



Himachal Pradesh Technical University

(A State of Govt. University Established Under State Legislative Act-16 of 2010)

Camp Office: Gandhi Chowk, Hamirpur (H.P.) – 177001

Phone: 01972-224180, Fax: 01972-224150, www.himtu.ac.in

Tender Notice

H.P. Technical University Hamirpur invites bids from eligible firms/ Companies/Government agencies for the following:

Sr.No.	Tender No.	Nature of Job	Cost of Tender Document	Last date of receiving of bid in University office	Date and Time of Opening	
					Technical Bid	Financial bids of technically qualified bidders
1	01/2020	Physics and Environmental Science Laboratory Equipments.	₹500/- (Non refundable)	18-02-2020 up to 05:00 PM	19-02-2020 at 11:30 AM	19-02-2020 at 03:30 PM

Tender documents can be downloaded from the official website of University www.himtu.ac.in. and the cost of the tender has to be submitted in form of Demand draft in favour of **Finance Officer, HPTU, Hamirpur, Payable at Hamirpur, H. P.** with tender in a separate envelope along with technical bid. The tender document may also be purchased from the office of H.P. Technical University Hamirpur on any working day/hours. The detail of tender is available on the University website mentioned above.

Tender received after due date, time, without tender cost and without earnest money will be summarily rejected.

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Purchase Officer
Himachal Pradesh Technical University Hamirpur

Himachal Pradesh Technical University Hamirpur-177001

Tender No. 01/2020

TENDER DOCUMENT



Providing and installation of Physics and Environmental Science Laboratory Equipments

Cost of Tender Document	: ₹500/- (By Cash/ Demand draft)
Last date for the submission of tender document	: 18-02-2020 upto: 05:00 PM
Date of opening the Tender (Technical bid)	: 19-02-2020 at 11:30 AM
Date of opening the Tender (Financial bid)	: 19-02-2020 at 03:30 PM

HimachalPradeshTechnicalUniversityHamirpur-177001

Tender Call Notice

Sealed tenders are invited for providing and installation of Physics and Environmental Science Laboratory Equipments for University Physics and Environmental labs. Tender documents having terms & conditions, technical aspects and other details of work may be downloaded from University website www.himtu.ac.in and applied along with D.D. of ₹500/- in favour of Finance Officer, H.P. Technical University Hamirpur, payable at Hamirpur (H.P.), or the tender documents may also be purchased from the office of H.P. Technical University Hamirpur on any working day/hours. Completed tender documents may be deposited in University till **18-02-2020 up to 05:00 PM**. Technical bid shall be opened in the O/o Purchase Officer, Himachal Pradesh Technical University Hamirpur, Near Gandhi Chowk, Distt. Hamirpur (H.P.) India, Pin 177001 on **19-02-2020 at 11:30 AM** in presence of tenderers or their authorized representative who may be presented at the time of opening of tenders. **Financial bids** of technically qualified bidders shall be opened on same day at **03:30 PM**.

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Purchase Officer
H.P. Technical University Hamirpur

CHECK LIST OF ENCLOSURES

Please arrange documents in cover 'A' for technical bid as per enclosure number given below
(Please write enclosure no. on the cover page of each document with ink)

Sr.No	Enclosure	Description
1.	Enclosure 1	Cost of tender form (Demand Draft of ₹500/-)
2.	Enclosure 2	Earnest money deposit EMD (Demand Draft of ₹50,000/-)
3.	Enclosure 3	Prescribed form of ANNEXURE-A duly filled, terms & conditions of tender and contract signed by tenderer with seal and signature on each page.
4.	Enclosure 4	List of organizations and supply orders of providing and installation of Physics and Environmental Science Laboratory Equipments.
5.	Enclosure 5	Copy of registration number of the firm.
6.	Enclosure 6	Copy of the GST No. of the firm.
7.	Enclosure 7	Copy of the PAN No. and TAN No. of the firm.
8.	Enclosure 8	Audited balance sheet of the firm for the last three years.

GENERAL TERMS & CONDITIONS OF TENDER AND CONTRACT

TENDERER SHOULD READ THESE CONDITIONS CAREFULLY AND COMPLY STRICTLY WHILE SENDING THEIR TENDERS. IF A TENDERER HAS ANY DOUBT REGARDING THE TERMS & CONDITIONS AND SPECIFICATIONS MENTIONED IN THE TENDER NOTICE OR IN CASE ANY CLARIFICATION IS REQUIRED, THE TENDERER MAY SEEK IT FROM PURCHASE OFFICER, H.P. TECHNICAL UNIVERSITY HAMIRPUR BEFORE SUBMITTING THE TENDER. THE DECISION OF THE PURCHASE OFFICER, H.P. TECHNICAL UNIVERSITY HAMIRPUR SHALL BE FINAL AND BINDING ON THE TENDERER.

1. QUANTITY

Tender is issued for providing and installation of Physics and Environmental Science Laboratory Equipments, as per **Annexure-C & Annexure-D**. Purchase Officer, H.P. Technical University Hamirpur may increase or decrease the above mentioned quantity as per the actual requirement.

2. DURATION

This tender is valid for a period of **1 (one) year** from the date of award of work which can be extended subject to the satisfactory performance.

3. ELIGIBILITY CRITERIA

Only those firms having at least 3 years continuous experience of providing and installation of Physics and Environmental Science Laboratory Equipments with annual turnover of at least ₹ 50,00,000/- in last 3 financial years shall eligible for participation.

4. SUBMISSION OF BID

Sealed Tender envelope should be superscribed " providing and installation of Physics and Environmental Science Laboratory Equipments" containing two separate sealed envelopes COVER 'A' & COVER 'B' as prescribed herein after should be submitted to the **Purchase Officer, H.P. Technical University Hamirpur, Near Gandhi Chowk, Distt. Hamirpur, Himachal Pradesh, India, Pin 177001** up to prescribed time.

5. Any bid received by Himachal Pradesh Technical University (HPTU) Hamirpur after the deadline for submission of bids prescribed in this document, will be summarily rejected. HPTU Hamirpur shall not be responsible for any postal delay or non-receipt/non-delivery of the documents. No further correspondence on this subject will be entertained.

6. Cover A should be addressed to the Purchase Officer, H.P. Technical University Hamirpur, Distt. Hamirpur, Himachal Pradesh, India, Pin 177001 and should be superscribed as

"Technical bid" and contain the following document:-

- (6.1) Cost of tender form i.e. D.D. of ₹500 /- in favour of Finance Officer, H.P. Technical University Hamirpur payable at Hamirpur (H.P.).
- (6.2) Earnest money deposit i.e. D.D. of ₹50,000/- in favour of Finance Officer, H.P. Technical University Hamirpur payable at Hamirpur (H.P.).
- (6.3) The tenderer shall attach a list of customers/organizations for whom they have providing and installation of Physics and Environmental Science Laboratory Equipments along with a certified copy of supply orders from the organizations for support of the same for last three years.
- (6.4) Enclose certified copy of document of the registration number of the firm.
- (6.5) Enclose document of GST No. of the firm.
- (6.6) Enclose certified copy of PAN and TAN Card/Certificate of the firm.
- (6.7) Enclose audited balance sheet of the firm for last three years.

(Signatory' authority of tender should sign all enclosures in cover 'A' and each page of terms & conditions including Annexure-A).

Note:

- a) All attested documents must be submitted in Hindi or English Language. If the documents are not in Hindi or English, they should be translated in Hindi or English and must be submitted along with the copy of original document.
- b) Tender will be liable for outright rejection if:-
 - i. Any rates are disclosed in technical bid i.e. cover A
 - ii. Any discounts/special offers are made in technical bid i.e. cover A
7. Financial Bid duly filled in as given in Annexure-B giving the rates for quoted items in individual envelope should be sent in separate sealed cover hereinafter called, "COVER B". COVER- B should also be addressed to the Purchase Officer, H.P. Technical University Hamirpur, Distt. Hamirpur, Himachal Pradesh, India, Pin 177001 and should be superscribed "FINANCIAL BID". Signatory authority of Tender should sign each page of Financial Bid.
8. Financial Bid i.e. Cover B will be opened only for those tenderers who technically qualified/satisfy the standards laid down by the details furnished by the tenderer in COVER A, in compliance of terms & conditions of tender.
9. **PERIOD OF VALIDITY OF BIDS TO AWARD THE WORK:** Bids shall remain valid for **180** days from the date of submission of bids.
10. Any change in the constitution of the tenderer Firm/Company shall be notified forthwith by the contractor in writing to the Purchase Officer, H.P. Technical University Hamirpur and such change shall not relieve any former member of the Firm/Company from the liability

under the contract. No new partner/partners shall be accepted in the Firm by the contractor in respect of the contract unless he/they agree to abide by all its terms and conditions and deposit a written agreement to this effect with the Purchase Officer, H.P. Technical University Hamirpur.

11. **EARNEST MONEY:** - Tender shall be accompanied by an earnest money of ₹50,000/- without which tenders will not be considered. The amount should be deposited in the form of demand draft in favour of Finance Officer, H.P. Technical University Hamirpur payable at Hamirpur (H.P.). The earnest money of unsuccessful tenderer shall be refunded soon after finalization of tender.
12. **FORFEITURE OF EARNEST MONEY** The earnest money may be forfeited in the following cases:-
 - a. When tenderer withdraws or modifies the offer after opening of the tender but before acceptance of the tender.
 - b. When tenderer does not execute the offer agreement prescribed within the specified time.
 - c. When the tenderer does not deposit the security money after the order is given.
 - d. When he fails to commence the service as per the order within the time prescribed.
13. Tender form shall be typed or filled in ink. Tender filled in with pencil shall not be considered.
14. In case, it is noticed at any stage that any item supplied by the approved firm does not conform to the required standard, the supplier shall be liable to refund the payment thereof if received to H.P. Technical University Hamirpur. The supplier will not have any rightful claim to the payment of cost of substandard supplies which are consumed either in part or whole pending receipt of laboratory test. It may be noted that supply of substandard goods is an offence and the same will be dealt with in the manner prescribed under relevant laws.
15. **RATES:** Only net rates should be quoted. No separate free goods or cash discounts should be offered. Rates must be valid for a period of one year from the date of award of work.
 - a. Delivery should be made to H.P. Technical University Hamirpur, Distt. Hamirpur, Himachal Pradesh, Pin 177001. The University will pay no cartage or transportation charges hence the rates must be quoted accordingly.
 - b. Net rates must be offered only against the specified column of the items. The net rate must be inclusive of all charges by way of packing, forwarding, incidental of transit charge including transit insurance, octroi and any other levies, duties, charges etc. on the product except GST.
 - c. Excise duty or surcharge prevailing on the date of submission of the rate must be included in the net rate and should also be shown separately in the Financial Bid (Annexure-B). Prevailing rates of GST etc. should be mentioned explicitly. Taxes not mentioned will not be paid/reimbursed by this University. In the event of any subsequent variation (increase or decrease) in GST by the government (State of Central) the same will be modified accordingly.
 - d. Other statutory increase or decrease shall be agreed upon mutually between University and tenderer and revised rate shall be applicable to order received by

the tenderer on or subsequent to the date of such increase in government duty.

- e. The rates must be written both in words and figures in the financial bid (Annexure-B), in case of discrepancy between the prices quoted in words and in figures, lower of the two shall be considered. There should not be any errors and/or overwriting. Corrections if any should be made clearly and signed by the tenderer with date.
- f. No paper should be detached from the tender form.
- g. The tenderer shall sign with seal on every page of the tender form including Terms & Conditions in token of his acceptance of all the Terms & Conditions of the tender and return the same along with tender. In case of, non-receipt of terms and conditions duly signed with the tender form, the tender will be rejected.

16. SECURITY DEPOSIT/PERFORMANCE SECURITY & AGREEMENT

- a. Firm whose offer is accepted will have to deposit a security deposit/performance security equal to **10% (Ten Percent)** of the total value of order in the form of an account payee Demand Draft or duly pledged Fixed Deposit or Bank Guarantee from a commercial Bank in favour of Finance Officer, H.P. Technical University Hamirpur payable at Hamirpur (H.P.). EMD shall be refunded to the successful bidder on receipt of security deposit/performance security.
- b. Successful tenderer will have to execute an agreement on a Non Judicial Stamp Paper of Rs. 100/- in the prescribed form with the Purchase Officer, H.P. Technical University Hamirpur and deposit security/performance security money within 15 days from the award of work, failing which the Tender/Quotation will be rejected straightway. The security will be refunded after six months from the date of expiry of the contract or on the expiry of guarantee (if any), whichever is later. The University will pay no interest on security/Earnest money deposit.
- c. In case of breach of any terms and conditions of the contract or on unsatisfactory performance, the amount of security deposit/performance security can be forfeited by the University and decision of the university shall be final and binding on the tenderer. The expenses of completing and stamping the agreement shall be borne by the tenderer.

17. **SUPPLY ORDERS:** The supply order will be placed to the approved tenderer (and not Agents/Suppliers/Distributors etc.) through registered post. **The firm shall have to supply & install the Equipments within the period of one month** to the University from the date of issue of supply order.

18. Subletting or assigning contract to third party is prohibited. In case the tenderer violates this condition, Purchase Officer, H.P. Technical University Hamirpur shall be at liberty to place the contract elsewhere on the Tenderer's account and at his risk. The tenderer shall be liable for any loss or damage, which the H.P. Technical University Hamirpur may sustain in consequence or arising out of such replacement of the contract.

19. PENALTY FOR DELAY

- a. The time specified for delivery in the supply order shall be deemed to be the essence of the contract and the successful Tenderer shall arrange supplies within the period on receipt of order form the University.
- b. In case of delay in the delivery period the penalty shall be made on the basis of following percentages of value of stores which the tenderer has supply:-

- i. Delay up to one-fourth period of the prescribed delivery - 2.5% of total order value.
 - ii. Delay exceeding one fourth but not exceeding half of the prescribed delivery period - 5% of total order value.
 - iii. Delay exceeding half but not exceeding three-fourth of the prescribed delivery period - 7.5% of total order value.
 - iv. Delay exceeding three-fourth of the prescribed period -10% of total order value.
 - c. Fraction of a day in reckoning the period of delay in supplies shall be eliminated if it is less than half a day.
 - d. The maximum amount of penalty shall be 10% of total order value.
 - e. If the tenderer firm requests for an extension of time in completion of contractual supply on account of occurrence of any circumstances beyond control of human being, he shall apply in writing to the authority, which has placed the supply order, for the same immediately on occurrence of the circumstances.
 - f. **If the tenderer is unable to complete the supply within the specified or extended period, the Purchase Officer shall be entitled to purchase the goods or any part thereof from elsewhere without notice to the tenderer on his (i.e., Tenderers) account and risk.** The tenderer shall be liable to pay any loss or damage which the University may sustain by reasons of such failure on the part of the tenderer. The tenderer shall not be entitled to any gain on such purchases made against default the recovery of such loss or damage shall be made from any sums accruing to the tenderer under this or any other contract with the government. If recovery is not possible from the bill and the demand, the recovery of such amount or sum due from the tenderer shall be made under the act or any other law for the time being in force.
 - g. **NOTE:** It is clarified that Purchase Officer, H.P. Technical University Hamirpur may, if necessary, resort to risk purchase without granting any extension as provided in above Condition.
20. All the stores supplied shall be of the best quality and conforming to the specifications laid down in the schedule attached to agreement. The decision of Purchase Officer, H.P. Technical University Hamirpur as to the quality of stores be final and binding upon the tenderer. In case any of the articles supplied are not found as per specification or declared sub-standard/spurious, they shall be liable to be rejected and any expenses of loss caused to the firm as a result of rejection of supplies shall be entirely at his account.
21. The tenderer must remove rejected articles from the destination where they lie within 30 days from the date of information of rejection. The officials will take reasonable care of such materials but will not be responsible for any loss or damage that may occur to while it is on their premises.
22. The tenderer shall be responsible for the proper packing and delivery of the material to the consignee.
23. No payment will be made for damage, or breakage or shortage, the tenderer shall make up the loss and shortage found at the checking of the materials by the consignee. No extra cost on such account shall be admissible.
24. **MODE OF PAYMENT:** The payment will be made through cheque/NEFT/RTGS 100% after the successfully completion of job within one month after the competition of installation.
25. All correspondence in this connection should be addressed to the Purchase Officer, H.P.

Technical University Hamirpur, Distt. Hamirpur, Himachal Pradesh, India, Pin 177001. Technical question should be referred to the Purchase Officer, H.P. Technical University Hamirpur direct by correspondence or by personal contact.

26. The quantity indicated in the tender is mere estimates and is intended to give an idea to the prospective tenderers to enable them to decide whether they will undertake to supply the article to this University on most competitive rates. The figures indicated in the tender do not constitute any commitment of the part of department to purchase any of the articles in the quantity shown therein against each or in any quantity whatsoever. It is further made clear that the University does not bind itself to purchase all or any quantity mentioned in the tender and no objection against the quantity of the indent of approved item being more or less than the approximate quantity will be entertained and shall not be acceptable as a ground for non-supply on the quantity indented.
27. The Purchase Officer, H.P. Technical University Hamirpur will have the right to accept or rejection of all or any of the tender without giving any reason for the same.
28. The Purchase Officer, H.P. Technical University Hamirpur can extend the original rate contract of the successful tenderer, subject to original Terms and Conditions.
29. The Contract for the supply can be repudiated at any time by the Purchase Officer, H.P. Technical University Hamirpur if the supplies/services are not made to his satisfaction after giving an opportunity to the Tenderer of being heard and after reasons for repudiation being recorded by him in writing.
30. Extra stipulation or any other condition contrary to the above Tender conditions are not acceptable and may render the tender liable to rejection.
31. Legal proceeding if any arising out of the Tender shall have to be lodged in courts situated in Hamirpur (H.P.) only.
32. The Purchase Officer, H.P. Technical University, Hamirpur can relax the terms and conditions in the exigency of the University work.

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Purchase Officer
H.P. Technical University Hamirpur

Annexure-A

TECHNICAL BID (Cover A)
(To be submitted separately in sealed envelope)

1. Name of firm with complete address

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.....

Phone No

Fax No

E-mail

Web site

2. Name of Proprietor of the firm:

3. Year of establishment:

4. Registration No. of the firm

5. GST No. of the firm

6. PAN/TAN No. of the firm

7. Whether Govt. Agency/ Public Ltd./Pvt. Ltd.:--

8. Annual turnover in lac (please attach CA certified balance sheet):

	2016-17	2017-18	2018-19
Annual Turnover (in lac)			

9. Whether income tax payee (duly audited by the C.A./authenticated agency) Yes/No (Attach I.T. clearance):

10. Since when performing the related jobs :-----

11. Past experience of Supply and Installation of Physics and Environmental Science Laboratory Equipments”

Year of Supply and Installation of Physics and Environmental Science Laboratory Equipments	Name of University/ Institute
2016-17	1. 2. 3. 4.
2017-18	1. 2. 3. 4.
2018-19	1. 2. 3. 4.

12. Tender form cost amounting to ₹500/- having DD No. dated

13. Net worth of the company/ firm (in crore):

14. Earnest money deposited (EMD) amounting to ₹50,000/- having DD No..... date

Certified that the aforesaid information is true to the best of my knowledge and belief. In case of any false statement observed later on, I/ We shall be liable for the consequences.

Dated:

Signature
(with office seal)

Financial Bid (Cover B)
(To be submitted separately in sealed envelope)

Financial bid for providing and installation of Physics and Environmental Science Laboratory Equipments

1. Name of Firm:
2. Address of firm:
.....
3. Contact No.:

Please read general terms & conditions. Quoted rates must be inclusive of all charges by way of packing, forwarding incidental of transit charge including transit insurance, octroi and any other levies or duties etc. and transportation of material up to University office/store except GST.

Sr. No.	Particulars of works	Rate per unit
1.	providing and installation of Physics and Environmental Science Laboratory Equipments as per Annexure -C and Annexure-D	
2.	GST/Tax, if any (Not mentioning of any taxes will automatically be considered as inclusive).	
3.	Total (1+2) ₹	

Dated: _____

Signature
(With Official seal)

LIST OF EQUIPMENTS REQUIRED FOR M.Sc. PHYSICS LAB. EXPERIMENTS

DEPARTMENT OF PHYSICS

Himachal Pradesh Technical University, Hamirpur

Sr. No.	Name of Equipment	Specifications	Unit price
1	Kelvin double bridge kit for determination of low resistance.	Complete set for (Conductor Resistance) Testing, Kelvin Double Bridge Range 0.2 micro Ohm to 11 Ohms, Spot Reflecting Galvanometer, DC Source 10 Amps, Attachment of 1 meter length.	
2	Anderson bridge kit for determination of self-inductance.	Variable resistance 0-100 ohms, Resistance dials 10x10, 10x100 & 10x1000 ohm., Standard capacitor 0.1 μ f and 0.2 μ f, Resistances 1000 ohm P and Q, Unknown Inductance L with Digital NULL Detector and Head phone	
3	Solar cell characteristics apparatus	SIZE OF ELECTRONIC EXPERIMENT BOARD, (L X B X H)= 350mm X 245mm X 40mm PERFORMING EXPERIMENTS & 24 FOR SUPPLY), CONNECTING LEADS = 1/4 mtr., 1/2 mtr., 1mtr. Solar Module, DC Voltmeter DC Ammeter, Decade Resistance Box, Switch Module Lamp Source (100W) Connecting Lead, Circuit Board	
4	Ionization potential set-up for measurement of Ionization Potential of Argon gas	Instrument comprises of DC Regulated Power Supply 0- 15VDC/150mA & AC Power Supply 6.3 VAC/1Amp, two round meters for voltage & current measurement, valve diagram is Printed on Front panel, connections of supplies & valve brought out at 4 mm Sockets.	
5	Millikan's oil drop experiment. with USB Camera & Software	Input voltage : AC 220V, 50Hz, Output power : 5W., Plate voltage : 0~500V DC, DIGITAL STOP WATCH, Display : 6 Digit, Necklace length : 2 feet, USBCAMERA, Sensor : 1.2 MP Eyepiece : 10X with adaptor ring, Connectivity : USB, System Requirement, CPU : PIV 2.0GHz or above, RAM : 1GB or above, O.S : Win2K/WinXP/Vista/Win7, Display : 32Bit, 1024x768	
6	Cauchy's Constant by spectrometer kit (With Mercury Light Source)	Advance Spectrometer, Scale : Brass, Dia. 175mm. Objective : Achromatic, focal length 178 mm, aperture 32mm, Slit : German silver., Reticle : 90 ⁰ cross etched on glass., Least count : 20 seconds, Base : Aluminium Casting, Prism (EDF), SIZE : 38 X 38 X 38 MM., Height : 38mm Material : EDF, Diffraction Grating, Size : 38 x 50 mm., Lines/inch : 15000, Micrometer Slit Pitch : 0.5 mm., Least Count : 0.005 mm. Range : 0 - 6.5 mm. Diameter : 38 mm approx. Mercury Light Source. Starting Voltage : 470 Volts. Operating Voltage : 220 Volts, 50 Hz.. Lamp House : 250 x 100 mm (L x dia.). Aperture diameter : 25mm. Mercury Lamp : 125W	
7	Michelson Interferometer (with Sodium Light Source) for the determination of wavelength and difference in wavelengths of sodium lines, and thickness of mica sheet.	Michelson Interferometer Base dimension : 290 x 212 x 168mm (L x W x H), Distance of mirror M2 from Beam Splitter : 100mm. Dimensions of beam splitter : 50 x 38 x 7 mm (L x W x T) Dimensions of compensating plate : 50 x 38 x 7 mm (L x W x T) Dimensions of mirrors M1 and M2 : 30 mm dia, Thickness 10 mm. Reflectivity : Transmittivity : 50 : 50 Flatness of beam splitter : $\lambda/8$ Least count : 0.01 mm (coarse adjustment knob) Least count : 0.0001 mm (coarse adjustment knob) Sodium Light Source Starting Voltage : 470 Volts Operating Voltage : 220 Volts, 50 Hz. Lamp House : Excluding Rod (300 x 85 mm dia.) Aperture Dia : 25mm	
8	Magnetic Hysteresis Loop Tracer for B-H curve of a given material	Constant current source 4-1/2 digit, range: 0 ~ 600 mA, adjustable Magnetic material sample 2 pcs (one die steel, one #45 steel), rectangular bar, section length: 2.00 cm; width: 2.00 cm; gap: 2.00 mm Digital Teslameter 4-1/2 digit, range: 0 ~ 2 T, resolution: 0.1 mT, with Hall probe	
9	Stefan's constant Kit	Thermometers Stop watch Sensitive galvanometer Silver-constantan thermocouple Beaker 600ml Steam generator	

10	G. M. Counter for (a) characteristics, (b) dead time (c) absorption coefficient of given material.	<p>Salient features Preset Time Digital Rate meter Preset Audio Alarm Adjustable High Voltage Volume Control Operate both manual and software mode.</p> <p><u>Radiation Counter:</u> Inputs : BNC connector - Accepts standard Geiger tubes.; MHV connector - Accepts scintillation detectors. High voltage : 0 to +1200 volts @ 0.5mA. Display : 6-decade LED, 1 in. numerals; 5-segment bargraph LEDs Modes: Counts; Elapsed Time; Preset Time; Count Rate (counts per second); High Voltage Level; Alarm Level; Speaker Volume. Audio : Includes an audio indication of radiation events and a programmable audio alarm. Interface : USB and RS-232 serial ports for both PC and Macintosh Power : 9 volt DC, at 500mA Dimensions : 10 inches W, x 7 inches D, x 4.5 inches H Software : Windows and Macintosh versions</p> <p><u>GM-35 Tube with Stand:</u> GM35 GM Probe : 35mm end window with BNC connector. Plateau : 2 mg/cm², 150V Deadtime : 200 microsecond Dimension : 35 mm OD, x 223 mm L Stand : 10 position stand with sample tray BNC cable : 3-ft.</p> <p><u>Set of 20 Absorbers:</u> This set of 20 calibrated radiation absorbers covers the range from 4.5 to 7400 mg/cm² and consists of aluminum, plastic and lead plates. The absorber are 2.75"x2.75" and are designed to fit all Spectrum Techniques detector stand assemblies. <u>Set of Five Radioactive Source:</u> Isotope; Activity; Half-life; Emissions; Energies (keV) Cs137; 5uCi 30.; 1yrs; Gamma, Beta; γ32, γ661.6, β511.6, β1173.2 Po210; 0.1uCi.; 138days; Alpha; γ5407.5 Sr90S; 0.1uCi.; 28.8yrs; Beta; β546 Co60; 1uCi.; 5.27yrs; Gamma, Beta; γ1173.2, γ1332.5, β1317.9, <u>Tl204S1; 1uCi.; 3.78yrs; Beta; β763.7</u></p> <p><u>Lead Shield:</u> Wall thickness : 0.5" Capacity : Holds up to 20 1" discs. Outside Dimensions : 3.6" x 2.25" (Lx ϕ) Interior Dimensions : 2.65" X 1.25" (Lx ϕ). Wall thickness : 0.5" Wight : Approximately 4.6 lbs This LSD5 lead shield container is suitable for higher activity gamma sources.</p>	
11	Planck's constant by photoelectric effect for the determine using photocell. (with minimum five filters)	<p>Salient features 4 Multipurpose electrometer amplifier. 4Cs photo cell. 4 Multipurpose power supply. 4 Monochromatic light source may be used in many other experiments also. 4 Hexagonal optical bench, OPTICAL BENCH TRIANGULAR Material : Aluminum extrusion Type : Triangular shape Scale : 0-100cm Least count : 1mm This optical bench is rigid, heavy, stable and long lasting. It has four levelling screw and flexible feets, POWER SUPPLY 12V AC/DC Output : 2,3,4,5,6,8,10 & 12VAC full wave rectified, unsmoothed & unregulated D.C. Overload : Resettable thermal trip. Input : 230 V AC, 50 Hz IRIS DIAPHRAGM Frame dia. : 120mm to avoid scattering of lights Rod dia. : 10mm Slit opening : upto 20mm DIGITAL MULTIMETER Resistance : 200W, 2000W, 20k, 200k & 2000k W.D.C. Voltage : 200 & 2000 mV: 20, 200 & 600 V.A.C. Voltage : 200 & 600 V.D.C. Current : 200 & 2000 mA: 20 & 200 mA, 10 A Testing : Diode & transistor Battery : 9V PHOTOCELL Photocell : Cs, vacuum tube. Output : 4mm safety socket. Mounting rod : 10mm dia. ELECTROMETER AMPLIFIER Input Impedance : >1013 W Input Current : < 0.5pA Output Voltage : upto +10V Output Current : 5mA (Short Circuit Protected) Output impedance : <1W Supply Voltage : 12 V AC MERCURY LIGHT SOURCE Starting Voltage : 470 Volts Input Voltage : 220 Volts, 50 Hz. Lamp House : 250 x 100mm (L x dia.) Aperture dia. : 25mm Mercury Lamp : 125W SET OF COLOR FILTER Red : 635nm Orange : 570nm Yellow : 540nm Green : 500nm Blue : 460nm</p>	
12	Diffraction grating experiment to find wavelength of given laser light using diffraction grating and carry out related studies (with slit). (with 500 LPI & 15000 LPI)	<p>Material: Aluminum extrusion Type : Triangular shape Scale : 0-100cm Least count : 1mm This optical bench is rigid, heavy, stable and long lasting. It has four levelling screws and flexible feets. SET OF 13 OBJECTS R5199 It consists of 13 Objects : Single slit, double slit, multiple slit 3, multiple slit 4, multiple slit 5, single tapered slit, fine grating, 4 holes, circular opaque spots. gray filter, mesh, coarse grating & grid pattern. Frame Size : 50mm x 50mm PIN HOLE PHOTO DETECTOR Detector : Silicon photocell Terminals : 4mm safety socket Aperture : 1 mm Rod : 10 mm diameter SLIT HOLDER Clear Aperture : 45x45mm Object holder : Clip type Mounting Rod : 10mm diameter DIGITAL MULTIMETER Resistance : 200W, 2000W, 20k, 200k & 2000k W. D.C. Voltage : 200 & 2000 mV: 20, 200 & 600 V.A.C. Voltage : 200 & 600V D.C. Current : 200 & 2000 mA: 20 & 200 mA: 10 A Testing : Diode & transistor Battery : 9V</p>	

13	phototransistor kit to study the related characteristics	<p>Phototransistor Type: Phototransistor Photodarlington Peak Wavelength: Less than 620 nm Collector Current: Less than 0.2 milliamps Collector Dark Current: Less than 3 nA Collector-emitter Breakdown Voltage: Less than 6 volts Power Dissipation: Less than 2 milliwatts</p> <p>Characteristics Of OPTO Electronic Devices comprises of DC regulated power supply 0-3VDC/150mA, Two round meter for voltage & current measurement, photo transistor, photo diode & LED mounted on the panel, connections of supplies, meters & components brought out at 4mm sockets. Lamp holder with 60W Bulb are given with this apparatus</p>	
14	Kit for Four probe method to find resistivity, conductivity and band gap of given semiconductor crystal at different temperatures	<p>FOUR PROBE POWER SUPPLY Voltmeter Display : 3½ digit, 7segment LED, auto polarity & decimal indication. Voltage Range : X1 (0-200.0mV DC) & X10 (0-2.00 V DC), 4mm socket Current/Temperature : 3½ digit, 7segment LED Display Temperature Range : -10 to +200°C @ 1°C Current Range : 0-20mA DC, 4mm socket Oven Supply : 60V AC Oven Connector : 5 Pin, DIN type Input Voltage : 220V, 50Hz AC Fuse : 1A, 250 V</p> <p>P-TYPE GE CRYSTAL Crystal : Ge Wafer, P type Crystal Size : 12 x 14 x 0.5mm (LxWxThickness) Resistivity : 1~ 10 ohm-cm Orientation : <100></p> <p>FOUR PROBE CRYSTAL HOUSING Material : Steel metal, Nylon Pillar : Spring loaded Height can be adjusted using three screw mounted on top OVEN Heating Element : 35 ohm, 75 Watt, Oven Supply : 60V AC Oven Connector : 5 Pin, DIN type Connector Make : MX Ambient Temperature : 50°C Fuse : 2A Temperature Range : -10 to +200° C Least Count : 1° C Length : 300mm approx.</p> <p>FOUR PROBE CABLE Pin : Spring loaded Probe Spacing : 25mm Connection : 4mm safety socket</p>	
15	Hall Effect Experiment: To determine the Hall coefficient for given semi-conductor and study its field dependence.	<p>CONSTANT CURRENT SOURCE Current Display : 0-20 mA DC, Voltage Display : <u>0+200mV@0.1mV</u>, Resolution : 10 micro ampere Current Adjust : 10-turns potential meter Power : 220V ± 10%, 50 Hz AC Display : 3½ digit LED Weight : 3 Kg approx.</p> <p>POWER SUPPLY Voltage : 0-20V DC continuously variable & stabilized Voltage display : 3½ digit LED Ripple : Less than 25mV Overload : Current limiting protection Current : 5 A continuously variable, 10% to full rating Current display : 3½ digit LED Working voltage : 230V AC, 50 Hz single phase</p> <p>HALL EFFECT APPARATUS Coils : 500 turns. Coil Current : 8.5Amp (Max.) Connection : 4mm safety socket. U Core : 150x130mm²(LxH), 40x40mm² cross section. I Core : Length=150mm, 40x40mm² cross section. Core material : Ferromagnetic. Base dimension : 360x180x33mm³, Weight : 8.8kg (Approx.)</p> <p>DIGITAL GAUSS METER, Range : 200 Gauss & 2 k Gauss, Resolution : 0.1Gauss at 0 - 200 Gauss, Offset : By Potentiometer to set ZERO, Display : 3½ Digit LED, Input Voltage : 220 V, ± 5 %, 50 Hz AC, Axial Hall Probe : InAs, GE CRYSTAL PCB, Crystal : Ge Wafer, P type Crystal Size : 6x7 x 0.5mm³ (LxWxThickness), Resistivity : 1~ 10 ohm-cm, Orientation : <100> Offset pot : Trim pot, Connection : 4mm safety socket</p>	
16	Ultrasonic interferometer to determine the velocity of ultrasonic in given liquid.	<p>HIGH FREQUENCY GENERATOR: Single frequency, MEASURING CELL: Max. displacement of the reflector : 20 mm Required Quantity of liquid: 10 c.c. Least Count of micrometer: 0.01mm/0.001 mm, SHIELDED CABLE: Impedance : 50 O Ultrasonic interferometer, sample liquids, high frequency generator etc.</p>	
17	Apparatus for the Measurement of Susceptibility of Paramagnetic Solution by Quinck's tube Method	<p>POWER SUPPLY: Voltage : 0-16V DC continuously variable & stabilized, Voltage display : 3½ digit LED, Ripple : Less than 25mV, Overload : Current limiting protection, Current : 5 A continuously variable, 10% to full rating, Current display : 3½ digit LED, Working voltage : 230V AC, 50 Hz single phase</p> <p>TRAVELING MICROSCOPE: The vertical carriage slides on a brass pillar. In the vertical and horizontal at carriages a locking arrangement is provided to arrest coarse motion when slow motion screw is used. By successively locking and unlocking, motion in the total traverse can be provided by the slow motion screw. Travel : Horizontal travel 170mm, vertical travel 110mm, Least Count : 0.01mm, Working distance : 50mm, Eyepiece Ramsden: 8x, Reticle : 90° Cross on glass</p> <p>DIGITAL GAUSS METER: Range : 200 G & 2 kG, Resolution : 1G at 0 – 200G, Power: 220 V, 50 Hz AC, Hall probe : InAs</p> <p>DIGITAL WEIGHING SCALE: Capacity : 700g, Display : Digital, Least count : 0.1g, Body : Plastic</p> <p>ELECTROMAGNET: Coils : 500 turns., Coil Current : 8.5Amp (Max.), Connection : 4mm safety socket., U Core : 150x130mm(LxH), 40x40mm cross section., I Core : Length=150mm, 40x40mm cross section. Core material : Ferromagnetic., Bore piece : Iron with 5mm graduated scale, Ventilation on three sides of coil to protect from overheating.</p>	

18	Apparatus for Velocity of light determination to determine 1. velocity of light in air. 2. velocity of light in water and synthetic resin and to calculate the refractive indices.	Light velocity measuring app., Screened cable, BNC, 1 1500 mm, Oscilloscope, 20 MHz, 2 channels, Block, synthetic resin	
19	Zener diode: Characteristics and voltage regulation. Diodes Si, Ge, Zener and LED	Circuit Board, Digital Multimeter, Diode Module, Flexible Lead Set (50cm) , Flexible lead Set (100cm) , Resistor Module 1k Ω , LED Module (red) , Resistor Module 330 Ω , Zener Diode Module , Variable Power Supply	
20	Uni-Junction Transistor kit for its characteristics and applications	Circuit Board 1, Digital Multimeter 3, Flexible Lead Set (50cm) 6, Flexible lead Set (100cm) 4 Resistor Module 1k Ω 1, Resistor Module 10k Ω 1, Resistor Module 100k Ω 1, Transistor Module 2N2222 1, JFET Module 1, Diode Module 1 Variable Power Supply	
21	Apparatus for FET and MOSFET characterization: Characteristics and applications as an amplifier	Circuit Board, Digital Multimeter, Flexible Lead Set (50cm), Flexible lead Set (100cm), MOSFET Module, SCR Module, Traic Module, Resistor Module 1k Ω , 1W, Resistor Module 100 Ω ,1W Resistor Module 50 Ω , 1W, Variable Power Supply	
22	Operational Amplifier as integrator & differentiator type	Circuit Board , Digital Multimeter, Power Supply +/- 15V , Flexible Lead Set (25cm) , Flexible Lead Set (50cm) , Flexible lead Set (100cm), OP-AMP Module, Resistor Module 100 Ω , Resistor Module 1k Ω , Resistor Module 4.7k Ω , Resistor Module 10k Ω , Resistor Module 100k Ω , Capacitor Module 0.01 μ F, Capacitor Module 0.1 μ F, Signal Generator, Variable Power Supply	
23	Shift Register	dc power supply 5 v/500 ma decade counter (7490), 4-bit binary full adder (7483) up / down binary counter (74193) 4-bit shift register (7495), monostable multivibrator (74121)	
24	Counter	instrument comprises of dc regulated power supply 5vdc/150ma, 1hz monoshot clock pulse, two output indicators, symbolic diagram for 4 'jk ' flip-flops printed & connections for inputs & outputs brought out at sockets on the front panel.	
25	Basic Logic Gates, NAND and NOR, XOR, XNOR, combinational Logic circuit	AND Gate Module, , Circuit Board , Ex-OR Gate Module , Flexible Lead Set (25cm) , Flexible Lead Set (50cm) , Flexible lead set (100cm) , NAND Gate Module , NOR Gate Module , NOT Gate Module , OR Gate Module , Switch Module , Variable Power Supply , AND Gate Module Ex-OR Gate Module NAND Gate Module, NOR Gate Module , NOT Gate Module, Gate Module	
26	Flip-Flops: RS, JK/JK master slave, T and D.	Circuit Board AND Gate Module , Ex-OR Gate Module , Flexible Lead Set (25cm) , Flexible Lead Set (50cm) Flexible lead Set (100cm) , Full Adder Module , Half Adder Module, Half Subtractor Module OR Gate Module , FND+7 Segment Decoder , Decade Counter Module , RS Flip Flop , D-Flip Flop , JK Flip Flop Module , Shift Register Module , Switch Module , Push Button Module Digital Multimeter, Signal Generator , Variable Power Supply	
27	Network Analysis- Thevenin and Norton's equivalent circuits	Power supply unit 9V DC, 5V DC , Plug in board , Digital voltmeter , Digital Ammeter, Connecting leads red & black (each) , Variable resistance load module , Resistance modules 10, 22, 50, 75, 100, 150, 220, 560 ohm 8	
28	Clipping and clamping circuit	Instrument comprises of DC Regulated Power Supply 0-3 VDC/150mA, Circuit diagram for Clipping & Clamping Printed, components placed inside & connections brought out at 4mm Sockets.	
29	A/D and D/A converter	Power Supply Voltage VCC +18 VDC VEE -18 VDC Digital Input Voltage, V5-V12 -10 VDC to +18 VDC Applied Output Voltage, VO -11 VDC to +18 VDC Reference Current, I14 5 mA Reference Amplifier Inputs, V14, V15 VCC, VEE Power Dissipation (Note 4) 1000 mW ESD Susceptibility (Note 5) TBD Storage Temperature Range -65°C to +150°C Lead Temp. (Soldering, 10 seconds) Dual-In-Line Package (Plastic) 260°C Dual-In-Line Package (Ceramic) 300°C Surface Mount Package Vapor Phase (60 seconds) 215°C Infrared (15 seconds) 220°C Operating Ratings Temperature Range TMIN \leq TA \leq TMAX DAC0808 0 \leq TA \leq +75°C	

30	Half and full adder of binary numbers	IC 7400, IC 7408, IC 7486, IC 7432, Patch Cords & IC Trainer Kit.	
31	Multiplexers and De-multiplexers.	IC 7400, IC 7410, IC 7420, IC 7404, IC 74153, IC 74139, Patch Cords & IC Trainer Kit.	
32	Modulation and demodulation: AM, FM, PAM.	Modules ACL-AM & ACL-AD, Power supply, 20MHz Oscilloscope, Connecting Links, Frequency counter	
33	Dual Channel and two trace CRO	Two Channel, latest version	
34	Travelling microscope	Fine: Horizontal 15 mm minimum Vertical 15 mm minimum Right angle 10 mm minimum; Coarse: Horizontal 150 mm minimum Vertical 150 mm minimum Right angle 100 mm minimum, Base Size (L x B x H) minimum 350 mm X2 50mm X 80mm 3 Base Plate Cast iron with three leveling screws 4 Objective lens focal length 50mm 5 Eye piece 10x or more with graduated scale 6 Least count of all the fine travels 0.01 mm or less 7 Telescope tube setting Can be set horizontally & vertically 8 accessories Reading magnifier 9 Packing Plywood box	
35	Analog and Digital Multimeter	Compatible for taking readings of all the experiments quoted	
36	Kit for Zeeman effect using Na lamp.	ELECTROMAGNET Coils : 500 turns., Coil Current : 8.5Amp (Max.), Connection : 4mm safety socket., U Core : 150x130mm(LxH), 40x40mm cross section., I Core : Length=150mm, 40x40mm cross section., Core material : Ferromagnetic., Bore piece : Iron with 5mm graduated scale, Ventilation on three sides of coil to protect from overheating., POWER SUPPLY 0-30V DC, 5A, Input Voltage : AC 220V \pm 5%, Output Voltage : 0-30V, Output Current : 0-5Amp, Voltage Display : 3½ Digit LED, Current Display : 3½ Digit LED FABRY PEROT ETALON Mirror optics : Lamda/20 Mirror gap : 3 mm, adjustable Filter : 532nm, Green, Interference Filter, Clear view : 40mm dia, Rod : 10 mm dia. USB CAMERA , Sensor : CMOS, Output : VGA, Connector : BNC, Power : 5V DC, Focus : Manual adjustment, Rod : 10 mm dia., CONVEX LENS IN HOLDER , Focal Length : 100mm, Diameter of Lens : 50 mm, Frame Diameter : 130 mm to avoid scattering of lights, Rod Diameter : 10 mm, POLARIZER FILTER , Angle : Adjustable (0°-90°), Aperture : 21mm dia., Frame : 130mm dia., to avoid scattering of lights, Polarization : Linearly polarized, Rod : 10 mm dia., QUARTER WAVE PLATE , Angle : Adjustable (0°-90°) Aperture : 15mm dia., Frame : 130mm dia., to avoid scattering of lights, Polarization : Circular polarized, Rod : 10mm dia., MICROMETER EYEPIECE , Eyepiece : 10X, Ramsden Pitch : 0.5mm, Least count : 0.01mm, Displacement : 20mm, OPTICAL BENCH TRIANGULAR Material : Aluminum extrusion Type : Triangular shape Scale : 0-100cm Least count : 1mm, This optical bench is rigid, heavy, stable and long lasting. It has four levelling screw and flexible feet. TRANSVERSAL SLIDER Material : AL Extrusion Base width : 35mm, Height : 25mm, Movement : + 25mm, Least count : 0.01mm It can hold rod from 8mm to 15mm, MERCURY TUBE WITH HOLDER Tube : High pressure mercury tube Input : 230V AC Output : 12V Connection : Tag with tightening screw, CONVEX LENS IN HOLDER , Focal Length : 50mm Diameter of Lens : 50 mm Frame Diameter : 130 mm to avoid scattering of lights, Rod Diameter : 10 mm, DIGITAL GAUSS METER , Range : 200 G & 2 kG Resolution : 1G at 0 - 200G Power : 220 V, 50 Hz AC Hall probe : InAs	
37	LDR (light dependent resistor) and photo voltaic cell to study the characteristics of LDR	Regulated Power Supply (0-10)V MI Ammeter (0-10)V MI Voltmeter LDR IR Sensor Connecting wires	
38	Desktop PC alongwith UPS & Printer with scanner	Desktop PC, Vertical Tower /Mini Tower Type, Arrangement for the CPU Cover/casing, Intel Ci5 – 4590 CPU 4 Core or higher / AMD A10- PRO-7800B Quad-Core CPU or higher, Processor- internal clock speed 3.3 GHz or higher, Planer clock speed / FSB 1600 MHz or higher, L2 / L3 Cache 4 MB or higher Memory (RAM) 4 GB (1 nos. of 4 GB DIMMs), Memory (RAM) max expandability 16 GB or more, RAM speed 1600 MHz or higher, Preloaded Microsoft Windows 8.1 Professional down gradable to window 7 professional licensed OS with latest updates and restore, Compatible UPS and printer with scanner.	
39	Projector for Laboratory	Product Dimensions 5 x 5 x 182 cm, Additional Features 1.5ft x 1.5ft (3ft Adjustable) wall mount brackets for Every projector, 15 Degree Tilt Option on bottom side., 360 Degree Rotate function, Suitable for Benq, Epson, Dell, Sony, Optoma, Hitachi Etc	

40	Linear air track with digital timer	LINEAR AIR TRACK Type : Triangular section. Material :Aluminiumalloy.Length : 200cm.Air hole : Two rows both side, 1mm dia.Support feet : Three.Connection : Air inlet.Very low frictionless surface maintain by small tiny holes for air., AIR BLOWERHose : Air outlet, Plastic, 35 mm diaOperating voltage : 220 V AC, 50 Hz, Air speed : Speed regulator switch, 30 ± 1 ms-1Switch : ON/OFFDimension : 230 x 185 x 250mm (L x W x H)Supplied with shrinkable plastic pipe., DIGITAL TIMER & PHOTOGATE Display : 2 line LCD, Type : Micro controller based, Time resolution : 0.1 milli second, Mode : Time, Speed & Acceleration, Photogate : 2 Nos.Interface : USB, Operating voltage : 5V DC, Photogate detector : Infra-Red, Microcontroller based and in-built test functions., Supplied with a pair of photogate and photogate mounting rod.	
41	Conductivity meter with probe (Model 601)	3½ Digit LED Conductivity&Temperature, 0 - 200 μ S/cm 0 - 2 mS/cm 0 - 20 mS/cm 0 - 200 mS/cm 0 - 1000 mS/cm, ± 0.5 % FS ± 1 Digit Temp: $\pm 0.1^\circ\text{C} \pm 1$ Digit, Auto : 0 to 50 C 0Manual : 0 to 50 C, Adjustable on Digital Display, Platinum DIP Type, 0.1 S/cm 0. 1°C, 12V DC using Adapter 110 to 250V AC,50 Hz, dimension 270x202x80 mm (lxbxh), Conductivity Cell, Operation Manual, Dust Cover, Cell Stand, Temperature Probe (with model 601)	
42	Breadboard	Height/Thickness: 0.5118” Length/width: 7.87-47.24”, Unit: Metric	
43	A.C. to D.C. Converter	As per equipments related to above experiments	
44	Digital Electronic Carbon Fiber Vernier Caliper	Unit type: piece package weight: 0, Material: plastic caliper type: digital calipers diy supplies: metalworking measurement range: 0-150mm , Model number: 0-150mm accuracy:	
45	Digital Micrometer Screw	Range: 0-1” , Resolution: .00005”/0.001mm , Accuracy: A plus or minus .00005” , Parallelism: .00004” Constant-force device: With ratchet stop	
46	Temperature controller Magnetic Stirrer	Frequency: 50HZ, Voltage: 220V, Max Stirring: 2L/5L,	
47	Digital Electronic Weighing Machine	Capacity 20g, 50g , Linearity (+/-) ,0.001g, 0.002g ,Readability ,0.001g ,Type , Electronic	
48	Micropipette	Bio Gene Micropipette, (10-100 μ l), ISO 8655 Standards, Autoclavable 121 deg centigrade	
49	Spherometer	Double disk spherometer (brass)	
50	Prism Solid and Hollow	size 38 38mm with 2 extra sides plate, one side rough	

LIST OF EQUIPMENTS REQUIRED FOR M. Sc. ENV. SCIENCE LAB. EXPERIMENTS

DEPARTMENT OF ENVIRONMENTAL SCIENCE
Himachal Pradesh Technical University, Hamirpur

Sr. No.	Name of Equipment	Specifications	Unit price
1	pH Meter	Display 3½ LED, Range 0 to 1000 Mhos/cm 5 Range, Accuracy ±1% FS ±1 Digit, Power Requirement 230V AC, Spare Conductivity Cell 1./0.5/0.1	
2	TDS Meter	Display 3½ LED, Range 0 to 1000 Ppt 5 Range, Accuracy ±1% FS ± 1 Digit, Power Requirement 220 V AC	
3	EC Meter	Conductivity Range: 0 to 199.9uS, 200 to 1999uS, 2.00 to 19.99mS, TDS/Salinity Range: 0 to 99.9ppm (mg/L), 100 to 999ppm (mg/L), 1.00 to 9.99ppt (g/L), pH Range: 0.00 to 14.00pH, Temperature Range: 32° to 149°F (0° to 65°C), Max. Resolution: 0.1uS, 0.1ppm (mg/L), 0.01pH, 0.1°F/ °C, Accuracy: +2%FS, +0.01pH, +1.8°F/1°C, Power: four SR44W button batteries, Size: 1.4x7.3x1.6" (36x186x41mm), Weight: 3.8oz (110g)	
4	Oven	Size :14x14x14 Inches , Max Temperature :350 PID Microprocessor & PID Controller Based , Air Circulation , Motorized Recirculation , No of Chamber 3 , Display Type Digital , Power, 240Volts .	
5	Double Distillation Unit	Type : Distillation unit, Other Power : 220-240 Volt (v) , Material : Quartz and Borosilicate Glass	
6	Incubator	Body Material : Stainless Steel , Power Electric , Display Type Digital , Frequency 50 Hz , Nominal Voltage 220-230 V, Nominal Power 1000-1500 W , Phase Single Phase	
7	Weighing Balance	Weighing range 0...100 g Readability 0.01 g Linearity ±0,02 g Repeteability 0,01 g Weighing pan stainless steel Weighing units g, oz , ct , gn Display backlit LCD display Enclosure ABS plastic Dimensions Scale:approx. 120 x 80 x25 mm Weighing pan: approx. 62x62 mm Weight 170 g	
8	Spectrophotometer	Optical System: Rowland off-circle arrangement, Single monochromator: Double beam type: Light source, Halogen lamp, Deuterium lamp, Wavelength range, 190 to 1100 nm, Wavelength accuracy +/-0.2 nm (at 656.1 nm) Wavelength repeatability +/-0.1 nm Spectral bandwidth (SBW) 1 nm Stray light 1 % (198 nm KCL 12 g/L aqueous solution) 0.02 % (220 nm NaI 10 g/L aqueous solution) 0.02 % (340 nm NaNO2 50 g/L aqueous solution) 0.02 % (370 nm NaNO2 50 g/L aqueous solution) SBW: 1 nm Photometric range -3~3 Abs Photometric accuracy +/-0.0015 Abs (0 to 0.5 Abs) +/-0.0025 Abs (0.5 to 1 Abs) +/-0.3 %T Tested with NIST SRM 930D Photometric repeatability +/-0.0005 Abs (0 to 0.5 Abs) +/-0.0005 Abs (0.5 to 1 Abs) Tested with NIST SRM 930D Scanning speed 10-8000 nm/min Slew speed 24,000 nm/min RMS noise 0.00004 Abs (0 Abs, wavelength: 500 nm, measurement time: 60 sec, SBW: 1 nm) Baseline stability 0.0004 Abs/hour (Value obtained more than one hour after turning on the source, when the room temperature is stabilized, wavelength: 250 nm, response: slow) Baseline flatness +/-0.0005 Abs (200 - 1000 nm) Detector Silicon photodiode Standard functions IQ accessories, Start button, Analog output Standard programs Abs/%T meter, Quantitative analysis, Spectrum measurement, Time course measurement, Fixed wavelength measurement, Validation, Daily maintenance, Two wavelength time course measurement Dimensions and weight 486(W) x 441(D) x 216(H) mm, 15 kg Power requirements 120 VA Installation requirements Room temperature: 15-30 Celsius, humidity: below 85%	