0.02	0.0001	0.02		
Be	0.0003	0.08	0.0001	0.00	0.0003	0.07
Bi	0.0030	0.65	0.0020	0.65	0.0020	0.11
Ca	0.0002	0.02	0.0001	0.01	0.0001	0.03
Cd	0.0005	0.35	0.0003	0.13		
Co	0.0010	0.65	0.0010	0.03	0.0010	0.60
Ga	0.0020	0.04	0.0020	0.04	0.0010	0.03
In	0.0020	0.02	0.0020	0.02		
Li	0.0002	0.05	0.0002	0.05		
Mo	0.0050	0.02	0.0050	0.02		
Na	0.0005	0.03	0.0001	0.03	0.0005	0.01
P	0.0020	0.02	0.0010	0.01	0.0010	0.02
Pb	0.0050	1.00	0.0015	1.00	0.0030	0.20
Sn	0.0020	1.00	0.0020	0.02	0.0020	0.33
Sr	0.0010	0.15	0.0001	0.00	0.0002	0.14
V	0.0020	0.12	0.0010	0.06	0.0020	0.06
Zr	0.0020	0.33	0.0002	0.05	0.0010	0.11

Sb	0.0070	0.14	0.0070	0.20	0.0070	0.14
Hg	0.0020	0.08	0.0020	0.01		

Appendix 3

PROPOSED ANALYTICAL PROGRAM FOR Cu BASE.

Element	Cu- Global		Cu-pure		Cu-Zn alloys	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Zn	0.0030	46.00	0.0002	0.14	12.0000	46.00
Pb	0.1000	22.00	0.0020	0.40	0.0020	3.30
Sn	0.0010	22.00	0.0002	0.11	0.0010	2.00
P	0.0050	1.10	0.0002	0.07	0.0005	0.25
Mn	0.0100	7.00	0.0001	0.14	0.0005	6.00
Fe	0.0050	6.50	0.0002	0.08	0.0005	5.00
Ni	0.0050	35.00	0.0005	0.45	0.0020	3.30
Si	0.0050	7.50	0.0005	0.04	0.0005	1.50
Mg	0.0050	0.20	0.0001	0.01		
Cr	0.0010	2.50	0.0002	0.90		
Al	0.0050	12.00	0.0005	0.02	0.0005	8.00
S	0.0050	0.13	0.0002	0.01		
As	0.0050	0.50	0.0005	0.03	0.0005	0.25
Be	0.0010	2.80	0.0001	0.01	0.0002	0.01
Ag	0.0010	1.60	0.0003	0.55	0.0005	0.03
Co	0.0050	2.40	0.0005	0.04		
Bi	0.0050	4.50	0.0005	0.08	0.0020	4.50
Cd	0.0020	0.13	0.0003	0.01	0.0020	0.13
Sb	0.0050	1.30	0.0015	0.30	0.0020	0.40
Zr	0.0050	0.40	0.0002	0.11		
Ti	0.0020	0.90	0.0001	0.00		
Au	0.0050	0.05	0.0010	0.06		
C	0.0020	0.04				
Nb	0.0050	1.30				

14. Specifications Thermogravimetric Analyzer

- Detailed specification of TGA is given below:
- i) Temperature requirement: From room temperature to 1600°C. The unit should have programmable temperature control. Instrument should run in both isothermal and non-isothermal mode.
- Temperature scanning rate for both heating and cooling: 0.01 to 100°C/min.
- ii) Weight: Maximum balance capacity is up to 35 g. Powdered or small solid pieces of sample (mainly metals/ceramics) to be studied. Instrument should be able to take load of 50mg -3 g or more. Sample crucible volume maximum up to 3 cc or more. Crucible should be made of such material that it can sustain 1600 °C temperature in inert gas, CO₂, air, O₂ or their mixture (in desired proportion) atmosphere. Crucibles should be of cup type and plate type.
- Temperature precision : ±0.8 °C
- Sample temperature precision : ±0.3 °C @ 300 °C, ±0.5 °C @ 900 °C
- Sample to program temperature correlation : ±0.5 °C @ 300 °C, ±1 °C @ 900 °C
- Balance digital resolution : 0.2 µg
- Balance sensitivity : 1 µg
- Balance accuracy : ±0.02%
- Sample crucibles (plate type) of 1cc or less: 3 nos.
- Sample crucibles (cup type) of 1cc or less: 3 nos.
- Sample Carrier: 2 nos. Balance resolution should be 1 microgram or better for entire measuring range and balance drift is better than 5 microgram/hr.
- iii) Gas input system: various inert gases (Helium, Argon, and Nitrogen) and various non-explosive gasifying agents such as, air, CO₂, O₂ and the mixture of inert and non-explosive gases in desired proportion should be introduced into the system in measured amount. A high precision mixture capable of mixing inert and non-explosive gases in desired proportion with digital display arrangement should be there. Gas flow should be controlled by very good quality MFC (flow rate from 10-200 ml/min). System should be vacuum controlled (10⁻² mbar) with fast switchover facilities for different gaseous atmosphere in the reaction chamber with out affecting the balance.
- iv) Product gas collection: Instrument should have port for product gas collection and upgradation.
- Fast cooling of the sample to room temperature should be possible (within few tens of minutes)
- v) Thermostat for the balance housing should be provided.

- vi) Data acquisition and monitoring system: I/O interface drivers and software for measurement of change in mass with temperature and time with state-of-art computer configuration. The software should be able to display change in mass with temperature and time very accurately. This software should be able to calculate residual weight, rate of change of mass (1st order derivative) in different units (wt/min or %/min). The software should have related statistical analytical tool. Software shall have to be compatible for installation in multiple computers and repeated installation should be allowed
- vii) Software for kinetic analysis: Software for kinetic analysis should give reactivity, Arrhenius plot, Activation energy and related parameter with standard method.
- viii) Suitable desktop computer to run the above TGA system with the following minimum specifications. (Quote as a separate item)
 - Processor : Intel Core i5 (2.66 GHz 3 MB) or more / Comparable AMD processor
 - Operating System : Genuine Windows 7 Professional 64 Bit English version
 - Chipset : Intel /AMD
 - Total memory : 6GB DDR3 (expandable up to 8 GB X 3)
 - Display type : LED monitor of 1600x1200 pixel resolution
 - Hard drive device : 512 GB
 - Optical device : DVD recordable (dual layer)
 - Interface : USB port 3 or more, HDMI out put
 - Others : Blue tooth laser mouse and key board.
- ix) Calibration: Instrument should be calibrated properly and the calibration to be checked with std. reference material at user's site (ultra pure Calcium oxalate, to be supplied by vendor minimum 50 gm). Complete calibration kits are to be provided.
- x) Installation, Commissioning and training: Installation and commissioning will be done by supplier's engineers at buyer's premises. Training for complete operation of instrument and software to be provided to the concerned scientists/technical persons at buyer's premises by testing standard reference samples and user's
- xi) CO₂/O₂ gas cylinders with appropriate certification.

15. Tubular Horizontal Furnace Temp. Range: 1350°C

- Furnace Tube : Alumina Tube 500 mm Long, 60 mm ID/
Quartz Tube 40 mm ID 750 mm long with both end assembly with gas inlet/outlet.

- Gas purification train for the removal of moisture, CO₂, and hydrocarbon impurities
- Maximum Temperature 1350°C: Thermocouple shall be introduced from outer surface of Alumina/ Quartz Tube to the center of Hot zone.
- Heating Load: 2 KW Max or commensurate with maximum temperature and 500g heating load.
- Control Panel: Temperature Control through PID Controller with Thyristor Power pack. The Control panel may consist of Ammeter, PID, MCB, Thyristor with Heat Sink, control Switches, Indicating lamp
- Special feature: The Alumina/Quartz Tube will have end Fixture to have Gas inlet, Thermocouple Inlet from one side and gas outlet from other side. The Furnace will have Rectangular shape duly insulated with ceramic fiber blanket
- N₂ gas cylinder with inlet manifolds, pressure gauges, and tubing as required
- Heating element : Super-Kanthal embodied Heating Element
- Input voltage : Preferably single Phase AC 50Hz

16. Tubular Horizontal Furnace Temp. Range: 1050°C

- Furnace Tube : Alumina Tube 500 MM Long, 60 MM ID/
Quartz Tube 40 MM ID 750 MM long with both end assembly with gas inlet/outlet.
- Gas purification train for oxygen gas for the removal of moisture, CO₂, and hydrocarbon impurities
- Gas cylinder, manifold, pressure gages, reo-meters and tubing as required.
- Maximum Temperature 1050 °C: Thermocouple shall be introduced from outer surface of Alumina/ Quartz Tube to the center of Hot zone.
- Heating Load: 2 KW Max or commensurate with maximum temperature and 500g heating load.
- Control Panel: Temperature Control through PID Controller with Thyristor Power pack. The Control panel may consist of Ammeter, PID, MCB, Thyristor with Heat Sink, control Switches, Indicating lamp

- Special feature: The Alumina/Quartz Tube will have end Fixture to have Gas inlet, Thermocouple Inlet from one side and gas outlet from other side. The Furnace will have Rectangular shape duly insulated with ceramic fiber blanket
- Heating element : Kanthal embodied Heating Element
- Input voltage : Preferably single Phase AC 50Hz

17.Specifications of Ultrasonic Cleaner

- Provided with digital control panel of set time and temperature.
- Drain valve system of manually cleaning the tank.
- Fully stainless tank with stainless steel basket and memory function timer and temperature setting is stored in the unit.
- Thermostatically continuously variable between 20 and 80 °c
- Complete unit should be of one piece design made of stainless steel

and drip proof.

- For heat retention it should be of double wall construction should include mesh basket and lid.
- Should have bottom mounted ultrasonic transducers.
- Tank capacity 2 liter

18.Thermostatic Water Bath

- ✚ **Construction** : three walled heating units
- ✚ SS 304 grade stainless steel of heavy gauge inner chamber. Inner chamber dimensions Width 6"x length 12" and height 6"
- ✚ **Heating:** by air heaters made of Kanthal A-1 wires for indirect heating. The warm air has to be evenly distributed within the chamber via natural water convection mechanism ensuring very good temperature sensitivity.
- ✚ **Temperature Range:** 30 to 90 °C.
- ✚ **Temperature sensitivity** $\pm 0.5^{\circ}\text{C}$
- ✚ **Front Panel to have** on/off switch, heating and mains indicator lamps, thermostat

7. General Requirements & Qualification Criteria

- Bidding Firm offering the product should have ISO 9001 Accreditation certification.
- Bidding Firm, offering the product, should have supplied similar type of test systems for a several years to Government establishments, defense organizations & National higher learning institutions like IITs, IISC etc., in India
- Bidding Firm offering the product should submit list of supplies made by it, during last two years with complete contact details of the end users such as phone number, fax number, e-mail ID etc. It should submit copies of order placed by such organizations and user certificates for goods of same/similar nature.
- Bidding Firm offering the Product should have a Local Service Support Facility, preferably in Hyderabad, and should submit address and contact details
- Bidding Firm should give an Undertaking that, un interrupted service support will be given for a minimum period of 10 years with unbroken availability of spares supply.
- Bidding Firm should give an undertaking that, the Software upgrades if any, during the warranty period of three year, should be supplied free of charge
- Bidding Firm should offer pre-dispatch inspection free of charge at their factory premises for 2 users for 3 days and post installation training at our three laboratories in different campuses to 2 users for 5 days.

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/ cashier's cheque or certified cheque drawn in favour of "Registrar, Rajiv Gandhi University of Knowledge Technologies" and payable at Hyderabad (India).