



INDIAN INSTITUTE OF TECHNOLOGY MADRAS  
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Ref: ICS/11-12/013/DSTX/TSUN

Date: 07.05.2014

Tender No.: ASE/SRCH/002/2014

Due Date: 27.05.2014, 3:30pm

N.E. Nagaraj  
Special Officer (Project Purchase)  
IC&SR, I.I.T. Madras

Dear Sirs,

On behalf of the Indian Institute of Technology Madras, offers are invited for the supply of various Scientific Instruments "Lasers" conforming to the specifications given in Annexure.

**D) Instructions to the Bidder**

- (i) **Preparation of Bids:-** The tenders should be submitted under two-bid system (i.e.) Technical bid and Financial bid.
- (ii) **Delivery of the tender:-** The tender shall be sent to the below-mentioned addresses either by post or by courier so as to reach our office before the due date and time specified in our Schedule. The offer/bid can also be dropped in the tender box on or before the due date and time specified in the schedule. The tender box is kept in the office of the "Special Officer, Project Purchase" IC & SR Building 2<sup>nd</sup> floor, I.I.T. Madras, Chennai – 600 036.
- (iii) **Opening of the tender:-** The offer/Bids will be opened by a committee duly constituted for this purpose. The technical bids will be opened first and it will be examined by a technical committee which will decide the suitability of the bid as per our specifications and requirements. The financial offer/bid will be opened only for the offer/bids which technically meet all our requirements as per the specification. The bidders, if interested, may be present on the financial tender opening Day which will be communicated to you.

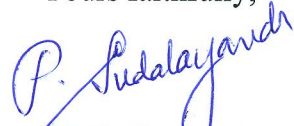
- (iv) **Prices:-** The price should be quoted in nett per unit (after breakup) and must include all packing and delivery charges to Various Institutions. The offer/bid should be exclusive of taxes and duties, which will be paid by the purchaser as applicable. However the percentage of tax & duties should be clearly indicated.

The price should be quoted without custom duty and excise duty, since I.I.T. Madras is exempt from payment of excise duty, and the custom duty will be paid at concessional rate against duty exemption certificate.

In case of import supply, the price should be quoted on FOB and CIF basis indicating the mode of shipment.

- (v) **Agency Commission:-** Agency commission, if any, will be paid to the Indian agents in Rupees on receipt of the equipment and after satisfactory installation. Agency Commission will not be paid in foreign currency under any circumstances. The details should be explicitly shown in Tender even in the case of 'Nil' commission. The tenderer should indicate the percentage of agency commission to be paid to the Indian agent. The foreign Principal should indicate about the percentage of payment and it should be included in the originally quoted basic price, if any.
- (vi) **Terms of Delivery:-** The item should be supplied to our Various Institutions as per Purchase Order. In case of import supply, the item should be delivered at the cost of the supplier to our Institution. The Installation/Commissioning should be completed as specified in our important conditions.
- (vii) IIT Madras reserves the full right to accept / reject any tender at stage without assigning any reason.

Yours faithfully,



**N.E. Nagaraj**

**Special Officer (Project Purchase)**

**IC&SR, I.I.T. Madras.**

एन.ई. नागराज

N.E. NAGARAJ

विशेषाधिकारी (परियोजना क्रय)

SPECIAL OFFICER (PROJECT PURCHASE)

आईसी एवं एसआर केन्द्र / Centre for IC & SR

आईआईटी मद्रास / I.I.T. MADRAS- 600 036

## SCHEDULE

### **I) Important Conditions of the tender**

1. The due date for the submission of the tender is **27.05.2014, 3:30pm.**
  
2. The offers / bids should be submitted in two bids systems (i.e.) Technical bid and Financial bid. The Technical bid should consist of all technical details / specifications only. The Financial bid should indicate item-wise price for each item and it should contain all Commercial Terms and Conditions including Taxes, transportation, packing & forwarding, installation, guarantee, payment terms etc. The Technical bid and Financial bid should be put in separate covers and sealed. Both the sealed covers should be put in a bigger cover. The Limited Tender / Open Tender for supply of “ \_\_\_\_\_ ” should be written on the left side of the Outer bigger cover.
  
3. (i) EMD should be Rs.10 Lakh (Rupees Ten Lakh only) irrespective of this bid amount. The EMD should be included in the Financial bid which will not be opened for Technical evaluation. **Enclosing the EMD in the Technical bid will automatically disqualify the tenderer.** EMD should be in the form of DD in favour of “The Registrar, Indian Institute of Technology Madras” and payable at Chennai. The tender without EMD would be considered as UNRESPONSIVE and REJECTED. Photo/FAX copies of the Demand Draft/Banker’s pay orders will not be accepted. No interest will be paid for the EMD and the EMD (Bid Security) will be refunded to the Successful bidder on receipt of Performance Security.  
  
(ii) The Successful bidder should submit Performance Security of an amount of 5% of the value of the contract. The Performance Security may be furnished in the form of an Account Payee DD, FD Receipt from the commercial bank, Bank Guarantee from commercial bank will be an acceptable.  
  
(iii) The Performance Security should remain valid for a period of sixty days beyond the date of completion of all contractual obligations of the supplier including the warranty obligations

4. If an Indian agent is involved, the following documents must be enclosed:
  - i) Foreign principal's proforma invoice indicating the commission payable to the Indian Agent and nature of after-sales service to be rendered by the Indian Agent.
  - ii) Copy of the agency agreement with the foreign principal and the precise relationship between them and their mutual interest in the business.
  - iii) The enlistment of the Indian agent with Director General of Supplies & Disposals under the Compulsory Registration Scheme of Ministry of Finance.
  
5. The offer/bids should be sent only for a machine that is available in the market and supplied to a number of customers. A list of customers in India and abroad with details must accompany the quotations. Quotations for a prototype machine will not be accepted.
  
6. Original catalogue (not any photocopy) of the quoted model duly signed by the principals must accompany the quotation in the Technical bid. No prices should ever be included in the Technical bid.
  
7. Documentary proof for the claimed position and repetition accuracies must be obtained from the principals and submitted along with the relevant pages of the standards.
  
8. Compliance or Confirmation report with reference to the specifications and other terms & conditions should also be obtained from the principal.
  
9. **Validity:** Validity of Quotation not less than 90 days.
  
10. **Delivery Schedule:-** The tenderer should indicate clearly the time required for delivery of the item. In case there is any deviation in the delivery schedule, liquidated damages clause will be enforced or penalty for the delayed supply period will be levied.

11. **Risk Purchase Clause:-** In the event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from other sources on the total risk of the supplier under risk purchase clause.
12. **Payment:-** No Advance payment will be made for Indigenous purchase. However 90% Payment against Delivery and 10% after installation is agreed to wherever the installation is involved. In case of import supplies the payment will be made only through Letter of Credit and 90% payment will be released against delivery and 10% after installation wherever the installation is being done.
13. **On-site Installation:-** The equipment or machinery has to be installed or commissioned by the successful bidder within 15 to 20 days from the date of receipt of the item at Institution of IIT Madras.
14. **Warranty/Guarantee:-** The offer should clearly specify the warranty or guarantee period for the machinery/equipment. Any extended warranty offered for the same has to be mentioned separately.
15. **Late offer:-** The offers received after the due date and time will not be considered. The Institute shall not be responsible for the late receipt of Tender on account of Postal or any other delay.
16. **Acceptance and Rejection:-** I.I.T. Madras has the right to accept the whole or any part of the Tender or portion of the quantity offered or reject it in full without assigning any reason.
17. **Disputes and Jurisdiction:-** Any legal disputes arising out of any breach of contract pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Chennai in Tamil Nadu.
18. **Acknowledgement:-** It is hereby acknowledged that the tenderer has gone through all the conditions mentioned above and agrees to abide by them.

**SIGNATURE OF TENDERER  
ALONG WITH SEAL OF THE  
COMPANY WITH DATE.**

## Specifications for following Lasers (same principal for all items preferred)

### I. Nd:YAG - 532 nm wavelength - dual cavity - double pulsed for PIV application (4 Nos.)

1. Repetition rate (Hz)	:	1 to 15 (adjustable)
2. Energy per pulse (mJ)	:	$\geq 140$ @ 532 nm and 15 Hz
3. Pulse duration (ns)	:	5-10 @ 532 nm
4. Beam diameter (mm)	:	$\leq 7$
5. Divergence (mrad)	:	$\leq 4$ @ 532 nm
6. Spectral purity	:	$\geq 98$ %
7. Near field spatial profile	:	Flat-top
8. Energy stability (% RMS)	:	$\pm 2$ @ 532 nm
9. Pointing stability ( $\mu$ rad)	:	$\leq \pm 100$ @ 532 nm
10. Flash Lamp lifetime	:	$\geq 100$ million shots
11. Far field beam overlap ( $\mu$ rad)	:	$\pm 100$
12. Near field beam overlap ( $\mu$ m)	:	$\pm 100$
13. Power input	:	220-250 VAC, 50 Hz
14. Operating ambient	:	20 to 28°C
15. Storage ambient	:	5 to 50°C
16. Coolant	:	Distilled/Deionised water
17. External trigger control	:	5v TTL for both Q-switch and Flash lamp input

#### Notes:

1. Provide near-field and far-field beam profile. Beam profile should be free of fringes and as uniform as possible
2. Product warranty of 2 years including optics
3. Should be capable of swapping the laser head and power supply between similar systems without any further calibration requirement
4. Single power supply with integrated single cooling unit
5. Laser head should operate in any orientation
6. The system should have a single head, dual cavity laser delivering two pulses of 532 nm wavelength separated by user selectable pulse timing from nanoseconds to milliseconds. Both the heads should be enclosed in a single box
7. Umbilical power cord from laser head to power supply unit should be at least 3 m long
8. Should have a user selectable pulse separation time control through RS 232
9. Installation and user training should be provided by the manufacturer or their authorized distributor

### II. Nd:YAG - 1064 nm wavelength with following specification (2 Nos.)

1. Repetition rate (Hz)	:	10
2. Energy (mJ)	:	$\geq 850$ @ 1064 nm $\geq 430$ @ 532 nm $\geq 230$ @ 355 nm $\geq 100$ @ 266 nm
3. Pulse duration (ns)	:	5 to 10 @ 1064 nm
4. Beam diameter (mm)	:	5 to 10
5. Divergence (mrad)	:	$\leq 0.5$ @ 1064 nm
6. Far field spatial profile	:	$\geq 0.9$ fit to Gaussian
7. Energy stability (%) (100% of the pulses)	:	$\leq \pm 2$ @ 1064 nm $\leq \pm 4$ @ 532 nm $\leq \pm 6$ @ 355 nm $\leq \pm 8$ @ 266 nm
8. Power drift over 8 hours(%)	:	$\leq \pm 3$ @ 1064 nm $\leq \pm 5$ @ 532 nm $\leq \pm 6$ @ 355 nm $\leq \pm 10$ @ 266 nm

9. Pointing stability ( $\mu\text{rad}$ )	:	< 50 @ 1064 nm, 532 nm, 355 nm, 266 nm
10. Jitter (ns)	:	$\leq \pm 0.5$
11. Linewidth ( $\text{cm}^{-1}$ )	:	$\leq 1$
12. Flash Lamp lifetime	:	$\geq 30$ million shots
13. Power input	:	220-250 VAC, 50 Hz
14. Operating ambient	:	20 to 28°C
15. Storage ambient	:	5 to 50°C
16. Coolant	:	Distilled/Deionised water
17. External trigger control	:	5v TTL for both Q-switch and Flash lamp input-output

Notes:

1. Provide near-field and far-field beam profile. Beam profile should be free of fringes and as uniform as possible
2. Provide second, third and fourth harmonic generators.
3. All harmonic generators should have electronic temperature stabilization with hands free automatic phase-matching facility.
4. All harmonic generators should be able to attach/detach easily with minor optical adjustment
5. Adjustable delay of the output synchronization signal with respect to opening of the Q-Switch (+/- 500ns)
6. Product warranty of 2 years including optics
7. Power supply with integrated primary cooling unit. Please mention if laser requires external chiller
8. Should have a user selectable control through RS 232/Ethernet and hand held remote control
9. Disconnectable cable and coolant line between the laser head and power supply to facilitate easy transportation
10. User should be able to change the flash lamp without any requirement of cavity optics re-alignment
11. Detachable pump chamber and rod assembly for easy serviceability
12. Installation and user training should be provided by the manufacturer or their authorized distributor

III. Nd:YAG Laser + Tunable Dye Laser in Combination (2 Nos.)

A. Pumping Nd:YAG Laser

1. Repetition rate (Hz)	:	10
2. Energy (mJ)	:	$\geq 1600$ @ 1064 nm $\geq 820$ @ 532 nm $\geq 490$ @ 355 nm $\geq 150$ @ 266 nm
3. Pulse duration (ns)	:	5 - 10 @ 1064 nm
4. Beam diameter (mm)	:	5 to 10
5. Divergence (mrad)	:	$\leq 0.5$ @ 1064 nm
6. Polarization ratio (%)	:	$\geq 95$ @ 1064 nm
7. Far field spatial profile	:	$\geq 0.95$ fit to Gaussian
8. Energy stability (%) (100% of the pulses)	:	$\leq \pm 2$ @ 1064 nm $\leq \pm 4$ @ 532 nm $\leq \pm 6$ @ 355 nm $\leq \pm 8$ @ 266 nm
9. Power drift over 8 hours (%)	:	$\leq \pm 3$ @ 1064 nm $\leq \pm 5$ @ 532 nm $\leq \pm 6$ @ 355 nm $\leq \pm 10$ @ 266 nm
10. Pointing stability ( $\mu\text{rad}$ )	:	$< \pm 50$ @ 1064 nm
11. Linewidth ( $\text{cm}^{-1}$ )	:	$\leq 1$
12. Jitter (ns)	:	$\leq \pm 0.5$

- 13. Flash Lamp lifetime :  $\geq 30$  million shots
- 14. Power input : 220-250 VAC, 50 Hz
- 15. Operating ambient : 20 to 28°C
- 16. Storage ambient : 5 to 50°C
- 17. Coolant : Deionised water
- 18. Water chiller : Quote separately
- 19. External trigger control : 5v TTL for both Q-switch and Flash lamp input-output
- 20. Provision should exist for attaching third and fourth harmonic generators
- 21. All Harmonic generators should be electronically temperature stabilized for better energy stability
- 22. Phase-matching of all harmonic generators should be able to be done electronically through the remote control
- 23. Temperature stabilized laser bench
- 24. Cooling of laser pumping chamber with an accuracy of  $\pm 0.1$  °C
- 25. Adjustable delay of the output synchronization signal with respect to opening of the Q-Switch (+/- 500ns)
- 26. Motorized or manual switching from 532 / 355 nm with minor optical adjustment

B. Tunable Dye Laser to be pumped with above laser

- 1. Pulse duration (ns) : 5-10
- 2. Beam divergence (mrad) :  $\leq 0.5$
- 3. Beam diameter (mm) : 3-6
- 4. Beam pointing stability ( $\mu$ rad) :  $< 50$
- 5. Polarization (%) : 98% vertical
- 6. Absolute wavelength accuracy (pm) :  $\leq 50$
- 7. Repeatability (pm) :  $\leq 4$
- 8. Thermal Stability ( $\text{cm}^{-1}/5$  °C/h) : 0.05
- 9. ASE (%) :  $< 0.5$
- 10. Grating (1/mm) : 2400
- 12. Tuning range fundamental wavelength (nm) : 420 – 750
- 13. Energy at required wavelengths (mJ) :  $\geq 8$  @ 225 nm  
 $\geq 45$  @ 281 nm  
 $\geq 40$  @ 390 nm  
 $\geq 24$  @ 410 nm  
 $\geq 20$  @ 450 nm
- 14. Linewidth ( $\text{cm}^{-1}$ ) :  $\leq 0.1$  @ 562 nm
- 15. Doubling/mixing crystals : Optical extension attached to dye laser with doubling and mixing crystals to achieve above 225, 281, 390, 410 nm. Provide KDP/BBO crystal to achieve high conversion efficiency.
- 16. All doubling/mixing crystals should have electronic temperature stabilization and motorized phase-matching facility.
- 17. There should be 4 pellenbroca prism based beam walk-off compensator coupled to the Dye Laser. Beam should remain at its position during a wavelength scan even at 5 m beam travel from the Laser exit.
- 18. Permissible energy reduction measured after the beam walk-off compensator:  $\leq 10$ -20% for 281,390, 410nm and  $\leq 20$ -30% for 225 nm.

Notes:

- 1. Provide near-field and far-field beam profile for both Nd:YAG and Dye laser. Beam profile should be free of fringes and as uniform as possible



2. Both dye laser and Nd:YAG laser should be manufactured by a same firm. The system should be supplied together, and dye laser performance should be tested along with the Nd:YAG laser being procured to confirm compatibility before delivery.
3. Test report should include energy and wavelength measurements at all above mentioned wavelengths.
4. Accessories required: (i) Second Harmonic Generator (ii) Third Harmonic Generator and (iii) Fourth Harmonic Generator to be fitted with Nd:YAG laser (iv) Necessary dyes to generate above wavelengths 3 gm each. Do indicate if the prices of accessories are included in the laser price if not, please quote separately.
5. Provision for accessing second, third and fourth harmonic wavelengths without altering the dye laser attachment.
6. Mechanical coupling between pump and dye laser and all components including UV extension module.
7. Product warranty of 2 years and minimum 90 days on optics
8. Installation and user training should be provided by the manufacturer.